# E-learning for Societal Needs

Scientific Editor

Eugenia Smyrnova-Trybulska

Katowice–Cieszyn 2012

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University of Silesia in Katowice,
Faculty of Ethnology and Sciences
of Education in Cieszyn

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Monograph

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## TABLE OF CONTENTS

# INTRODUCTION

E-learning, which today is no longer considered as a fashionable modern trend, but as an effective, modern form, method, technology of teaching and learning proves its utility not only in tertiary education but also at lower levels of education – in secondary and basic schools.

Currently, we can see how actively develop also social media. Social media includes web- and mobile-based technologies which are used to turn communication into interactive dialogue among organizations, communities, and individuals (http://en.wikipedia.org/wiki/Social_media). There are more than 30 definition of category "social media" (http://heidicohen.com/social-media-definition/). For example, Andreas Kaplan and Michael Haenlein define social media as "a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user-generated content." I.e. Social Media are social software which mediate human communication. When the technologies are in place, social media is ubiquitously accessible, and enabled by scalable communication techniques. In the year 2012, social media became one of the most powerful sources for news updates through platforms like Twitter and Facebook. Social media technologies take on many different forms including magazines, Internet forums, weblogs, social blogs, microblogging, wikis, social networks, podcasts, photographs or pictures, video", others. "Social media is a collection of online platforms and tools that people use to share content, profiles, opinions, insights, experiences, perspectives and media itself, facilitating conversations and interactions online between groups of people" (Doreen Moran). "Social media is digital content and interaction that is created by and between people. (Sam Decker – Mass Relevance).

Social media as well as other Internet Technology, in particularly e-learning, has great potential to overcome physical barriers. It could improve access to learning for people with disabilities. Over 320 respondents across Europe gave their views about accessibility to e-learning for people with disabilities. Most were extremely positive about the potential benefits and opportunities for learners with disabilities opened up by technology, but few know how to increase accessibility or about international best practice (http://www.trainingvillage.gr). At the same time, the research activity, first of all in area the e-learning and e-mentoring, which should be adapted to people with disabilities and dependence should be run more intensively, globally and comprehensively.

However, there are still a lot of questions that have not been answered yet. The papers of the authors included in the monograph are an attempt at providing such answers. The aspects and problems discussed in the materials of the include the following:

- E-learning and social media for the disabled; the use of Internet technology and social media for people with limited abilities and special needs – theoretical and practical aspects of their use;
- The place and role of distance learning and Social media in the education systems in Visegrad group countries and other European countries;
- Teachers' and learners' competences in distance learning and computer science;
- Efficient use of e-learning in improving the level of students' key competences;
- Pedagogical and methodical aspects of Cloud Computing;
- Distance learning of humanities as well as science and mathematics – a differentiated approach;
- Distance learning and Lifelong Learning; Use of E-learning in the Training of Professionals in the Knowledge Society
- Psychological, social, ethical, cultural and legal aspects of distance learning;
- Appropriate, efficient methods, forms and techniques in distance learning;
- Quality tools in E-learning and criteria for evaluation of distance courses;
- Educational Strategies to Enhance Learners' Motivation in E-Learning, etc.

The monograph includes the best pieces of work, prepared and presented by the authors from seven European countries and from more than twenty universities during the academic conference entitled "*Theoretical and Practical Aspects of Distance Learning",* subtitled*: "E-learning for Societal Needs",* which was held on 15-16.10.2012 at the Faculty of Ethnology and Sciences of Education in Cieszyn, University of Silesia in Katowice, Poland.

The speakers were from the Constantine the Philosopher University in Nitra (Slovak Republic), University of Twente (Netherland), University of Ostrava (Czech Republic), Jagiellonian University (Poland), Warsaw University (Poland), University of Silesia in Katowice (Poland), National Defence University (Poland), Silesian University in Opava (Czech Republic), Church Pedagogical Institute in Graz (Austria), University of Defence in Brno (Czech Republic), Maria Curie-Skłodowska University in Lublin (Poland), Lublin University of Technology (Poland), Kazimierz Wielki University in Bydgoszcz (Poland), Czestochowa University of Technology (Poland), Cracow Pedagogical University (Poland), Borys Grinchenko Kyiv University (Ukraine), Russian State Vocational Pedagogical University in Yekaterinburg (Russia), Center for Innovatics, Nowy Sacz Business School – National-Louis University (Poland), State Higher Vocational School in Krosno (Poland), Cardinal Stefan Wyszynski University (Poland), University of Social Sciences and Humanities in Warsaw (Poland), Dniprodzerzhinsk State Technical University (Ukraine), Academy of Social Science in Slupsk (Poland), Poznan University of Medical Sciences (Poland), University of Žilina (Slovak Republic), Adam Mickiewicz University in Poznan, Mieszko I College of Education and Administration in Poznan (Poland), Jesuit University of Philosophy and Education "Ignatianum" in Cracow (Poland).

Among the authors are well-known scholars, young researchers, academic lecturers with many-years' training and experience in the field of e-learning, PhD students, the creators of distance courses, multimedia teaching materials, web-sites and educational sites.

I am convinced that the monograph will be an interesting and valuable publication, describing the theoretical, methodological and practical issues in the field of the use of e-learning for societal needs, offering proposals of solutions to some important problems and showing the road to further work in this field, allowing for exchange of experiences of scholars from various universities of many European countries.

Publishing this monograph is a good example of expansion and strengthening of international cooperation. I am very grateful for valuable remarks and suggestions which contributed to the quality of the publication. Here I would like to thank especially Professor Robert Mrózek for his editorial recommendations, Andrzej Szczurek, MA and Ryszard Kalamarz for assistance in the edition and proofreading of this publication. Also I say 'thank you' to the authors for the preparation and permission to publish their articles. I wish all readers a pleasant reading. Thank you.

Eugenia Smyrnova-Trybulska

# I. E-LEARNING FOR SOCIETAL NEEDS. PSYCHOLOGICAL, ETHICAL, CULTURAL AND LEGAL ASPECTS OF DISTANCE LEARNING

## SOCIAL MEDIA

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### INTRODUCTION

Western cultures have relied heavily on institutional government the last two centuries. Sociology recently made us aware that corporate autonomies need to be questioned and revisited (Kaplan 2005). The notion of the Network Society offers new opportunities but threats as well. Social Media have the recent reputation to make management models volatile en subject to rather quick evolutions nowadays. One of the reasons is that communication patterns change due to mediated communities like shown in marketing, education and health care (Eyrich, Padman & Sweetser 2008). The other reason is that the new social media may help enterprises to conquer a positive presence and reputation by means of networking platforms like Yelp and Foursquare. This lecture provides you with the recent findings in social media effects and the way management can accommodate or even anticipate to it. The tools will be provided like network analysis and sociometric representations.

### 1. EDUCATION AND SHARED KNOWLEDGE

This lecture demonstrates the new options for social dynamics between learners, differently from the traditional method called "collaborative learning" where students are encouraged to learn together but still facing an individual assessment. The essential pivot for educational reform is not so

much the didactic or instructional design; it is the question whether we allow learners to be sensitive to the agenda of those who already master the topic, or to become fundamentally open to one's personal cognitive needs at that very moment. In terms of "learning as an existential need" it is clear that learners have only a limited view on what is needed to accommodate future demands.

Teachers at least can extrapolate the disciplines built before. In this sense there is not necessarily a polarity between instructivism and constructivism; both need each other. However from a pedagogical perspective it is vital that the learner is seen as a person with a growing awareness on the final goals in life, and should thus be taken seriously if it comes to the question: Who is the owner of the learning process? Beyond the paradigmatic issues this workshop opens the question we expect mobility and virtuality to land in real learning settings soon? Social media prompt youngsters need for "social presence" even when there is a lack of time and even if there is a need for convergence in terms of attention and mental focus. In recent projects we have observed how learners, teachers and parents struggled with the rather drastic reorientation that mobile learning may trigger; Learners were quite happy with "learning by heart". It allows them to keep their mind in a most versatile position; no fixations to the limited span of working memory. Learners typically choose dynamic situations with diverse modalities and information channels: TV, telephone, books and …. Food. An easy way to label such situations is that learners want to keep their mind in an "everyday-life" condition. Instead of reducing cognitive overload by limiting social "noise", young learners tend to build upon routine mentality: watching many kind of social signs and keep free to express any kind of feelings as long as possible. For many of the teachers it was much more the issue how to keep learners tightened to the prescribed topic. Mobile phone were not seen as counterproductive to learning, as long as they were programmed to narrow the learners' attention and increase feedback for right/wrong answers. Parents were typically concerned on maximizing the "time on task"; as they observed their children often on the borderline of what they called "learning" versus "playing", it was their prime worry that the mobile phone would distract learners' attention to functional strands like MSN, twittering and Facebook. These tools were seen as "opposite" to learning, by the parents. In this lecture and workshop we will open the examples given by recent projects and try to derive the best rules of thumb on how to combine the alternative cognitive load theory and the more pragmatic tactics that teachers already have. The final goal is to formulate policy rules on how to make both teachers and

students more creative in finding out how social media help various stages of learning best at various ages.

## 2. LEARNING AT THE SCALE OF ICT AND INTERNATIONAL ENDEAVOUR

This lecture challenges both your memory and your imagination, by asking who of you had estimated the web to become so vital? Interesting enough we also need to admit that as now information access is that immense; Which direction do we take in order to make learning even better and more efficient? Indeed, we hardly mention the long debates from the years ’70 and ’80 on student modeling, programmed instruction and mixed initiative dialogues. What are the key discussions at the moment?

1. Fortunately the essence of PBL (Problem-based Learning) is back on the agenda: Working, playing and learning at a distance. In order to mitigate skeptic feelings, we carefully mention “serious” gaming in order to avoid connotations of “playing”.
2. Through openness for PBL we also meet an open mind for students’ problem solving and creative design. Are authentic solutions by the student more welcome than the anticipated once by the teacher? Have we squeezed out the juice of improvisation by the teacher as we now have saturated curricula, tuned to the test to be expected?
3. TRIZ as materialized Altshuller’s Theory of Inventive Problem Solving is being (re)discovered by Secondary- and Higher Education to make students aware of how to remove built-in contradictions
4. Teams for collaborative problem solving via synchronous media have been accepted recently when solutions by expert teams became even better when few novices became member of such team
5. Social media so far have helped to articulate awareness on relational networks among students. The question now is if and how social media can help teachers to learn from each other and build upon each other work and experience?
6. The question on if and how international student exchange is going to contribute to students’ learning attitude? So far we see that universities start having international campuses, with only very tiny interactions between the international- and the local students. This is an unsatisfactory situation, as it prevents the real synergy among guests and the local population.

This keynote lecture will highlight the new plans for a teacher Master Degree on the integration of ICT in didactic contexts. UNESCO's IITE institute in Moscow is working out the plans for such an extra degree in the hope that it will stimulate school leaders and national authorities to reward extra efforts for innovation more vigorously.

**Biographical Note**

Piet Kommers specialized during his master degree in education in ICT for adapting to learners' cognitive style and mental repertoire in the late 70ties. His PhD was in conceptual representations for navigating in hypertext systems. Since 1990 he specialized in 3D virtual reality and surgical training. As editor of the International Journal of Continuous Engineering Education and Life-Long Learning he has coordinated more than 12 special issues. He then started the International Journal of Web-based Communities. Since 2004 he became chairman of the IADIS conferences. As associate professor of the University of Twente he teaches Media for Communication and Education. Since his work together with the Kiev UNESCO Institute for Educational Technology he received the honorary professor title. His work now for International Student Exchange makes him keen on educational policies and capacity building. His publications can be found here.

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# THE VISION OF AN INCLUSIVE SOCIETY IN THE VIEW OF PARENTS, TEACHERS AND YOUNG PEOPLE AND THE ROLE OF ICT

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***Abstract:*** *What values does a society strive to realize? What should a society's guiding principle concerns be? In 1994 the UNESCO proclaimed: The aim is an "inclusive society", which represent diversities not as a barrier, but an enrichment.*

*Our research questions: How do parents, teachers and young people perceive the distinctive age-and development-specific interface between inclusion and integration? To what extent do young people perceive elements of this guiding principle, and what does this mean for its sustainable realization in society? For this purpose, an "Interfaith Online Survey," and quantitative and qualitative research in schools, youth centres and outreach work were carried out.*

**Keywords:** values, inclusion, inclusive society, heterogeneity, tolerance.

## INTRODUCTION

Where is society heading for? Is it going in the direction of "social competition" or in the direction of "man of the world"?

In the light of catchy advertisement phrases such as, "I never share", "Stingy is cool" one asks oneself: Where is such a society which postulates such an attitude going, and is this meant to serve as a role-model? How can education counteract such withdrawal of solidarity?

Therefore, it is necessary to have the following aims: Within the meaning of aesthetic pedagogy sensing one's own needs and the needs of others, and consequently again discovering the connection between aesthetic and ethic.

The aim of theological ethic is “lucky life” – like Jesus said, “I have come that they may have life, and have it to the full« (John 10, 10). The aim of the theological ethic is the luck of *our* life (not my individual life / but the social life in community).

Therefore the main question is: How is it possible to achieve life in happiness for as many people as possible?

How is it possible, to get from one’s own little world to the “global” thinking and acting, to a “planetary awareness” (Boff 1996)

The earth is not to yield, but we are part of the earth! We are the earth! We must not hesitate! We should dare to act with the Creator, so that in the perspective of a new heaven and new earth participating in the banquet for all is possible, not only for the rich. A "planetary consciousness" (Boff 1996) is in demand:

## 1. TO OVERCOME BORDERS IN YOUR HEAD – HELPING TO CREATE A “NEW SOCIETY“

A mother asked her first-class pupil,

"How many foreigners have you got in your class?"
The child asked back, "Foreigners? “
Mother, "You do have foreigners in your class?"
Child, "We don’t have foreigners, we just have children." (Feldbach, VS2)

This honest reply of a six-year old child exactly points out what inclusive pedagogy is all about: not to categorize and not to label (Feiner 2008).

What did Europe experience just a little more than two decades ago? Fifty kilometres south of Graz there was war, shells even bombed the church tower of Bad Radkersburg. Twenty five years ago hardly anybody could imagine, that the two political blocks would come closer to each other and the Iron Curtain would disappear. We all witnessed the fall of the Berlin Wall. A border between people crumbled, which could only be crossed having to fear for one’s life. The people who built the wall are not the people of the new Europe, it is them who build bridges tearing down the separating walls. Since December 2007 we can go from Portugal to Romania, from Sicily to Norway without being stopped at the state borders.

In a sensational speech in Salzburg 1995, the great liberation theologian Leonardo Boff talked about a direction that mankind should move to. At the beginning he quoted the astronaut John W. Young who in 1972, looking

down from the moon, expressed this new awareness with far-reaching words, "*– Because the bottom is the earth. This blue-white, beautiful, radiant planet - our human homeland! Here from the Moon, I think of him with bare hands. From this perspective, there is neither black nor white, there is no division between East and West, there is neither capitalist nor communist, neither North nor South. All we form a single planet. We need to learn this planet from which we are a part and a piece is to* love" (cited after Boff 1996: 31). – A highly inclusive thought.

L. Boff raises the postulate of a new planetary awareness, "The growing planetary awareness turns us, who so far were inhabitants of this or that country, into citizens of this one earth. We form a society of fate. The human fate is indissolubly connected with the fate of the planet and the cosmos; we are asked to become global and universal beings" (Boff 1996: 32.38f).

Only such an openness will help to form a "new society".

## 2. "IT IS NORMAL TO BE DIFFERENT" (F. V. WEIZSÄCKER)

The Salamanca–Statement has smoothed the way to see heterogeneity not as an obstacle but as a chance. According to the guiding principle of the UNESCO this chance should be given to any marginal person. As the marginalisation of minorities does not take us – as society – any further. In 1994 representatives of 92 governments and 25 international organisations agreed on a clear educational direction under the patronage of the international organisation for education of the UN, "The guiding principle … is that schools should accommodate *all children* regardless of their physical, intellectual, social, emotional, linguistic or other conditions. This should include disabled and gifted children, street and working children, children from remote or nomadic populations, children from linguistic, ethnic or cultural minorities and children from other disadvantaged or marginalized areas or groups" (UNESCO 1994: 6).

"We believe and proclaim that:

- every child has a fundamental right to education, and must be given the opportunity to achieve and maintain an acceptable level of learning,
- every child has unique characteristics, interests, abilities and learning needs" (UNESCO 1994: VIII).

Chapter I of the Salamanca Statement postulates a "New Thinking in Special Needs Education" (UNESCO 1994: 10).

With that a milestone was set towards inclusion, with the aim to make a general standard, an educational aim of general pedagogy out of it.

Out of the Salamanca Statement the Index for Inclusion developed – which was published in English in 2000 (Booth, Ainscow 2002) and has now been translated into 40 languages on all continents. It is a pioneering piece of work that aims at a pedagogy for a mankind that does not exclude but welcomes everybody.

The Index contains "a detailed analysis of how learning barriers can be reduced and overcome and how the participation of all pupils can be guaranteed." It is a "tool" to create an inclusive model (Boban - Hinz 2003: 8).

In the course of its development the Index of Inclusion was originally designed for *one* child: Where does this child experience barriers and how can they be reduced? –

In the meantime the Index has been extended to a whole group, class or school. Recently it has even been applied in municipalities for example in Wiener Neudorf: Where in our local community are barriers and how can they be overcome? (http://www.wiener-neudorf.gv.at/)

The aim is that inclusive thinking and acting becomes such a natural thing that we don't need a separate term anymore; Inclusion is resolved in a *general pedagogy* according to Hegel. A clear distinction of the phases is not possible, there have been and are overlaps. – Maybe the idea of inclusion stays a vision; but we should move there and even further.

We are convinced that the term integration is not enough anymore to show what school should aim for today. The issue, by far, is not just about the integration of people with disabilities. Since the political change in 1989/90 new necessities concerning school have come up in Austria: How can pupils whose mother tongue is not German be supported? How can they bring in their cultural and religious identity to the enrichment of all? And: How can each of them develop their talents and integrate them into social contexts (Feiner 2011)? Which chance does the perception of heterogeneity offer? – Such questions were tried to be answered in a research project; our starting point was the question how inclusion was perceived by parents and teachers.

## 2.1 Perception of Inclusion from the Perspective of Parents and Teachers

The results of research on „Perception of inclusion from the parents' and teachers' perspective" 2006/07 Knauder – Feiner – Schaupp were presented in a separate publication (Knauder 2008: 11 – 28 and Schaupp 2008: 29 - 44). In this survey 424 parents and 168 teachers from Styria were questioned.

A few significant results are to be mentioned: The crucial result seems to be the attitude towards integration / inclusion versus separation.

Which attitude concerning inclusion do parents want from teachers?

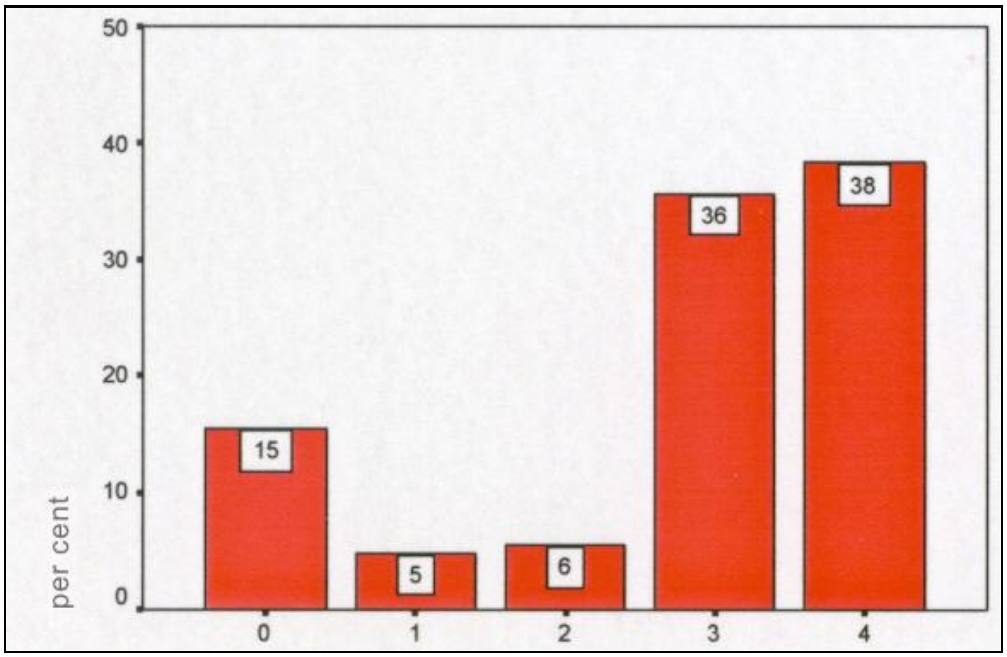


**Figure 1. Item: "Teachers should have a positive attitude concerning inclusion".**

*Source: own elaboration*

About ¾ (74 %) see the positive attitude of teachers concerning inclusion as a "must"!

*What else I want to say:*

Answers to open questions often have a stronger effect than any figure and emphasize the statistic data:

Out of 424 (100%) parents questioned, 69 accounting for 16,3 % (!) made use of the impulse "What else do I want to say":

**Table 1.**

**What else do I want to say.**

| Total survey | „What else do I want to say“ |
|---|---|
| N = 424 (100 %) | N = 69 (16,3 %) |

| Pro Inclusion | Contra Inclusion | neutral / differ-entiated | Adaptation | Language | Talent | Education | Survey | De-cision | Total |
|---|---|---|---|---|---|---|---|---|---|
| 22 | 4 | 14 | 10 | 5 | 2 | 5 | 6 | 1 | 69 |
| 32% | 5,8% | 20,3 % | 14,5% | 7,2% | 2,9% | 7,2% | 9% | 1,4% | 100% |

*Source: own elaboration*

22 people (32 %) are in favour of an ”inclusive school“, however 4 (4,8 %) are clearly against it.

A differentiated view that weighs up pro and contra, but does not have a clear position concerning inclusion vs. segregation gets 14 contributions (20,3%). Ten people (14,5%) plead an adaptation to “our culture” and language, while “language” (e.g. “language problems with different mother tongues”) is seen as urgent by 5 people (7%). The question of supporting talents was addressed by two people.

With the (small) group who is against inclusion, partly emotional statements stand out, e.g.: “Disabled people, people with different skin colours and (other) denominations should go to separate schools!!! I wish my child not to feel like a foreigner in his / her own country.” If people with such an attitude should be won for the idea of inclusion, you first have to tackle their prejudice and emotions in order to convince them.

From those statements that show preference for inclusion some should be quoted:

- ”For ‘normal’ children it is good to be in an inclusive class, as they better learn how to treat disabled children“.
- ”Shared practical life – important for the child’s development“.
- ”I like the idea that all children have the same chance“.
- ”In our primary school this model is realised successfully. I am for it. This model widens the (social) horizon of our children“.

– "Inclusion is a great thing, unless excessive demands are put on the teachers, as the idea is not easy to realise. No child should come off badly – neither the gifted nor the disabled children. Is that possible? If yes, then inclusion is a great thing."

## 2.2 Inclusive Pedagogy from the Perspective of Religious Education Teachers – Results and Tendencies

### 2.2.1 Research Design of the Project "Inclusion in Religious Education"

Between January and May 2008 religious education teachers were asked to fill in a questionnaire concerning inclusion (Feiner – Hausberger - Ladstätter - Prügger - Straßegger-Einfalt 2009). The questionnaire consisted of an introduction, personal and school- related questions, questions about the Index for Inclusion (cf. Boban – Hinz, 99f.).

184 people participated in the survey, 145 (79 %) of which were female and 38 (21 %) of which were male; the far highest number of participants is aged between 35 and 44 (44 %) and between 45 und 54 (41 %); 10% are younger and 5 % older; ¾ of the schools questioned are on the countryside, ¼ are in the city.

The teachers questioned also say that

- all (100%) of the schools involved have ***Catholic*** pupils;;
- 76,1% of the schools involved have ***Protestant*** pupils;
- 48,4 % have pupils with other ***Christian denominations***;
- 66,8% of the schools assessed have ***Muslim*** pupils;
- 26,6% of the schools assessed have pupils with ***other denominations*** (Buddhist, Hindu, Jewish, Bahai, others, without denomination);

In the existing questionnaire the items 1 to 24 are taken from the Index for Inclusion and are related to the topic cultures (item 1-9), structures (item 10-15) and techniques (item 16-24). The answers had to be placed on a rating scale with the following choices: fully true, partly true, not true and need more information. The distribution of frequencies for the individual items is presented in a circle diagram. A $\chi^2$-calculation is done with the socio-graphic variables "school type" and "place of school".

In the following significant detail results are presented:

### 2.2.2 Everybody Feels Welcome in School

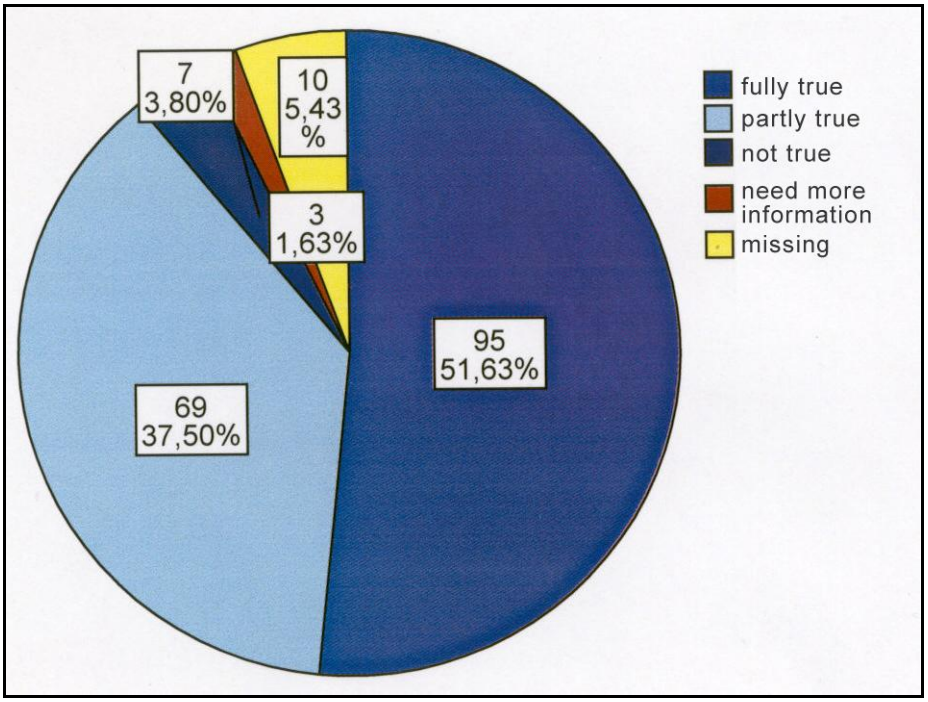


**Figure 2.**
**Item: "Everybody feels welcome in that school".**

*Source: own elaboration*

If you count the two agreements (full and partial) together you get 89% from the teachers' view. But still 3.8% say that it is not true. It would be interesting to investigate the pupils' and parents' perspective.

Item 11 puts item 1 into more concrete forms, "When a pupil comes to this school for the first time, somebody helps him / her to settle down": agreement 87% and only 0.54% say "not true".

Furthermore item 14 makes item 1 more concrete: "The teachers arrange school in such a way that you like to go there": 95% agreement; 2,7% say that "is not true". From the school to the actual lessons: Item 16 "The teachers arrange their lessons so that everybody likes to go there" got 94% of agreement. There is always the question how far an "inclusive culture" is shown in "inclusive policies" and how far actions according to an inclusive experience become visible. This can be shown from the teachers' perspective in the first item-complex.

### 2.2.3 Inclusion – Realized in a School's Charter?

It is essential if a school tends to work towards inclusion in its basic concept. Because: Inclusion first starts to be in people's heads.

Items 42 "Inclusion is of high importance in the guiding principles of our school" and 43 "Inclusion is of high importance among the colleagues of our school" are vital and showed similar results: agreement (total and partial) of 83% and 79%. The disagreement is also interesting: 17% with item 42 and 21% with item 43.

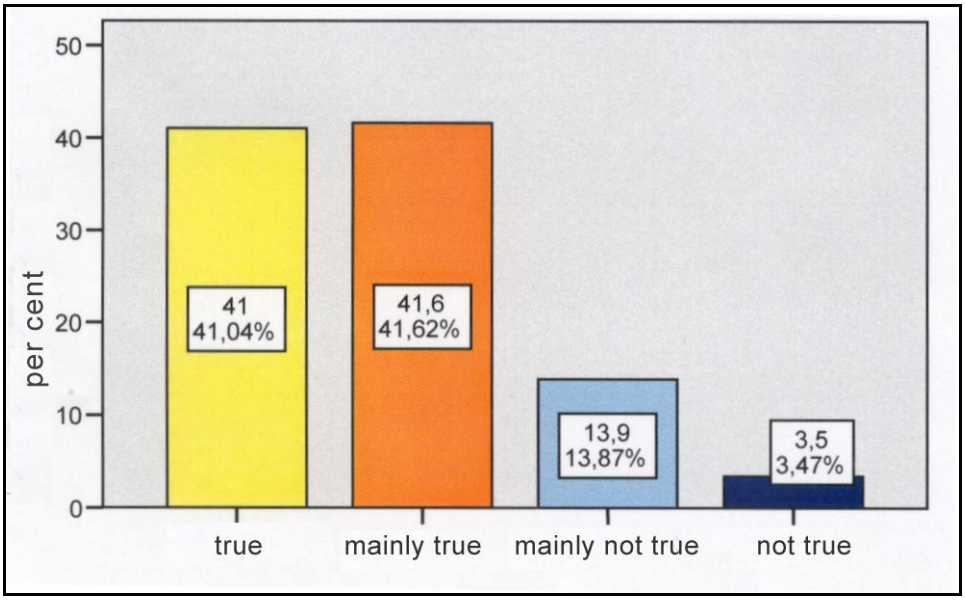


**Figure 3. "'Inclusion is of high importance in the guiding principles of our school".**

*Source: own elaboration*

In comparison: In the survey Knauder – Feiner – Schaupp 2006/07 74% agreed with the item "Inclusion is an aim of our school development" (Knauder 2008: 18).

The teachers questioned could also assess the realisation of the inclusive idea through the ranking system of school grades (1-5). Diagram 22 shows the distribution of frequencies.

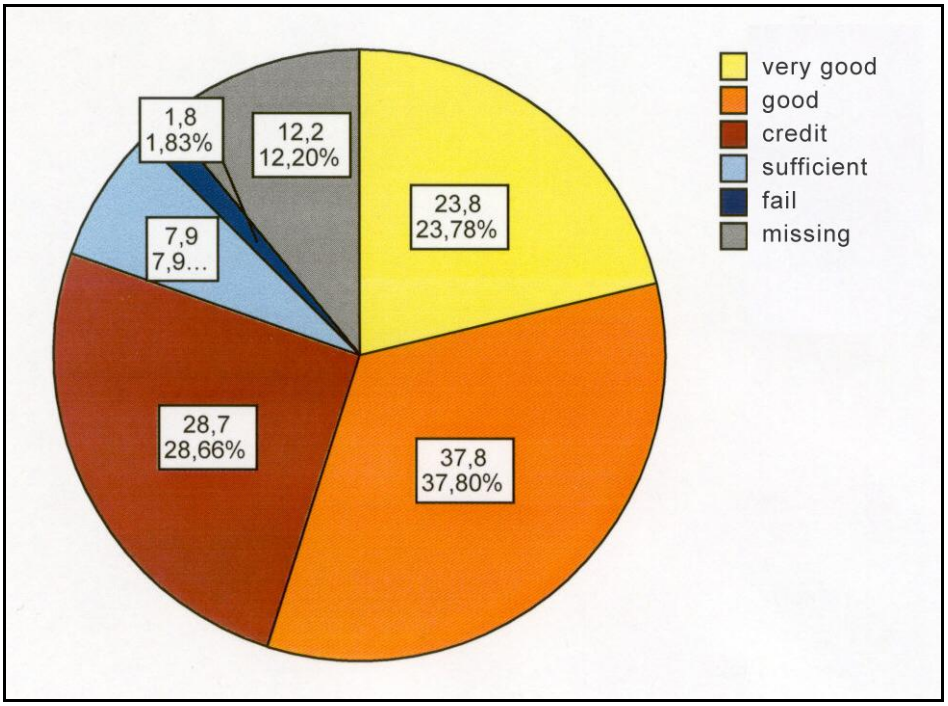


**Figure 4. Realisation of inclusion in my school.**

*Source: own elaboration*

In comparison to the first study (Knauder – Feiner – Schaupp) the much better assessment is striking: The mark 'very good' with nearly ¼ (23,78%) as opposed to 14% in the first study; 'good' with 37% nearly the same (as 39% in the first study ); 'credit' with 28,66% as opposed to 25%, 'sufficient' 7,9% as opposed to 15% and 'fail' 1,83% as opposed to 3%; 12,2% made no statement as opposed to 3% (cf. Knauder 2008: 19).

### 2.2.4 Helping Each Other and Respect as a Basis for an "Inclusive School Climate"

Here the items 2, 4 and 19 show a close connection and similar results:

91% (full and partial) agreement with item 4 "Staff and pupils deal respectfully with each other" can be seen as a high figure and an essential contribution to a school climate that is based on esteem and an orientation on communication equally.

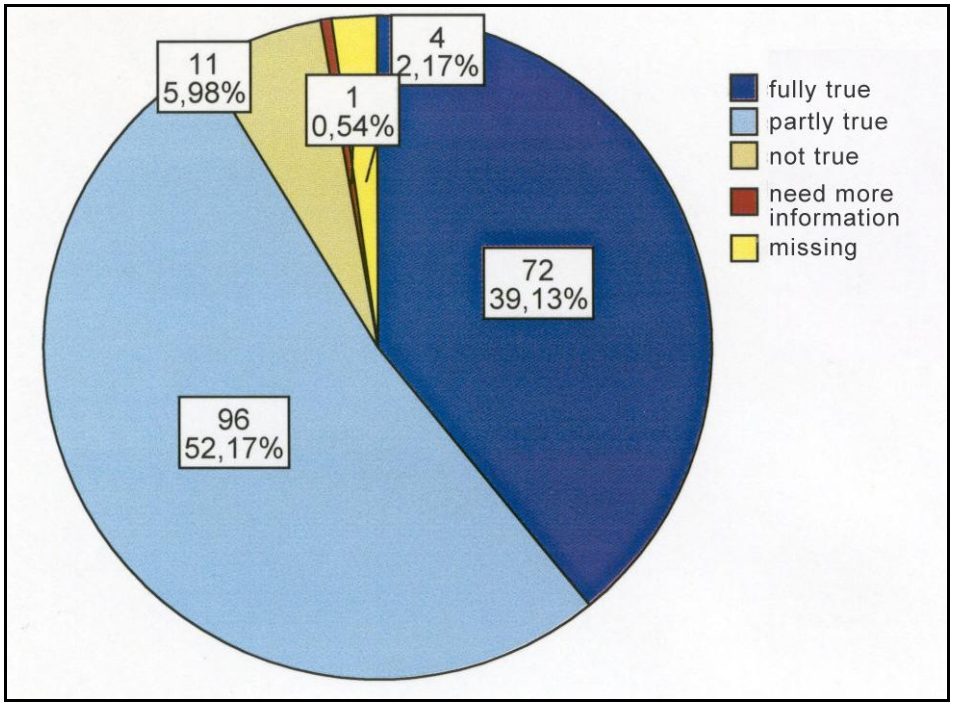


**Figure 5. Item: "Staff and pupils deal respectfully with each other".**

*Source: own elaboration*

Item 20 "Pupils and teachers treat each other in a fair way" shows an even better result: 93% (full and partial) agreement.

Concerning the question if pupils help each other (item 2) and if the teachers expect the pupils to help each other in the lessons (item 19), almost a change in paradigm seems to have taken place. – If in former times school was (and partly still is) defined by the principle of competition ("Everyone should look after him / herself and their own marks"), something now seems to become more essential and self-evident that Maria Montessori postulated as the helper principle: Older pupils help younger ones, stronger help weaker ones, in one subject better pupils help others.

### 2.2.5 Equal Treatment of All People – also of Foreigners

This question tackles the issue of migrants, "Pupils learn to appreciate people of other ethnic origin than their own": The percentage of 96% (full and partial) agreement for this item shows that the pedagogical efforts of the teachers concerning tolerance, acceptance and even "appreciation" of foreigners are very high.

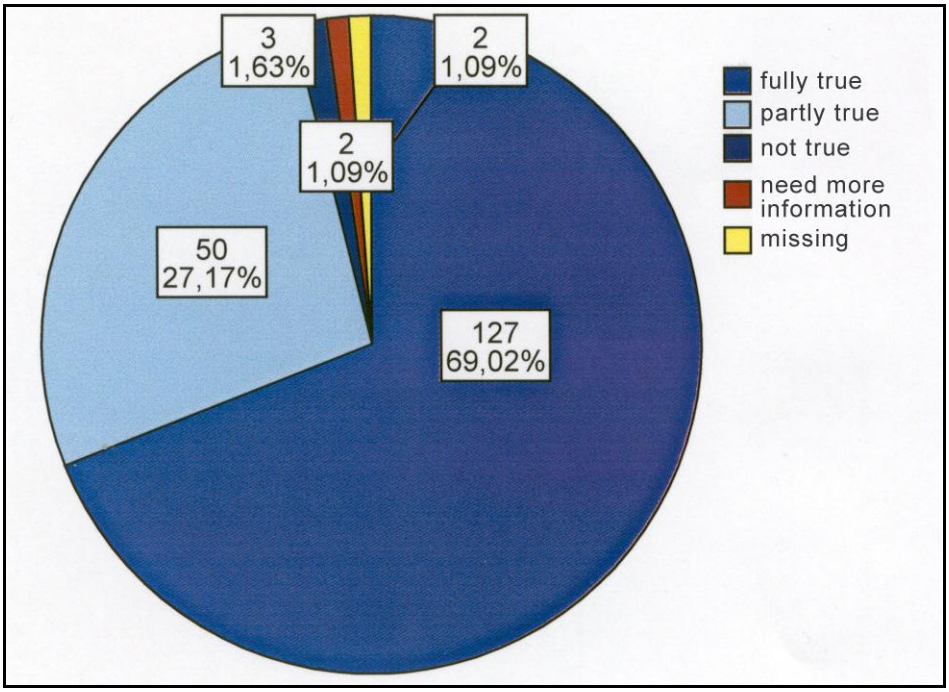


**Figure 6. Item: "The pupils learn to appreciate people with another ethnic origin than their own".**

*Source: own elaboration*

### 2.2.6 Reduce Barriers for (Physically) Handicapped People

Item 10 "It is easy for children and adolescents with impairments to get to school" shows a full and partial agreement of 87% whereas 9% say that it "is not true"!

### 2.2.7 Solve Conflicts Together as a Contribution to an Inclusive Form of Communication

The results of item 13 "Behavioural problems / conflicts are solved together" and 15 "A lot is done to prevent harassment and violence" show with a full agreement of 90% and a partial agreement of 91% that a lot of efforts are made to reach fairness.

### 2.2.8 What I want to change at that school

The religious education teachers were asked to name "three things that they would change in their school" and their answers were distributed to the six sections of the Index for Inclusion:

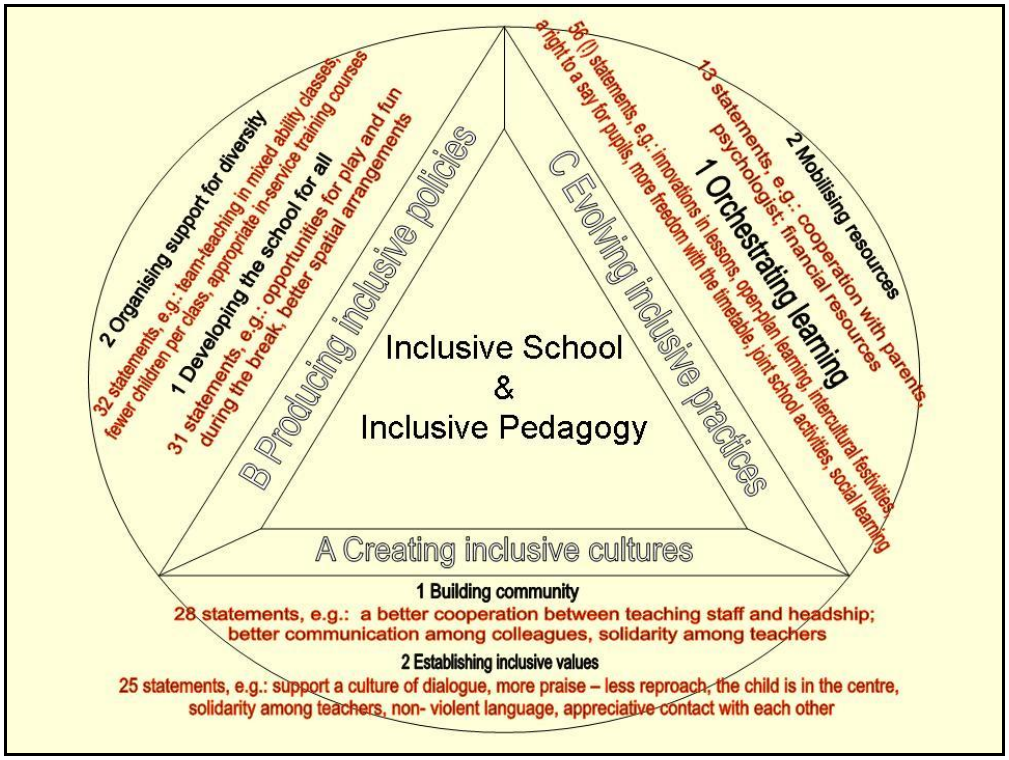


**Figure 7. Three things I want to change in my school**

*Source: own elaboration*

The study recognizes a high degree of willingness and engagement concerning inclusion. At the same time it defines a few conceptual insecurities e.g. the differentiation between "integration" and "inclusion": Here a large number of religious education teachers don't seem to be aware that "inclusion" reaches far beyond "integration", namely as a radical way to take heterogeneity seriously. Finally a noticeable sensitivity for heterogeneity as well as a strong interest to deepen the qualifications in dealing with religious plurality competently can be seen.

What about young people? *To what extent do young people perceive elements of this guiding principle, and what does this mean for its sustainable realisation in society?*

# 3 YOUNG PEOPLE'S OUTLOOK REGARDING LIFE, VALUES AND FEELINGS

## 3.1 Learning Tolerance as a Life Task

Young people in puberty and adolescence experience major changes in psychological development during this time: biological, intellectual and social restructuring characterize this phase of adolescence. They can be described as being “no longer a child”, but also “not yet an adult”, significantly in areas of tension of the stages of development.

“Behaviour from childhood must be given up and the duties and roles of the adult world must be taken up. Thus, the basic prerequisites for later adulthood are set at a young age. This concerns, above all, personality development, identity, relationship skills and different patterns of positive life skills ... How young people think about themselves and about the world is characterized by opinions and personal preferences, which do not vary over time and across content arbitrarily. They have related patterns "(Straßegger-Einfalt 2008: 7, 31).

Dreher and Dreher (1985) elaborating on Havighurst (1982), modified development tasks for adolescence and differentiated by gender, with the theme of "values" as one of nine tasks, referred to explicitly as: Developing one's own ideology; being clear about what values, one represents and with what principles one wants to align his own actions.

## 3.2 Exercising out one's own Individuality - Learning Tolerance and Empathy

In the maturation of the ego in eight stages, Erikson called the fifth crisis, “Identity and identity diffusion” (Erikson 1965). In the daily struggle with tasks in the social context of parents, peers, teachers, etc., the ego can mature. The enormous importance of the peer group for learning empathy and tolerance is always emphasised.

Mirror neurons enable us to feel empathy. "All real living is meeting" (Buber 2008: 12) For Martin Buber only those who learn to say ‘Thou’, even can say ‘I’. “Saying ‘Thou’ I am becoming ‘I’” – “Ich werde am Du zum Ich”. With Buber's statement that "With ‘Thou’ Man becomes ‘I’” – Der Mensch wird am ‘Du’ zum ‘Ich’” (Buber 2008: 28) it is clear that development of identity happens only from the relationship to ‘Thou’.

The ability to understand somebody intuitively and to empathize with other people is decisive. Why can we understand each other intuitively, feel spontaneously what others feel and act socially and for the good of all? The

explanation of all these phenomena is found in mirror neurons which were accidentally discovered in 1996. These neurons enable us to be in emotional resonance with others, provide us with intuitive knowledge about people's intentions who are close to us and let us share their joy or pain. They are the basis of empathy, intuition and the ability to love.

Even a short impression of a person is enough "to build up an intuitive idea about how the recent course of physical sensations of the observed person will look like" (Bauer 2006: 44f.).

In order to participate in other people ´s feelings, "our own nerve cell nets are put into resonance and made to vibrate, which let appear the feelings of other people in our own mental experience" (Bauer 2006: 51).

Out of somebody's eye movements far reaching conclusions can be made. That is not only true for assessing a current situation, but also and particularly for thoughts, intuitions and a person´s intention for actions (Bauer 2006: 55).

### 3.3 Social Capital and Sense

For Bourdieu the term 'capital' involves "all resources that are socially valuable" (Fröhlich – Rehbein 2009: 134). Bourdieu's expanded concept of capital includes the "preservation or improvement of social position" (ibid, 135), the "relation to the totality of social relationships ... thus capital is the basis of social action, more precisely, the essential resource for any action" (ibid. 135). "On the economic and cultural capital, Bourdieu also recognizes a social capital that can be translated roughly to the terms of social relationships. 'Social capital is the sum of current and potential resources associated with the possession of a durable network of more or less institutionalised relationships of mutual familiarity or acknowledging, or, in other words, these are resources that are based on affiliation to a group '(...). Besides the family, examples include clubs or parties. The decisive factor regarding the relationships is the help that they provide "(ibid, 137f).

By committing to others, engaging in a community, energetically working on a task, meaning is experienced. And so: The sense of being is not situated in self-fulfilment and self-realization. Only to the extent that by fulfilling tasks and demands, we fulfil and realise ourselves" (Frankl 1972: 75).

### 3.4 Research Design

On the basis of an intercontinental research project of the University Maribor (SI, SRB, BIH, Japan, USA) a comprehensive, so-called "Inter-religious

questionnaire" was developed, and adolescents in various types of schools were asked in a written survey about life, values and direction of meaning.

Analysis is based on a large sample (n = 2361; 51.2 % female and 48.4 %male youths). The interviews were conducted in schools where young people aged 15-20 attended. They took place from January to March 2012 in Styrian secondary schools (n = 848; 35.6 %), in Styrian vocational schools (n = 833; 35.0 %), in a few polytechnical institutes (n = 60; 2.5 %) and in Styrian agricultural schools (n = 640; 26.9 %). Of those youths questioned, they were selfdescribed as 88.1 % Roman-Catholic and 4.3% Evangelical. A further 3.9% indicated that they are of no faith and 1.4% reported being of Islamic faith. 1.6% have another faith and 1.7% gave no answer. The sample is of limited representativeness: (1) There is no data for Styrian youths who attend business or technical schools and (2) the proportion of respondents of Roman-Catholic faith is very high. The age and sex distribution is shown in the table below. It is not an equal distribution. (Chi-Square = 69.21; df = 19; p = 0.00).

**Table 2.**

**Age and Sex Distribution**

| Age | Female (in %) | Male (in %) | No Response (in %) | Number of respondents (100 %) |
|---|---|---|---|---|
| 14 years old | 64.9 | 34.3 | 0.8 | 245 |
| 15 years old | 54.8 | 45.2 | 0 | 609 |
| 16 years old | 49.3 | 50.3 | 0.4 | 513 |
| 17 years old | 45.9 | 54.1 | 0 | 484 |
| 18 years old | 48.9 | 50.5 | 0.6 | 317 |
| 19 years old | 40 | 58 | 2 | 100 |
| 20 years old and older | 3 | 2.9 | 5.4 | 70 |

*Source: Schwetz - Sever-Wilfinger - Straßegger-Einfalt*

In addition, this project includes an "Interfaith online survey" (evaluation is in progress) and a qualitative survey using interviews in youth centers, street work and schools with ethics courses (evaluation in the winter term 2012/13).

### 3.5 Tolerance – Crucial for an 'Inclusive Society'

Tolerance, as a skill, belongs as an action-guiding value of our democratic society. It is a feature of an "inclusive society"

In our latest study we addressed the question, "what factors influence the attitude of tolerance," in order to be able to identify starting points for effective intervention. The knowledge-guiding interest was understanding and explaining an important educational objective, such as tolerance. It raised the question whether the level of tolerance is to be understood as coming from the individual and / or societies (e.g., classes, schools, groups of friends), in which the individual moves (e.g., class, friend groups, etc.).

The following model was measured by a survey (n = 2361) given at academic secondary schools, vocational schools and agricultural schools in Styria:

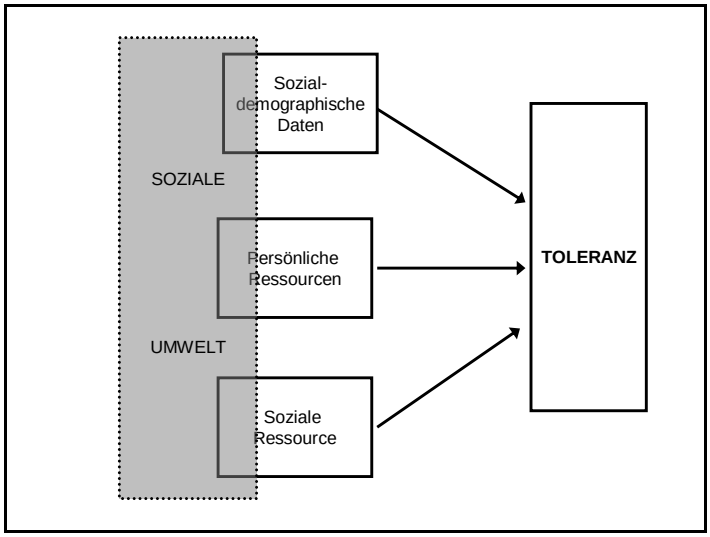


**Figure 8. Action Model for the Development of Tolerance**

*Source: Schwetz - Sever-Wilfinger - Straßegger-Einfalt*

The dimension of tolerance is compiled from the following items. The wording of the questions was "It is important to me ... to respect people of other religions; ... to pay attention to others; ... to be tolerant; ... to respect people with different views; ... to help others; ... to be tolerant of people from non-European countries and continents (e.g. Africa, Chechnya, etc); ... to be respectful of beggars..."

## The Results

With reference to this study the underlying model found that predictors (or covariates) from all three areas have a significant effect on the dependent variable...:

- Importance of learning languages and learning about other countries and cultures
- Importance of trying new things
- Importance of reading
- Importance of optimism
- Importance of good manners
- Faith
- Interest in Austrian politics
- Interest in international politics

Furthermore, it can be stated that the following variables from the area of social resources have a significant impact in both analyses:

- Importance of friends and
- Importance of what parents say

When trying to summarise the list of important factors, the conclusion can be ventured that optimistically, youths are interested in politics, languages and cultures, receptive to new things and have a positive attitude toward tolerance. For these young people, their circles of friends are also very important and they are open to the advice of their parents. (Wilfinger – Schwetz – Straßegger-Einfalt)

## 4 THE ROLE OF ICT FOR DEVELOPING AN "INCLUSIVE SOCIETY"

In any case, direct, face-to-face conversation, direct experience and direct interacting in the social educational sense prevail over media communication, virtual experience and interactive actions on a computer.

Nevertheless, it should be emphasised that the internet and computers offer significant opportunities for a society to develop in the direction of an "inclusive society".

### 4.1 A New Agora or Forum

In the Message of the World Communications Day 2002 John Paul II sees the Internet as the new "forum": "The Internet is certainly a new "forum" understood in the ancient Roman sense of that public space where politics

and business were transacted, where religious duties were fulfilled where much of the social life of the city took place.

John Paul II sees in this forum also the chance for proclaiming the Gospel message: “For the Church the new world of cyberspace is a summons to the great adventure of using its potential to proclaim the Gospel message.” (John Paul II 2002)

### 4.2 The Connecting World Wide Web

The web is a symbol for connection, the internet connects people all over the world. Pope Benedict XVI emphasizes the role of the Communications Media for formation, participation and dialogue (2006). He says, that he is “confident that serious efforts to promote these three steps will assist the media to develop soundly as a network of communication, communion and cooperation, helping men, women and children, to become more aware of the dignity of the human person, more responsible, and more open to others” (Benedict XVI 2006).

### 4.3 The Communications Media at the Service of Peace

Dictatorships introduced by force can maintain for a time, but not for long. This was seen in 1989/90 and it could be seen recently in North Africa and the Middle East.

In 2003 Pope John Paul II published the Message "The Communications Media at the Service of Authentic Peace in the Light of 'Pacem in Terris'". He wrote, that »peace, justice and social stability are still lacking in many parts of the world” – but “the power of the media to shape human relationships and influence political and social life, both for good and for ill, has enormously increased”. Pope John Paul II emphasised, that the Communications Media do a service for truth, justice, freedom and love, and so peace can grow: “Men and women of the media are especially bound to contribute to peace in all parts of the world by breaking down the barriers of mistrust, fostering consideration of the point of view of others, and striving always to bring peoples and nations together in mutual understanding and respect - and beyond understanding and respect, to reconciliation and mercy!” They are “called to be agents of truth, justice, freedom, and love, contributing by their important work to a social order ‘founded on truth, built up on justice, nurtured and animated by charity, and brought into effect under the auspices of freedom’ (Pacem in Terris: 167)” (John Paul II 2003)

### 4.4 Sharing the Knowledge – the True Utopia of Common Knowledge

Franz Nahrada considers 'open source' in software development as a "true utopia of common knowledge" (Nahrada 2005). Certainly Bill Gates and many others have become financially rich through monopolization and protected copyright of its products. Nahrada speaks instead of "wealth by copyleft". Making knowledge available on the Internet in the last two decades has become a matter of course. Sharing knowledge creates a great treasure for all internet users - a great chance for an 'inclusive society '.

## CONCLUSION

*A new society* to put it in the words of Gestalt pedagogy: We could say that at the beginning of the third millennium a tendency towards the "good character (Gestalt)" can be felt in society, where exclusive thinking can slowly be overcome and where society aims to reach a "good character (Gestalt)" in the form of inclusive communities, that people more and more define themselves as "citizens of one earth" in which also regional identities can be accepted.

Inclusion is the vision of a new society which accepts and integrates all people in their difference and through that also a piece of an eschatological dream of a new heaven and a new earth; this dream can never be fully made to come true, but we are encouraged to help it realize, "If one dreams alone, it is only a dream, but if many dream together, it is the beginning of a new reality" (Dom Helder Camara).

In pedagogy we postulate a school for the future, a vision of a school that excludes nobody but is open for everybody; a school that promotes everyone according to his / her individual abilities, talents, interests and diverse intelligences.

Research projects should deal with the questions how an inclusive attitude can be learnt and which impulses are necessary to lead society, school, people to a global, universal, inclusive way of thinking and acting.

With particular reference to the heterogeneity in a class in order to promote the talents of individuals to communities, so that the guiding principle of the UNESCO Salamanca statement of "inclusive society" more and more can be realized.

Tolerance is a high value for the young people surveyed- and imperative in order to realize the vision of an 'inclusive society'. This includes values such as solidarity and altruism. Especially important is the question: What are the patterns of sharing and solidarity that society offers to young people and thus,

'social capital ', where young people at home are motivated to develop a vision of a society of the future and take an active role in shaping it.

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# E-LEARNING AS A MODERN METHOD OF MODELING ENVIRONMENTAL CONSCIOUSNESS IN POSTINDUSTRIAL ERA: THE PROS AND CONS

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***Abstract:*** *Humanity's annual demand for resources is exceeding the Earth's regenerative capacity by more than 50%, and is still growing. If we want to save ourselves we need to support life in all its diversity and respecting the limits of the planet's natural resources. A society that wishes to understand and overcome the present crisis ought to change its perception of environment and relationships with nature. In the article e-learning is proved to be a strong and effective tool in shaping environmental consciousness and preparing today's society to live in a sustainable world. A successful example of the e-learning course entitled "Philosophical and ethical aspects of environmental protection" prepared at the University of Silesia is discussed in the article.*

**Keywords:** environmental consciousness, sustainable society, e-learning course.

## INTRODUCTION

We have tamed landscapes and ecosystems in ways that enhance our food supplies, reduce exposure to predators and natural dangers, and promote commerce. The net benefits to humankind of domesticated nature seem to be positive. Unfortunately, we have made mistakes, causing unforeseen changes in ecosystem attributes, while leaving a few, if any, truly wild places on Earth (Kareiva et al. 2007). Humans depend on land and ocean ecosystems for important and valuable goods and services, but human use has strongly altered these ecosystems through direct and indirect means. Our biosphere is sick. We have a planet that behaves like an infected organism. Each element of the biosphere is destroyed and it's getting faster. Over the past 25 years

there has not been published a scientific article, which would deny this assertion (Skubała, Kukowka 2010).

If we want to save ourselves we need to support life in all its diversity and respecting the limits of the planet's natural resources. If we want to stop unwanted processes we need to change. If we want to achieve happy life, our definition and measurement of prosperity and success needs to change. If we want to achieve a better quality of life now and in the future, we need to change our consciousness into ecological one (Living Planet Report 2004). We need to improve the quality of human life while living within the carrying capacity of our supporting ecosystems. The grand challenge of our age is to build a sustainable society, a society of environmentally thinking people.

A new didactic method which becomes more and more popular at universities is so called distance learning. Today many learning institutions offer a broad selection of different e-learning courses on various topics. The baseline question which I would like to consider in this article is: can e-learning be an effective and successful tool in modeling environmental awareness? Taking as an example the e-learning course entitled "*Philosophical and ethical aspects of environmental protection"* which has been present at the e-learning platform at the University of Silesia for two years now, I would like to find an answer to this question. All possible advantages and drawbacks of using e-learning as a tool to modify environmental consciousness are discussed. The present environmental situation on the Earth and the importance of creating a new consciousness, with the help of modern techniques, e.g. distance learning, is also analysed by the author.

## 1. THE EARTH TODAY. HUMAN IMPACT ON THE BIOSPHERE

Scientific analyses indicate that no area is unaffected by human influence. Significant changes in physical and biological systems are occurring on all continents and in most oceans. Eighty-three per cent of land area is under the direct influence of humans. Over 14% of Earth's land area has been designated as a natural protected area, but even most of this landscape is under human influence and use. Indeed, land set aside as wilderness areas represents only 1% of Earth's land surface (Kareiva et al. 2007). As regards marine ecosystems, the analysis prepared by Halpern and co-authors indicates that no area is unaffected by human influence and that a large fraction (41%) is strongly affected by multiple drivers. Large areas of high

predicted impact occur in the North and Norwegian seas, South and East China seas, Eastern Caribbean, North American eastern seaboard, Mediterranean, Persian Gulf, Bering Sea, and the waters around Sri Lanka. Areas of relatively little human impact remain, particularly near the poles (Halpern et al. 2008). The result of our present style of life is a gradual deterioration of global ecosystems.

We live on a bountiful planet, but not a limitless one. The global economy and human population continue to grow, but our planet remains the same size. Today, overshoot is no longer a hypothesis, but a reality. Humanity's annual demand for resources exceeding the Earth's regenerative capacity by more than 50%, and it keeps growing (Living Planet Report, 2010). In 2007, humanity's Footprint was 18 billion gha (global hectare), or 2.7 gha per person. However, the Earth's biocapacity was only 11.9 billion gha, or 1.8 gha per person. This represents an ecological overshoot of 50%. Put another way, people used the equivalent of 1.5 planets to support their activities. The day on which people first began to consume more resources than the Earth could provide for a year was 1986, the first "Earth Overshoot Day". In 2010, that "Overshoot Day" had already been reached by the 21st of August (Living Planet Report 2010).

Johan Rockström and colleagues tried to identify the Earth-system processes and associated thresholds which, if crossed, could generate unacceptable environmental change (Rockström et al., 2009). They selected nine such processes for which they believe it is necessary to define planetary boundaries: climate change; rate of biodiversity loss (terrestrial and marine); interference with the nitrogen and phosphorus cycles; stratospheric ozone depletion; ocean acidification; global freshwater use; change in land use; chemical pollution; and atmospheric aerosol loading. Their analysis suggests that three of the Earth-system processes - climate change, rate of biodiversity loss and interference with the nitrogen cycle - have already transgressed their boundaries. Authors suggested that planetary boundary for biodiversity was exceeded ten times the background rates of extinction (Rockström et al. 2009).

"*In this crazy world, the faster we deplete our resources and the more damagingly we pollute our environment, the better off we appear to be*"

Porrit (1990)

So the extinction of species seems to be the most important environmental problem. According to Norman Myers (a British environmentalist specialising in biodiversity) we are witnessing the start of a mass extinction

of species that will, if allowed to run its course, leave a deeply depauperized biosphere for at least five million years - a period twenty times longer than humans have been humans. Moreover the repercussions of what we do, or don't do, in the next couple of decades will affect people for the next several million years (Myers 2003). Species disappearing at least 1000 times faster than the background rate of the prehistoric past (Millennium Ecosystems Assessment 2005). Species are becoming extinct at a rate that has not been seen since the last global mass-extinction event. The authors said that the Earth cannot sustain the current rate of loss without significant erosion of ecosystem resilience (Rockström et al. 2009).

Three eminent ecologists in 2004 in *Science* underlined that our generation is the first to fully comprehend the threat of the ecological crisis and the last with the opportunity to stop unwanted processes (Wheeler et al. 2004). Harald Welzer (German psychologist and writer) and Claus Leggewie (German sociologist) in the interesting book entitled "*The End of the World as we once Knew it ...*" commented on world's climate that it may reach a tipping point if we do not radically change course in the decade. And this will lead first to conflicts, then probably wars (Welzer, Leggewie 2010). Time is rapidly running out.

## 2. WHY SHOULD WE CARE?

If we do not stop unwanted environmental processes (e.g. extinction of species, global warming, nitrogen pollution and many others) we will not be able to survive in the changing world. The loss of life (biodiversity) should be of concern to everyone for several basic reasons (Ehrlich, Wilson 1991).

The first is ethical. We have a moral obligation to protect natural resources from excessive damage by humans not only because of their value to us and to future generations, but because they are intrinsically valuable, as elements of the planetary biosystem. Humans have a duty to protect nature because we would otherwise violate the rights of all living things. Plants and animals have a right to exist and this right limits the ways in which we are justified to use them for our purposes (Rydén 1997). Aldo Leopold (American ecologist, forester) pointed out that not only human beings, but plants, animals, and natural habitats, have moral rights. We need, Leopold argued, a new ethical system that will deal with our relationships not only with other human individuals and with human society, but also the land, and its non-human inhabitants (Warren 1983). The second reason is that humanity has

already obtained enormous direct economic benefits from biodiversity. Nature provides us with food, medicines, industrial products, fresh water and many others. The third reason, perhaps the most poorly evaluated to date, is the array of essential services provided by natural ecosystems, of which diverse species are the key working parts. Ecosystem services include such fundamental services as air quality regulation, climate regulation, water regulation, erosion regulation, water purification, disease regulation, pest regulation, pollination. They contribute to human welfare, both directly and indirectly, and therefore represent a crucial part of the total economic value of the planet. The fourth is cultural one. Nature serves for us with some important cultural services. It is the source of spiritual, religious and aesthetic values. It is the source of recreation and ecotourism.

„*This is us, Earth. We realize it sooner or later, but there is no getting around it. If we do not learn to live in harmony with the food chains, with the ecosystems, then gradually they will come out of balance, and then they will die. It is all a circle and we are in it; we cannot escape*"

Robert Baden-Powell, founder of the Boy Scouts (Dowd 1991)

What is the value of the world's ecosystem services and natural capital (genes, species and ecosystems)? Are we rich enough to pay for these services? Constanza and co-authors estimated the current economic value of 17 ecosystem services for 16 biomes (the world's major ecosystems, classified according to the predominant vegetation), based on published studies and a few original calculations. Authors estimated for the entire biosphere, the value with an average of US$ 33 trillion per year. Global gross national product total is around US$18 trillion per year (Constanza et al. 2007). It means that we will be unable to pay (if it was possible) for these services. They are priceless.

## 3. HOW TO BUILD SUSTAINABLE SOCIETY?

I am convinced that to change the world and build a new society, we need to engage all humans across Europe and the world and get people to take real ownership of the sustainable development challenge. A society that wishes to understand and overcome the present crisis ought to change its perception of environment and relationships with nature. However, for people to do this, they need not only clear information on the challenges and the options available for more sustainable patterns of production, consumption and development. We also need to be able to change people's attitude toward nature. On the horizon of the great transmutation we need to find a

sustainable (post-carboniferous) society with radically different social, political, and cultural parameters. A society, that wishes to understand and overcome the present crisis, ought to change its perception of environment and relationships with nature. How to achieve this?

Humans need economy. We need green economy, in which economic thinking embraces people and the planet. Green economy needs different indicators than gross domestic product (GDP). We already have a set of suitable indicators, e.g. the Ecological Footprint, the Carbon Footprint, the Living Planet Index, ecosystem services indices. Bringing the use of natural resources within ecological limits is part of the jigsaw puzzle of finding development pathways that allow us to live in harmony with nature (Living Planet Report 2010). How to attain this harmony?

"*What might the person have thought who cut down the last tree on Easter Island, thereby sealing the unstoppable decline of a culture that had been successful for 700 years already? Probably those trees had always been cut down and that things would still be normal after the last one was gone*"

Jared Diamond, biologist (Diamond 2005)

Afflicting is the fact that most people, among others politicians are fixated on a short-termed perspective. While the extinction of many species is progressing at an unprecedented pace, and while the seas have been over-fished and the forests radically reduced, our actions still seem guided by the idea we are dealing with reversible processes (Welzer, Leggewie 2010). The decision we are taking today – through our lack of sufficient conservation effort and through the decision's impact on the unconsulted behalf of future generations – is surely the biggest decision in the whole of human history (Myers 2003). It should be underlined that it is almost entirely disregarded by the public and its political leaders. How to change people?

A society that wishes to understand and overcome the present crisis can no longer rely on scientists, engineers, bankers, or politicians. It must instead become a vigorously civil society whose members see themselves as an integral part of environment and biosphere and are aware that they cannot survive if they do not play an active role in it. Before each of us there are many personal choices ahead, including purchasing more goods produced in a sustainable manner, making fewer journeys and eating less meat. Each of us should become aware that every our action impacts the planet's ecosystems. This idea is really optimistic, because it means that we can perform a huge

number of good things for environment. And in this way limit our pressure on earth's ecosystems. How to change people's behaviour?

Our measurements concerning repairing environment are illusory repairs. Achim Steiner (Director General of the International Union for Conservation of Nature and Natural Resources, IUCN) in the report "Global Environment Outlook" commented that during the last 20 years we do a lot for the environment but we defeat (Global Environment Outlook). What we should be asking ourselves is not whether we are now doing better than before (and in certain respects we are doing much better). There is only one question that ultimately counts: are we doing enough?

## 4. DISTANCE LEARNING IN SHAPING ENVIRONMENTALLY CONSCIOUS PEOPLE

Distance learning seems to be a strong and effective tool in shaping environmental consciousness and preparing today's society to live in a changing world. I would try to convince readers that distance learning can play an important role for those who want to leave the old world behind and take part in the shaping of a better one. A successful example of a course which is aimed at broadening ecological consciousness of different groups of a society is the e-learning course prepared at the University of Silesia entitled "*Philosophical and ethical aspects of environmental protection"*. The problems presented in the three above chapters concerning the state of earth's ecosystems, the possible future of the humanity and many other aspects connecting with our life in the biosphere are presented and intensively discussed during the course. The content of the course is greatly variable and seems to be attractive to students and every person who realised that environmental context of his/her life is fundamental. The course begins with a 10-minute introductory film, in which the authors invite students to participate in it (Figure 1). Then 15 modules are introduced:

1. Ecology as the basis of philosophical and ethical system. The state of knowledge on the functioning of the biosphere.
2. Ecology as the basis of philosophical and ethical system. Laws in the natural world.
3. Ecology as the basis of philosophical and ethical system. Man and his relationship with nature.
4. Is life on the Earth threatened? The human impact on the biosphere.

5. Biodiversity as the greatest and least appreciated treasure of humanity.

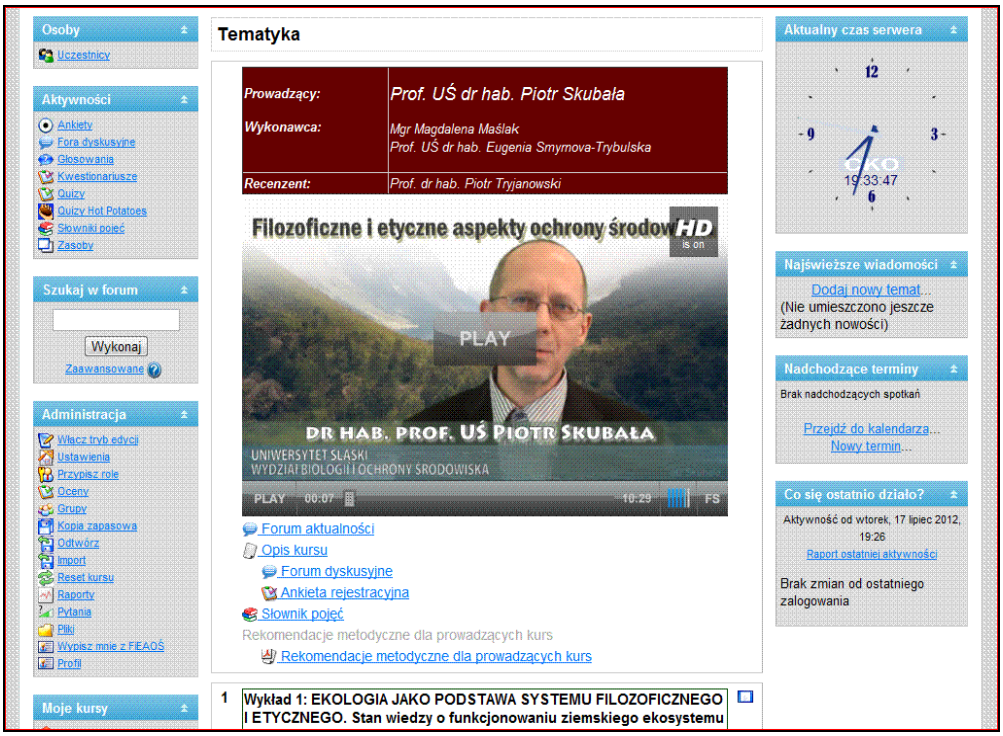


**Figure 1. A special 10-minute introductory film.**

*Source: E-learning course "Philosophical and ethical aspects of environmental protection" (http://el.us.edu.pl/upgow/)*

6. Why should we protect nature? Reasons of environmental protection.
7. People in the defence of nature. My rating of social behaviour.
8. Ethics and environmental conflicts. Case studies.
9. Ethics and environmental conflicts. Are you for or against?
10. Trends in environmental ethics. What kind of ethics do we really need?
11. Main trends in environmental philosophy. Deep ecology and bioregionalism.
12. Main trends in environmental philosophy. Ecological humanism, social ecology and ecofeminism.
13. The philosophy of animal rights.

14. Our trace on the Earth. The method of ecological footprint.

15. Do the Poles take care of nature?

Each module includes a basic lecture which is usually a PowerPoint presentation, but in a few cases it is also a video lecture. The great advantage of the course is its section called "Additional Materials". It is really a great library of supporting materials. They are represented by scientific articles, reports, links to articles, reviews of books, links to movies or documentaries, interviews with famous people (scientists, environmentalists, journalists, philosophers, activists), links to ecological calculators, advertisements, animations or even songs (of course devoted to the future of humanity and our globe).

The important parts of the e-learning course are the "Discussion forums" (Figure 2) and so called the "Choice" section. These parts appeared especially important in this kind of a course. Furthermore, there are several more components of each module, e.g. a glossary of terms, a crossword and pre- and post-tests.

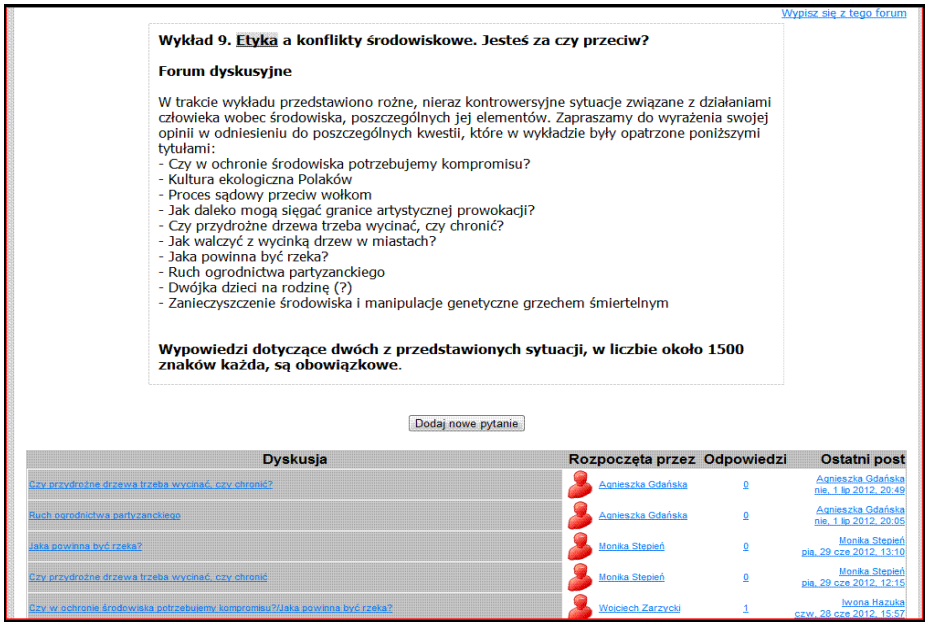


**Figure 2. "Discussion forum" - People in the defence of nature**

*Source: E-learning course "Philosophical and ethical aspects of environmental protection" (http://el.us.edu.pl/upgow/)*

## 5. BENEFITS EXCEED DRAWBACKS IN USING E-LEARNING FOR BUILDING THE SOCIETY IN POSTINDUSTRIAL WORLD

At the beginning of my adventure with e-learning teaching, I was convinced that distance learning was the invention of our new globalised "anti-ecological" world. Distance learning seemed to be a tool which supported our consumer civilization. When looking at the differences between traditional education and e-learning I saw only disadvantages in the e-learning method. Especially when thinking about the great challenge of the humanity – to take an idea that sounds abstract – Sustainable Development – turn it into reality for all the world's people and build sustainable society. E-learning seemed to be useless for me in the realisation of this crucial task.

*"Before I flew I was already aware of how small and vulnerable our planet is; but only when I saw it from space, in all its ineffable beauty and fragility, did I realize that humankind's most urgent task is to cherish and preserve it for future generations"*

Sigmund Jahn, German astronaut (Dowd 1991)

At first glance it seems that an e-learning course gives mainly knowledge. As regards knowledge, the amount of knowledge which offers the above-mentioned course (and many others) is really impressive. The amount of knowledge which is offered to student is incomparably bigger than during a traditional course. The presented knowledge in the course "*Philosophical and ethical aspects of environmental protection"* gives a student an overall picture of the current state of knowledge about environment and complicated relationships between nature and society. But it is not only knowledge; the course is mainly an intellectual and emotional adventure and an inspiring interactive project. During the course some deep questions are posed to a student, he is forced to reflect and his blind faith in science is immediately questioned. In fact, the questions which have to face students are probably the most important existential questions. These are the questions of:

- Who are we?
- What is our place in the natural world?
- Why do we destroy nature?
- What can motivate people to take care of nature?
- What are the main goals in life?
- Does a modern society enable the realization of basic human needs, such as love, security, communing with nature?
- Which of the values we really need?

- What society, education system, form of religion are the most beneficial for all life on our planet?
- Is social and political structure of modern societies adequate to face the oncoming ecological crisis?

As regards knowledge, it played a big role in great transformation in my life. Some 20 years ago I became a totally different person, a person aware of his relationships with the surrounding living world. Good books and articles helped me in changing perspective and become an environmentally consciousness person. Then I met right people and started to practice deep contact with wildlife.

*"Each of us must accept total responsibility for the earth's survival. We are the curators of life on earth, standing at the crossroads of time"*

Helen Caldicott, Australian physician, environmental activist (Dowd 1991)

The most characteristic feature and the advantage of the course is its multidisciplinarity. Environmental issues have been presented here from the perspective of the scientific biologist and the environmentalist, but also ethical and philosophical dimensions of ecological problems associated with the relationship between humans and the environment have been presented thoroughly. Furthermore, many references related to the economic, social and political topics, and even issues related to methodology of biological studies can be found in the lectures and extensive supplementary materials.

The great diversity of didactic methods, which is available in distance learning, and especially in the above-mentioned course, influences on emotions and imagination, which is very important while thinking about environmental consciousness of a man. The study of great amount of attractive materials increases personal engagement; it becomes addictive adventure and constant exploration of new and inspiring ideas. Learning is no longer just learning but it becomes a gripping adventure and constantly discovering something new. Throughout the course, although a participant cannot feel the smell of a forest, he can see the most beautiful parts of the planet from above, observe the world through the eyes of the mites, can also see flourishing life where it seems it should not be - such as hydrothermal vents. He can see great suffer of different animals made by humans. He can take part in the Biosphere 2 project while watching films and taking part in the lively lecture by Jane Poynter (one of the original crewmembers of Biosphere 2) (Figure 3).


**Figure 3. An example of a YouTube video presentation („Life in Biosphere 2") added as an interesting didactic aid.**

*Source: E-learning course "Philosophical and ethical aspects of environmental protection" (http://el.us.edu.pl/upgow/)*

As regards teacher-student relationships in distance learning, there is lack of direct "live" contact, which is obviously a drawback. We can say that a student does not exist in reality. Instead of a person we have only test results, his post on forum, system log records, some mails. It is true that there are no face-to-face meetings in e-learning, but this does not mean that there is no contact between participants and the leader. In fact, in case of e-learning, the student-teacher interaction may be even more frequent and direct than in traditional teaching. Course participants can co-operate and discuss in spite of the fact that they may never meet face to face. And learning dialogue is

crucial in this kind of a course, which is aimed at changing people's perception of environment. The relationships in e-learning are not worse or more difficult to establish. They are simply different, since they are realized by means of technology and Internet communication methods. It is proved that in e-learning courses students use tutorials more frequently, ask the teacher questions more often than in traditional learning (Rudak 2010). The technology is the reason, which allows to ask a question as soon as the need arise. A participant of a course can send an e-mail, post a message on a forum at any time. In this sense, the contact with the teacher is easier than at university, where it is necessary to wait for the lecturer's office hours, and take into account the fact that tutorial time is limited and many students may come (Rudak 2010). Mietzel (2001) underlined that people learn better when they have the possibilities to communicate with others, to take up cooperation and to express emotions. Moreover, this kind of relationships can be prolonged for much longer time than the duration of a semester. Participants of the e-learning course are all the time encouraged to reflect and discuss with other participants of the course about the future of the humanity and our planet.

"*In the past, people came to the information, which was stored at the university. In the future, the information will come to the people wherever they are*"

Noam (1995, cited after Smyrnova-Trybulska 2010)

Traditional learning imposes some limitations with respect to time and place of learning. There are no such limitations in distance learning. In an e-learning course, for a participant, there are no limits regarding time and place of learning. Free selection of a learning place is very convenient for a student. A student can take part in a course while sitting at his own computer at home or at a university computer room, but also while sitting in a park, high in the mountains or at the riverbank using even a smartphone.

One more benefit observed in e-learning courses is that it tremendously broadens the possibility of checking the learner's knowledge. Each module in the e-learning course begins with a pre-test and ends with a post-test (or obligatory statement in some cases). In traditional learning we usually perform a final test and only sometimes pre-tests. But it is practically impossible for traditional learning to check student's knowledge with such high intensity as during an e-learning course. Knowledge is not a priority while talking about environmental consciousness, nevertheless, knowledge is a good base for changing our consciousness and brings strong arguments

while discussing with others on necessary steps undertaking by our civilization.

During traditional courses on environmental protection or bioethics at my University I had a live contact with some 150-250 students from the Faculty of Biology and Environmental Protection (University of Silesia) each year. Thanks to the e-learning course many more students from different regions of Poland can study and discuss these important environmental topics. Large audience is not only satisfaction for the teacher, but in this case (modeling environmental consciousness) it is a very important factor in accelerating changes.

## CONCLUSION

We live on a bountiful planet, but not a limitless one. If we do not stop unwanted environmental processes (e.g. extinction of species, global warming, nitrogen pollution and many others) we will not be able to survive. A society that wishes to understand and overcome the present crisis can no longer rely on scientists, engineers, bankers, or politicians. It must instead become a vigorously civil society whose members see themselves as an integral part of environment and biosphere and are aware that people will not survive if they do not play an active role in it. Distance learning is proved to have potential to be a strong and effective tool in modeling environmental consciousness and preparing today's society to live in a future sustainable world. There are some drawbacks in using e-learning as a tool for shaping environmental consciousness of students, e.g. focusing on knowledge, lack of face-to-face contact between the teacher and the student. In general, advantages exceeded drawbacks in this learning technique using for this purpose. They are as follows: a great amount of the newest scientific knowledge and great diversity of didactic methods offered to students, high intensity of contacts between students and the teacher and students, many possibilities of checking the learner's knowledge, permanent stimulus to reflect and discuss with other participants of the course about the future of the humanity and our planet.

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# INFORMATION TECHNOLOGY IN EDUCATION SYSTEMS: ARE IMPLEMENTED STUDY ACTIVITIES USEFUL FOR SOCIETAL NEEDS?

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***Abstract:*** *This paper is centred on the analysis of study activities with regards to societal needs. Modern education must correspond with the current state of science and lifelong learning based on motivational interviewing, well formulated stories, and well-tuned educational materials. The key is communication via activities; therefore, the first idea is dedicated to an analysis of study activities with the support of Petri Nets. The benefit is the definition of the common relations that are based on the needed number of places and transitions. These numbers influence a quick implementation in practice. Teachers need dynamic and flexible work with the optimal number of places and transitions that respect the designed minimalist resolution. The possibility for further simplification brings innovation based on inspiration in other IT (information technology) products.*

**Keywords:** globalisation, information technology, Moodle, study activities, societal needs.

## INTRODUCTION

Modern society depends on information. This information is available in many forms and from various sources. A positive aspect is that information technology accesses information without time and space limitations. A negative impact is the large quantities of data and their diversity. IT products serve to handle data via implemented software in high quality and minimal time. The basic conditions are defined in an information society, where quality of life, perspective of societal change, and economic growth

are dependent on information and its use. (Murray 2008) The main factor for success is reliable and rapid access to information. (Grublová & Franek 2009) This information must be managed because information is important for everyone (firms, organisations, and individuals). Information technology offers strong and safe products for processing and data presentation from a number of fields. Users of information technology have various operating and database systems, BI and CRM products, and specialized tools or applications installed for quick analysis and interpretation of existing information.

Every information technology user must develop his or her abilities and knowledge about needed software and hardware. Everyday usage of information technology leads to active installation, optimization, or customisation from users via a user-friendly interface. This trend influences education with links to societal needs and conditions. Europe needs knowledge (Communication from the Commission to the Council European Parliament and the Economic and Social Committee, 2005). The key is an interdisciplinary approach with an optimization of resources and international cooperation between public and private sectors in research and development. The ability to generate knowledge depends on the education of researchers, engineers, and other interested persons. This education must correspond with the current state of science and lifelong learning. There is a wide range of initiatives to promote mobility and training such as the European Science Foundation (ESF) and the Human Frontier Science Program (HFSP). Such activities help to fulfil the needs of society and individuals. Societal needs are a long-term point of interest. An arrangement of human needs was defined by Maslow (the American Psychologist) in 1943. This theory of needs divides human needs by priorities from the minimal physiological needs to the needs for self-fulfilment or self-transcendence (Vysekalová & et al. 2004). Global processes influence these needs via oppositional moves and contents, changes and results in widespread formation and decay units, formulae, and models with the support of education and knowledge. The problem is to find the appropriate authority that guarantees the right concept for optimal use of individual power. Riegel defines individual power in society with a close relation to the power society. A power society provides a diverse range of initiatives and requires a number of skills. The needed initiatives are:

- enough food,
- much information,
- saturation of contacts, and

- impersonality and objectivity.

The needed skills are:

- the ability to achieve high and stable performance,
- the ability to quickly fix any errors and mistakes,
- the ability to achieve a high level of compatibility, and
- an adequate level of identity, integrity, and invention. (Riegel 2006)

Firms, organizations, and individuals must have a good bearing on available possibilities and limits based on psychological characteristics of human behaviour. (Tyzska 2004) The hardness, complexity, and demands of mediation help to solve education with a teacher or external coach. The coaching (Donné 2012) offers useful methods with a link to development and application of skills via education. Irreplaceable feedback and the "aha moment" bring a benefit in the form of optimal communication with regard to potential output and inner barriers. The inspirational activities include a discussion of options for resolving and active listening to motivational interviewing (Sikora 2011) for a positive effect on the perception created by presentation, contribution, or chapter in a book. Students prioritize a well formulated story that specifies what is needed to do with adopted methodology. The term "story" has links to other types of communication in science and research through the media (Kořen & Vrtiška 2012) with an aim to present the results of research of information technology in education.

## 1. EDUCATION AND RESEARCH FOR INNOVATION

Modern society brings enough possibilities on self-fulfilment or self-transcendence. Education helps with the transfer of information to knowledge and user skills based on learning about supporting decision making, improving cooperation and teamwork, and accessing modern forms of personal development via a process of sharing and evaluating information in education systems. These systems must offer practical work via multilingual educational materials to raise awareness about information technology. Educational materials are created for different age groups, including videos, animations, films, brochures, and other educational documents and activities on the Internet. It is important to prepare well-tuned educational materials and study activities on communication support for a given type of student. (McCarthy 2012) Intuitively, the teacher understands the attraction of

materials and activities because it is necessary to engage new students; however, a number of necessary connections often leak.

A sophisticated education system naturally guarantees the functioning and effective management of knowledge and information. The data and educational materials must be stored in an adequate format and structure, which then leads to optimal knowledge creation. The support for knowledge management needs to combine two properties of globality and interactivity (Grublová & Franek 2009). Standard education must provide a systematic training for users of information technology. Education with innovation support has the potential for a variety of methods that are used for necessary progress in all human fields. Firms, organizations, universities, and schools must work together in research excellence (Vosečková 2012). Research excellence leads to the development of unique products and services that use information technology. International organizations, agencies, firms, and universities use defined terminology, guidelines, models, and standards for the correct implementation of information technology with respect to actual benefits and risks.

Education must take into account the close relations between science, practice, and information technology. Finding meaningful improvement and innovation of existing information systems and applications is based on the philosophical approach with the support received from methodological grounds. Selection and application of appropriate methodologies helps in determining required methods, techniques, and tools. (Scientific methods in the social sciences, 2010) Uncompromising competition and urgent user requirements lead to more prudent practices, research, and education in the field of information technology innovation. Users must understand modern access, methods, and tools with links to research. Research is increasingly specialized, and finer models of reality are in centre of interest. The adequate languages and methods are used for analysis as an example in Petri Nets.

## 2. ANALYSIS WITH THE SUPPORT OF PETRI NETS

A suitable analysis of software development uses simulation. The created models assess various views on the simulated system and they show the strengths and weaknesses of the adopted solution on the basis of comparisons. Most of the defined models are temporary. The reason is changeability of societal needs and the environment in a global society. The benefit of the simulation techniques is to present an attempt with modelled information about the original analysis system. (Křivý & Kindler 2001)

One of the suitable methods is an analysis via Petri Nets. Petri Nets have a wide spectrum of applications in:

- the analysis and simulation for object-oriented systems (Motameni, Mirzaeian 2011),
- the analysis of distributed systems (Bordbar, Giacomini, Holding 2000),
- the modelling of inventory control processes, (Andrić, Makajić-Nikolić, Stevanović, Vujošević 2005) and
- the analysis for discrete-event systems (Cabasino, Giua, Mahulea, Seatzu 2011).

The above-mentioned list shows only a few applications for Petri Nets. Other Petri Net use is dedicated, for example, to analyses of multiprocessor memory systems, data-flow computing systems, local-area networks, formal languages, human factors, or decision models. Next lines are dedicated the Petri Nets for describing parallel and concurrent activities in a selected education system. Teachers often work with education system like Moodle (Moodle 2012). Moodle is a system used to support communication between teachers and students in learning. This system must also respect societal needs and requirements on information technology. The key for communication is the implementation of study activities. Moodle offers Chat, Conversation, Database, Glossary, Forum, Lesson, Notes, Questionnaire, Research, Survey, Test, Wiki, and Workshop activities. These activities have an influence on education and students receiving training; therefore, these activities are analysed like first. An exercise of such an analysis based on simulation for the Workshop activity with Petri Nets is showed in Figure 1. The validity of the defined model is verified by starting the given simulation. A route cycle has the starting place P1 and the path goes through the specified transitions and places.

The created model describes the standard method for creating a study activity. It is apparent that the Workshop (*Wosh*) is defined by the following relation:

$$Wosh = \sum_{i=1}^{25} P_{6-i} \ ,.$$

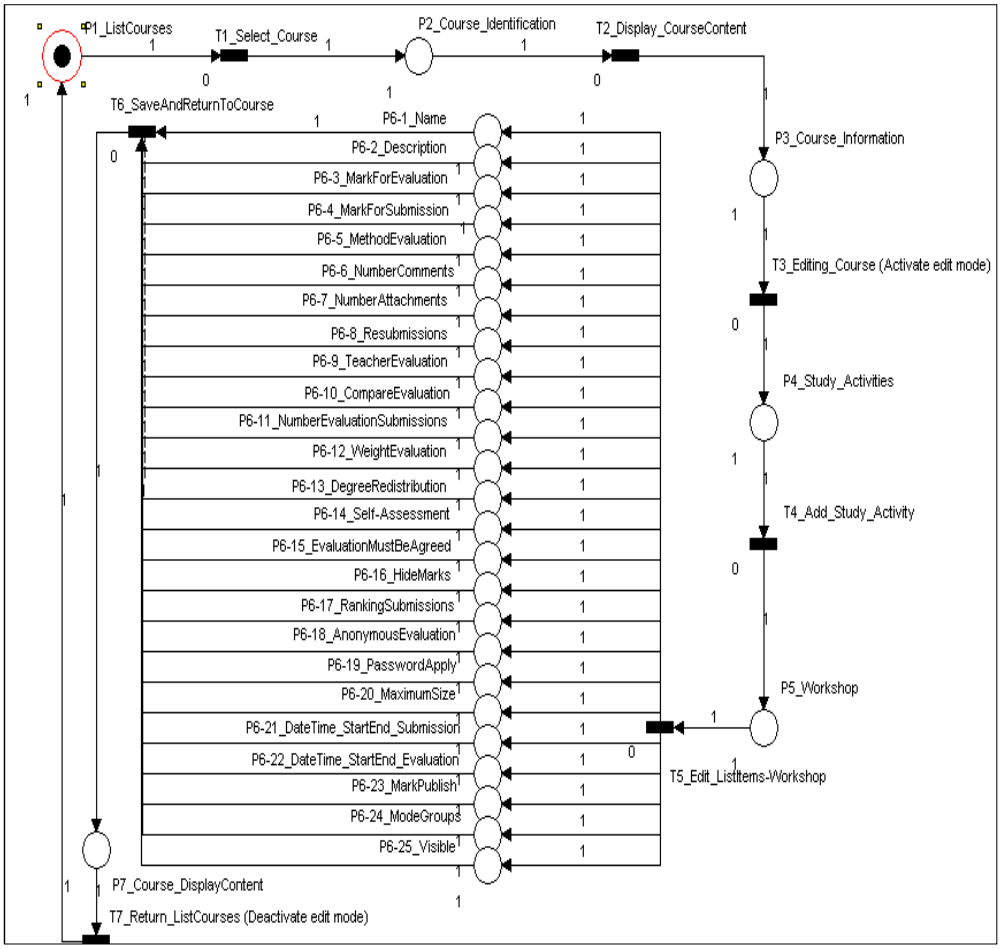


**Figure 1. Simulation method for creating a Workshop in the Moodle system.**

*Source: own elaboration*

The benefit of additional analysis is the definition of common relations based on the above realized simulation. The defined relations are based on the needed number of transitions and places for activity creation. These numbers influence a quick implementation and activation in practice. The Moodle system implements study activities (objects) via defined items (attributes). The range of needed attributes is different. Available objects are created via seven attributes (for Exploration), fourteen attributes (for Database, Wiki), sixteen attributes (for Glossary, Survey), eighteen attributes (for Forum), or twenty-five attributes (for Workshop). The identified numbers of the places (attributes) have limits from the suitable and necessary view. The minimal

number of places is defined by seven places and the maximum number of places has a value of twenty-five (study activities are realized via the menu from the website):

$$\textit{The minimum (7 places)} \leq \textit{place number for study activity creation} \leq \textit{maximum (25 places).}$$

Teachers (like standard users, small and medium-sized firms, and individuals) need easy and quick implementation. They need dynamic and flexible work with the education systems. The work must use a minimum of items and commands so that the optimal number of places respects the designed minimalist resolution. The possibility for further simplification brings innovation based on an optimal number of places (items = attributes) for study activities:

$$\textit{The optimal number of places for study activity creation} \leq \textit{minimum (7 places).}$$

Similar relations are defined for needed transitions. These transitions represent commands for implementation selected study activities into course structure. All activities use the same method. Such method creates seven transitions (select course, display course context, editing course, add activity, edit list item for activity, save and return to course, return to course list). Searching innovation with advantage uses inspiration from other IT products. Existing IT products often use a standard procedure based on practice. An optimal analysis continues via a further volume of work that is centred on the analysis of selected layers and comparisons with other education systems. This analysis of education systems uses defined layers of IT products such as architecture, file systems, process management, security, and user environment. These layers are defined for design of IT products like operating and database systems, or BI and CRM products.

## CONCLUSION

The application of information technology requires from the user to customize his or her products with regards to current needs in companies and organizations, but also for individuals. The positive factor is that people are looking for new innovations offered by information technology via correct education with links to research and centres of excellence. The consolidation and development of professional skills is necessary, with an aim to improve the current state of practice, and to respect societal needs. Presentation and communication are necessary skills in the modern global information society.

Teachers must know how to listen actively, to define the methodological bases and results of work precisely; therefore, it is important to use the attractiveness of communications, reports, articles, or chapters in education. This type of education respects successful communication and efficient publishing with a practical application of the coaching process and research activities into education via activities. Study activities must be easily implemented on the basis of suitable analysis with regards to societal needs. Realized analysis defines the common relations based on the simulation with support Petri Nets. The defined relations are built on the minimal, maximum, and optimal number of transitions and places for a study's activity creation. These numbers influence quick implementation and activation in practice.

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# ETHICAL ASPECTS OF THE CURRENT DISTANCE LEARNING

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***Abstract:*** *The paper deals with the ethical aspects of the current distance learning. The basics of the balanced teacher-student relationship are discussed from the point of view of a member of the communication and information systems department. The author assumes that the respect to the ethical aspects significantly supports the motivation of the students. On the other hand, an underestimation of this issue may pose difficulties in the future development of the distance learning technology and its usage in teaching and learning processes. The author offers some necessary points for discussion on this selected problem. The paper is a result of the author's current experience in this field.*

**Keywords:** education, ethical aspects, distance learning, autonomy, study privacy.

## INTRODUCTION

Ethics (moral philosophy) is a branch of philosophy that involves systematising, defending, and recommending concepts of right and wrong behaviour (Fieser 2009). According to Weinstein (Weinstein 2012), there are five basic principles of ethics that are common to all faiths:

- Do no harm.
- Make things better.
- Respect others.
- Be fair.
- Be loving.

These values are defined differently in different parts of the world, but they are cross-cultural and expected among all groups of people.

Based on the argument that there is only one universal good and all other moral goods are cultural and relative, Jarvis (Jarvis 1997) develops the position that adult education is a site within which human morality is worked out. It seems to be sure that maintaining proper conditions for improving and development of teaching and learning processes is a key element for the future economic and social prosperity of modern states.

The basic principles relating to the rights of students and educators developed by the Association of American Educators (AAE) Advisory Board and by the Executive Committee of AAE can be found in the Code of Ethics for Educators (Association of American Educators 2012). As the second source of information the 'Code of Ethics – Education Profession' formulated in Florida (Florida Department of Education 2012) can be used. An interesting approach to the topic is also the 'Ethical Guidelines for Educational Developers' (Professional and Organizational Development Network in Higher Education 2012).

In the next text the author formulates some points which can serve as a basis for discussions leading to a suitable solution from the distance learning point of view.

## 1. BASIC CHARACTERISTICS OF THE CURRENT DISTANCE LEARNING

Distance learning is a field of education that focuses on teaching methods and technology with the aim of delivering teaching to students who are not physically present in a traditional educational setting such as a classroom. Distance learning is ideal especially for older students who have busy family and work lives that prevent them from attending on-campus classes.

Distance learning technology has become a very successful approach especially to the lifelong learning but its usage is wider and wider. Due to developments with the Internet and interactive technology, distance learning is a rapidly changing field (Snow 2012).

The current distance learning requires respecting the specific ethical standards which are similar to common standards of practise for the teaching profession. Vongalis-Macrow stated that the current era, marked by a new global economy transforming economic and social development, has created the need for a reorganisation of teachers' representation. The Professional

Code of Ethics should create a sense of professional identity and unity amongst teachers (Vongalis-Macrow 2007).

The current distance learning is closely connected with modern information and communication technologies (ICT). There is a necessity to highlight the ethical dilemmas and pedagogical considerations of usage of the Internet with its social networks. It is a fact that the technical level of the contemporary society makes it possible to affect the private sphere of the students during their distance learning. The reason is that the access to information and the distance education itself is based on computer networks and the society has no problem with a large amount of data archiving, rapid, powerful and effective searching. Analytical tools and data mining systems are available.

The author assumes that a distance study environment should enable students to study and to act, to go to his/her study goals, according to his/her own will.

Independent thinking and study autonomy should be supported and the privacy of the education participants should be protected.

## 2. ETHICAL STANDARDS OF THE CURRENT DISTANCE LEARNING

The main purpose of the ethical standards of distance learning should be the development of such a study environment which can support an atmosphere of trust and openness. These rules should not be focused only on teachers and students but also on other persons who support this education, such as software creators and computer networks administrators.

The key principles are as follows:

- Building an atmosphere of trust and openness;
- Providing suitable support for newcomers;
- Encouraging tolerance to different opinions;
- Supporting professional development and culture;
- Promoting cooperation;
- Good knowledge of laws, regulations and policies;
- Promoting the autonomy and independence of students;
- Respecting multicultural and social justice;
- Responsibility in using net technology.

- Taking care of proper resources, appropriate pedagogy, assessment and evaluation.
- Protection of privacy.
- Elimination of cheating.

Due to the necessary autonomy of the current student and protection of his/her privacy there should be especially emphasised:

- Every student should have the right to select on his/her own ways to meet the educational goals.
- Students must not be forced to use educational methods which are in conflict with their opinions on the effectiveness of their time devoted to study and their efforts.
- Educational methods, which are used by a particular student, are his/her private matter and the monitoring of students is not possible without his/her own agreement and written permission.
- The assessment of students is equitable, the cheating should be impossible.

The above principles are described in more detail below.

### 2.1 Atmosphere of Trust and Openness

Building an atmosphere of trust and openness should be a permanent process. A pleasant and kind environment and a transfer of positive emotions among the education participants contribute significantly to the successful fulfilment of study goals and support the motivations of all participants of a distance learning course.

### 2.2 Support for Newcomers

The form of a suitable support for newcomers depends on the main characteristics of the target group. The individual support can be often demanding for the teacher and so the form of FAQ (frequently asked questions) can bring a quick positive effect.

### 2.3 Tolerance to Different Opinions

Encouraging tolerance to different opinions is closely connected with the distance learning course improvement. Different opinions should always be welcome. They are valuable for the teacher. They can play an important role in setting new points of view, new questions to solve and new approaches to be used.

### 2.4 Support Professional Development and Culture

The professional development and culture should be primarily supported inside every educational institution. This support should be based on a good knowledge of the world leading practices. Every educational activity should be connected with an appropriate culture.

### 2.5 Promoting Cooperation

The distance learning study activities have to be connected with the principle of promoting cooperation. The contemporary civilisation needs especially self-confident experts who are able to cooperate effectively. This cooperation is often carried out in an international and multicultural environment.

### 2.6 Respecting Laws, Regulations and Policies

Good knowledge of laws, regulations and policies is always necessary. The appropriate respect building is a never ending process. Especially in an international and multicultural environment it can be a very demanding process and a misunderstanding can sometimes arise.

### 2.7 Promoting the Autonomy and Independence of Students

Promoting the autonomy and independence of students is closely connected with the basic principles of distance learning. Distance learning is primarily based on a higher autonomy and independence of its students. The need for the autonomy and independence seems to be generally dependent on the intelligent quotient (IQ) of students. A hypothesis can be formulated as ‘a student with higher IQ requires more autonomy and independence’. The research activities in this field could be beneficial.

### 2.8 Respecting Multicultural and Social Justice

Respect multicultural and social justice is an important prerequisite for the formation of a pleasant study environment. The students should feel the equality with regard to their cultural values and their access to education. On the other hand the students have to respect the rules of their distance learning provider.

### 2.9 Responsibility in the Net Technology Usage

Responsibility in the net technology usage should guarantee the information exchange with regard to possible danger connected with the computer networks usage. The awareness of various threats associated with computer networks should be also supported by current information from the distance education providers.

## 2.10 Taking Care of Proper Resources, Appropriate Pedagogy, Assessment and Evaluation

Take care on proper resources, appropriate pedagogy, assessment and evaluation is a prerequisite for a successful education process. As the technology base of contemporary education is under a rapid change, the education providers should be flexible and keep in mind the possibilities of the modern technology usage.

The main role of the teacher is closer and closer to an expert guide. The teacher should keep in his/her mind the existence of open educational resources and exploit them effectively. The open educational resources can radically contribute to the improving of educational outcomes. The teacher should give a professional advice with regard to their usage to his/her students. Especially the use of professional tailored animations and video clips enables better understanding and deeper insight into selected key parts of study branches.

Identifying, classifying, and evaluating educational multimedia products should be an important task for the guarantees of contemporary subjects. IT support for knowledge management can make their work easier. Nowadays, the communicative competence of teachers, preparation for cooperation, information sources building and sharing increase their importance.

## 2.11 Protection of Privacy

In the U.S., the education records are protected by a number of federal and state statutes and regulations. Generally, school records cannot be released without the prior permission of the student. The Federal Education Records and Privacy Act (FERPA) requires that any school or institution that receives federal funds for education may not release school records or any other personally identifiable information without prior consent of the student, with a few specific exceptions. (Banisar 1994).

In the Czech Republic education activities should respect the Czech Republic Law No. 101/2000 (Personal Data Protection 2000). A possible application of this law from the point of view of learning management systems can be found in (Coufalíková and Hrubý 2010).

Continuing research in the field of personalised education leads to the personalised learning environment and the construction of personal adapted e-learning systems. There should be required specific solutions for students' private protection because of the proper function of these systems has to be based on a perfect knowledge of every student, his/her learning style, etc. The

sensitive personal data stored in these systems requires special treatment in compliance with the current law.

### 2.12 Elimination of Cheating

The new technologies enable new forms of cheating. The possibility for cheating cannot go unnoticed in the teaching and learning processes. It would lead not only to a degradation of the work of teachers but also to a degradation of the whole education system. The teachers have to be prepared to this new environment and they should modify the form and content of current exams. The maximum possible efforts to eliminate cheating in the teaching and learning processes are necessary.

## CONCLUSION

We can see that the boundaries between work and personal lives of teachers and students appear to be blurring in social network communications and privacy and confidentiality of personal information are often disregarded. On the other hand, social network user groups and blogs may contribute to education as they are regarded as trustworthy sources of information. It appears mandatory that internationally accepted policy frameworks should be established and discussed with the aim to address basic rights and responsibilities of users and providers of the Internet and its usage in distance learning. Furthermore, academic programmes leading to professional qualifications should include instruction on how to maintain the image and integrity of their profession in the usage of the Internet (Delport 2011).

Current distance learning calls for ethical standards. The author assumes that the ethical standards proposal stated in the text of the article should be discussed and the final solution should always be formulated according to the social-culture specifics of the target group.

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# RULES FOR CONSTRUCTING E-LEARNING TOOLS WHICH FOSTER INDEPENDENT, CRITICAL AND INNOVATIVE THINKING

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***Abstract**: I discuss which conditions conducive to creativity are essential to be recreated online. Built-in functionality for providing and maintaining anonymity should be an important component of e-learning procedures since it maximizes the chance for both creativity and for objective and precise assessment. Idea evaluation should rely on several explicitly stated quantitative criteria using several measurement scales and descriptive statistics. Emphasis should also be placed on visualization methods, enriched by findings from cognitive psychology.*

**Keywords**: criteria, creativity, e-learning, heuristics, innovation.

## INTRODUCTION

Nowadays, most of educational effort goes, unfortunately, to filling students' minds with facts and schemata that are satisfying, but provide only superficial understanding of the phenomena and rapidly become obsolete. Tools based on IT should redirect the educational process from fact-delivery to the focus on methods and concepts. I believe it may be more effective than teaching traditional facts and theories (Jasieński 2007b).

In fact, our entire educational philosophy should move towards building intuitive understanding, teaching heuristic methods of problem solving and developing powerful fact-finding skills (Morgan 2001; Jasieński 2012). Modern information technology makes such a shift easy to implement. For example, the need for formal mathematical skills and analytical reasoning may be substituted by numerical (computer-intensive) approaches (Efron &

Tibshirani 1991). The latter may be very effective at accomplishing the goals relevant for students.

The main point of this paper is the issue of what we should pay attention to when designing online tools that are supposed to assist-foster-nourish-promote-stimulate innovative thinking. However, I am not concerned with any cognitive-psychological issues related to designing optimal online tools (Krug 2005), but I focus on the content instead. Is it possible to facilitate creativity using online tools? What features should they possess?

Paradoxically, creativity also needs discipline in thinking, not only free-flowing chaos (Nęcka 2001). The process of implementing a heuristic method in software necessitates increased precision in designing the overall flow of the procedures and clarity of instructions. A certain amount of imprecision inherent in organizing live meetings is no longer acceptable when specifying rules for the functioning of an IT tool.

## 1. CHARACTERISTICS OF THE ENVIRONMENT CONDUCIVE TO INNOVATIVENESS (ECTI)

Just like behind the success of eBay and Allegro was the insight of their designers who knew how to manage trust online, any well-designed online educational or training systems should recognize human needs with respect to social behaviour (Jasieński 2011). Especially relevant are the needs related to trust and cooperation, and efficient online substitutes should be implemented in virtual collaboration settings (Brown et al. 2004; Carchiolo et al. 2010; Kelton et al. 2008; Kuo & Yu 2009; Mitchell & Zigurs 2009; Sarker et al. 2011; Thomas & Bostrom 2008). Only then can we hope that inter-personal distance disappears from distance learning (Jasienski 2007b).

Creativity needs certain conditions to be fulfilled and it makes no difference if our activity is conducted online or in a live setting, since in this case the requirements of human nature are quite fundamental. Online tools should create a situation which facilitates creativity; some of the postulated conditions to be fulfilled remove the negative effects associated with any group activity (e.g. competition, social loafing), while others strengthen or generate the positive effects (teamwork; see also: Jasieński 2009b).

The context conducive to creativity or, what Jasieński & Rzeźnik (2012) called the environment conducive to innovativeness (ECTI), should possess certain characteristics. They will make more likely building the social learning environment (Vassileva 2008) or achieving an effective mix of,

what was called, liquid and solid learning (Das 2012). One could speculate that ECTI should be:

- stress-free, because we are easily intimidated, especially when we our contributions are expected to be non-standard, novel, controversial, or unorthodox;
- peer-pressure-free, because we tend to be easily embarrassed;
- hierarchy-free, because we perform better when treated as equals; formal relations among participants reduce the chance for true spontaneity;
- fun, because we are more creative when we laugh;
- routine-free, because we like being spontaneous
- suspenseful, because we are easily bored;
- stimulating (by providing customized hints and objective and quantitative feedback to the proposed ideas), because we are impatient and the sense of urgency or perception of limited risk have a beneficial effect on the creative process (Simmons & Ren 2009).
- orderly: because keeping timing and providing easy access to fact checking (thus removing ambiguities or imprecision) facilitates idea evaluation.
- organic: online resources may stimulate creativity better than pre-selected databases of ideas because they are "alive" – they have the capability to grow out of our control and, therefore, they may surprise us with unexpected insights; also, such online resources learn about our needs, so they may give us more useful hints (just like Google's PageRank algorithm).
- interdisciplinary: inspiration flowing from other disciplines is the basis of, what Wilson (1999) calls "consilience" which is the next step in the evolution of ideas and views.

## 2. BASIC FEATURES OF AN ONLINE SYSTEM FOR INNOVATIVE THINKING

An effective system must possess certain basic, "physiological", features in order to become an effective tool at the higher, "intellectual" level of functionality (see also Rudak 2009). I argue that poorly designed administrative functions governing access, anonymity and feedback, will seriously reduce the creative effectiveness of even the most sophisticated online tool. The devil, as usual, is in the details.

### 2.1 Managing access and administrative privileges

Clearly formulated procedures for deciding who and when should perform certain administrative activities are necessary for the proper functioning of online tools. The system must allow convenient ways for assigning who divides the group into teams, who has the right to post answers. and who and when evaluates the proposed ideas. This issue is particularly important in the case of group activities, when e.g. a group of students, together with their section leader, form a profile for conducting a brainstorming session. Similarly, a team of employees may log in together to perform a morphological analysis in order to develop a new product. Sometimes, administrative privileges may form a hierarchical structure, with several teams (each led by its team leader) working independently on the same project, with departmental head evaluating the proposed solutions.

### 2.2 Immediate and stepwise feedback helps creativity

Pre-programmed online procedures can be more efficient than any human assistance if they are equipped with a set of automated feedback statements. Immediacy of such evaluations may allow the participants to benefit from a continuous stimulation, maintaining interest in the topic. In addition, feedback may be generated by the system in increments, in responses to small steps of the creative process, rather than offered only at the end and, consequently, generate substantial educational benefit (see Handley & Williams 2011; Krause et al. 2009; Thoms 2011, and Tsai 2010, on the importance and role of feedback in education).

### 2.3 Controlled anonymity: whenever it is needed

Providing and maintaining anonymity is an important component of various creative-thinking procedures since it maximizes the chance for unconstrained creativity and objective evaluation. When the need to protect personal image is removed, one's creativity may be greatly improved. The referees are freed from the risk of interpersonal conflicts between them and the authors of ideas. This effect is especially relevant in institutions with hierarchical and formal organizational cultures (Jasieński 2007).

In live settings attempts at protecting privacy (at certain points during debates or team activities) may be considered as rude or as expressions of lack of trust. In contrast, when anonymity is simply a pre-programmed, built-in feature of an automatic system, it may be managed more effectively and it is more readily accepted by the participants. For a discussion of a privacy-preserving reputation management system and the ways of implementing

anonymity see, respectively, Answar & Greer (2012) and Weippl & Tjoa (2005) and Yong (2008).

### 2.3.1 "Don't ask – don't tell": the "quadruple anonymity" system at WSB-NLU

The system of managing submission of Bachelor's and Master's theses and obtaining reviews and grades for them may serve as a good illustration of the role of anonymity in influencing human interactions in the academic context. The Faculty of Entrepreneurship and Management at WSB-NLU introduced in 2009 a set of online procedures which guarantee freedom from any form of peer pressure that may be felt by the student, the reviewer and thesis adviser, all involved in the process of evaluating the submitted thesis.

The system is said to be characterized by "quadruple anonymity" and is based on the following conditions:

1. the student does not know the identity of the thesis reviewer – this condition frees the reviewer from any form of stress related to knowing student's expectations with respect to the grade. The reviewer's name is never revealed to the student by the employees managing the office. The content of the review, including the partial scores and the text of the review, is sent to the student's profile in the intranet.

2. thesis adviser does not know the identity of the thesis reviewer – this condition frees the reviewer from any form of stress related to knowing the adviser's expectations with respect to the grade. Since most of the time the thesis adviser is the reviewer's colleague, and often is lower in academic ranking, such peer pressure could be, and indeed was observed to be, quite intense and detectable. As described above, the reviewer's name is never revealed to the thesis adviser by the administrators.

3. thesis reviewer does not know the identity of the student – this condition frees the student from any form of lack of objectivity on the part of the reviewer related to knowing student's gender or academic quality. In other words, it protects the student from potential sexism and elitism sometimes exhibited by the reviewers. The reviewer receives either the electronic (pdf) or a printed version of the thesis, either of which has the student's name (and also the page with acknowledgements) removed by the online system.

4. thesis reviewer does not know the identity of the thesis adviser – this condition protects the student from the negative effects of potential pre-existing conflicts between the academic colleagues who serve as the reviewer and adviser. The reviewer's low evaluation may be used as a form of punishment directed against the adviser, with student being, of course, the

casualty of such academic conflict. The reviewer's version of the thesis misses the adviser's name, which is removed by the online system.

The online environment makes implementation of these procedures relatively easy, given that a customized system has been created and that the faculty members and administration agree with the system's objectives (see also Czerniak 2010). The sense of freedom and independence that is the desired outcome of the above listed procedures are prerequisites for honesty of judgment and creativity in exploring solutions.

## 3. HEURISTIC METHODS AMENABLE TO SOFTWARE IMPLEMENTATION: EXAMPLES

### 3.1 Morphological analysis: a modular structure

A conceptual engine for running the morphological analysis could have the structure outlined below. Even though there is nothing novel in the description of the method itself (see e.g. Ujwary-Gil 2004), the main benefit of this exercise is to clarify the logical structure of the task of adopting a particular heuristic method for the software environment. Value engineering and attribute listing are two methods based on similar sets of principles.

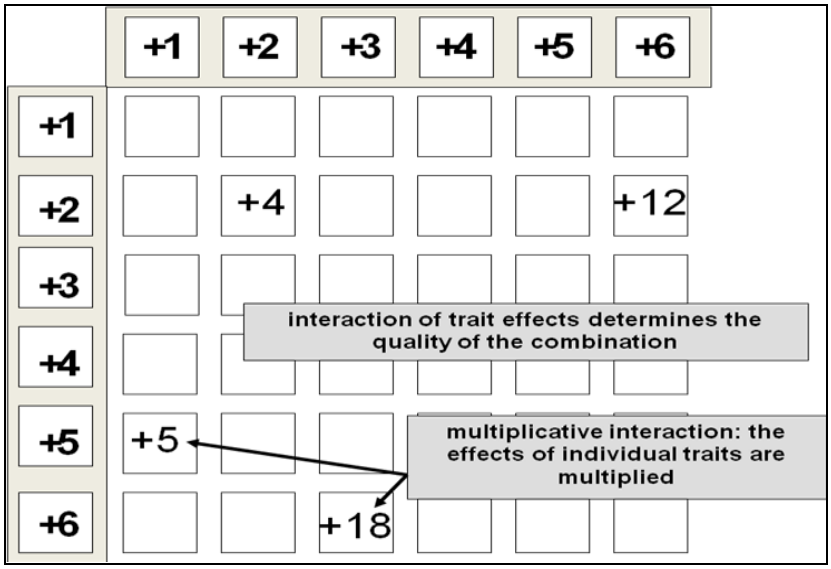


**Figure 1. Quality of each of the combinations results from a unique interaction of trait values: in this case a multiplicative interaction is illustrated.**

*Source: own elaboration*

- Analyzer generates the description of the product. It must allow the user to create a listing of all attributes of the analyzed product, such as colour, size, shape, presence of certain characteristics or components used for its production etc. Each attribute should be described in the manner which allows enumeration of several states in which this attribute exists. For example, listing of several colours, several categories of size or several sizes of the storage capacity. Categories may be purely qualitative, i.e. they may form a nominal scale (such as types of materials: leather, metal, plastic, fabric, glass etc.), or they may lend themselves to be listed on a quantitative scale (such as categories of size, cost of production etc.). In general, quantitative metrics enable us to apply more powerful tools for analyzing interactions between variables and therefore yield more robust solutions during optimization analyses (Figure 1).

- Legislator generates the criteria used in evaluation of the product's quality.
A) The criteria are product- and problem-specific and therefore the specific menu used in any given case may be a subset of a larger list of criteria.
B) selecting the scale used with each criterion (for example: ordinal scale of quality from 1 to 10 or a continuous scale for measurements of some physical property etc.)
C) assigning weight to each criterion, with the weights for all criteria adding up to 1; the system should automatically check if the weights are selected correctly.

- Explorer searches through the combinations comprising the morphological box, according to certain, clearly specified rules. The choice of the searching strategy is partially dependent upon the size of the universe to be searched, thus depends on the number of attributes and their levels.
a) The rule "systematic examination of every combination" guarantees success in finding the best combination, but is obviously feasible only with a small number of traits and a small number of levels per trait.

b) The rule "random walk" involves the following steps:
- randomly pick which cell of the box will be examined first, e. g. A2B3C3D5
- decide the index of which trait is to be modified, e. g. trait D
- decide whether the index will be increased (+1) or decreased ( –1), e. g. -1
- check the next cell: A2B3C3D4

c) The rule "sequential sampling" involves the following steps:
- form all combinations of traits A (2 levels) and B (4 levels):
A1B1, A1B2, A1B3, A1B4, A2B1, A2B2, A2B3, A2B4
- examine all the combinations and pick those that satisfy the criterion of

quality, i.e. the best combinations, for example A1B4 and A2B3; discard other combinations
- add trait C and form combinations of A1B4 and A2B3 with 3 levels of C: A1B4C1, A2B3C1, A1B4C2, A2B3C2, A1B4C3, A2B3C3
- pick the best combination

An important issue to explore, and related to the concept of sensitivity analysis (see below), is the significance of the order of including the traits in the sequential analysis of combinations. It is entirely possible that exploration which would start with analyzing combinations of traits B and C, adding trait A as the last, would yield different outcomes than the order described above. Such order-dependence should be taken into account, by providing options for changing the order of the recombined traits.
- form all combinations of traits B (4 levels) and C (3 levels): B1C1, B1C2, B1C3, B2C1, B2C2, B2C3, B3C1, B3C2, B3C3, B4C1, B4C2, B4C3
- examine all the combinations and pick those that satisfy the criterion of quality, i.e. the best combinations, for example B3C1 and B4C3; discard other combinations
- add trait A and form combinations of B3C1 and B4C3 with 2 levels of A: A1B3C1, A1B4C3, A2B3C1, A2B4C3
- pick the best combination, but please note that now the list of available combinations to choose from is completely different than before.

- Combinator is capable of creating all possible combinations of attributes and of their levels and visualizing in a convenient way descriptions of the generated combinations. Only these combinations are generated which are selected by the Explorer module.

- Evaluator allows us to perform evaluation of the combinations selected by the Explorer; each combination selected by the explorer is shown with full description on the screen, together with the list of all criteria available for the assessment of this combination. The module computes the total index of quality, based on the partial assessments, taking into account the weights of each criterion (Figure 2). Sometimes the trait values may have quantitative effects - i.e. not as categories (like colours) but like concentrations of a chemical compound, dimensions, colour intensities, temperatures etc.

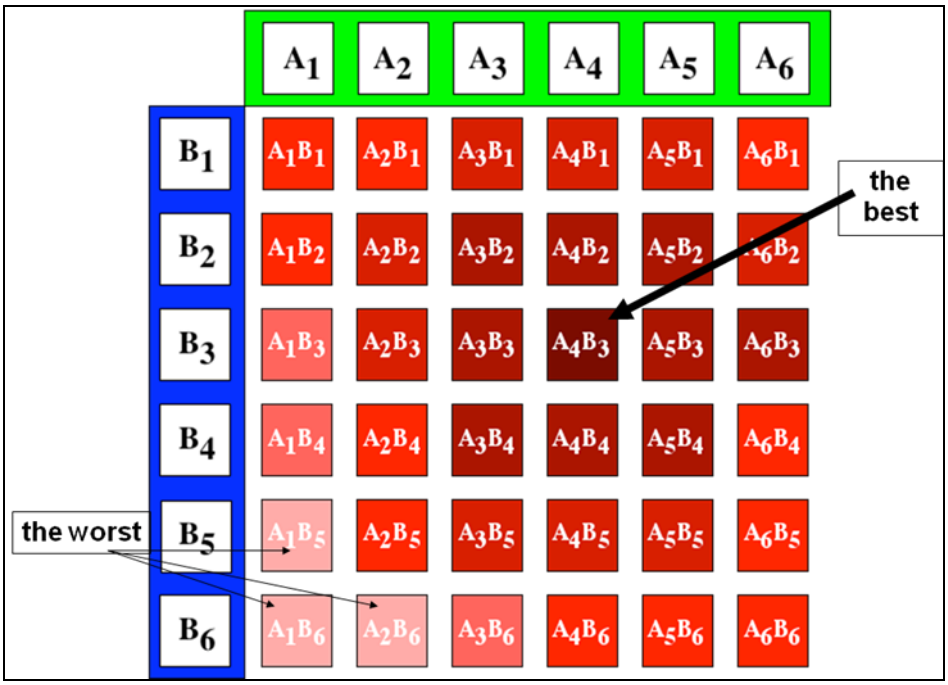


**Figure 2. A two-dimensional landscape of 36 combinations of various levels of quality.**

*Source: own elaboration*

- Integrator of evaluations shows the current ranking list of the evaluated combinations according to their overall quality score; the module may also calculate distances (as the number of steps or units) between combinations along each of the dimensions of the morphological box. One overall, multivariate measure of distance may also be used for those dimensions which are quantitative. This module should also present the verbal characteristics of the most highly-evaluated combinations, creating their descriptions.

- Exporter allows output of data for further analysis, using more specialized software. The data may be coordinates of all evaluated combinations, together with their partial scores and their weights.

### 3.2 Gordon-Little version of brainstorming: temporal dynamic well suited for online implementation

Since the system allows for revealing the content and sequential stages of the procedure gradually, it maintains the involvement of the user. Some of the traditional heuristic methods, such as the Gordon-Little brainstorming session, have the same advantage: the moderator gradually reveals new

information which is necessary for the participants to know what the topic of the session is (rather than providing all the needed information at the beginning; Proctor 2002). The online system allows storing the ideas submitted at each stage of the process by all of the registered participants and also keeps timing of the stages.

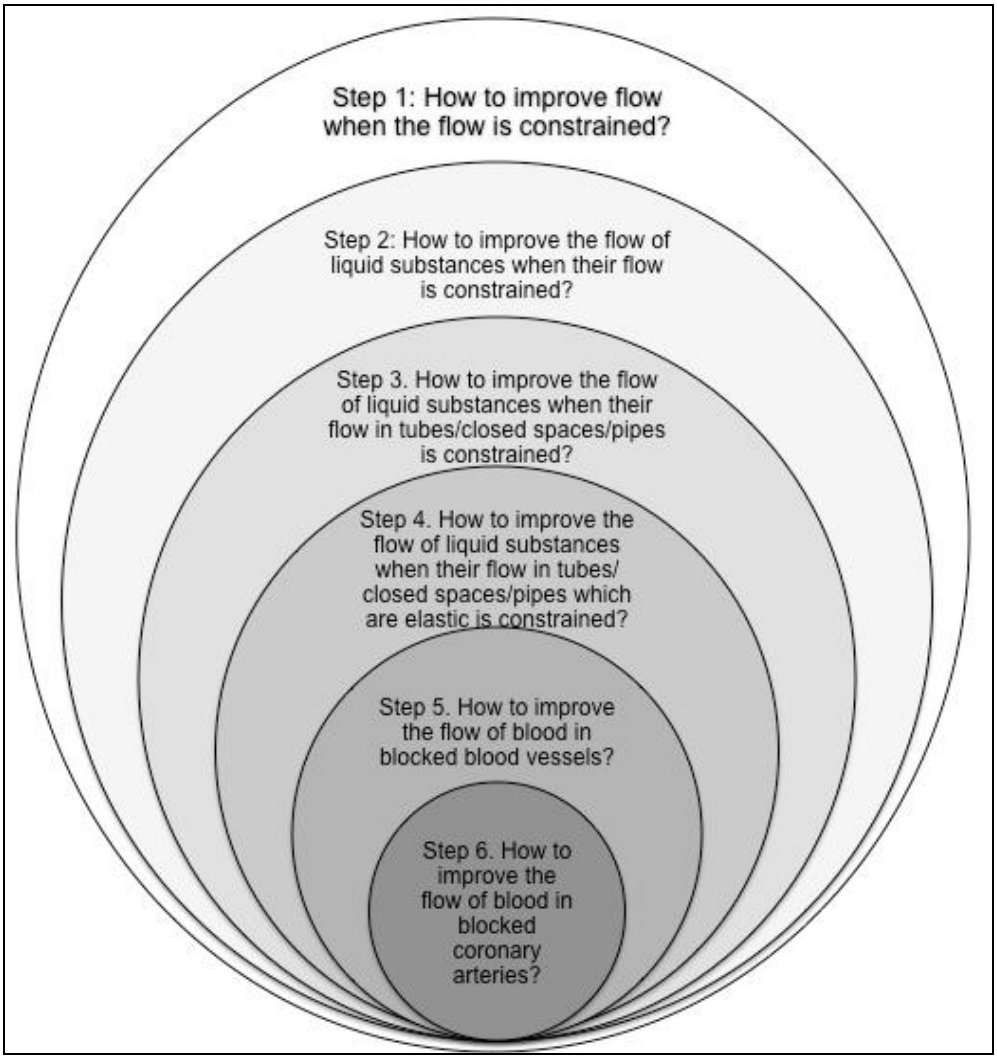


**Figure 3. The Gordon-Little version of brainstorming. The relative sizes of the circles visualize the range of possible interpretations of the topic which is finally presented in Step 6.**

*Source: own elaboration*

The participants do not know the problem to be solved – only the moderator knows it and provides hints in the right direction. Advantages of this approach are evident: participants' attention and enthusiasm are kept high, and ideas suggested at early stages may become useful later, when more is known about the problem. From the standpoint of the final problem, they may be radical and brilliant insights, even though they were just standard solutions to one of the earlier versions of the problem.

Initial hints prepared earlier by the moderator and provided by the system give the participants only very general outline and yet they are expected to suggest clear and detailed solutions. In the subsequent rounds, the hints become more detailed, which also means that the range of possible applications becomes narrower. Finally: the actual specific issue is presented. In Figure 3 one can follow one specific scenario of a hypothetical session, presented in 6 steps.

### 3.3 The nominal group method: another example of a method benefiting from online guidance

The main feature of this method is the separation between two critical stages of intellectual work: individual creativity and group feedback and criticism (Greenberg & Baron 2000). Online systems can very effectively accomplish this goal. Having received information about the topic of the debate, participants privately (i.e. protected from any form of social pressure) write down their ideas about solutions, and then their ideas are posted online. The system should allow all contributions to be shown in a convenient way, with removed authorship information.

At the next stage, each idea is discussed, clarified, and evaluated by group members, with comments and criticisms being visible to all members of the group, with or without authorship information. Withholding knowledge about who said what greatly improves honesty and increases the quality (and, maybe, harshness) of criticisms. In order to decide on a single best proposal, the next stage again assures privacy: participants privately rank the ideas in order of their preference, knowing only the content of each proposal and the criticisms it has received during the group stage. The highest-ranking (on the average) idea is taken as the group's decision.

### 3.4 de Bono's concept fan: from specific to general or vice versa

This is a simple method, proposed by de Bono (1992), which not only stimulates the users towards better creativity but also provides good training of critical thinking.

It involves searching for solutions to a specific problem (the goal) proposing either very specific ways (de Bono's "ideas") and then generalizing from them, or starting from general ways ("concepts" or even "directions") and then working towards specific. The need for reflection on what constitutes a general and what a specific statement makes this heuristic method a good educational tool.

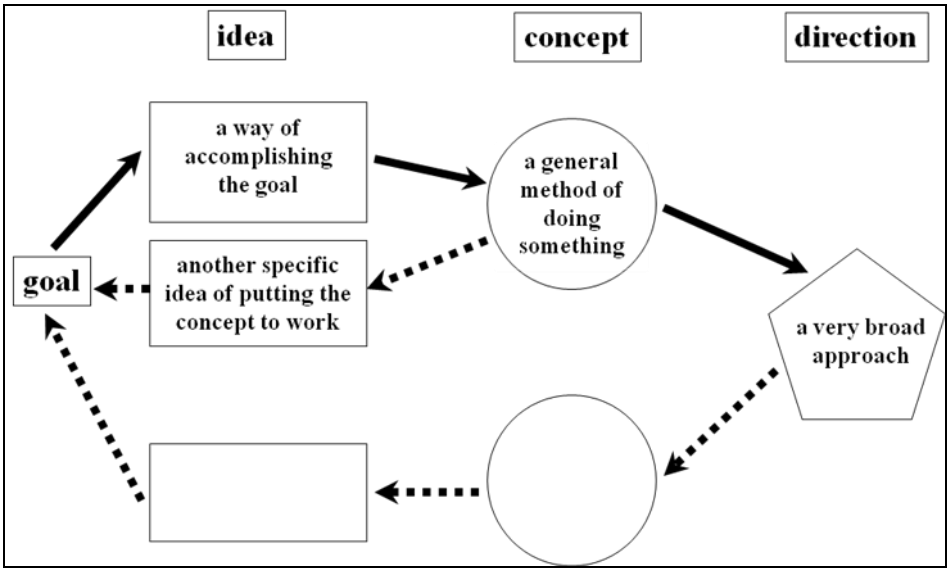


**Figure 4. The concept fan method of Edward de Bono.**

*Source: own elaboration*

## 4. CRITERIA FOR EVALUATING SOLUTIONS: SOME RECOMMENDATIONS

### 4.1 No room for subjectivity and manipulation: make the criteria of quality explicit

There are as many dimensions of quality as there are dimensions of human interest. Comprehensive software which can be used in as many contexts as possible, should have a substantial base of optional criteria to choose from. While some of the criteria may be limited in their applicability to software, other criteria have universal and fundamental significance, such as simplicity, reliability or durability. One should also note a universal tendency of the authors overstating their assessment of the quality and significance of their own results (Jasieński 2006, 2009a).

The computer system which must be ready for the user, must have all the criteria and measurement scales thought through, decided upon and prepared. It forces us to be clear and to formulate our criteria for assessing the quality of solutions up-front. Such criteria may be, for example, 8 dimensions of quality according to Garvin (1987): performance, features, reliability, conformance, durability, serviceability, aesthetics, and perceived quality. Góralski (1980) listed the following criteria for assessment: physico-mechanical, geometric, energetic, economic feasibility, design, degree of standardization and unification, ergonomics and safety for the user, and reliability.

A handy list of, the so called, „ilities" for systems engineers could include: accessibility, accountability, adaptability, administrability, affordability, agility, availability, credibility, compliance with standards, composability, configurability, customizability, degradability, dependability, deployability, distributability, durability, evolvability, extensibility, flexibility, installability, interchangeability, learnability, maintainability, manageability, mobility, modularity, operability, portability, predictability, recoverability, reliability, repeatability, reproducibility, reusability, scalability, serviceability, securability, simplicity, stability, sustainability, testability, timeliness, understandability, usability (source: Wikipedia). There are similar, parallel in meaning and maybe termed differently, criteria in other fields. For example, in marketing, there are various metrics such as purchase intent, believability, or frequency of purchase etc.

### 4.2 No room for hand-waving: make the criteria quantitative

Any preprogrammed system makes it relatively easy to use quantitative methods since it may have various built-in functionalities for computing indices, changing measurement scales (interval-ordinal-nominal, Likert vs continuous, arithmetic vs logarithmic etc.), and modifying weights. Such flexibility, however, must come with new responsibilities, when we must understand and be ready to justify each of our methodological decision. For example, the decision about the type of scale to use should be based on careful reasoning about the underlying metric of the process we are trying to capture in our analyses.

The system may accumulate the data from users' responses thus generating knowledge about the shape of the distribution of individual partial scores and their correlation structure (see below). Such knowledge may be very useful in introducing various correcting factors, thus making the indices more robust and less biased. After all, each quantitative index represents a researcher's attempt at capturing complexity of the phenomena (in psychology,

economics, biology etc.) and there is no guarantee that it is accurate, precise, and possesses appropriate statistical properties. For example, the ratio-based indices are characterized by very broad confidence intervals, thus making hypothesis testing difficult, if not impossible (see Jasieński & Bazzaz 1999).

### 4.3 No room for simple-mindedness: multidimensional analyses and multi-objective optimization

The simplest explanation of this issue would be by comparing it to a simple regression analysis, but in which we juggle numerous X (independent) variables and several Y (dependent) variables. We feel that a complex problem requires applying a comprehensive approach. X variables are usually components (such as chemical substances mixed in various proportions) or factors (such as temperature or population density). The Y variables could be Garvin's (1987) eight quality dimensions (in business) or 20 core criteria for assessment of e-learning quality (Bell & Farrier 2007), or physico-chemical properties of the alloys (in industrial experiments). Furthermore, with many criteria to be simultaneously optimized, there are painful decisions to be made; for example, when forming a single aggregate objective function, should the criteria receive equal weights? Probably not, when e.g. costs are irrelevant because we are Arab sheiks, the criterion "cost" may be given the weight of 0.01 or may be skipped altogether. This is just one example of subjectivity that may greatly affect the outcome of the analysis.

### 4.4 No room for arbitrariness: sensitivity analyses, or a need to anticipate criticism

Even a most comprehensive list of quality criteria, each evaluated in a quantitative manner, may suffer from a fundamental methodological weakness, namely that of arbitrariness. After all, decisions of which criteria to use, along which scale to evaluate them and how to weigh their contributions to the overall score, may significantly impact the final selection of the best or most desirable solutions/ideas. The notion of arbitrariness in the selection of criteria focuses our attention on the risk of making decisions which may be wrong because they are based on unrepresentative assumptions. By "unrepresentative" I mean such assumptions which are atypical, strange, unusual and do not correctly represent the overall range of available options.

There is no reason to suggest that arbitrariness arises only from irrationality, whim, capriciousness or wilful manipulation aimed at influencing the result of analysis. Sometimes these assumptions may result from traditionally

accepted rules of decision-making or from a sense of propriety (of what is acceptable or elegant). Even when the selection of criteria is based on honest judgment, reason, or scientific principles, one could ask what would happen if another set of equally relevant inputs were to be used. Would the final conclusions/outputs be the same? To give a simple example: how is the aesthetic value of jewellery (or quality of gold-plated jacks in audiophile speakers) affected if we replace 30% of gold with copper? How about 50%?

This is the basis of the approach called "sensitivity analysis" and involves assessing the degree to which the final outcome (output) depends on the initial assumptions or inputs (with respect to the particular criteria chosen, partial weights, or scales etc.). Since these initial "settings" are to some extent subjective, we can slightly modify the values assigned to each criterion and redo the computations. Some of the parameters may turn out to be more important than others, i.e. changes in their values (settings) may be more strongly reflected in the output. We are basically exploring the nearest vicinity of the parameter space of the chosen solution and testing the stability of this solution. If it is still the best, even though various combinations of the criteria were tested, we may safely accept this solution as optimal.

### 4.5 No room for wishful thinking: justify decisions with statistics

The decision of including many partial criteria of quality makes it more likely that they will be correlated, i.e. assess very similar aspects of quality. Since each partial criterion would receive some weight, their combined contribution to the overall score would be excessive, thus biasing the total towards some particular aspects of quality. Another difficulty is due to ubiquitous psychological effects, for example of the consumers exhibiting consistent association of certain flavours with packaging colours.

On the other hand, it could be difficult for the users to evaluate abstract, compound criteria that would result from replacing simple, descriptive ones with, for example, principal components. Therefore, it may be preferable to retain these simple and intuitively more obvious criteria. However, the pre-programmed procedures should have the appropriate statistical analyses built in and the computation of the final score should take the correlation of the partial criteria into account. The difficulty of taking the correlation structure of the criteria into account arises from the fact that one does not know what the correlations are until a certain number of analyses have been performed. Alternatively, one could limit the list of criteria to subsets revealed through cluster analysis.

Another challenge is to correctly localize the optimum, from the perspective of the desired set of criteria. Response surface methodology (Box & Draper 2007) provides statistical tools to explore the landscape created e.g. by combinations of conditions set up by the experimenter. As if this was not difficult enough, we often face the challenge of simultaneously optimizing two or more conflicting objectives (multi-criteria optimization). Usually, trade-offs between objectives appear, which force us to accept Pareto optimal solutions. A sophisticated and comprehensive online tool should provide assistance in conducting quantitative explorations of the universe of generated solutions. Leaving the user without guidance, lost in the labyrinth, would mean not fulfilling the mission of teaching people how to think (see also Jasieński 2011c).

## CONCLUSION

Egalitarian, Internet-based resources, like, for example, Wikipedia have a profound social role to play, since they equalize chances of various groups of users. They also allow disabled individuals or people, whose development would be constrained by hierarchical organizational culture or social and religious norms, to realize their full potential. I have introduced a semi-serious notion of "google intelligence" (Jasienski 2007a), describing a new class of citizens, freed from such constraints thanks to the Internet. However, easy access to data is not sufficient for dynamic societal progress (see also Jasieński & Diukova 2010).

Specialized online tools for managing creativity and fostering independence of thought should also be developed. They teach critical and rational thinking by forcing us to use explicitly defined criteria and express our thoughts clearly (see also Smyrnova-Trybulska 2009 and Stodberg 2012 for a discussion of the importance of assessment). They prevent eruptions of social pathologies, such as groupthink or polarization. Finally, they facilitate creative synthesis of ideas. At the risk of sounding grandiose, one could say that our future depends on it.

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# EXPERT PROCESSING OF DOMAIN ONTOLOGIES FOR SEMANTIC WEB

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***Abstract:*** *The number of web pages grows constantly and it is therefore more complicated to find relevant information. That is why in 2001, the World Wide Web creator Tim Berners-Lee introduced the idea of the Semantic Web. One part of the Semantic Web are the software agents that search the web and collaborate with each other. Successful search is based on information that is well structured and described. In the environment of the Semantic Web, this structured organisation of information is achieved by creating ontologies; they can be created by various methods, the most frequent one is the mining of knowledge of experts. This article describes the thoroughly proposed method that creates ontologies by gathering explicit and tacit knowledge of experts.*

**Keywords:** ontology, semantic web.

## INTRODUCTION

There is an enormous amount of information located in the web space and new information is being added constantly; the information is saved in directories and databases and it is hardly utilisable outside these systems. These systems are not created under a unified vocabulary: neither in the field of knowledge representation, nor in the formal description of methods. The

possible solution of making the knowledge accessible to other people and available for further use lies in the semantic web and the domain ontologies. If the formal representation of knowledge can be translated into domain knowledge in which the semantic meaning of individual terms and the relations among the terms are clearly specified, the knowledge contained in these databases could be shared by various systems, countries and cultures and it could be further used by methods of statistical analysis and data mining.

## 1. MATERIAL AND METHODS

There are several related methodologies and languages used for designing ontologies (Kučerová 2011, Lukasová et al. 2010). Source analysis focusing on different tasks of the development of educational ontologies discovered there are two naturally separated research fields. While some studies focus mainly on the theoretical aspects of designing ontologies, other extensive sources deal with the practical aspects of ontology development. The latter contains two major group:

1. Automatic and semiautomatic ontologies – creation and extraction using various types of sources and technologies.
2. Expert ontology creation, where the research focuses on the issues connected either with the process of ontology designing or with education technology specific problems.

The existing development indicates that the distributed network of the World Wide Web will not be based on a single all-embracing universal ontology (Although even these efforts can be noticed in the form of “basic”, “generic”, “upper” and “top level” ontologies – e.g. BFO, Cyc, KR ontologies or the Wordnet lexical ontology. However, these basic ontologies are intended to be used as a source for creating specialised domain ontologies, rather than being used directly in the organisation and communication of knowledge.); to the contrary, several domain and task specific ontologies are being developed to serve the needs of particular communities.

**Automatic and semiautomatic ontologies can be created from:**

- databases;
- available documents e.g. on the web.

**Ontology made from database**

The task of developing ontology from relational databases can be divided in accordance with the constructs, or characteristics that are being acquired. Usually, only these constructs and characteristics are taken into account:

- classes;
- properties;
- hierarchy;
- cardinality;
- instances.

The principle of creating ontologies from relational databases is based on the procedure reverse to the procedure of transforming conceptual model into relational model. This transformation is based on the definition of the relational data model and transforms constructs created in the conceptual model into constructs that allow a relational data model. This is mainly about the decomposition of the relations in the N:M cardinality and about the conceptual model using multi-value and group attributes. The issue of compulsory or optional participation of entities in relation to other entities in the conceptual model arises. The ontology creation is then based on discovering the original conceptualisation, which has been obscured by the transformation process hiding the original semantics of the modelled reality (Lukasová et al. 2010).

**Ontology made from documents**

During the creation of ontology, input documents in Czech or English are processed step by step as per Figure 1. After potential translation, syntactic sentence analysis and relation mining in WordNet (http://wordnet.princeton.edu/) occur. At the end, the created tool enables creation and export of a domain model (Šaloun, Klimánek & Velart 2011).

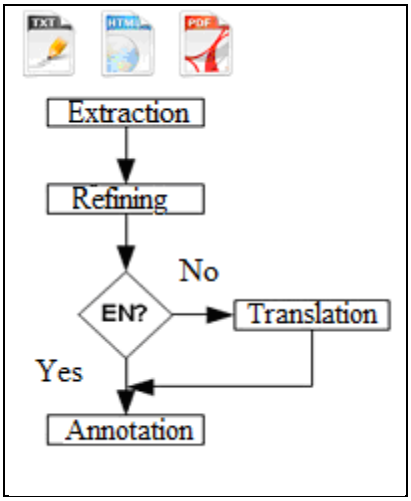


**Figure 1. Process of creating ontologies from documents.**

*Source: Šaloun, Klimánek, Velart, 2011*

*Extraction*

The input documents of extraction are in TXT, HTML and PDF formats; its output is unformatted text. Reading HTML documents can be done in the Jtidy (http://jtidy.sourceforge.net/) system the output of which can be used as input for the XML parser DocumentBuilder. To extract text from the PDF format, the Apache PDFBox (http://wordnet.princeton.edu/) can be used (Šaloun, Klimánek, Velart 2011).

*Refining and translation*

Text refining is based on removing special characters, e.g. numeral marking of parts of text and links to them, one-letter prepositions, brackets, hyphens, etc.

*Annotation*

For text annotation, a package of tools from Standford CoreNLP (http://pdfbox.apache.org/) for natural language processing is used; it comprises of: Stanford Parser (http://nlp.stanford.edu/software/corenlp.shtml) Stanford POS tagger (Toutanova, Manning 2000) and Stanford Named Entity Recogniser. These tools are based on machine learning on an extensive amount of processed data and their algorithms are based on the statistical model of maximum entropy. Creating one's own model would require extensive man-annotated data. This package contains intelligent models that can be used right away.

*Concept mining*

The mining of concepts is based on the assumption that concepts comprise of nouns. All tokens that were labelled as nouns by the POS tagger are the first concept adepts. They can be either one-word nouns or multi-word phrases. The list of discovered adepts is sorted in descending order by the frequency of their occurrence in all assessed documents. From all identified adepts, a domain model creator must select those that truly belong to the model and add any missing concepts (Šaloun, Klimánek, Velart 2011).

*Is-A relationship proposal*

By choosing a concept and assigning its synset, proposals of Is-A relationships are automatically generated for the given concept. The proposals are to be selected from the whole list of discovered nouns. Is-A relationships are generated by multi-word terms. If the right portion of a multi-word term corresponds with an already discovered concept, an Is-A relationship is created between this multi-word concept adept and the concept, e.g. *assignment expression Is-A expression*. A second way of generating Is-A relationship proposals is based on the analysis of sentence syntax by the SNLP parser – more specifically amod (adjectival modifier) that serves for formulating grammatical relations in sentences. The identified adjective-noun relations become as a basis for Is-A relationship proposals (Šaloun, Klimánek, Velart 2011).

## 2. RESULTS

### Expert Creation of Ontologies

The most frequent method of designing domain ontologies is currently still based on mining the knowledge of experts, especially in highly specialised fields of human endeavour. Experts possess a vast amount of tacit knowledge and if we want to acquire it and describe it in such a way that it can be shared and further used we must use a formal representation of knowledge, preferably by using ontologies. The expert describes domain of interest by the natural language and the conversion to suitable language is task for knowledge engineer. Designing ontologies is an iterative process; a proposed raw ontology is gradually revised and refined. Ontologies represent real world domains and their terms and relations must reflect reality as faithfully as possible. We developed a method for ontology designing that is mainly based on the Grüninger-Fox method (1995) and Noy-McGuiness method (2001) and extended it with knowledge patterns and ontology deducing. The way ontologies are designed with this method is represented in Figure 2.

Process of designing ontology:

- Determining the domain and scope of ontology: Defining the domain, fields of use and users of the ontology. Formulation of competency questions.
- Integration of existing ontologies: Some domains have existing ontologies saved in publicly available libraries of ontologies that can be imported, extended or modified. Ontology for Pedagogical Diagnostics has been loosely based on O4E (Ontology for Education) (Dicheva, Sosnovsky, Gavrilova, Brusilovsky 2005) using the knowledge from the Ontology of Knowledge Testing (Réka 2007).
- Formalisation of terminology: Terms to be used in ontology must be specified using first-order logic, or KIF language (Knowledge Interchange Format). In this discourse, defined objects are represented by constants and variables. Objects are defined by attributes as unary predicates and relationships between them are defined by n-ary (e.g. binary) predicates.
- Defining the classes and the class hierarchies: Within our domain designs we used the *top-down* approach. From the list of terms, we chose terms defining objects with independent existence and designated them as classes. Generic hierarchy relationships between classes were defined, using inheritance. This phase is closely connected with the following phase and is done iteratively.
- Defining class properties: From the terms that were not designated as classes, those terms that represent properties of one of the defined classes are selected. These properties are taken into account: object properties describing relations between classes; data properties describing the data type, allowed values, number of values (cardinality) and other possible parameters. Properties describing relations are assigned with domain and range.
- Defining knowledge patterns: Knowledge patterns serve for reusing knowledge. Concepts and relations having identical structures, but different names can be found in already existing ontologies. Knowledge pattern (as generalised as possible) is created from identical structures and used in another situation (either in the same or different ontology); we only need to map general terms to more specific terms. For depicting a knowledge pattern, we can use e.g. the RDF graph language.

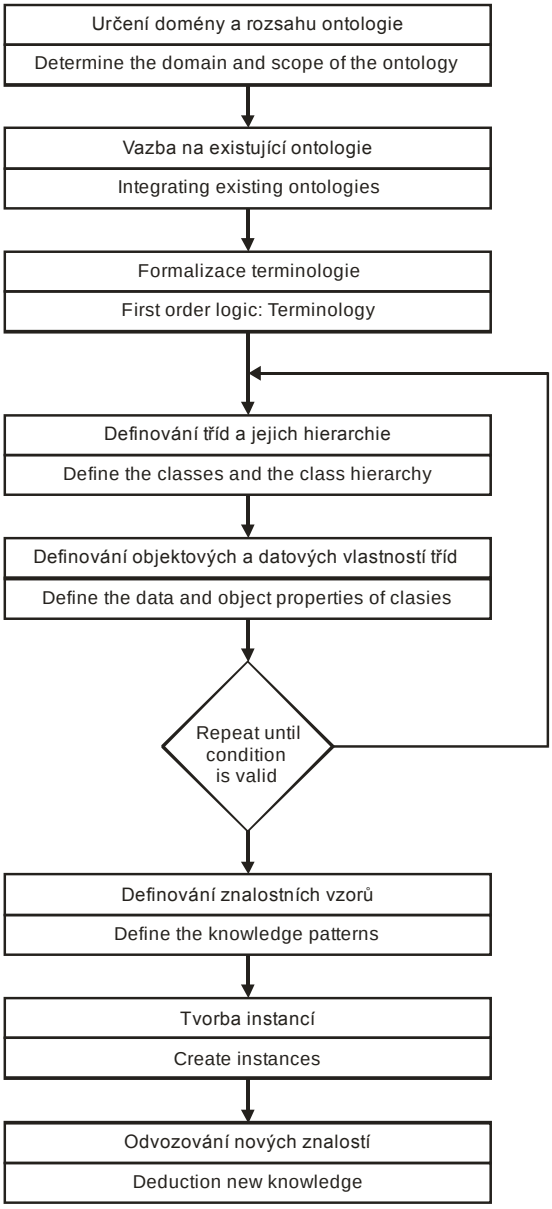


**Figure 2. Process of designing ontology.**

*Source: own elaboration*

– Creating instances: Creating individual class instances and filling their properties with values. The process of instance creation should be automated since there can be a huge number of instances in an ontology and their manual creation would be demanding and lengthy.

Moreover, manual instance creation is prone to contain more errors than automatically generated instances.

– Ontology deducing: The resulting ontology allows questioning and deducing. It is possible to create queries about classes and individuals. While placing a query about a class, the answer comprises of those classes that comply with the conditions of the query; the same can be done with individuals (instances) returning the list of individuals (instances) that comply with the query criteria. Query is based on natural language, similar to the SQL language, e.g. "Which persons live in Ostrava?" While deducing, hidden relationships between classes can be discovered that have not been explicitly specified in the ontology.

## 3. DISCUSSION

Ontologies are closely related to knowledge representation. Ontology forms description of terms in domain of interest and relations among them. This description represents the knowledge about modelled domain.

When creating ontologies, it is important to decide which language to use. Individual languages have different expressive abilities. When considering ontologies for the Semantic Web, it is best to use one of the "web" ontology languages. The most important of these languages are: RDF (Resource Description Language) + RDFS (RDF Schema) and OWL (Web Ontology Language). RDF is less expressive, but more accessible for inexperienced users. Ontology can be represented graphically (using nodes and arrows); graphical representation is easy to comprehend. The RDFS enriches RDF with additional constructs such as defining classes and sub-classes, determining domain and range of functions, etc. The OWL language extends RDF+RDFS with additional options such as defining disjoint classes, using universal and existential quantification, defining the cardinality of properties, etc.

If the created ontology is depicted using web ontology languages it can be represented in the RDF graph visualisation. All concepts and relationships defined in RDFS or OWL can be transformed into an RDF graph. Using knowledge patterns in ontology can facilitate its creation. Relationships between concepts do not need to be created again, all that needs to be done is to map specific terms into general terms.

When using knowledge patterns in ontology creation, two options can arise. Found knowledge patterns are valid on a general level and can be used virtually in any domain ontology. The second option is finding knowledge patterns of a lower level, i.e. of the level of the modelled domain. These patterns are only valid in the give domain or given ontology.

## 4. CONCLUSION

This article introduces two methods of ontology creation. First method is based on the automated creation of ontologies. Concepts, their properties and relationships among these concepts are generated automatically from a database or a set of documents in the TXT, PDF or HTML format. After automated ontology generation, however, the ontology needs to be examined or even manually extended. Second method is the creation of ontologies based on knowledge gathered from experts. New methodology of ontology creation has been proposed, using existing methodologies for its basis. A great contribution to ontology creation is the use of knowledge patterns that enable the reuse of knowledge and make ontology creation easier. Knowledge pattern represents a general structure of concepts and while using it, domain specific terms are mapped into general patterns and saved in the pattern.

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# DEVELOPING SOCIAL AND CIVIC COMPETENCES AS ASPECTS OF INTERCULTURAL COMMUNICATIVE COMPETENCE – E-LEARNING FOR MIDDLE SCHOOL STUDENTS – A CASE STUDY

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***Abstract:*** *Social and civic competences as defined by the Recommendation of the European Parliament and of the Council on Key Competences for Lifelong Learning are an indispensable element of the process of developing intercultural communicative competence among the learners of English. This paper aims at showing this complex and challenging aim met by the authors of the English e-learning units in the e-Academy of the Future project, designed for the Polish middle school learners. The uniqueness of the project lies in its approach to shaping the communicative competence of young learners through culture specific ideas adjusted to the needs and expectations of the users and the requirements of distant learning. In order to illustrate the multidimensional concept of the language competence, the theoretical background has been provided.*

**Keywords**: language competence, key competences for lifelong learning, intercultural communicative competence, language learning, e-learning, cultural identity.

## INTRODUCTION

*The Youth of 2011* report, prepared by the team of experts under the supervision of the Polish minister Michał Boni, shows that the young Poles spend from 17 to 20 hours weekly online. The Internet fulfils their basic social needs; it creates bonds and the feeling of belonging to a community, which "no other real social surrounding is able to provide." Moreover, "a wide access to the Internet widens their sphere of freedom" (Szafraniec 2011). The experts claim that although young Poles refuse to participate in

politics, they are engaged in charity, volunteer work, find group work useful and are less altruistic. They live in the global village, the world of consumerism and the ideology of success. The experts agree that young Poles are a driving force of changes in Poland (Szafraniec 2011). These arguments are quite convincing that developing by e-learning social and civic competences as aspects of intercultural communicative competence seems a very worthy cause.

## 1. BACKGROUND

### 1.1. Defining the language competence – the rise of communicative competence

The notion of communicative competence was introduced by Dell Hymes (1972) as a reaction to Noam Chomsky's (1965) inadequate view of linguistic theory. According to Chomsky (1965), there is a distinction between competence (the knowledge of language) and performance (the actual use of language in particular situations). As a response to Chomsky's theory, Hymes (1972) postulated a new theory of competence, which states that communicative competence consists of several sectors and grammar is just one of them. This is how linguistic competence, or predominant focus on accuracy and grammaticality, traditionally regarded as the only indicator of language proficiency, became replaced by a more complex set of competences, both "(tacit) *knowledge* and (ability for) *use*" (Hymes 1972: 282).

The fundamental work of Canale and Swain (1980) transplanted the theoretical framework of communicative competence to second language teaching. According to their theory, communicative competence "is observable indirectly in actual communicative performance" (Canale & Swain 1980: 29) and consists of three major components:

- grammatical competence, or the knowledge of lexis, rules of morphology, syntax, semantics, and phonology, the ability to define and express correctly the literal meaning of utterances;
- sociolinguistic competence, consisting of sociocultural rules and discourse rules, the ability to interpret utterances in terms of social meaning, taking into account such factors as topic, role of participants, setting and norms of interaction;

– strategic competence, which encompasses verbal and non-verbal aspects that may be used in case of breakdowns of grammatical and/or sociolinguistic competences.

The model proposed by Canale and Swain (1980) has been significantly expanded by Bachman (1990), who enumerated a greater number of subcompetences, as illustrated in Figure 1 below.

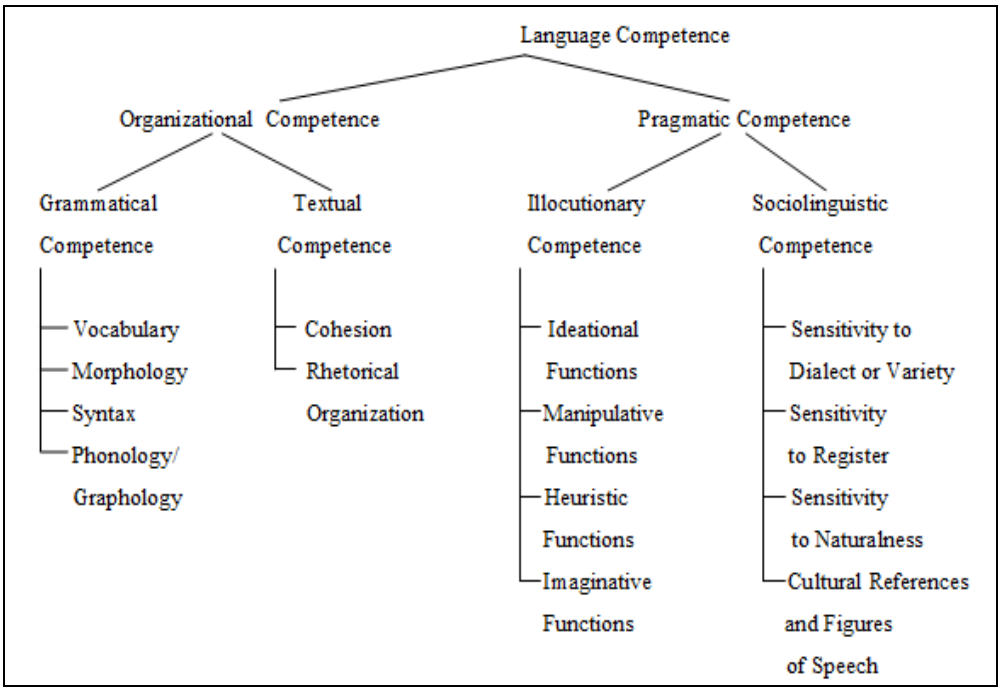


**Figure 1. Components of language competence.**
*Source: own elaboration based on Bachman 1990*

According to Bachman's (1990) theory, language competence is divided into two main categories: organisational competence and pragmatic competence. Organisational competence, which deals with the rules of language usage at the sentence-level, includes grammatical and textual abilities. On the other hand, pragmatic competence (the concept parallel to Canale and Swain's 1980 sociolinguistic competence), is the ability to construct a text according to the rules of cohesion and rhetorical organisation. As such, pragmatic competence pertains to the relationships between language users and the context of communication, with its separate categories of illocutionary competence and sociolinguistic competence (Bachman 1990).

*The Common European Framework of Reference for Languages* (2001) also defines language competence placing great emphasis on its communicative aspect. Each of the three components of language proficiency (linguistic, sociolinguistic and pragmatic competences) has its own subcategories. Thus, linguistic competence is subdivided into lexis, grammar, semantics, phonology, orthography, and orthoepy. As for sociolinguistic competence, it refers to linguistic markers of social relations, politeness conventions, expressions of folk-wisdom, register, and dialect and accent. Finally, pragmatic competence encompasses discourse competence, functional competence, and design competence (*Common European Framework of References for Languages* 2001).

### 1.2. The concept of intercultural communicative competence

While communicative competence, which refers to the ability of a learner to use a second language in different settings and interactions, concerns linguistic awareness, it is generally acknowledged as insufficient to master a foreign language. In the process of language learning people should be aware not only of linguistic aspects, but also of the foreign culture as well as their own culture and the social context of the target language use.

The most popular model of intercultural communicative competence as proposed by Byram et al. (2002) consists of the following components:

1. *Intercultural attitudes (savoir être)*, curiosity and openness to different values, beliefs and behaviours.
2. *Knowledge (savoirs)*, knowledge of social processes, and knowledge of illustrations of those processes and products. This is knowledge of one's own culture and of the interlocutor's culture, of the ways in which people interact and perceive each other.
3. *Skills of interpreting and relating (savoir comprendre)*, the ability to interpret documents or events from a foreign culture and relate them to similar documents and events from one's own culture.
4. *Skills of discovery and interaction (savoir apprendre/faire)*, the ability to gain knowledge of a foreign culture and cultural practices and to use this knowledge, skills and attitudes in real communications.
5. *Critical cultural awareness (savoir s'engager)*, the ability to approach critically and rationally themselves, their own values and the values of other people.

Thus, intercultural competence implies particular knowledge, skills, attitudes and critical awareness which embrace the knowledge of social groups,

products and practices characteristic of both native and foreign culture; the skills of interpreting texts from another culture and relating them to one's own; the willingness to constantly explore new aspects of other cultures and the ability to operate thereby acquired knowledge under the circumstance of real communication; the critical cultural awareness that implies the ability to evaluate diverse culture-specific criteria (Byram 1997).

For Fantini (2005: 1), intercultural communicative competence is "the complex of abilities needed to perform effectively and appropriately when interacting with others who are linguistically and culturally different from oneself". As such, it encompasses the following features:

1. *traits and characteristics*: flexibility, humour, patience, openness, interest, curiosity, empathy, tolerance for ambiguity, and suspending judgement;
2. *three areas or domains:* the ability to develop and maintain relationships, the ability to communicate with minimal loss and distortion, the ability to cooperate in order to accomplish something of mutual need or interest;
3. *four dimensions:* knowledge, (positive) attitude/affect, skills and awareness;
4. *proficiency in the host language*: the ability to communicate in the foreign language;
5. *four developmental levels*: educational traveller, sojourner, professional, and intercultural/multicultural specialist;

In Deardoff's (Deardoff 2004) perspective intercultural competence is the ability to interact appropriately and effectively in intercultural situations. As such, it consists of specific attitudes (for instance, openness, respect, tolerance, curiosity); intercultural knowledge (e.g., cultural self-awareness, knowledge and understanding of other cultures and different mindsets and world views); skills (listening and observing, analysing, evaluating and relating); ability to reflect upon intercultural knowledge, skills and issues as internal outcome of intercultural competence (flexibility, adaptability, empathy) and ability to interact constructively as external outcome of intercultural competence (behaving and communicating appropriately and effectively in intercultural situations).

Also other authors point out to the indispensable features of intercultural communicative competence, as summarised in Table 1 below:

**Table 1.**

**Components of intercultural communicative competence.**

| Myczko (2005) | Deardoff (2004) |
|---|---|
| • comprehensive knowledge of the target culture reality; | • flexibility and adaptability to new cultural environments; |
| • ability to independently examine and reflect upon native and non-native cultures; | • cultural self-awareness and capacity for self-assessment; |
| • ability to interpret other cultures in the context of one's own and conversely; | • cross-cultural understanding, empathy and respect; |
| • awareness of one's own culturally-induced attitudes and behaviours; | • tolerance for ambiguity and withholding judgment; |
| • ability to identify and remedy cross-cultural misunderstandings; | • ability to listen, observe, analyse, interpret and relate; |
| • development of cultural awareness through a positive attitude towards cultural diversity | • general openness to intercultural learning; |
| | • understanding of the value of cultural diversity. |

*Source: own elaboration based on Myczko 2005 and Deardoff 2004*

### 1.3. The social dimension of language competence in classroom practice

Starting from Hymes's (Hymes 1972) original statement, socio-cultural features are not excluded, in fact they constitute an integrated part of language competence. Hymes (Hymes 1972) advises asking the four questions to gain a richer context for language use (p. 283):

1. Whether (and to what degree) something is formally *possible*;
2. Whether (and to what degree) something is *feasible* in virtue of the means of implementation available;

3. Whether (and to what degree) something is *appropriate* (adequate, happy, successful) in relation to a context in which it is used and evaluated;
4. Whether (and to what degree) something is in fact done, actually *performed*, and what its doing entails.

Most of the theories of ICC as summarised above take into account the social context in two dimensions. On the one hand, it is the knowledge of the target country reality (Byram et al.'s 2002 *savoirs*). As such, it is important that curricula and materials need to be grounded in the L2 reality without stereotypes or clichés, transferring the knowledge about both high and low culture, big C and little c (Stempleski, Tomalin 1993). The second area of the social dimension is the provision of authentic social context for target language communicative exchanges. Thus, students need to be exposed to samples of real language use, for instance, on video, which, when analysed, would lead them to building proper intercultural attitudes (*savoir être*), as well as serve as a starting point for the development of all the remaining intercultural skills (interpreting, relating, discovery and interaction – Byram et al., 2002). This is where the framework of social and civic competence for lifelong learning comes in immensely useful, as this very competence joins the two aforementioned aspects (target reality knowledge and target language social context).

As far as teaching materials for developing intercultural competence are concerned, Dubin et al. (1986) claim that instructional materials (authentic texts, written documents, audio recordings, and visuals - Byram et al. 2002) should preferably offer a multi-dimensional outlook, that is present culture-related themes from different perspectives. Huhn (1978, after Byram 1989) contends that culture-rich teaching materials should be characterised by the following set of characteristics:

- factual accuracy and contemporaneity of cultural information;
- presentation of the realistic image of the target culture society;
- relativisation of stereotypes by making learners aware of them;
- avoidance of ideological tendencies presented in the material;
- comparative dimension of culture-specific phenomena.

The use of e-learning and Internet-based learning is widely promoted by researchers dealing with ICC. For Byram (1997), online materials constitute an obviously rich source of cultural information. Moreover, Renate (1994)

maintains that the integration of audio-visual media and technology is indispensable to bridge the gap between linguistic performance, communicative competence and cultural awareness. The implementation of interactive multimedia enables teachers to integrate the linguistic patterns within appropriate socio-cultural contexts.

### 1.4. Key competences for lifelong learning and e-*Academy of the Future* project

"The implementation of e-learning as self-study materials for the development of key competences in language education is a relatively new issue" (Gadomska, Krajka 2011a: 143). The three-year-long e-*Academy of the Future* project, run by Wydawnictwa Szkolne i Pedagogiczne and co-financed from the European Social Fund within the framework of Human Capital Operational Programme 2007-2013, Subaction 3.3.4. is one the newest and most comprehensive programmes of this kind aimed at Polish middle-school learners. It engages 200 selected middle schools in Poland, 1,500 teachers, and 15,000 pupils starting school in the school year 2010-2011. This interdisciplinary programme, uses blended learning and project work methods; for this purpose, there has been launched an e-learning platform hosting all the project-related materials (Okońska-Walkowicz 2009).

In the article "Shaping Key Competences in Language Classes - on the Implementation of E-learning in Middle School Foreign Language Education," published in *Use of E-learning in the Developing of the Key Competences*, we reflected on the experience of creating competence-building e-learning English teaching materials from the point of the view of the authors within e-Academy of the Future project. This time, we would like to focus on the social and civic competences developed in the project's e-learning materials. We believe that these competences are a crucial aspect of intercultural communicative competence as they provide the authentic and motivating context for the language practice.

The idea of Key Competences for Lifelong Learning was introduced by *Recommendation of the European Parliament and of the Council on Key Competences for Lifelong Learning* in 2006 (2006/962/WE). It defines key competences as a combination of knowledge, abilities and attitudes relevant to given situations (Okońska-Walkowicz 2009), necessary for pupils for personal development, as well as social integration and employment.

*Recommendation* (2006) defines eight key competences:

1. Communication in the mother tongue.

2. Communication in foreign languages.
3. Mathematical competence and basic competences in science and technology.
4. Digital competence.
5. Learning to learn.
6. Social and civic competences.
7. Sense of initiative and entrepreneurship.
8. Cultural awareness and expression.

According to *Recommendation*, "[social] competence refers to personal, interpersonal and intercultural competence and all forms of behaviour that equip individuals to participate in an effective and constructive way in social and working life. It is linked to personal and social well-being. An understanding of codes of conduct and customs in the different environments in which individuals operate is essential." On the other hand, "[civic] competence and particularly knowledge of social and political concepts and structures (democracy, justice, equality, citizenship and civil rights), equips individuals to engage in active and democratic participation" (2006/962/WE). The concept of intercultural competence, which entails the knowledge of social groups, products and practices characteristic of both native and foreign cultures, is essential for the planning and designing of foreign language teaching materials.

*Recommendation* states: "EU countries should try to ensure that initial education and training offer all young people the means to develop the key competences to a level that equips them for adult and working life, thus also providing a basis for future learning" (2006/962/WE). Although the current Polish core curriculum (in use since the school year 2010/11) "does not refer directly to the category of key competences; however, its implementation in the middle school simultaneously develops key competences" (Gadomska, Krajka 2011a: 141).

### 1.5. Integrating the elements of national cultural identity

*I do not want my house to be walled in on all sides and my windows to be stuffed. I want the cultures of all the lands to be blown about my house as freely as possible. But I refuse to be blown off my feet by any.*
Mahatma Gandhi

There have been 21 units planned for English for the implementation in 2010-12 in the *e-Academy of the Future project*. Each unit is meant for a 45-

minute student's self-study or in-class use and it is subdivided into Lesson, Practice and Test modules. "The first two encompass a series of self-study activities of multiple types (text and picture matching, fill-in-the-blanks, matrix of choices, drop-down menu choices, error correction, reordering, and many others), which are aimed at integrating language and competence contents, within all the three areas of knowledge, skills and attitudes. According to the principles of contemporary foreign language methodology, each unit follows a balanced syllabus, integrating fluency and accuracy focus, grammar and vocabulary instruction, receptive and productive skills. In this way, it is hoped learners get a well-developed course catering for all their language needs taking as its contents topics related to components of key competences" (Gadomska, Krajka 2011a: 143).

As stated before, intercultural competence entails the knowledge and critical awareness of one's own culture and of the interlocutor's culture. Therefore, the authors' aim was to achieve a comparative dimension by integrating not only the English language cultural content but also the knowledge, skills, attitudes relating the Polish social and cultural life to fulfil one of the objectives, i.e. the ability of learners "to interpret documents or events from a foreign culture and relate them to similar documents and events from one's own culture (Byram et al. 2002). According to the *Youth in Action Programme*, social and civic competences include the "awareness of basic concepts relating to individuals, groups, work organisations, gender equality, society and culture; understanding of different cultures and how a national cultural identity interacts with European identity; (…) knowledge of the concepts of democracy, citizenship, civil rights and awareness of their application at local, regional, national, European and international level"

("Social and Civic Competences").

Thus, in case of designing the units aimed at shaping social and civic competences, we paid particular attention to introducing the topics and themes deeply rooted in the contemporary Polish life, yet significant in a wider European perspective. In effect, the social and civic competence geared the authors, for example, towards the topic of *Learning through Humour* and the story of the cult graphic artist and the participant of the Warsaw Uprising, Papcio Chmiel or another famous Pole, Jurek Owsiak and his Great Orchestra of Christmas Charity. However, when talking about charity organizations, we divided the unit content into both European/American and Polish non-governmental organizations, thus introducing Oxfam, YMCA, PAH, WOŚP, Polish Red Cross, Caritas, and many others (Figures 2-8).


**Figure 2. A sample interaction screen introducing the topic of charity organizations from *WOSP- the Great Orchestra of Christmas Charity* e-learning unit, featuring English language Avatar (centre, with a book) and his friends.**

*Source: e-Academy of the Future platform*

The process of designing each thematical unit consists of several stages: specification of competence objectives, matching Core Curriculum objectives, specification of language content, storyline design, activity design. In effect, the central idea, which in this case is built on the topic of charity organizations, binds the whole unit, where the storyline (interaction of the characters, i.e. the Avatars) is interspersed with activity screens, which in turn "serve as pre-reading or pre-listening, enable students to conclude on the text they have just read or listened to, activate their schemata or create context" (Gadomska, Krajka 2011a: 145-148). The pupils learn about WOŚP and how to become its volunteer (Figure 2, 4), listen to an interview with Jerzy Owsiak, its founder and spiritus movens (Figure 4), and in the second module of the unit (the Practice) learn about other charity organizations in Poland and the U.S.A and the U.K (Figure 6). The language content is integrated into the storyline. The focus is on practicing reading, listening and writing skills, acquiring new vocabulary, practicing the use of cardinal numbers (Figure 7), Saxon Genitive, Passive Voice and Present Simple, Present Continuous, Present Perfect and Simple Past tenses (Figure 3, 7).

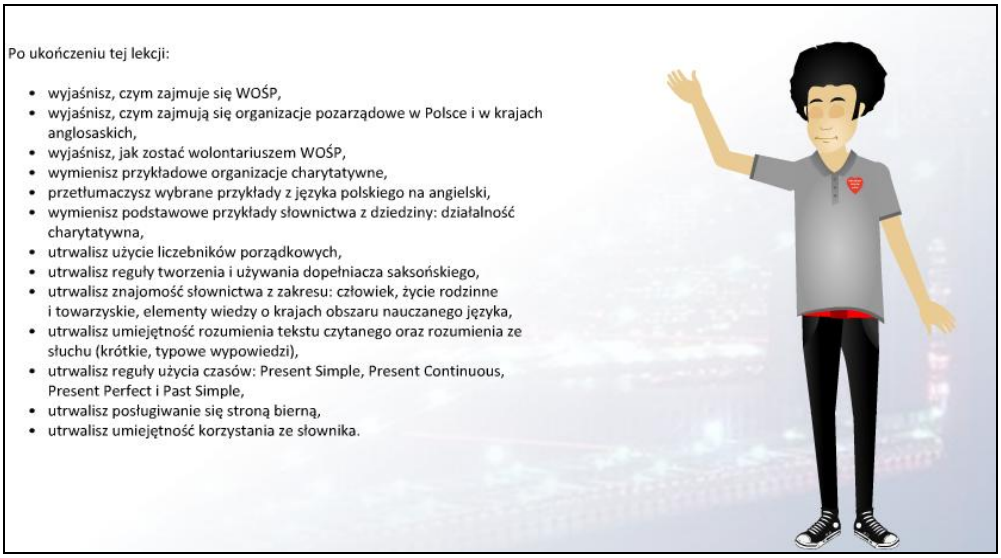


**Figure 3. An introductory screen "Language Aims" from *WOSP- the Great Orchestra of Christmas Charity* e-learning unit.**
*Source: e-Academy of the Future platform*


**Figure 4. Interview with Jerzy Owsiak (reading comprension task) from *WOSP- the Great Orchestra of Christmas Charity* e-learning unit.**
*Source: e-Academy of the Future platform*

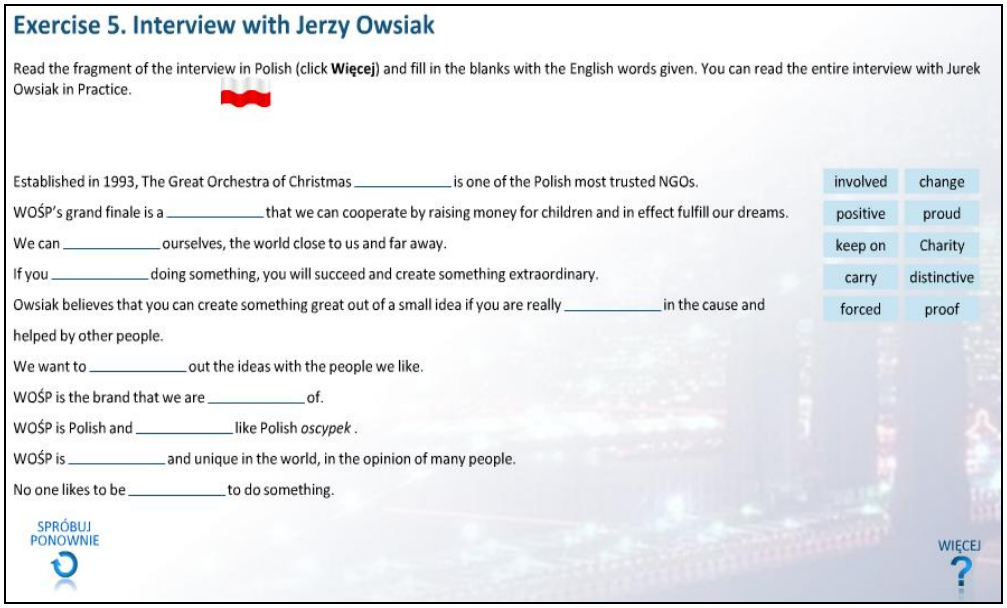


**Figure 5. Vocabulary exercise (drag and drop) from *WOSP- the Great Orchestra of Christmas Charity* e-learning unit.**
*Source: e-Academy of the Future platform*

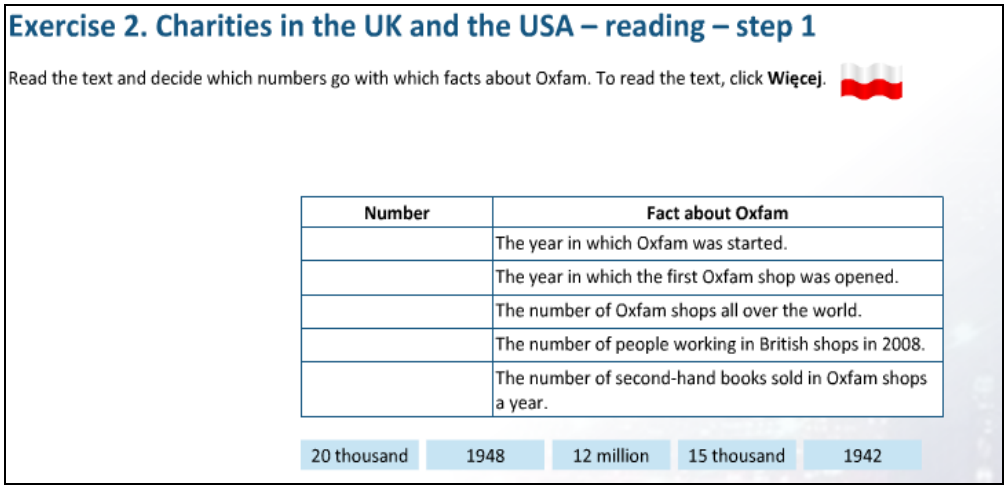


**Figure 6. Practicing English numbers (drag and drop) from *WOSP- the Great Orchestra of Christmas Charity* e-learning unit.**
*Source: e-Academy of the Future platform*


**Figure 7. Avatar teaching about English cardinal numbers from *WOSP-the Great Orchestra of Christmas Charity* e-learning unit.**
*Source: e-Academy of the Future platform*

Another unit, entitled *Learning through Humour*, introduces Henryk Chmielewski, a cult artist for many Poles, the author of the cartoon stories of Tytus, Romek and A'Tomek. The social and civic competences and the second book of cartoon stories *Tytus Receives a Driving Licence* were again the starting point for this unit. One of the teaching objectives was to make pupils acquainted with Henryk Chmielewski's biography. He is not only a graphic artist known to millions of Poles but a participant of Warsaw Uprising. (Figure 8) This unit shows how the competences overlap and complement each other, serving not only to shape social and civic competences but also to sensitise pupils to similarities and differences between communication in the mother tongue and communication in the foreign language. Here we can see how this unit fulfils the Polish Ministry of Education's policy of shaping among pupils the principles of social and civic responsibility (including the responsibility for the fate of our homeland), persistence, self-esteem, respect for the others, creativity, etc. (Gadomska, Krajka 2011 b)

By shaping the key competence of communication in the mother tongue during an English lesson, we develop the intercultural competence. "Both the Polish core curricula for different types of schools and the EU policy recommend shaping the cross-cultural competence." It includes the principles for "preparing for the contacts between people born in different cultures" but also for "the better understanding of one's own culture and identity" (Aleksandrowicz-Pędich 2007: 40). This principle is also fulfilled by other units in the project, for example: *Have you ever been to London?* where Avatars travel to London, meet foreigners and Poles living there and are forced to translate the information, exchange ideas, discuss the options, etc. By developing communication in the mother tongue during an English lesson, we focus on differences and similarities in spelling, the use of tenses, false and good friends, translation aspects, habits, customs, and resulting communication strategies, etc.

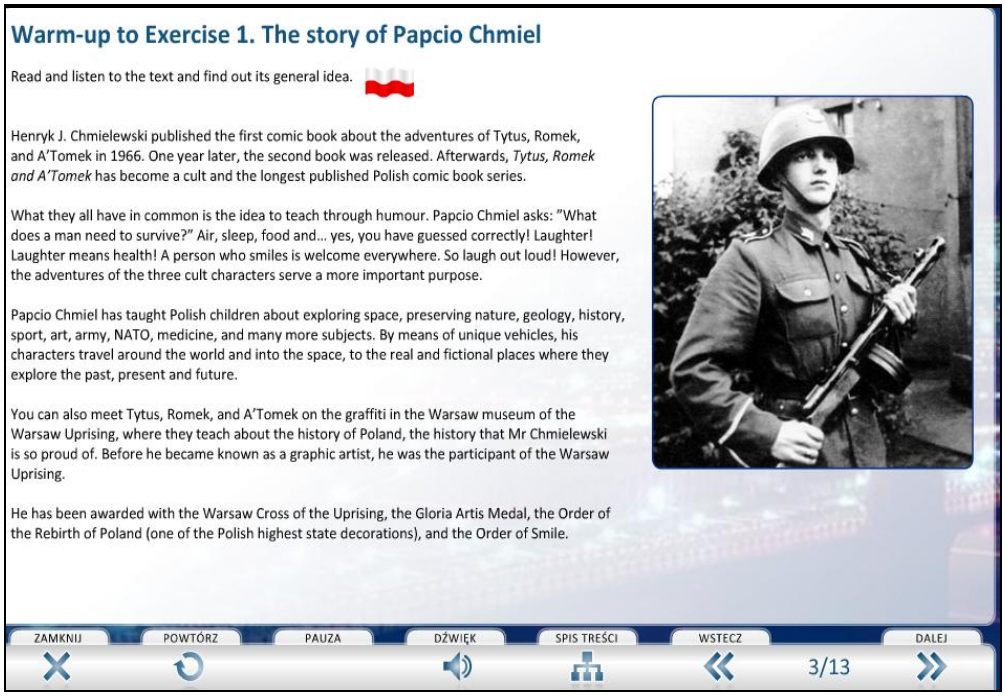


**Figure 8. Warm-up exercise. The Story of Papcio Chmiel from *Learning through Humour* e-learning unit.**
*Source: e-Academy of the Future platform*

## CONCLUSION

The authors' experience in the design of language materials to suit the specification of knowledge, skills and attitudes of particular competences in *Recommendation of the European Parliament and of the Council on Key Competences for Lifelong Learning* is a great challenge. This challenge becomes even greater if one thinks about developing digital materials for e-learning because of: mixed-ability groups, classroom teachers of different, expertise in blended e-learning, of varied approach to the use of e-learning, equipment available at schools, teacher's role as a motivator and facilitator, computer safety regulations, copyrights, software limitations (Gadomska 2011).

The idea of integrating culture specific ideas, materials based on the interviews with leading Polish personas, access to the most up-to-date, engaging and interesting for the Polish learner materials, create rich and motivating content for language learning purposes. Moreover, e-learning enables to teach about "big ideas" through highly attractive digital materials, the challenge that is worth taking as the recipient, being a middle school learner, is highly demanding and has special needs and interests, not only educational but also social and emotional. In fact, the uniqueness of the e-learning materials designed for teaching English lies in its role in triggering empathy among young Poles to the ideas and problems shared by their peers not only at home but also abroad.

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# II. THEORETICAL AND METHODICAL ASPECTS OF DISTANCE LEARNING

## EDUCATIONAL STRATEGIES TO ENHANCE LEARNERS' MOTIVATION IN E-LEARNING

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***Abstract**: The learner's motivation has an impact on the quality of learning, no matter how it is provided, be it via classroom, e-learning or blended learning. The university teacher encountering the problem of decreasing students' motivation in e-learning tends to adopt educational strategies typical of the behaviorist approach. It is argued in this paper that motivation strategies inspired by the humanistic and constructivist approach are more efficient. Presented examples include establishing motivating goals, creating intellectually engaging tasks as well as successfully moderated discussion forum, supportive evaluation system and community of learners.*

**Keywords**: Motivation, constructivism, learning objectives and tasks, supportive assessment, community of learners.

### INTRODUCTION

It is extremely difficult to motivate e-learners, especially in asynchronous forms of distance learning. Each practitioner who uses e-learning for academic teaching has to deal with issues such as: why students tend to choose some of the tasks on the e-learning platform and yet are reluctant to try the others; why some of the students are more engaged and open to prolonged effort and do not give up, while others become discouraged and quit their work as soon as they come across some difficulties; what makes one topic on the forum highly responsive, while the other seems to be dead.

All of these issues concern a sensitive matter of "the art of motivation." When the academic teacher has to face the problem of diminished or deficient activity on the part of learners, he or she might feel helpless. His or her efforts seem to be ineffective and unsuccessful. In order to manage the situation, the teacher reaches for instruments which "force" students to fulfill tasks. Therefore, the teacher uses (either on purpose or not) behavioral control procedures as they appear to be effective, quick, non-complicated and nearly always successful. Still, the success achieved in this way can be ostensible and requires a lot of work to break reluctance of a group, not to mention the fact that it often proves impermanent in the long term. The following piece, quoting a PhD student of the Jagiellonian University, is an example of using behavioral strategies for motivating learners: *"... it seems that the only effective motivator is still a systematic demand that students apply their knowledge, prepare for and attend classes, executed by punishing and rewarding. Providing rigorous rules of participation proves effective for forcing students to observe the required attendance limits. Also, regular tests enforce students to gradually acquire knowledge. If the student fails more than one test, he or she cannot get a credit and take the exam. The reward for getting the best possible grade for participation in tutorials (5.0) is exemption from a descriptive part of the exam (...). The main problem, however, is a relatively low activity of some of the students. Sometimes the reason behind it is that they do not read the assigned text before classes. Making students prepare for classes is difficult mainly because such methods as asking test questions, getting answers from the students or forcing them to take part in the discussion seem to be inappropriate at academic level.*" The author is not even aware that she condemns students to failure by using the strategy of behavioral management of learners' activity, motivating them by rewards and punishments and expecting a true engagement in classes at the same time.

The purpose of the paper is to show alternative ways of motivating learners, based upon the humanistic and constructivist theories. Each of these approaches promotes different learning schemes and motivating strategies. The paper consists of two parts. The first one is dedicated to theoretical background for strategies for motivating students to learn, derived from three psychological orientations: behavioral, humanistic and constructivist. The text provides reconstruction of the leading theses of these approaches in order to highlight some crucial differences between them. The second part concerns educational applications of the humanistic and constructivist approach and educational strategies of supporting and stimulating the learning process of e-learners. It covers the issues of how to set motivating

learning objectives, create mentally engaging tasks, arrange successful forums, assess in a supportive and encouraging way or establish a community of learners. The content of this paper emerged from my own practice and experience with preparing e-learning courses and materials, running both synchronous and asynchronous modules, and from the discussions held during the Cracow Seminars on the Pedagogy of eLearning, dedicated to academics and organized by the Institute of Educational Science of the Jagiellonian University and the Jagiellonian University eLearning Centre.

## 1. THEORETICAL BACKGROUND FOR THE ART OF MOTIVATION

If we want to consider what the "art of motivation" is, we must first refer to a psychological analysis of the motivational processes. These are usually regarded as the processes of psychological adjustment which control an individual's actions in order to achieve a particular effect (Reykowski 1992). These processes also determine an individual's actions and decide on the amount of energy that he or she is ready to use to achieve a particular objective (Reykowski 1977). Descriptions and justifications of the mechanisms of motivation have been changing as new paradigms in psychology emerged. If we look through the history of psychology, we can indicate numerous theoretical approaches which created their own theories of motivation, e.g. introspective, dynamic, behavioral or cognitive psychology. The best known theories include: the instinct theory, the drive theory, Rotter's cognitive theory related to the locus of control, Freud's psychodynamic theory and Maslow's humanistic theory (see Zimbardo, Johnson, MacCann 2009). Not all psychological concepts, however, are reflected in learning theories. Approaches that have become essential for education include mainly the following three: behavioral psychology, cognitive (constructivist) psychology and humanistic psychology. Nevertheless, in the area of education we most often come across a mixture of theoretical concepts with suggested practical solutions. D. Klus-Stańska, a renowned professor in educational sciences in Poland, in many of her papers draws attention to the fact that theory and methodology are often mixed, and so are teaching paradigms in terms of assumptions and school practice (see Klus-Stańska 2009). Therefore, it is advisable to recall the leading theses of the aforementioned theoretical approaches in order to highlight the crucial differences between them. This is because each of the approaches promotes different learning patterns, clarifies them in a different way and provides the teacher with diverse motivation tools.

### 1.1 Motivation in behaviorism

Numerous learning theories were developed within the behavioral psychology. The emerging educational theories were strongly influenced by B.F. Skinner's classical learning theory referring to instrumental conditioning which assumed that people learn desirable responses by linking them with a biologically significant stimulus. Using the "stimulus-response" connection in education allows to enforce the learner's reactions in response to a particular stimulus, which is in this case a teaching strategy. Direct repetition and appropriate application of positive and negative reinforcements are aimed at imprinting the content on the individual, internalizing desirable behavioral patterns and taming undesirable ones. Those concepts of education, which derive from behavioral psychology, assume that human behaviour can be controlled by means of appropriate procedures. People are ready to repeat and internalize beneficial behaviours and avoid those which have negative effects. Behavioral models of teaching are still common. The most popular ones include: models based on the social learning theory, programmed learning, simulation and direct learning (see Joyce, Calhoun, Hopkins 2008). They are mostly based on assumption that an individual is a self-corrective communication system. Learner's behaviour is „added" with a feedback on consistency with expectations and the pattern. Thanks to the feedback mechanism (behaviour ↔ feedback ↔ modified behaviour ↔ feedback, etc.), an individual can correct his or her behaviour to be more desirable, which results in learning progress.

Behavioral motivation strategies are mainly based on rewarding and punishing as well as providing learners with an appropriate feedback during task performance. This is a relatively common motivation strategy, also at academic level. According to this model, learners are considered to be reactive, to acquire fixed contents presented to them. Tests allow to check whether the learner completed the tasks. Here are some typical features of behavioral educational environment and motivation strategies arranged within it:

- the teacher has full control over the learning process including all its components;
- all elements of the course are defined and imposed by the teacher – learners' space for making free choices is marginalized;
- content of the material provides true, reliable and unquestionable knowledge;
- uniform course level adjusted to the so called "average";

- clearly defined reward and punishment system according to task performance or participation in particular forms of online activity;
- dominating position of methods of knowledge assimilation – lectures, presentations, fixed materials for self-studying;
- systematic review of learners' participation in the class and execution of subsequent steps.

### 1.2 Motivation in humanism

The leading concept of motivation in the humanistic psychology is the one created by A.H. Maslow, describing a model of human nature and behaviour in terms of meeting an individual's needs (see Zimbardo 2009; Kozielecki 1998). Maslow's pyramid represents a hierarchical arrangement of six groups of human needs: from the most basic needs such as physiological needs, through needs for safety and love/sense of belonging, to more advanced needs such as esteem or self-actualization. Everything that people do results from their natural willingness to fulfill these needs, but if the basic needs from the bottom of the pyramid are not satisfied, the secondary ones became less important. At the top of the hierarchy there is a natural need for self-actualization which motivates the individual to strive for self-fulfillment, the realization of one's ambitions and goals in life, personal development and fulfillment of one's interests. This means that humans are active rather than reactive individuals. They initiate and undertake actions on their own in order to achieve goals and experience self-satisfaction. Therefore, motivation is considered an internal state, auto-generated by the learner. If so, is it possible for the teacher to support learners' motivation? Of course, it is. Applied strategies must be, however, aimed at joint elaboration of educational objectives and satisfaction of learner's needs. Best motivated students are those who are free to choose courses they are interested in, in accordance with their own needs and true interests. The role of the teacher is to provide the learners with safe and stable educational environment, satisfy their need for belonging to the group, esteem and self-actualization. How to do it in the case of e-learning students? Some clues for establishing humanistic educational environment can prove helpful:

- ensure that you have mutual objectives – discuss with students suggested objectives and introduce modifications to the course according to what they expect to learn (e.g. diversity of problems or extending materials);
- define rules of working during the course, negotiate a mutual agreement – take care to satisfy the need for safety and esteem;

- establish safe and learner-friendly environment – e.g. by giving an opportunity to ask questions or correct provided solutions for problems – satisfy the need for safety, build learners' self-confidence and accuracy;
- create numerous opportunities for group work, satisfy the need for belonging to the group and esteem;
- ensure that learners have positive experiences from the work they do – create opportunities to show and distribute their results – satisfy the need for love, respect and self-esteem;
- diversify tasks on the platform so that each learner could find a problem consistent with his or her interests – satisfy the need for esteem and self-actualization;
- provide learners with an opportunity to make truly free choices – e.g. topics for essays, reports, etc., encourage creative searching and thinking (also unconventional) – satisfy the need for self-actualization;
- be available and present – in the case of both asynchronous and synchronous modules (e.g. "e-learning conferences" – videoconferences dedicated to any form of support);
- keep correspondence more personal, avoid impersonal forms or serial correspondence – take care to meet the need for esteem.

### 1.3 Motivation in constructivism

The constructivist approach is based on the cognitive theory of human development. Both J. Piaget, J. Bruner and L. Wygotski, whose works are regarded as a basis of the constructivist approach, shared the view that "(...) mature thought emerges through a process of development that is (...) a reorganization of psychological structures resulting from organism-environment interactions. Basic mental structure is the product of the patterning of interaction between the organism and the environment, rather than a direct reflection of either innate neurological patterns or external environmental patterns" (Kohlberg, Mayer 1972). Development, which is driven by the dialogue between human and environmental structures, means progress according to fixed and ordered subsequent stages. The purpose of education is to make the learner reach another (higher) level of development. Thinking becomes a driving force which makes this growth systematic and well-organized. According to this approach, education is not only transmission of knowledge or establishing algorithmic skills, but rather

transmission of patterns and methods of scientific thinking and research which allows learners to construct particular meanings on their own. To make it possible, the educational environment must be actively stimulating. This is because learning takes place when the learner creates individual senses by reference to educational materials and communication with other participants of the process. However, materials must be active and should stimulate the learner to ask and solve real cognitive questions. Learning means interpreting reality and giving it individualized meaning. Representatives of the constructivist approach consider knowledge as an active change in thinking patterns induced by experienced opportunities of problem solving.

Cognitive theories provided a basis for numerous concepts of motivation. One of the best known concepts is the social learning theory and the concept of locus of the control by J. Rotter (Zimbardo 2009). According to J. Rotter, many human behaviours are motivated by cognitive processes which are determined by two factors: expected goal achievement and personal goal value. This is because an individual is active in arrangement of one's relations with the environment by reference to one's own expectations, and hopes that the results will be worth the effort. Expectations on how successful our actions are going to be are strongly dependent on the locus of control and evaluation of one's own effectiveness, and a subjective evaluation of chances of success. The research by A. Bandura (Bandura 1986) shows that people who are convinced of their own ineffectiveness shy away from difficult tasks and cut themselves off from rewarding experiences, whereas people who find themselves highly effective increase their efforts if faced with a difficult task or situation, which allows them to acquire new competences. Motivating students at any age to learn can be then related to increasing their self-esteem, a positive 'can do' attitude, and willingness to address difficult but solvable problems. Here are a few tips on how to organize educational environment in this manner:

- support the sense that anything the learners do has its purpose - the objectives are supposed to be difficult but achievable;
- establish the educational environment that actively stimulates learners;
- apply various teaching forms and methods, including in particular problem-based methods and facilitative learning – support independent search for problem solving strategies;
- apply learning and teaching methods that allow working in communities and social negotiation of meanings;

- emphasise creating rather than recreating knowledge;
- decrease the number of tasks related to knowledge acquisition and increase the number of problems which require cognitive activity and refer to real situations;
- apply teaching aids which encourage learners to ask their own questions, look for the answers and create new knowledge according to the context;
- try to be a facilitative trainer.

### 1.4 Three approaches to motivating learners

The three discussed approaches - behavioral, humanistic and constructivist - derive from a completely different anthropological and psychological background. The way we look at a human being – as reactive and controlled from the outside or an active individual who creates his or her environment or a person who strives for self-actualization – directly affects the way we establish the educational environment and define its particular elements. To make these differences more visible, they have been gathered in a table below. Selected sample categories have been taken under consideration: "contents," "methods and forms," "tasks and problems," "control and evaluation," "teacher's role," and eventually, "motivation tools."

**Table 1.**

**Characteristics of the teaching-learning environment.**

| Distinctive categories | Behavioral approach | Humanistic approach | Constructivist approach |
|---|---|---|---|
| *contents* | - strictly defined by the teacher;<br>- compulsory for all learners with no individual distinctions;<br>- in a form of sequential, logical steps;<br>- prevailing ready and fixed pieces of knowledge to be acquired. | - opportunity to choose individual courses for studying;<br>- open choices;<br>- different interpretations are accepted;<br>- the content is intended to create stimulating environment for learners. | - contains a lot of problematic issues which stimulate reflective thinking;<br>- constitutes a field of negotiation with students;<br>- puts emphasis on creating rather than recreating knowledge. |

| | | | |
|---|---|---|---|
| *methods and forms* | - dominated by methods based on knowledge assimilation: lecture, presentation, description, instruction;<br>- the group is treated like a uniform community with no distinction of methods in terms of individual needs. | - no dominant predefined teaching methods imposed by the teacher, methods are chosen according to preliminarily recognized learner's preferences;<br>- prevailing individualized approach;<br>- group work possible. | - prevailing methods that assume learner's own approach to knowledge, problem-based learning: classical problem-based learning, games, brainstorming, project method;<br>- application of methods for knowledge assimilation aimed at active data processing: e.g. mind maps, metaplans, SWOT analysis;<br>- process-oriented methods;<br>- team working. |
| *tasks and problems* | - convergent tasks and problems;<br>- tasks aimed at reconstruction of contents and application of particular sequence of actions;<br>- tasks are obligatory. | - a variety of tasks and problems, selected in accordance with all levels of goals;<br>- voluntary performance of tasks;<br>- the tasks and problems are equipped with auto-evaluation tools. | - divergent tasks and problems;<br>- often in a form of experiments (also mental);<br>- selected according to mental abilities and application of knowledge for problematic and atypical situations;<br>- mutual agreement in terms of tasks performance. |
| *control and evaluation* | - external control;<br>- teacher's direct supervision of what | - internal control;<br>- self-control and self-evaluation (tools integrated | - internal control prevails;<br>- external control is aimed at providing |

| | | | |
|---|---|---|---|
| | the learners do;<br>- permanent control aimed at reviewing tasks performance;<br>- assessing results not progress;<br>- tests as a leading mean of control. | with learning materials);<br>- conferences in order to get additional tips and explanations. | learners with feedback;<br>- possibility to correct own mistakes;<br>- assessing progress not the result. |
| *teacher's role* | *"Computer engineer"*<br>- responsible for provision of all information;<br>- full control over teaching/learning process;<br>- directive and autocratic attitude. | *"Guide, tutor, counsellor"*<br>- does not disturb but only provides with advice;<br>- direct influence replaced by establishing safe and stimulating environment;<br>- facilitative attitude. | *"Trainer"*<br>- frequent contacts;<br>- designing diversified activities for students;<br>- creating problem-based tasks;<br>- stimulating students for active participation;<br>- engaging discussions;<br>facilitative attitude. |
| *motivation tools* | - constant supervision, preview to participation with instant and direct intervention;<br>- involvement: controlling behaviour by rewarding or punishing. | - making an effort to meet learners' need for safety, esteem and self-actualization;<br>- establishing goals and educational environment in accordance with learners' needs. | - setting stimulating educational objectives – difficult but achievable;<br>- providing learners with challenging problems;<br>- diversified forms and methods to enhance engagement (both mental and emotional);<br>- providing positive feedback on progress; |

| | | | |
|---|---|---|---|
| | | | - reinforcing a positive 'can do' attitude;<br>- establishing an active educational environment. |

*Source: own elaboration*

## 2. THE ART OF MOTIVATION IN E-LEARNING

It is particularly difficult to motivate learners in the e-learning environments. They naturally limit personal interaction between a teacher and learners to distance learning forms of activity, mainly asynchronous and limited synchronous ones. The limited contact and a specific form of communication (which does not allow e.g. reading non-verbal or intonation signals) make it more difficult for the teacher to employ motivational strategies. However, they do not render him or her helpless. The suggestions of educational strategies for enhancing learners' motivation in e-learning, in selected forms of activity, are presented below. The issue in question concerns establishing motivating learning objectives, creating intellectually engaging tasks, leading a successful discussion forum, conducting supportive evaluation, and creating a community of learners. The examples and instructions have been derived from the humanistic and/or constructivist paradigms.

### 2.1 Setting goals and tasks in e-learning

Setting educational objectives in e-learning is not different, and should not be different, from setting objectives in traditional forms of education. The differences in constructing and formulating educational objectives, as well as their quality, arise rather from the theoretical approach assumed by the teacher. From the behaviorist perspective, the goals are established mostly in terms of retrieving information and utilizing knowledge in algorithmic situations. They are uniform for the entire group of learners and formulated a priori by the academic teacher. Assuming the humanistic perspective brings about a complete change in the way the objectives are formulated, and in their content. These objectives should be the goals of an individual, based on his or her needs and interests, and as such they are extremely individual in their nature. It is very difficult to utilize the humanistic model in academic learning. It is of no use in mandatory courses. The idea of the humanistic approach to learning seems even more difficult to apply in terms of e-learning. However, some promising elements could be found in teacher's

tasks following the facilitative learning model (cf. Joyce 2008). Furthermore, some elements could be utilized in e-learning e.g. as individual correspondence, special forums or video chats dedicated to consulting, guidance and counseling sessions. There is much more room for the constructivist approach to be employed in typical e-learning courses. Following the constructivist approach, the objectives should:

- be difficult but realistic – progressive, developing, encouraging to "go beyond your limits";
- show the meaning and value of undertaken efforts;
- be negotiated with a group so as to be viewed by the participants as their own.

The constructivist approach promotes educational goals that foster the reorganization of cognitive structures. Reconstructive activities aimed at describing, reviewing or presenting a given topic fail to present a motivational challenge to learners to undertake a mental effort; instead, they often entice them to use a 'copy-paste' option. In this respect, they discourage rather than motivate learners. Therefore, it is advisable to establish educational objectives of higher taxonomic categories – first and foremost mental skills such as analysis, synthesis, comparison, abstraction, deduction and induction as well as the ability to utilize knowledge in atypical or problematic situations. In accordance with the established objectives, the academic teacher preparing educational materials for the platform should focus on tasks that are developing and motivating. How to make sure that the tasks are intellectually or emotionally engaging while remaining in line with the set educational objectives? The constructivist perspective gives a number of clues. Firstly, if they are to be developing, the tasks must provide educational support in the learning process and act as "mountaineering hooks," allowing for climbing up safely while presenting a challenge: yet another, more difficult step to take. If they are to appear so, the tasks cannot be based on universal tools, appropriate for any group or material. On the contrary, they should be carefully tailored in terms of their arrangement, type, difficulty, etc. for a person undertaking the climb. Their arrangement and layout is up to the teacher, who in this metaphor acts as a person marking out the path and as a safeguarding coach. Accordingly, the tasks must be precisely tailored to particular learners and ensuring that they keep climbing up mentally; they must present a challenge that would bring about the reorganization of learners' cognitive structures as required and defined by educational objectives. To form such tasks, the teacher must very carefully diagnose the phase of development (in terms of competences stimulated in

educational process) of a given group of learners or prepare a number of highly diversified tasks so as to allow each learner an attractive route that presents genuine challenges. A task that is too easy fails to present a sufficient impulse to make an effort, while a too difficult task discourages from maintaining a high level of engagement and perseverance. The examples of intellectually engaging tasks include the following:

- compare and contrast essays (comparing or evaluating) including tasks such as: "evaluate," "compare," "explain the relationship/links," "compare the differences/similarities" (Cottrel 2008);
- discursive essays – in which one is supposed to e.g. prove a controversial thesis statement, define one's views, present arguments or evidence supporting the thesis, demonstrate knowledge of the opposing arguments, demonstrate the strengths of one's own arguments and weaknesses of the opposing arguments (Cottrel 2008);
- case study (e.g. diagnostic case study, case analysis/analysis of didactic or educational situation);
- preparing a topic/problem-based mind map;
- preparing an individual or group project where learners are supposed to match, plan, solve, design, present, etc.;
- constructing appropriate tools for a particular method by learners.

### 2.2 Leading an active discussion on a forum

Moderating a discussion forum is one of the more important educational tools in the art of motivation. All teachers leading e-learning discussion forums should address the following questions:

- What topic for discussion to choose to make it lively, engaging and stimulating?
- How to moderate a forum to keep learners engaged?

The author's personal experience provokes reflection that questions the effectiveness of forum discussion topics, designed for discussion or for assessing the understanding of the texts presented on the platform, which are not controversial or exciting. Such a forum quickly ceases to exist and fails to motivate a long-term effort. Therefore, what topics should be chosen for a forum to activate learners? First and foremost those that are emotionally engaging – issues that are controversial, contentious and ambiguous, provoke

conflicting views and values or require some kind of evaluation. This way one of the most important educational strategies is activated, namely learning through experiencing. Although, as W. Kwiatkowska emphasizes, "using the e-learning platform deprives the teacher of nonverbal tools for psychoemotional stimulation...," (Kwiatkowska 2011) it still leaves him verbal tools to use. A discussion forum is therefore an excellent form of promoting cognitive activity based on emotions. Other discussion areas that successfully engage and activate learners include topics related to getting to know learners' opinions and collecting and relating their personal experiences. Such discussion forums are designed not only to process information, but also to foster interaction and fulfill the needs to be part of a group, to promote self-respect and respect within the group. The art of motivating and engaging learners requires that the teacher should not only select a suitable topic for discussion, but also actively moderate a forum. Assuming the humanistic or constructivist approaches requires from the teacher to act as an attentive, vigilant advisor or as an actively stimulating instructor. Obviously, depending on the needs and preferences of learners, these attitudes can also alternate. Active moderation of a forum manifests itself in taking care to create a friendly environment for exchanging views among learners. To ensure that the discussion does not evolve into a 'ping-pong' kind of discussion between a teacher and a learner, the moderator should use paraphrases, discussions and references, and show relations between different statements. With a view to maintaining a high level of engagement, it is also advisable to "stir up a hornets' nest" or to "play devil's advocate" for a while, i.e. to find and present diametrically different, controversial, objectionable or unpopular arguments. A crucial element of the motivating processes is the careful reading of each post and searching for clues that could be employed in education, which trigger the need for further explanation, elaboration or finding a path that would meet the individual requirements and interests of learners.

### 2.3 Assessment – the vicious and the virtuous circle

I think it will not be imposing to say that "success implies success" and "failure implies failure." These two statements, although derived from behaviorism, illustrate the vicious and the virtuous circle in education, where the way learners are provided with assessment of their work and feedback from the teacher plays a major role. What then, a success or a failure? In his considerations on how to motivate learners G. Petty remarks that in the course of education either the virtuous or the vicious circle can be produced (Petty 2004). The virtuous circle looks as follows:

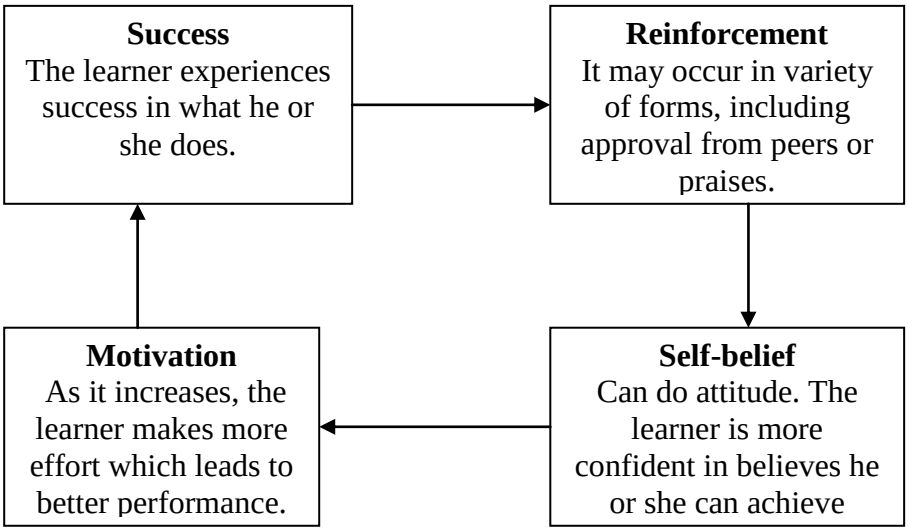


**Figure 1. The virtuous circle in the learning process.**

*Source: own elaboration based on Petty 2004: 47*

According to G. Petty, success is the engine that drives all learning. A well-done task reinforced by the teacher's praise improves the student's self-belief and improves his or her motivation to increase efforts. A level of effort does not decrease and learners do not abandon their work but are more persistent and engaged in the issue. Positive reinforcement can be either the teacher's praise or peer approval. Two of the teaching tools incorporated in the platform are task assessment and feedback opportunity. This is the place for that unique type of the academic teacher's correspondence with learners aimed at motivating them by producing the virtuous circle. To make it possible, the teacher has to follow the rules of formative and supportive assessment. Supportive assessment includes the assessment which reflects the actual state of knowledge and provides reliable information on the results, but at the same time it is communicated in a way which supports learner's development, i.e.:

- give feedback that includes the information about progress (people are ready to double their efforts if they are provided with feedback about their progress);
- give grounds for each grade or assessment;
- provide learners with tips for further work, instructions, recommended literature or possible/interesting tracks for searching;

– use “positive code” to communicate your assessment, express your postulates and requirements rather than complaints and accusations;

– sequence of information is significant: first provide learners with positive information and then discuss what should be improved.

Any comments to particular task or a piece of work, feedback, assessment and other information reported to learners can be such ”praise” that gives grounds for the victorious circle and encourages to make further efforts in order to improve skills or knowledge. On the other hand, they can produce the opposite result – the vicious circle represented by G. Petty as below:

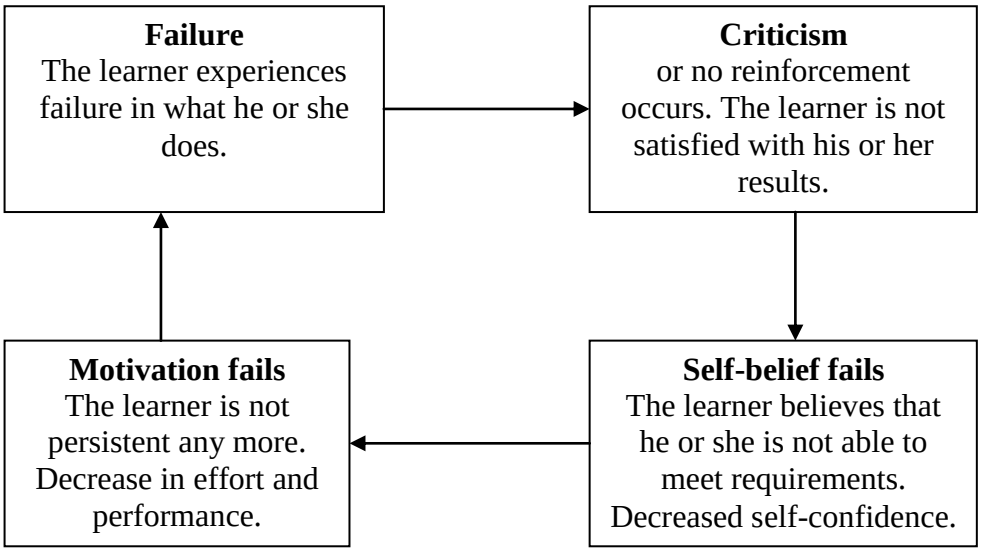


**Figure 2. The vicious circle in the learning process.**

*Source: own elaboration based on* Petty 2004

According to G. Petty, if the learner experiences failure and criticism or punishment from the teacher, he or she will possibly find himself or herself unable to be successful and to meet the requirements. A decreased ‘can do’ attitude results in a drop of motivation and efforts. As a result, the learner’s work deteriorates, which discourages him or her to make further efforts. It makes the learner subject to another failure, which will reinforce the lack of belief in his or her own effectiveness.

Nearly every task assigned to learners on the platform can be improved. Yet at the same time, nearly each task of those that failed to meet teacher’s expectations has some positives. Consequently, the way assessment is made becomes significant. It makes difference for improvement and final success

whether it is the grade like 1/10 (one point out of ten possible) or „F", which provide nothing more than a specific value of the result, or a positive feedback on what has to be improved (read, well-thought-out, classified, etc.).

## 2.4 Creating a community of learners

Creating a community of learners on the platform could be a process initiated by the leader as well as the group members themselves. The first step is to create an individual profile by course participants. The academic teacher could be the first one to suggest the model and range of information provided. The teacher could also take care of activating and initiating informal on-line chats before the course starts or in its early stages, so as to relieve the stress related to finding oneself in the new environment, create an open and relaxed atmosphere and foster personal interaction (Penkowska 2010). Other methods designed to promote interaction and a sense of community among learners include a round of introductions, an on-line survey, or an opinion forum or round (Kwiatkowska 2011); such activities facilitate forging relationships, expressing one's expectations, arranging deadlines, gathering opinions or initiating an interesting discussion topic. However, the principal tools for creating a community of learners in the learning process are derived from social models, e.g. group studies, social studies, legal studies, laboratory models, role-playing models, positive interdependence or structured social studies (cf. Joyce 2008). Obviously, not all of them can be used in e-learning; however, they could provide a teacher with important patterns for constructing new strategies. They are all based on the assumption that cooperative learning promotes creating collective energy, known as synergy, which multiplies efforts and makes achieving goals easier. The methods most frequently employed in cooperative e-learning include a group study method, a projects method, interactive essays or on-line group puzzles. It often proves difficult to create project teams or learners' communities. The difficulties are often related to the inability to communicate in terms of determining a common theme of activities, distribution of tasks and meeting deadlines. Still, these difficulties are typical of any form of group work, and they intensify when personal contact is limited and group members are chosen randomly. After all, it is no easy task to initiate cooperation among people who know virtually nothing of each other, except for a small note an individual profile provides. The success of a given project is often determined by the process of getting to know each other and openness/readiness to undertake group work. What is essential for the considered motivational processes is the structure of the goal of group work as defined by the teacher. It is not irrelevant whether learning based on

cooperation is supposed to foster creating educational community, to fulfill the need for safety, belonging and respect, or whether the group work is competitive in its nature. Competition is associated with setting rewards and estimating value, it turns learning into a race and cooperation into a contest. In competition, other learners become obstacles. The motivation to compete is promoted while the motivation to learn is diminished. Research shows that cooperative learning based on co-working, as opposed to competing, changes external motivation of learners into internal one (Joyce, Calhoun, Hopkins 2008).

## 3. CLOSING REMARK

Even though academic e-learning in Poland has been developing dynamically, still a large number of academic teachers have not discovered the joy that comes from enhancing their teaching skills by possibilities that arise from e-learning. Perhaps the reason behind it is the fear related to new technologies and the lack of skills that hinders effortless operating in the electronic environment. Perhaps the stereotypes concerning e-learning are to be blamed, as they unjustly associate this form of education with programmed learning and place it in a behavioral perspective only. It is my opinion that neither those who equate e-learning with utilizing behavioral learning strategies only, nor those who juxtapose e-learning with the so called traditional education and treat it as a modern form of education, are in the right. There are no grounds for equating "a modern model of education" with using only "modern technologies in education." In fact, modern technologies can be utilized in any educational paradigm, including a traditional one, related to behaviorism and ideology of cultural transmission. What determines the modernity of education is the employment of modern theories of education, in stationary and distance learning alike. Modern approach to education is undoubtedly related to assuming the humanistic and/or the constructivist perspective.

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# THE IMPORTANCE OF TEACHING PROGRAMMING IN INFORMATICS FIELDS AND ITS SUPPORT OF E-LEARNING

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***Abstract:*** *Currently, good programmers are in great demand. It is assumed that one becomes a good programmer immediately after graduating from university in the IT field of study. Of course, there are exceptions, but generally the shown presumption does not apply too. The basic question is how we can support the teaching of programming so that graduates have the best possible level of knowledge and be beneficial for enterprises. The main objective of the article is to present possible approaches to teaching programming with a focus on the possibility of combination of full-time and part-time study, especially e-learning.*

**Keywords:** IS/ICT education, programming, distance learning, e-learning.

## INTRODUCTION

A new conception of the economy and its development, development of the manufacturing and its automation, development of existing and new technologies, integration and cooperation of production, trade and development activities, and a new approach to solving problems in all areas of social life brings pressure to develop means by which we can easily, quickly and efficiently achieve the implementation of specific solutions and goals. By these means Information and Communication Technology (ICT) can be considered. ICT base and in particular integration of ICT into the Internet services has become the standard for the support of the strategic goals and objectives of all types of enterprises (manufacturing or sale oriented), government institutions, educational institutions, etc., and an integral part of the lives of ordinary users. The emergence of new processes and activities in the field of economic development, production, management

and informatics puts new demands on access to the educational process, particularly at universities, which must and will have to educate new professionals capable of the above system approaches to implement in practice. From this perspective, it is always advisable to ask whether the current approach to curriculum programmes at the economic, technical or multidisciplinary (rather interdisciplinary) oriented faculties from the perspective of development trends in the areas mentioned above is optimal. The main purpose of the article is mainly focus on the issue of higher education in study program System Engineering and Informatics in the field of study Managerial Informatics at Silesian University in Opava, School of Business Administration in Karviná (hereinafter SU OPF). The issue will be analysed particularly in terms of teaching programming.

## 1. DEVELOPMENT IN DEMAND FOR IS/ICT SPECIALISTS

If we look briefly at history, from 1995 to 2000, there was the greatest demand for developers and programmers with knowledge of the languages and tools especially for web applications design, which was at that time far from necessary to directly integrate them with CRM (Customer Relationship Management) and/or ERP (Enterprise Resource Planning) systems, although initial efforts existed. This was the reason that a high percentage of high school graduates found applications in this field. Since 2000, change occurred in the demand for IS/ICT professionals. At that time gradually started rising demand for not only "pure" programmers but also for specialists with a broader knowledge of both technology and business environment. That development in demand persists in the present. Although knowledge of programming is not a sufficient and exclusive condition for informatics and their competitive advantage in the labour market, is one of the necessary conditions.

If we look at the problem in general, in terms of education and knowledge of computer science, business environment can be divided into three basic groups, which are (Suchánek at all 2011):

– **IS/ICT specialists, programmers primarily** - current needs are focused mainly on the knowledge of Java, J2EE, Hibernate (framework written in Java), Spring (open-source application framework for developing J2EE applications), JSF (JavaServer Faces) JSP (JavaServer Pages), Ajax (Asynchronous JavaScript and XML), MS SQL Server, Oracle, JavaScript, VBA (Visual Basic for Applications), UML (Unified Modelling Language), XML (Extensible Markup Language), XSL

(eXtensible Stylesheet Language), Eclipse, Microsoft Visual Studio (C + +, C #, Web Developer (ASP.NET), Visual Basic.NET). Be noted, that knowledge of HTML (HyperText Markup Language) and XHTML (eXtensible HyperText Markup Language) and CSS (Cascading Style Sheets) is considered quite obvious.

- **IS/ICT experts with at least a basic knowledge of business in terms of economics and related fields** – a typical example may be graduates of managerial science or related fields, who, in addition to informatics subjects, graduate in courses focused on the fields of economics, sociology, psychology, etc., so from the fields to help them gain knowledge oriented to target areas and groups for which they develop, optimize and manage IS/ICT support. There is assumed at this group basic knowledge of:
  - programming (rather, at least basic knowledge of algorithms and programming techniques),
  - architecture, user interface and implementation of CRM and ERP systems (as an example, MS Dynamics Navision, Helios Orange, K2, Abra, Orax, Leonardo, Inspiro, Altus Vario, Twist Inspire, Infor, etc.),
  - implementation of projects to support the business within which we can, among others, gain support for the implementation of information systems (for example, under the operational programs OPEI - Operational Programs promoting Entrepreneurship and Innovation),
  - reengineering with output of optimization of processes to reduce costs and implementation of lean business, and
  - managing both IS/ICT and business and manufacturing activities.
- **Workers without direct knowledge of IS/ICT** - people whose education was not directly focused on informatics. Due to social and global developments and the rate of penetration of ICT in all areas, it is evident that, if they want to be successful in today's highly competitive environment, they cannot do without ICT. As a trivial example can be considered the urgent need of searching the current information in information sources and processing and presentation of this information. It is therefore evident that even this target group desperately needs to get at least basic information about computer science. In connection with the increasing rate of use of IS/ICT in enterprises and the continuous development of new business models based on the principle of e-

commerce and e-business seems to be some degree of information technology education in persons with expertise in economics and related disciplines (especially marketing, management, entrepreneurship) as appropriate, expressed in real terms, as necessary.

Universities and especially faculties oriented to education in informatics and economical fields try to devise study programs and courses, so that on the one hand, to prepare graduates for the needs resulting from the current market requirements and on the other hand, to differentiate from competitors. It is often not, due to possible ranges teaching, trivial matter. Anyway, it can be assumed that precisely this fact may play a very important role in terms of evaluation of higher education institutions in the future.

## 2. THE BASIC INFLUENCING FACTORS FOR TEACHING PROGRAMMING

As mentioned above, programming should be part of the basic knowledge of graduates in computer science fields. In this context, it is therefore necessary to ask the basic question, how to teach programming in the best way. From this point of view, we should find all factors that may influence teaching programming. These factors can include:

- target group;
- forms of teaching;
- teaching methods;
- teaching tools.

### 2.1 Student categories

As well as some other fields, programming can be considered a specific field of study designed only for a specific group of students. We can say, that programming is a skill that is understandable and obvious to some individuals, to others it is a very distant and unattainable island on the Earth or maybe even a piece of territory on another planet in another galaxy. Unfortunately, in every class there are students who are not able to find the source of the error and grope for explaining the behaviour of their program. Before we start to ponder on teaching debugging, we should remind ourselves that students are not a homogenous group. We can split them into several categories (Pecinovský 2011):

- Students who want to specialise in a different profession (mostly management) and who consider the mandatory subject of programming an inevitable evil.
- Students who are interested in programming and who want to learn it. We split them again into two categories:
  - The beginners who have never dealt with programming before.
  - The students, who know how to program and who bring some inevitable wrong habits with their experience, too.

Each category needs a specific approach. Let's have a look at some typical situations and reactions we can come across in all categories (maybe without the most experienced students).

### 2.2 Forms of teaching

When we talk about forms of study, it is useful to recall the following information and definitions. There are three forms of teaching enshrined in the Higher Education Act in Czech Republic. There are forms:

- Full time study;
- Distance form of study;
- Combined form of study.

At universities in the Czech Republic we can usually meet full time study and combined form of study. Full-time study is known for everybody. Distance education or distance learning is a field of education that focuses on teaching methods and technology with the aim to deliver teaching, often on an individual basis, to students who are not physically present in a traditional educational setting such as a classroom. It has been described as "a process to create and provide access to learning when the source of information and the learners are separated by time and distance, or both. (Honeyman 1993). The third form is the so called combined form of study (also referred to as hybrid (Tabor 2007) or blended (Vaughan 2010), which is a distance form of study that requires a physical on-site presence for any reason (including taking examinations). A specific form of study belonging to the distance or better combined form of study is so called e-learning. E-learning is an educational process, using information and communication technologies for the:

- creation of study materials;
- learning content distribution;

- communication between students and teachers;
- learning process management.

### 2.3 Teaching methods

Teaching methods are generally tied to the didactic and methodological approaches. In general, it is necessary to set objectives, and to achieve them, we should use all available means, tools, methods, etc. In the context of teaching programming, therefore, we should determine an objective of teaching programming at universities, especially in relation to the field of Managerial Informatics, which is related to this article. Teaching programming in a university setting means, first and foremost, teaching how to interact with a computing machine and how to deal with all the surprises that a machine can throw at you — notwithstanding the availability of languages capable of insulating a programmer from many of those surprises. While it may make good sense to develop a commercial application using a language that has type safety, range checking, and garbage collection built into it, those are exactly the features that make a language unsuitable as the primary medium for programming instruction. More specifically, teaching programming means, of course, teaching basic control structures of a language and the data structures which it allows us to create for solving various problems. But teaching programing at its core must also include the art and science of implementing efficient strategies for memory management, for writing signal handlers so that a program can interact with the operating system, for input/output related to different types of data, for dealing with synchronization issues related to concurrency, for process control, etc (Kak 2011). In terms of methods, related content and development of teaching programming, we can trace two main streams (Pecinovský 2008). One group of teachers recommends to begin with teaching programming with presentation of the basic algorithmic structures. Proponents of a more modern approach recommend to use and work with objects, classes and interfaces directly from the beginning of teaching programming. In the context of teaching programming, there is another problem. A distinction must be made between teaching programming language and teaching programming itself.

### 2.4 Teaching tools

It is clear that the primary tool for programming is a computer. Also necessary is software environment, in other words, the programming language compiler. In general, students can rely on the interpretation of the teacher, and may also use books and other printed or published in electronic form study materials. Currently, those resources are insufficient for

programming. To facilitate education it is appropriate, rather necessary to work with Internet resources, where there is a large amount of ready source codes and their descriptions. Also on the Internet there are a number of discussion forums in which a number of specific problems are solved. Given the current programming languages and their development environments, show internet resources are commonly used by experienced programmers.

## 3. TEACHING PROGRAMING AT SU OPF AND THE AUTHOR'S EXPERIENCES

At SU OPF, there are taught the following subjects focused on teaching programming:

- Algorithms and programming;
- Object-oriented programming;
- Programming technology;
- Programming in Visual Basic.

Beside the above items, programming is an integral part of other subjects such as:

- Basics of creating websites;
- Portal and its management;

Currently a subject called Basics object-oriented programming is being prepared. The author of this article guarantees and teaches subjects Programming in Visual Basic and Portal and its management.

In relation to the information contained in sections 1 and 2, at SU OPF main focus is oriented on teaching HTML and XHTML, CSS, C#, C++, Visual Basic, Visual Basic for Applications and PHP. XML, JAVA, ASP and other programming and markup languages are taught only partially, and in the specific context. Currently, basic development environment and compiler is Microsoft Visual Studio 2010 Express Edition.

In terms of a target group, we are full aware that not all students in the field of Managerial informatics are interested in teaching programming. On the other hand, we can conclude that in each group every year we can find several students who want to be interested in programming completely or at least in the future in their profession. These students receive a special attention from teachers.

Programming is a discipline for whose full-time study is inadequate. Therefore, it seems to be very appropriate to use all the resources that are available. Generally, students have access to study materials, which are presented in lectures and seminars, very often work with online textbooks and blogs on the Internet and use electronic materials for e-learning. It is widely known, that e-learning study materials are commonly used in the combined but also in full-time form of study. It is not surprising. Generally, the possible range of contact teaching greatly limits the amount of discussed and practice curriculum. Programming is far more depended on practicing, and in this respect, a range of full-time teaching is inadequate. In this context, we can ask the question whether it is possible to educate and bring up a quality programmer using typical methods and tools in the field of distance learning, particularly e-learning. The author of this article believes it really is, and considers the most appropriate combination of full-time and distance form of study. Learning programming requires a lot of independent work by students and printed and especially electronic study materials can significantly help them.

## CONCLUSIONS – THE AUTHOR'S STATEMENTS TO DISCUSS

- In the field of informatics and managerial informatics, programming is basic knowledge.
- Some students of managerial informatics think that programming knowledge is of no use for them. They are wrong and they find out about it in practice.
- The author has an experience that it is appropriate for teaching programming always to begin with teaching basic algorithms in which it is possible to work with basic objects. Development environment Microsoft Visual Studio 2010 is suitably applicable for this approach.
- A greater emphasis should be put on teaching, not teaching programming language. The author considers this fact to be one of the complex issues requiring sufficient experience on the part of the teacher.
- Programming teachers have to adequately motivate the students.
- The typical number of three hours of lectures and seminars per week in full-time study is inadequate. Students must devote a lot of time to programming and sometimes they need help. Considered helpful are printed books, electronic books, blogs and discussion forums on Internet

or electronic texts presented in some of Learning Management Systems (LMS), for example, Moodle at SU OPF.

– A combination of full-time and distance learning, e-learning, is very advantageous for teaching and learning programming (from the author's own experience).

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# PEDAGOGICAL ASPECTS OF USING CLOUD COMPUTING

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***Abstract:*** *Recent advances in computer science in the area of redundancy and protection led to sharing data in many different storage places. Modern infrastructure has made cloud computing secure and reliable, and the spread of computing fundamentally changes the understanding of the use of resources and services. Materials of this article are devoted to pedagogical possibilities of using cloud computing to provide training, based on competence approach and monitoring of students.*

**Keywords**: cloud computing, Internet services, educational opportunities, Web 2.0 technology, performance monitoring, competence-based approach, competence task, information learning environment.

## INTRUDUCTION

**The Problem**. The emergence of cloud computing is changing our understanding of the use of hardware, software and data storage. Data warehouse as an object that can be separated from a particular computer has become a common device, but now that light has been perceived and applied. Instead of placing files and software on a single computer, results and tools are gradually moved and placed in the cloud. Under such conditions, applications and data are available from many computers as tools that are used to solve certain problems, are free or very cheap.

According to Wikipedia cloud computing is technology for distributed data processing where computing resources and power is available to the user as an Internet service. It provides user services as Web services, which is a key concept in cloud computing, namely:

- Everything as a service - the customer service is provided in the form of everything from software and hardware to managing business processes, including the interaction between users;
- Software as a service - a service "software on demand", i.e. software deployed on remote servers, and the user gets access to it through the Internet, while the user does not worry about the issue of licenses or software updates;
- Hardware as a service - the user equipment is available on loan, thus saving on maintenance;
- Workplace as a service - using cloud computing for workplace employees (students, teachers), by installing and configuring the required hardware and software;
- Data as a service - the user is disk space that can be used to store large amounts of data;
- Security as a service – allows to quickly deploy software products for the safe use of web technology, e-mail, LAN, etc..

In practice, cloud computing makes it possible to deploy tools that can scale as needed to serve any number of users. For the user the cloud is invisible; the technology used to support applications does not matter - it is important that applications are always available. Users often use the cloud without even realising it. For example, using services like Flickr (http://www.flickr.com), YouTube (http://www.youtube.com), and Blogger (http://www.blogger.com), as well as numerous other services, based on the Web 2.0 technology, containing a set of effective tools for cloud performing any tasks that the user may require, clearly demonstrates the possibility of public clouds (http://habrahabr.ru/blogs/cloud_computing/111274). In addition, content created with these tools, can be shared easily, for cooperation in the process and for disseminating the results.

Today there are many studies to determine the educational possibilities of using Web 2.0 services (Protsenko 2007), since educational institutions are beginning to take advantage of ready-made applications hosted on a dynamic cloud that is constantly expanding, which enables users to perform tasks which previously required a license to use, as well as installation and maintenance of individual software packages. E-mail, word processing, spreadsheets, presentations, collaboration, editing content that includes a multimedia character, and much more - all this can be used by the browser if the software and files are hosted in the cloud. Applications of the above can

be free or very cheap for students and teachers as an alternative to expensive instrument.

However, public clouds, like any others, have several disadvantages. Unlike traditional software packages that can be installed on your computer, we create a backup copy and use it as long as it is supported by the operating system, cloud applications are a service offered by companies and service providers in real time. To entrust the work and data to a cloud, the user should also believe that the service provider will continue to work even when you change the market or other conditions. For many organizations, cloud computing offer appropriate solution services, data storage and computing resources for users of the Internet, the number is increasing. Moreover, this solution does not require investing money in physical computers that need maintenance and upgrades in the field. In such situations, we talk about private or hybrid clouds. That is why the current study includes the problem of pedagogical aspects of using clouds, determines the main directions for their use to ensure the quality of the educational process on the development of the information society. The authors proposed and implemented an example of using clouds for the purpose of pedagogical research in the country, the effective conducting of which would be impossible for traditional reasons: remote monitoring of the level of development of skills in the area of using information and communication technologies in practice as demonstrated by graduates of secondary schools in Ukraine.

## 1. OBJECTIVES, METHODS AND KEY FINDINGS

The effective use of a wide range of products that are sold on the basis of modern information and communication technologies (ICT), particularly in the clouds, is associated with the development of modern researchers. IT competences (Golovan 2007) of all participants in the educational process, which involves the ability, skills and abilities of students to create data and new knowledge in accordance with the requirements of the knowledge society, as for successful entry into the processes taking place in the economy, education, social development. At the present stage the graduate must possess skills of the 21st century (Intel ® Teach to the Future), in particular, looking for the right information, organising, processing to analyse and evaluate them, and modern society and their own needs: educational, professional and social.

ICT competences also include the following attitudes to ICT: the habit to use information technology independently and while working in a team and work

as a group, the ability to determine the value of any data and information; a positive attitude to the rules of safe and responsible online experience, including personal issues and understanding of the cultural differences between people; interest in expanding horizons through ICT by participating in various communities, including cultural, social, etc. (Morze 2010).

A successful entry of student's informational competences for school goes beyond one science subject and is driven by a number of factors: the development of teachers' and leaders' data competences as a driving force of pedagogical innovation, organization of relevant technological infrastructure as the basis for the implementation of ICT in the educational process, reorientation training programmes and techniques for the widespread use of electronic resources of e-learning and online interaction of partners in the process as tools of the modern educational information environment. It should be noted that in the characteristics of the modern educational information environment there are a number of terms and their different definitions. Among them: an open learning environment, information-learning environment, learning environment (distance learning environment), an interactive environment, and others. What all these concepts have in common is largely the fact that a learning environment is characterised by the use of network and information technology to support the learning process (Soldatkin 2002).

Modern specialist network software systems that support an educational process (SSEP) provide a different ratio between informative, organisational, educational components, as well as classroom learning, networking and independent work. The most famous systems include BlackBoard, WebCT, LearningSpace, ILIAS, OpenUSS, MOODLE, MS Share Point etc.. Traditionally designed SSEP based on a carefully designed beforehand static hierarchy of data structures and information links as a full-featured system is quite complex, tied to a specific model of the educational process and the modernisation will require significant additional effort. However, most of the existing development focused primarily on the creation and use of automated courses, and does not solve the problem of mobility, the question remains open about the interaction between several remote SSEP (Theory and Practice of Online Learning 2004).

One possible solution to this problem is the use of cloud computing - a new paradigm where data processing resources is available to end users as an internet service. Today the leader in commercial "cloud" services is the Microsoft company, which offers appropriate solutions to customers using the Microsoft Online Services platform and Windows Azure

(http://www.microsoft.com/ukraine/news/issues/2010/11/steve-ballmer-innovations.mspx). Since the authors believe cloud computing can provide innovative processes not only in business, public institutions and in education, which is an effective social tool, it is using the Windows Azure platform in April 2010, according to the Ministry of Education and Science of Ukraine № 139 from 23 February 2010 "On remote monitoring of the level of the formation of secondary schools skills in the scope of using information and communication technology in practice", the level of the developing of graduates' information competences was monitored, which covered more than 1000 students from all regions of Ukraine. This way the competence approach was introduced in the new learning environment that eliminates the above warning about SSEP. An environment where you can organise a process of both acquiring informational competences by students and monitoring their development is a portal developed by KiberBionik Systematiks Ukraine (http://cbsystematics.com). The portal (http://www. testprovider.com) is based on Microsoft Azure platform, which is an example of a hybrid cloud allowing to test more than 5,000 students at a time, to process automated test answers, to collect operational data of the process of testing throughout Ukraine.

The development of solutions based on Microsoft Azure platform allows you to test and train regardless of the location of students, to ensure the safety and privacy of all data, because the data is duplicated and stored in three large data centers on different continents, which prevents their loss; quickly increase power hardware. Minimum requirement when working with the specified portal - access to the Internet at a speed not less than 128 KB / sec.

## 2. NEW WORK OPPORTUNITIES IN THE CLOUD

The organisation of work in the cloud provides the ability to assign multiple student tests: random-turn or performance, indicating binding sequence.

It supports the following type tests: multiple choice questions in the form of questionnaires and arbitrary form: a task test rolls down into the archives and the student's responses boot the archive on the portal. The data table is filled out by a student, for information about the performance of intermediate calculations. In turn, data from this questionnaire can be used to analyse the process of complex tasks solved by students.

Similarly, there are registered teachers (during the study - science teacher), and then a webpage teacher. Interface of this page allows you to see information about all the students who performed the tasks on the portal,

download the student's files for review and verification, read the evaluation criteria test task and evaluate the student's answers.

Also, the webpage supports the possibility of the teacher's access to student answers and instructions for testing and evaluation of this optional task. If a student is learning, then he should perform dual registration as both a student and a teacher so that he can get the access to test results.

To provide automation of the evaluation process on the portal has two features: to assess the student on the criteria on a "yes / no" because experts developed explanations to each criterion that help the teacher to decide whether the student matches the criteria and compare the results with those for example that the authors have produced problems as one of the possible.

To ensure prompt feedback based on Microsoft SharePoint 2010 forum organised support works within the portal. In particular, during the mentioned monitoring of posts placed all guidelines for testing, instructions to use the portal for students and teachers, was a general discussion of the testing process, provided advice to teachers on using the portal, teachers explained the criteria for conducting assessment, teachers expressed their ideas on how to improve the testing process.

This way, the users (in this case students from Ukraine) with an Internet connection and browser support with even a very simple computer with a basic configuration are able to access data storage and programs and practice using the above services. However, it is impossible to fully assess the effectiveness of modern technological solutions, in this case in the field of cloud computing, without creating a database of competence problems (Morze, Kuzminska, Vember, Barna 2010) and the criteria for their evaluation, because their solution to students must be formed and include critical thinking skills, higher-order thinking according to B. Bloom's taxonomy (analysis, synthesis, evaluation), evaluation of new teaching skills for teachers.

The problem of competence in computer science can be regarded as a complex problem of an applied nature which tinvolves the deployment of modern ICT as a means of solution of multi-level assistance and evaluation criteria as the final result, and ways to obtain it. (Morze, Kuzminska 2008)

In the course of solving the problem students show competences, skills that are modelled as informational competences, known as the "big seven" (Burmakina, Zelman, Falyna, Much Semërka 2007). Some experts call it metacognitive structure or strategy for solving information problems that can be applied in all situations where human activity involves active use of

information. It shows how versatile skills of finding and processing the data with the help of modern technical equipment can be integrated into a systematic process aimed at solving a wide range of practical problems (McKenzie 2000).

Here's an example of one of these objectives and criteria for its evaluation.

Tasks "By car"

A family from Dnepropetrovsk plans to travel by car during the year to different cities of Ukraine. Find the distance from Dnepropetrovsk to Kyiv, Lviv, Kharkiv, Odesa, Kherson, Donetsk and the approximate cost of fuel A-95. Determine the required technical specifications of the car - the volume of the fuel tank and fuel per 100 km if the family travels by a Nissan Note with a 1.6 litrer engine and automatic transmission.

Create a spreadsheet with the distance from Dnepropetrovsk to these cities, calculate the amount of fuel required and the cost of fuel for each city as well as the formula using logical functions determine which cities must additionally fill the car on the road. Construct a chart which display the distance and cost of travel to each city.

Select a city to which you think they should go first, and argue your choice.

Positive experience of monitoring the level of the development of graduates' informational competences (Order MES 05.07.2010, № 660) suggests the authors argue the relevance of the propagation experiment on the use of cloud computing to other school subjects cycle and disciplines taught at universities.

However, it should be noted that the authors see the application of cloud computing in universities in a broader perspective:

- For users (teachers, students): a personal collection of software depending on the specialisation, course, etc., saving significant amounts of personal data - independent of device mobility;
- IT Staff centralisation and control flexibility, minimising the need for maintenance, savings on the purchase of new equipment, flexibility in the deployment of new systems;
- For high schools: personal environment of the student for the duration of training, access to your own environment from any place at any time, portability and storage session (Hot Desking), automatic distribution of software packages according to curricula, research needs and more.

## CONCLUSION

Internet service should not be understood as access to the service through the Internet. It can also be done via a local network using Web technologies. Thus, the development platform, organised in a tiered cloud-based infrastructure enables thin clients to realise, the results of which include: scalability, configuration - isolation from one terminal, quick and simple means to reconfigure the system in case of problems, high safety, high reliability, low demands on performance and specifications of terminals as a result - reduce their costs, in addition, the terminal can serve not only the computer but also mobile phone, etc.

The organisation of virtualization processes enables dynamic binding of certain applications to specific user groups, redistribution of resources, maximum utilisation of the park servers, fast cloning systems, etc.

Clearly, the practical realisation of these areas is likely to be a hybrid cloud, requires time and significant resources from the state to create a cloud system for educational institutions, in particular for creating a unified information learning environment for secondary education as to the disadvantages of using cloud computing include:

- *permanent access to the network for access to services "cloud";*
- *privacy* - at the moment there is no technology that would guarantee 100% confidentiality of data stored in the cloud. Therefore, experts advise not to keep the most valuable documents in the public cloud;
- *software and its customization* - there are certain restrictions on software that can be deployed in the cloud and provide it to users that the user always has the ability to adapt the software to their own needs;
- *expensive equipment* - to build a private cloud company should provide considerable material resources that are not beneficial for small businesses and organizations.
- But the benefit of this work include the following arguments - the benefits of cloud computing:
- *Accessibility* - the clouds are available to all from any point where the Internet, from any computer where the browser. This allows users (institutions) to save on the purchase of expensive PCs. Employees are more mobile because they can access your workstation from anywhere using a laptop, netbook, smartphone. No need to buy

licensed software, its configuration and updates - you just need to go to the service and use its services should pay only for actual use.

- *Low cost* - reducing the cost of servicing the virtual infrastructure, which is caused by the development of virtualization technology, through which you can reduce IT staff maintenance facility structure, payment of actual resource use saves the purchase of licensed software, the use of cloud on loan saves on buying hardware means;
- *flexibility* - unlimited computing resources (disks, memory, CPU) by using systems virtualization. Process scaling and administration of the cloud becomes simple task;
- *Reliability* - The reliability of clouds, particularly those stored in special TsODah (center of data) is very high under the responsible care.

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# APPLICATION OF QUALITY TOOLS IN E-LEARNING COURSES

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***Abstract:*** *The implementation of e-learning in higher education institutions is undoubtedly a complex undertaking. Although it has been present in the Polish and worldwide eduction for a certain period of time, e-learning still arouses a lot of emotions, particularly in ensuring the quality of the educational process.*

*Successful implementation of e-learning depends, among others, on effective quality management. Hence the challenge now faced by academic institutions leading the country in e-learning is a widely understood quality of e-learning.*

*While quality management methods in traditional higher education have been fairly well described and widely used in universities, distance education requires the use of other criteria, tools and measures.*

*The paper presents the possibility of using a selected number of tools aiming at improvement of quality at different levels of implementation of the distance learning/teaching process, from the preparation of an e-course through its implementation and realization, to the evaluation and assessment of learning outcomes. It also presents the possibility of application of the basic tools of quality management in the organization of distance education at tertiary level.*

*The following tools have been described: the flow chart, the check sheet, Ishikawa's diagram, Pareto-Lorenz's chart, the histogram. The seven basic tools are widely used in industry for control, visualization, evaluation and*

*improvement of production and auxiliary processes. They are easy to use, quick to implement, useful for gathering and collecting data and conducting analysis. These features help to make appropriate decisions based on facts.*

*The authors indicate the possibility of application of the above mentioned tools by the employee and managers at all stages of development and management of an e-course, which further on should lead to the improvement of the quality of the e-learning process.*

**Keywords:** E-learning, e-course, quality, quality tools, Total Quality Management.

## INTRODUCTION

E-learning is becoming a regular part of the academic reality in Poland. Since its introduction is a complex undertaking, not always the actions associated with it are properly planned and organised. At the same time e-learning is not just the use of information technologies in education, but also a new form of the whole teaching process. Thus, e-learning requires teachers to open up to the methods and techniques which are common in other areas of our lives, but can be used successfully in e-learning.

## 1. E-LEARNING AND QUALITY

One of the main challenges faced by e-learning is to provide quality e-courses. It is a very difficult task, on the one hand because of the diversity of forms used in learning and teaching with the Internet and the lack of a model of academic e-learning in Poland; on the other hand because of the multidimensionality of the concept of quality. The very definition of quality is already a big challenge as it alone can be divided into 7 groups (Garvin 1984):

1. General (transcendent),
2. Associated with the production,
3. Associated with the product,
4. Associated with a user,
5. Associated with the formation of values,
6. Multi-dimensional,
7. Strategic.

The authors of this article suggest that in the debate the definition proposed by Feigenbaum (Feigenbaum 1983) should be used as it seems to be appropriate to the needs of the analysed issue. The product and service quality are defined as follows: the total composite product and service characteristics of marketing, engineering, manufacture and maintenance through which the product and service in use will meet the expectations of the customer. It should also be noted that the authors are aware of the shortcomings and deficiencies of such a definition in the case of e-learning. Interesting discussions in terms of quality of education can be found in the articles (Lagrosen, Seyyed-Hashemi, Leitner 2004), (Sahney, Banwet, Karunes 2004) or (Hildebrandt & Teschler 2004).

Developing assessment criteria for the quality of e-education forms would allow teachers to assess their own e-classes and would help school authorities to evaluate e.g. didactic units. Attempts to develop such standards were undertaken by the Association for Academic E-learning (Zając et al. 2009). The assessment criteria for the quality of e-classes have been publicly available since October 2008 at the Association's web page (http://www.sea.edu.pl/kryteria/). At the same time attempts are being made to use quality management principles, and even TQM, in the organization of e-learning (Walasek et al. 2011a, 2011b). Looking at e-learning as a service and following the terminology of quality management, it can be assumed that the quality of e-education can be measured by the extent to which a service (e-education) caters for the demands and expectations of the client. The main recipient of e-education is the student for whom an e-course is a 'product' on offer. The student is the external client of e-education. The academic teacher who develops an e-course and conducts online classes is the internal client. Both categories of clients co-exist in the process of e-learning/e-teaching (Figure 1) and they both assess the process according to their needs and expectations. The assessment is subjective and changes with time. Furthermore, satisfaction of the student and satisfaction of the teacher are mutually dependent.

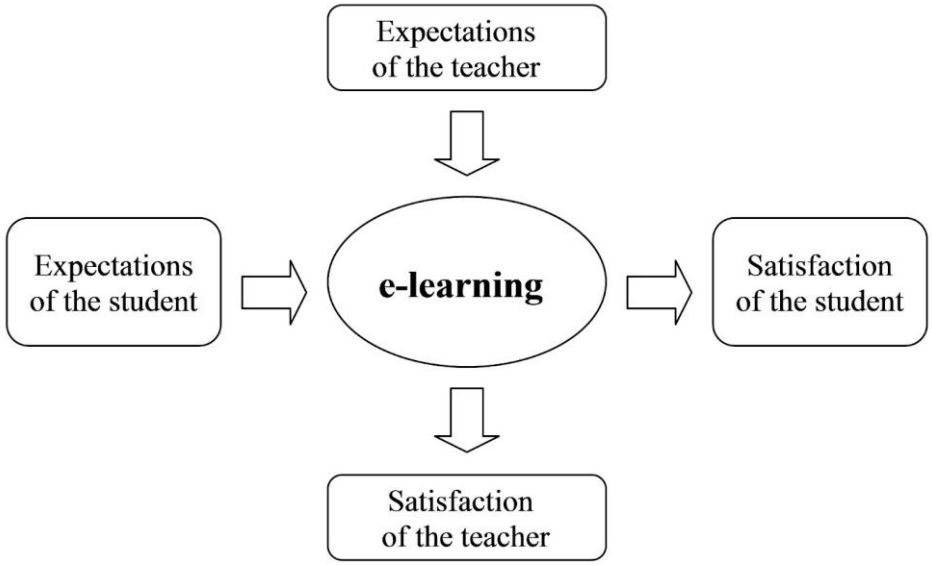


**Figure 1. E-learning process and its clients.**

*Source: own elaboration prepared by Kucharczyk, Walasek 2011*

At the same time the idea of quality management is based on the reduction of all kinds of the product defects, improvement of the applied solutions, and thus continuous improvement of quality. Applying this idea to e-learning should ensure a good quality of an e-course at all stages of its implementation, from design to evaluation. Furthermore, the clients should also participate in the process of quality improvement. E-course evaluation by its author, usually the teacher, may vary significantly from the assessment made by the student, (Kucharczyk et al. 2011).

First of all, if we want an e-course to meet the customer requirements, decisions on how to improve its quality should be based on actual facts. It is impossible to perfect an e-course, relying only on our own feelings and imaginings. Therefore, it becomes necessary to collect and analyse data relating to the e-course.

As it seems, e-learning needs tools to support the improvement of the quality of e-courses. The literature on quality management (Dahlgaard et al. 2000, Borkowski 2004), distinguishes a number of tools supporting continuous improvement. Their application enables the collection of data, the analysis of which can provide information needed to take preventive or corrective actions.

## 2. QUALITY TOOLS

Without reliable and complete information, it is difficult to talk about taking effective action to systematically improve quality. Quality management tools serve to collect and process the data related to various aspects of quality. They are instruments of monitoring and diagnosing the activities occurring in the life cycle of the product.

The seven classical quality tools are:

- Flow chart - used to visualise the process from beginning to end. Allows you to schedule and analyse the process with all its branches and critical points in order to improve or even simplify it or to prevent errors.
- Cause and effect diagram - basic tool of visualization and categorization of brainstorming results. Clearly shows the relationship between the causes and effect, allowing to expose and find the major cause. The fishbone diagram can be used by individuals or teams.
- Check sheet - a commonly used tool for data collection. The simplest type of a check sheet is a list of events where you can put a check mark for each occurrence (e.g. attendance list). Another example would be a city map with flags marking crime sites.
- Pareto diagram - is a natural consequence of the use of check sheet. Is used to visualise the collected data and allows you to find the most significant groups of data such as the causes of defects or types of defects.
- Histogram - a widely used tool to analyse characteristics of variation and provide visual interpretation of data. It allows a rapid insight into the distribution of collected data.
- Scatter plot - shows two or more variables plotted against each other. It can be used to show that two or more variables are correlated (or not). The plot can also be called regression plot as the line plotted is a 'regression' line showing the linear relationship between the variables.
- Control charts - the concept of the control chart is to control the process measuring variation, taking repeated samples, and calculate upper and lower control limits. If any observed point exceeds these limits, it is a signal that some additional activities should be performed. Control charts allow to manage the process deviation before it goes out of control.

## 2.1 Continuous Improvement Process

Following the Total Quality Management rules, the work on the e-course is based on application of the PDCA cycle, also called the Deming cycle.

PDCA (Plan – Do - Check – Act) is an iterative process aiming at systematic and constant quality improvement. The PDCA Cycle, developed by W. Shewhart in the Bell Laboratories, USA, in the 1930's, was promoted by W.E. Deming twenty years later and is currently widely known as the Deming Wheel or Deming Cycle. The main idea behind it is to divide the process into four steps. Although in each case the range of activities assigned to a given step may differ, the list below presents a number of general examples:

- Plan - defining the concept, aims and objectives; identifying problems and critical points; training; developing templates, models, methodology, etc.
- Do - solving a problem on a small scale; preparing documents and procedures; describing the process; piloting, etc.
- Check - measuring the results; evaluating the solution/model; comparing the results with the established goals; preparing standards, quality assurance procedures, and the review process, etc.
- Act - full scale implementation; implementation as a standard; introduction to the company culture, etc.

The main purpose of PDCA-cycle application is in process improvement. When the process improvement of an e-course starts with planning, it results in corrective and preventive actions, supported by appropriate quality tools, which leads to process improvement. A possible application of quality tools in correlation with four steps of PDCA-cycle is shown in Figure 2.

At the stage of e-courses planning (**Plan**) the Flow chart can be used to mark places that require a decision, the teacher's intervention, it allows you to schedule the course, plan activities, determine the score and weight of individual tasks, methods of evaluation and support, additional materials and the way they are shared and many more. At this stage, it is worth doing the Cause and effect diagram as a visualization of brainstorming of the team creating the course or - when the course is prepared by one person - as a tool of systematization of the work on an e-course.

The stage of an e-course preparation (**Do**) does not give a great field for the application of quality improvement tools. Here, the burden of work consisted

mainly in the development of materials, their implementation and execution of the course using the available tools. It is possible, however, to use the Control chart and other tools such as histogram to perfect an e-course in subsequent cycles of improvement. It is necessary to evaluate the e-course after the first semester / year, and that is when you can and should use some of the tools of quality improvement.

Checking (**Check**) aims to assess the existing activities. It seems that it is at this stage when the Quality tools are most useful. All kinds of Check Sheets, whether electronic or traditional, surveys, questionnaires, activity sheets are ideal for data collection. Using the Histogram to illustrate the data is a natural consequence. In the next step, the selected data sets can be presented by means of the Pareto diagram depicting the most significant categories or groups of problems. Here, too, it is worth using the Scatter plot to determine the correlation between categories.

Thus prepared and analysed e-course is made available to students whose work in the course is constantly monitored (**Act**). For this purpose, the flow chart is used to determine the critical points during the implementation of the e-course, actions that require a decision and the planned communication with students. Various Check sheets are still used to collect data and their visualization is done by means of histograms and Pareto diagrams. Although it is possible to use the Control chart at this stage of improving the quality of the e-course, the authors admit that so far they have never tried it.

It is worth emphasizing, however, that in the process of improving the quality of e-courses some of the New Seven Quality Tools have been used, such as:

- Affinity Diagram: used to organise a large number of ideas into categories,
- Relations Diagram: similar to Ishikawa diagram - shows cause-and-effect relationships and links between different aspects of a complex problem.
- Tree Diagram: breaks down the analysed problem into finer and finer layers of detail, used to look into the problem from generalities to specifics. Often similar to Work Breakdown Structure - commonly used in the project management methodology.
- Matrix Diagram: shows the relationship between 2 to 4 categories delivering more specific information about the character of the relationship.

– Matrix Data Aanalysis: shows relations between sets of data in a simple and clear graphical way.
– Arrow Diagram: basic method used to show the order of the tasks in a project or process.
– Process Decision Program Chart (PDPC): helps to visualise the process from begining to end and predict what might go wrong in the plan.

Yet, the application of the New Seven Tools is not the subject of this article.

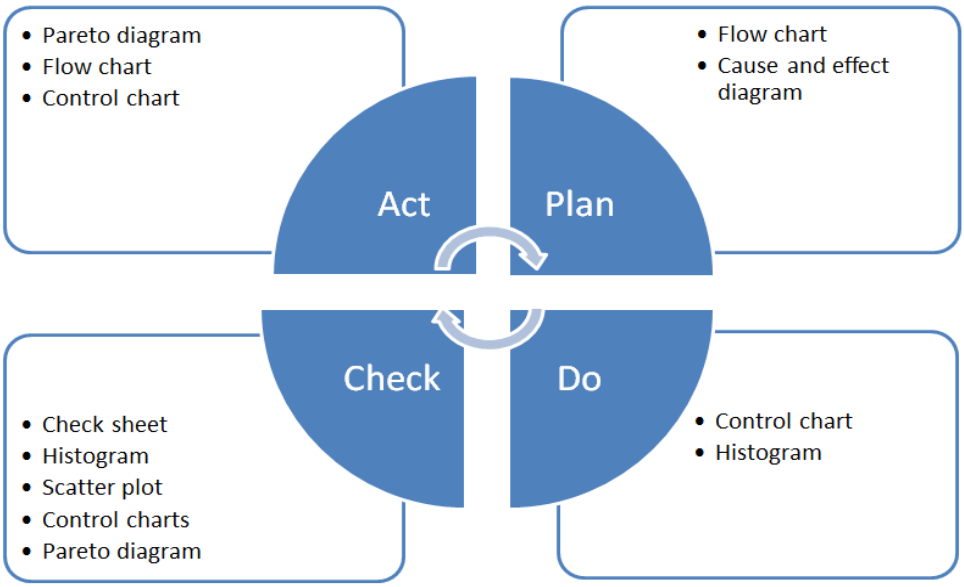


**Figure 2. PDCA-cycle of e-course and quality tools.**

*Source: own elaboration prepared by Kucharczyk, Walasek 2011*

## 2. CAUSE AND EFFECT DIAGRAM

The Cause and effect diagram is a graphic presentation of the relationship between the problem (effect) and the reasons that cause it. As the diagram resembles the skeleton of fish, it is often called the fish bone diagram.

The graph consists of a main axis indicating the effect - the analysed problem and several groups of causes. Each group of causes (category) constitutes a separate segment of the diagram, which is a branch of the main axis. Within each of the categories, there are causes of more and more specific nature, which results in a tree-like structure.

The diagram is read from the main axis to the bones, answering the question Why? In the opposite direction, from the particular to the general, we answer the question *What result does it bring*?

In the classic version proposed by Kaoru Ishikawa and used in the production process, there are six categories of causes: Man, Machine, Material, Method, Management and Measurement (Figure 3). 6M is not a closed system, and not the only one. The diagram is becoming commonly used in other fields, hence the cause categories are defined depending on the problem under analysis so as to identify the causes mainly affecting problem.

In e-learning, the Cause and effect diagram can serve as a supporting tool for planning a quality e-course, in all phases of its life.

It is recommended that the Ishikawa diagram be built at the design stage of the course as this would ensure a complex identification and analysis of the factors that may affect the e-course and thus a positive evaluation of the "product" by the customer (student). Although the diagram should be the result of team work, whose members possess substantial knowledge on the process of designing and implementing an e-course, the very act of making the diagram by an individual e-course creator is already a positive phenomenon.

"Quite often creators (...) do not analyse all the factors that affect the work on the project, just try to prepare educational resources (...), without any deeper reflection and reference to learning objectives and specificity of the implemented subject." (Dziubińska, Wierzbicka 2011).

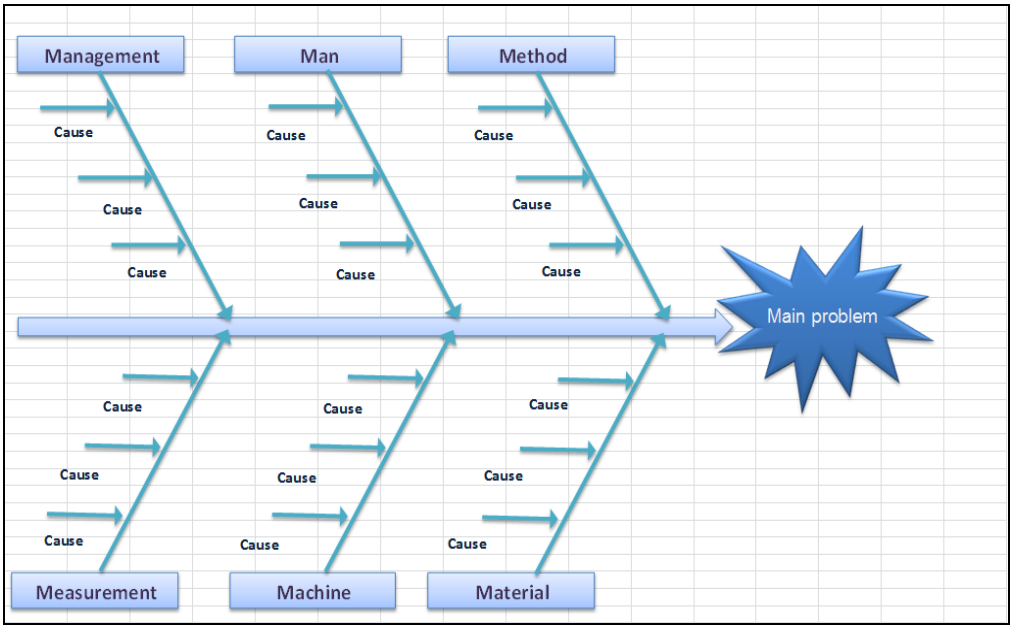


**Figure 3. Six cause categories proposed by Kaoru Ishikawa - Man, Machine, Material, Method, Management i Measurement.**
*Source: own elaboration*

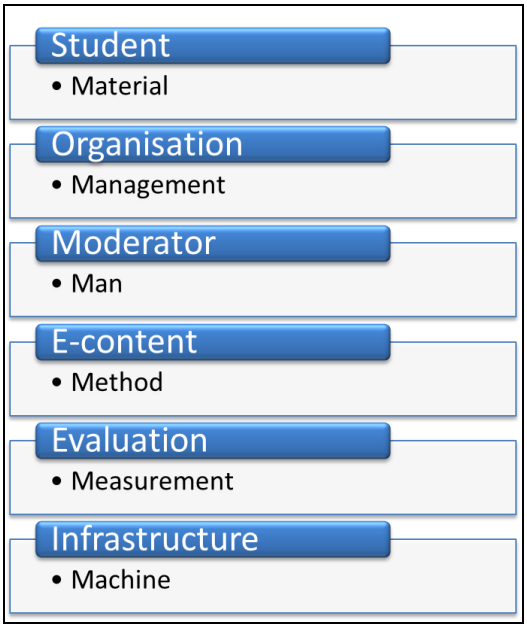


**Figure 4. Categories proposed for analysing the quality of an e-course.**
*Source: own elaboration prepared by Kucharczyk, Walasek 2011 based on http://en.wikipedia.org/wiki/Ishikawa_diagram*

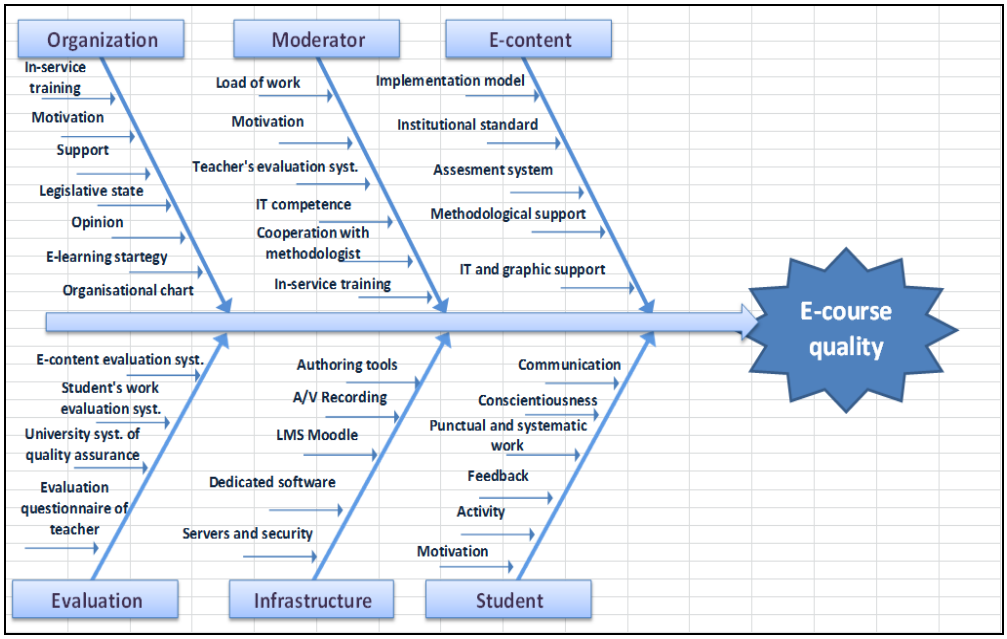


**Figure 5. Ishikawa diagram constructed for e-course quality.**
*Source: own elaboration prepared by Kucharczyk, Walasek 2011*

## 4. FLOW CHART

In a graphic manner, the block diagram presents, using appropriate symbols, the sequence of actions carried out in the process. The subsequent steps are connected by arrows indicating the flow of e.g. information, materials, etc. Developing a flow chart enables better understanding of the process detecting gaps in it (indefiniteness, ambiguity, etc.), which may cause problems later. An attempt to build a flow chart at the design stage of the implementation of an e-course, requires looking at the entire process, from beginning to end, and presenting the planned activities in the right order. The block diagram may be helpful in indicating the activities which may lead to wasting time and effort by the teacher or the student. The block diagram may also be helpful to identify problems associated with the flow of information and time management. Its use should result in finding a better way to implement an e-course.

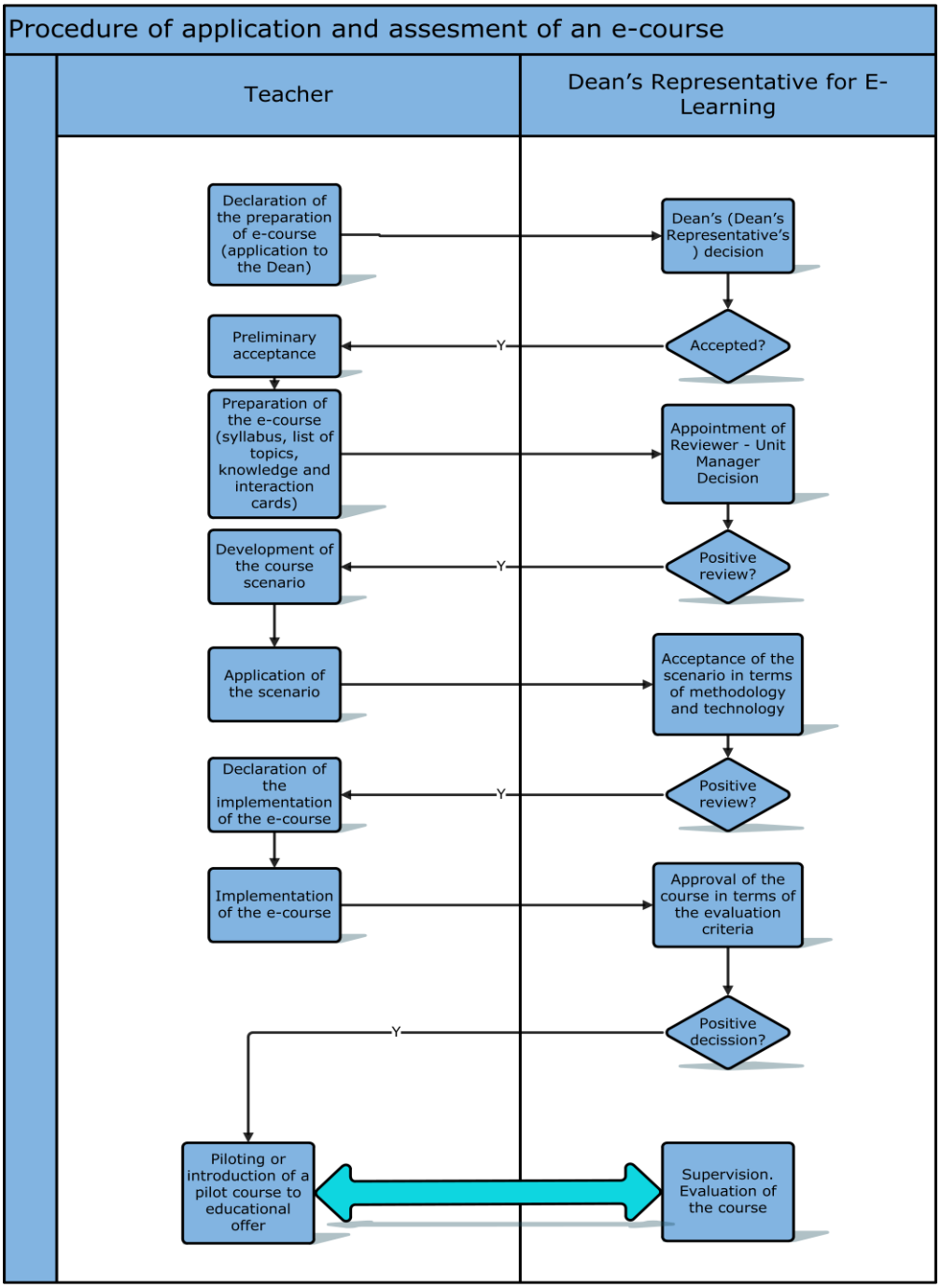


**Figure 6. Flow chart constructed for the process of e-course creating.**
*Source: own elaboration prepared by Kucharczyk, Walasek 2011*

## 5. HISTOGRAM

A histogram is a bar chart showing the frequency of occurrence of the tested event whose variability is contained within certain limits. The horizontal axis shows the boundaries of the intervals. The vertical axis has a scale corresponding to the number of events in each interval.

When the histogram has been made, we can analyse its location against tolerance adopted for a given event, i.e. to what extent it remains under the control.

## 6. CHECK SHEET

When planning activities leading to the improvement of quality, it is advisable to rely on facts and not on views or on what seems to someone. A helpful tool in achieving this goal is the check sheet. The check sheet is the most popular tool used for collecting and organizing data in production processes. The sheet is filled in with data about events associated with the process under consideration, in particular the frequency of their occurrence. Thus, in a planned and logical manner, the sheet allows to obtain information about whether the event took place and how many times it occurred. While preparing the sheet, the purpose and types of data to be collected should be specified. Defects, interferences or causes of problems are most common events.

Since the check sheet allows you to quantitatively assess the analysed issue, it is reasonable to use it in e-learning as a tool supporting the collection of data, for example, about what causes dissatisfaction of the e-course participants. On the basis of thus collected data, we can draw conclusions about defects appearing in the e-course, their number and periods of occurrence.

Figure 7 shows a check sheet which in one of the universities in Czestochowa was used to keep records of observations made by the students participating in the e-course. Their comments related to the e-materials accompanying the course and were presented at "Help forum". The e-course was conducted for three groups.

| Course: **Total Quality Management** | | | Academic year: **2010/2011** | |
|---|---|---|---|---|
| ***Students' Remarks on e-course*** | | | Examined period: winter semester | |
| **Problems** | **I course** | **II course** | **III course** | **Together** |
| 1. Materials too general | \|\|\| | \|\| | \|\|\|\| | **9** |
| 2. Content too extensive | 𝍸 | 𝍸 \|\|\|\| | \|\| | **16** |
| 3. There is no clear division between obligatory and optional content | \| | \|\| | | **3** |
| 4. Too little examples | 𝍸 \|\|\| | 𝍸 𝍸 \| | \|\|\|\| | **23** |
| 5. Errors in content | \|\|\| | \|\| | \|\| | **7** |
| 6. Lack of consistency in terms of appearance | \| | \| | | **2** |
| 7. There are no references to the bibliographical source | \|\|\| | \|\|\| | \|\|\|\| | **10** |
| 8. Others | \|\| | \|\|\| | \|\|\|\| | **9** |
| **TOGETHER** | **26** | **33** | **20** | **79** |
| Made by: XY | | | Data: **20.02.2011** | |

**Figure 7. Check sheet.**

*Source: own elaboration prepared by Kucharczyk, Walasek 2011*

## 7. PARETO CHART

A Pareto chart is based on empirically identified by Vilfredo Pareto regularity that in nature, technology, human activity, etc. usually 20-30% of the causes (factors) determine 70-80% of the effects. This chart is a bar chart in which the height of each bar shows the significance of the problem. The bars are arranged in a descending order. Thus, at the beginning, there are problems which must be taken care of in the first place. Identification of these problems allows you to take preventive and corrective measures that are particularly effective for improving the process.

Figure 8 shows a Pareto chart built for the data presented in the check sheet, Figure 6. Almost 50% of the comments focused on the number of posted

materials (too many) and examples (not enough). Taking appropriate measures for the two types of comments will have the same effect in the evaluation of the e-course (number of comments) as dealing with the other six types of comments made by the students.

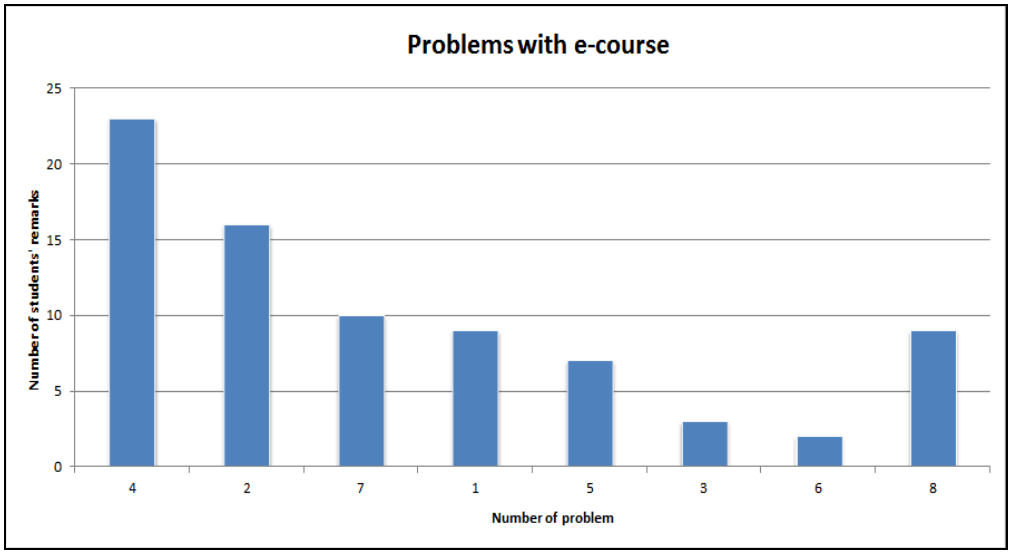


**Figure 8. Pareto diagram. Problems with an e-course, pointed out by students.**

*Source: own elaboration prepared by Kucharczyk, Walasek 2011*

## CONCLUSION

The paper presents a proposal to use some tools of quality management in the implementation of an e-learning course. A possibility to apply a cause and effect diagram and a flowchart at the design stage of the course has been pointed out. During the implementation of the course, a check sheet and a histogram can be used to collect data. This information can then constitute input data for a Pareto chart.

The presented tools enable evaluation of an e-course on the basis of actual facts. They may be an element of monitoring of the course quality thus helping to eliminate errors. Reducing defects in the course will lead to an increase in participants' and teacher’s satisfaction.

A continuous use of these tools should lead to ensuring the e-course quality at all stages of its implementation, and thus support its continuous improvement.

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# EMPIRICAL STUDY OF THE E– LEARNING'S IMPACT UPON THE STUDENTS' EPISTEMOLOGICAL BELIEFS

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***Abstract:*** *The paper lays out results of the empirical study aimed to investigate the impact of e-learning upon the students' epistemological beliefs. The experiment was held among students learning for the bachelor and master degrees. The methods of the investigation were interviewing, observation, and statistic analysis. Groups of students, learning traditionally, and those taking experimental courses enhanced by information technologies (IT) as a means of learning were interviewed in the beginning and in the end of the learning periods. The obtained results demonstrated a significant difference in the students' epistemological beliefs as developed under the conditions of traditional study and e-learning.*

**Keywords:** personal epistemology, epistemological beliefs, e-learning, students.

## INTRODUCTION

Personal epistemology is viewed as one of the determining factors which are essential for establishing students' attitude to learning, learners' personal style, and learning results (Colbeck 2007, Sekret 2008, 2011(1), Schommer 1990). Taking into consideration the importance of the personal epistemological beliefs for learning, scientists from different countries investigate the personal epistemology manifestation, factors which effect its development, and changes occurring under the influence of different learning techniques and environments (Clancy et al. 2007, Colbeck 2007, Conley et al.2004, Hammer et al. 2002, Österholm 2009, Sekret 2008, 2011(1)).

A number of studies provide evidence that understanding personal epistemology can contribute to elaborating more sophisticated techniques

addressed to learners' special needs and learning styles (Colbeck 2007, Sekret 2008, 2011(1)).

The problem becomes more urgent when it comes to the implementation of the distant forms of education. Under the conditions when teachers and students are separated by time and distance it becomes difficult to tune learning to the learner's personality. It turns out to be a complicated task to supply a student with the learning material through such methods and techniques which would correspond to his/her needs, ideas of learning and strategies he/she used to apply.

Therefore, knowing personal epistemology, on the one hand, helps to overcome psychological barriers in learning and communication which may appear on the part of the student as well as the teacher, work out time-consuming learning technologies, and as a result, achieve better learning outcomes.

The topicality of the problem for the development of the student-centred learning enhanced by information technologies, further implementation of e-learning and distance education determined the aim of the current research. It is purposed to study the impact of e-learning upon students' epistemological beliefs in comparison to those which are developed under the influence of the traditional learning.

To achieve the aim of the research it is intended a) to present an overview of the latest studies devoted to the problem of epistemology and epistemological beliefs; b) to describe the methods applied, the procedure of the experiment and its participants; c) to detail the learning environments defined as traditional and IT-enhanced in which the students studied and then were questioned; d) to analyse the data and results obtained; e) to provide conclusions drawn out of the research.

## 1. PERSONAL EPISTEMOLOGY IN LEARNING

### 1.1 Defining Personal Epistemology

Research on epistemological beliefs has clearly increased in the last decade (Limon 2006). The majority of the psychological research on personal epistemology can be traced to William Perry's (1970) studies (Hofer & Pintrich 1997, Ahola 2009). Since then, the construct has most frequently been viewed either as a developmental process or as a system of beliefs (Hofer 2004). Those who apply the developmental approach (e.g. Baxter Magolda 1992, Perry 1970) have posited that individuals' views on

knowledge and knowing follow a sequence of positions that are qualitatively different from other positions (Ahola 2009). Furthermore, Perry's developmental approach offered a stage theory of how students move from a dualist level toward more relativist and evaluativist levels of epistemological understanding (Kaartinen-Koutaniemi & Lindblom-Ylänne 2012).

Models of systems of beliefs (Schommer 1990), on the other hand, view personal epistemology as a belief system that is composed of several more or less independent dimensions (Ahola 2009).

As Österholm states personal epistemology is not a unitary theoretical framework (Österholm 2009). As all theories of personal epistemology focus on (the activation of) certain parts of mental representations (Österholm 2009), differences between them can be related to more fundamentally different ways of viewing human cognition; developmental, cognitive and contextual approaches (Pintrich 2002).

Hammer and colleagues (Hammer & Elby 2002, Louca et al. 2004) define beliefs by referring to more fine-grained parts of mental representations called epistemological resources (Österholm 2009) instead of defining beliefs as a property of individuals' mental representations. These resources are directly related to specific individual experiences. In a certain situation, different epistemological resources can be activated and thereby utilized in the activity at hand (Österholm 2009). Therefore epistemological belief is not seen as a property of mental representations but as a property of the activity in a certain situation, which is dependent on prior experiences (epistemological resources) (Österholm 2009).

Developing the theories of Schommer-Aikins (2004), etc. about epistemology and epistemological beliefs D. Colbeck define them as concepts concerning the nature of knowledge and learning as well as beliefs about how individuals come to know, how knowledge is constructed and how knowledge is evaluated (Colbeck 2007).

Analyses of different views on the nature of personal epistemology allowed to define it as a personal formation which comprises a person's experience of getting knowledge about the world, previous experience of learning, ideas about knowledge, knowing and cognitive processes, strategies of learning and obtaining knowledge. It is developed under the influence of learning on the one hand, and on the other one, determines the learning success (Sekret 2011(1)).

### 1.2 Methods of Personal Epistemology Study

Personal epistemology has been studied using a variety of different methods (Ahola 2009). The particular conceptualisations of the construct of the personal epistemology have determined methodological choices and the development of the applied instruments (Ahola 2009). Quantitative measurement of personal epistemology, i.e. individuals' conceptions of knowledge and knowing continues to be a great challenge, despite many attempts to develop instruments (Ahola 2009).

Thus, researchers in the developmental approach often apply interview methodology (e.g. Kaartinen-Koutaniemi & Lindblom-Ylänne 2012, King & Kitchener 1994, Perry 1970) while investigators working within the models which represent systems of beliefs (Schommer 1990) most frequently use surveys, in which beliefs are measured on a Likert-type scale (Ahola 2009). In response to cost, time and complexity of interpretation of interview methods, some researchers working with the developmental approach (e.g. Hallett, Chandler & Krettenauer, 2002, Kuhnet al. 2000) have also developed paper-and-pencil methods (Ahola 2009, Sekret 2011(1)).

In spite of a number of the existing instruments the effective quantitative measurement of the construct remains a challenge (Ahola 2009). Thus, as Kaartinen-Koutaniemi and Lindblom-Ylänne state, Likert-type measurements and questionnaires have failed to indicate the development and growth of personal epistemology, understanding of the complexity of individual personal epistemology is more reliably achieved with qualitative methods (Kaartinen-Koutaniemi & Lindblom-Ylänne 2012).

Analyses of different approaches to measuring personal epistemology proves that as most psychological instruments are characterized by some weaknesses or limitations, the existing instruments measuring the personal epistemology can be applied in a complex contributing to each other (Sekret 2011(1)). Therefore, the quantitative instruments should be added by the qualitative ones in a form of interviews and observations in order to get a better idea about a person's epistemological beliefs.

This research is based upon the approach to measuring epistemological beliefs suggested firstly by Schommer-Aikins (Schommer-Aikins 1990, 2004), and further developed by Colbeck (Colbeck 2007). Its detailed description will be presented in the following sub-chapter.

## 2. DESCRIPTION OF THE EMPIRICAL STUDY

### 2.1 Methods Applied

This research is based upon a complex of qualitative and quantitative methods aimed to gain an understanding of the epistemological beliefs of the university students learning traditionally in a comparison to those who study in conditions of e-learning. The data obtained by the quantitative instruments were supported by the information received in a course of personal interviews, group discussions and observations undertaken in a process of the students'learning.

The main quantitative instrument utilized in the research is elaborated by D. Colbeck (2007). The scholar suggests the structure of the personal epistemology as one comprising ten clusters of beliefs: 1) tendency to seek single answers; 2) avoiding integration; 3) avoiding ambiguity; 4) assurance that knowledge is certain; 5) dependency on authority; 6) no authority criticizing; 7) belief that ability to learn is innate; 8) belief in learn the first time; 9) certainty that learning is quick; 10) belief that success is unrelated to hard work (Colbeck 2007, Sekret 2012).

Every cluster is represented by a number of statements. The number of statements on each cluster varies from 2 to 6. Their total number of the statements in the questionnaire is 34.

The questionnaire was translated into Ukrainian. The prime approbation of the instrument was undertaken among the university students and teachers in a number of 58 persons. Their answers were analysed; the recipients were interviewed on the point of their impression from the questionnaire and its statements. As the result, some amendments were introduced into the Ukrainian text of the questionnaire preserving the initial meaning of the original statements.

The data obtained with a help of the questionnaire were analysed by the statistical methods. The main indicators include the r – coefficient of the rank correlation by Spearmen, U – criterion by Man – Whitney and φ* – criterion by Fisher (Sidorenko 2001).

### 2.2 Participants of the Experiment

The total number of the students taking part in the empirical research is 373 persons. Among them there are 127 first-year students and 97 second-year students learning at the technical faculties of Dniprodzerzhinsk State Technical University, 104 second and third year students studying for the

bachelor degree in the speciality "Translation" and 45 students learning for a master degree at the technical faculties of the same university.

### 2.3 Procedure of the Experiment

The empirical research was conducted in several stages (Sekret 2012).

At the first stage all the participants as those who had had experience of only traditional learning were interviewed. Their responses to the statements of the questionnaire were analysed.

During the second stage of the investigation an experimental group of learners was formed. It included second and third year students studying for the bachelor degree in the speciality "Translation". The total number of the students participating in the experimental learning was 104 persons.

The next stage presupposed experimental learning where the students of the experimental group took courses enhanced by IT. The students learning for the bachelor degree in the speciality "Translation" had four academic disciplines such as "Basics of the Scientific Research", "History of the English Language", "Contrastive Lexicology of English and Ukrainian" and "Methods of Teaching English". Each of them lasted for four months sequentially with one-two face-to-face lessons per week. The total period of the experimental learning was two academic years which comprised the second and the third years of learning at the university. The disciplines mentioned are compulsory in the program of training bachelors in Translation and are traditionally taught every year. But for the conducting of the experiment the teaching and learning were renovated by IT implementation.

The other students went on learning in a traditional way (details of the traditional learning environment and experimental e-learning environment as they are defined in this article are given below).

During the whole period of the experimental learning the students' learning progress, outcomes and attitude towards their study and the methods of learning had been under observation. Formal and informal interviews were taken. All these measures helped to construct the whole picture about the impact of e-learning upon the students' academic progress and their personal epistemology.

At the fourth stage of the experiment the students from the experimental group were invited to fill in the questionnaire again. The data obtained were compared with the results received from the control groups of the first year students and those learning for a master degree at the technical faculties as

well as from a second year students studying for the bachelor degree in the speciality "Translation".

The fifth stage entailed the data analyses by the appropriate statistical methods and interpretation of the obtained results.

### 2.4 Learning Environments in Details

#### 2.4.1 Traditional Learning Environment

Traditional learning is viewed here as one where students are taught through conventional forms of the teachers-students interaction in lectures and seminars (Sekret 2011(2)). Teacher-centred techniques prevail presupposing that a teacher is a prime source of knowledge who determines the students' learning by providing them with necessary tasks. At lectures students make notes of the material heard from the teacher. At seminars they report on some issues connected with the topic of the lecture. The student's report is mostly based upon the lecture heard and may involve some additional material taken from the books advised by the teacher. Traditional way of reporting is one-to-one i.e. a student reports to a teacher or a group of students. It may be followed by some questions from the teacher and the groupmates. In rare occasions the questions may arouse a discussion.

Usage of IT in traditional learning is of occasional character. Students use Internet on their own and by their own needs. Internet resources may be utilized by teachers and students on their own as a sort of library chaotically without a certain system.

#### 2.4.2 Experimental E-Learning Environment

In this research e-learning is viewed as learning enhanced by informational technologies introduced purposefully and utilized systematically. The total amount of the informational technologies applied during the experimental learning varied from 40 to 60 per cent depending upon the specifics of the students. This dimension allows to refer it to a kind of a blended learning where face-to-face learning is combined with distant forms of getting knowledge and education (Sekret 2011 (1)).

As the implementation of e-learning technologies was in a certain extent restricted by the administrative and program demands, it was realised through abundant inweaving of IT into conventional forms of the learning organization in the university. In brief the innovations which were introduced are as follows.

**Lectures**

First of all lectures were transformed in a form of Power Point presentations and presented via a projector. Such a mode of the lecture presentation allowed to provide a bigger amount of theoretical and illustrative materials in a comparison to a traditional mode. It became possible to organize the material in different forms avoiding a form of a linear text, enriching it with schemes, tables, animations, pictures and excess to Internet resources. Easiness of operating with the slides of the presentation permitted to return to more difficult for students' understanding issues and establish logical connections between new information and the one already familiar to them.

Excess to audio and video resources from Internet or DVD made the theoretical material more interesting, vivid and convincing.

The borders of the classroom were extended via an excess to Internet resources including encyclopaedias, on-line dictionaries, etc on the topic studied. As the result, the focus from the teacher as a main source of the learning material shifted upon the object of learning. Meanwhile the students learned to compare and analyze different points of view, their sufficiency and make their own conclusions about the issues learnt. Under such conditions a role of the teacher as the learning information transmitter was fulfilled by the informational resources and the students themselves, when perceiving the learning material, discussing it, interpreting and explaining certain issues to each other. The teacher him/herself put on a role of a guide and a facilitator, who just attracted the students' attention to the issue and directed their learning through necessary pointers and encouraging the students' progress.

Lectures in the Power Point mode of presentation were easy for the teacher to reorganize in order to tune them upon the characteristics of the academic group and their learning abilities.

The students in their turn chose their own style of working with the learning material. Some of them used cameras, mobile phones to take photos of the slides and record the lectures as a podcast or video. Then they worked through the material at home, made necessary notes in the notebooks, etc. Other students made occasional notes in the classroom sure that they could take its full electronic version after the lecture either from the university informational portal or the teacher or the students. It allowed to make the students feel free for discussions right in the classroom in order to express their own ideas on the information received.

Having the lecture material in the mobile phones and knowing the path to the useful Internet resources the students had an opportunity to revise the

material in any suitable for them time and place. It contributed to its better assimilation and allowed the students to enlarge their idea on the object learnt by referring to new Internet links connected with the main body of the material.

**Practical Classes**

It should be noted that in such a mode of learning lectures lost an essential part of their traditional meaning which presupposes transmission of the theoretical material in one way direction from the teacher to the students. They turned into a kind of a laboratory work purposed to investigate a certain problem. Therefore, the practical classes as called according to the discipline curriculum became a kind of continuation of the discussion initiated at the lecture. The difference is that during these learning periods the students themselves presented their own results of the scientific search on the problem studied.

It is interesting to note that sometimes the tasks for further investigations were born in a process of the material discussion at the lecture even without being predicted or planned by the teacher. The students themselves came up to the issues which needed clarification or thorough investigation. At such moments they felt themselves real researchers and discovered for themselves that science is not something being fixed long time ago but there are still aspects which require further elaborations and can pose an interest for them.

Moreover, the students started to take a determining role in planning further classes putting forward their suggestions on the learning material the teacher should explain to them at the nearest lectures and the problems they would like to work through on their own and present the results of the scientific search in the classroom.

In a contrast to a traditional students' reporting at the seminars which was conducted in a form of the paper reading, the renovated practical class was based upon the students' Power Point presentations prepared ordinarily as an outcome of some mini-project accomplished by a small group of students.

To prepare a presentation the students posed a problem to study, shared responsibility for different parts of the work among the members of the small group. Then they analyzed appropriate Internet resources pointed by the teacher and those found by their own, worked out the idea of the presentation and implemented it in a form of slides. They were free to use any computer technologies they would like to.

Some students preferred individual work and made up their own presentations.

In order to keep the presentations on a sufficient level of the information reliability and accomplishment the students were demanded to present the Internet links allowing others to evaluate the resources utilized. Besides, the presentations were discussed and estimated by the students in the group. The criteria for the evaluation were the content of the presentation, the correspondence of its title to its content, ampleness and sufficiency of the material, usage of illustrations (their reference to the content and appropriateness), form of the presentation (structures, schemes, tables as a way of transforming a linear text and their appropriateness), creativity (originality, variety of technologies used).

Such a mode of learning allowed to overcome methodological and psychological problems which usually appear in the circumstances of traditional learning, namely:

1. Students became more involved, active and motivated in learning.

2. They got skills enabling them to analyze, compare and criticize the information resources.

3. The problem of plagiarism in the students' work was almost solved. They understood that showing the resources with which they worked is the evidence of the reliability and soundness of their study and research.

4. They became more interested in science regarding it as a constantly developing organism.

5. Students became more open and friendly to each other. The feeling of the group unity developed.

In spite of generally positive atmosphere and results of the experimental learning, some specifics could be noticed (Sekret 2012). Among them are the following.

1. The students were more ready and much more open to those teaching technologies they had been used to.

2. They felt anxious and unsure when they were offered to do something new, never experienced before even if the proposed activities were more interesting.

3. In order to introduce a new learning activity with Internet there was a necessity for the teacher to start it in the classroom, show how it works and demonstrate positive experience. It was in spite of the fact that students had had quite an extended previous experience of dealing with Internet and its resources.

4. The students tended to follow a teacher's example in preparing presentations. If the teacher presentation was weak on some aspects (for the technologies used, illustrations, the form of the material organization, etc), he/she should be ready to see the same drawbacks in the students' presentations. In order to eliminate the disadvantages it was required to attract students' attention to such matters, discuss them and show how to present the material in a better way.

5. The students felt uneasy using technologies to make their work more creative. It happened despite the fact that they were familiar with those technologies but had experience of applying them in some other context (e.g. for personal needs and communication, learning the subject "Computer Technologies", etc). This fact witnesses that the presence of some knowledge and skills received in a certain context or a situation is not a guarantee that those formations will activate in the other context. Therefore, in order to establish links between present knowledge and skills it is required not only to tell the students about those formations' potential in the other situations but provide conditions in which they would have an opportunity to apply those formations to solving problems of different character and in such a way to gain correspondent personal experience.

6. The students faced difficulties in operating with images, graphics and pictures in their presentations preferring to put the material in a form of a linear text which was sometimes overburdened with complex long sentences. The tasks inviting the students to prepare a presentation only in graphics with minimum words posed the greatest problem.

7. A tendency to put into presentation as much as possible of theoretical material was noticed both among the teachers and the students. The former were eager to provide the students with all the abundance of the material related to the problem conveyed. The latter using such a strategy demonstrated insufficient level of skills necessary for the material analyses. In such cases the text became too long and difficult for understanding its main idea.

### 2.5 Data Analysis and Results Interpretation

#### 2.5.1 Results Demonstrated by the Students Taught Traditionally

The data obtained from the students taught traditionally were analyzed both in a horizontal dimension (taking all the recipients as a whole) and a vertical one (comparing results shown by the students of different years of the university study). It allowed to find out certain regularities in the system of the epistemological beliefs characteristics for all the students and specific for

certain age groups. Here are the results on each cluster of the personal epistemology as defined above.

*1. Tendency to seek single answers.* According to the answers to the questions referring to this cluster the students are sure that learning academic disciplines permits to find a single answer to most of the existing problems (70 per cent). Most students believe that a good lecturer will keep their students from wandering off the right track (90 per cent). The data on this point correlate with cluster 5 indicating that students are more inclined to ask the teacher to explain to them some complicated material than to work it out on their own (66 per cent).

*2. Avoiding integration.* Analyses of the data on this cluster did not show any regularity among the students. It may be regarded as an indication that such beliefs are formed rather as a result of the individual experience and character than under the influence of certain educational paradigm.

*3. Avoiding ambiguity.* The students demonstrated a tendency to prefer factual information to theoretical statements, considering the knowledge of some concrete facts as more precious in the context of higher education. This conclusion is based on the data obtained from the students' positive reactions to the statements "It is a waste of time working on problems that have no possibility of coming up with clear cut and unambiguous answer" and "If lecturers stuck more to facts and less to theory, students would get more out of university" and a negative one on the idea "I find it refreshing to think about issues that experts cannot agree on".

*4. Assurance that knowledge is certain.* The data on this cluster showed that most students believe in existence of knowledge which is truthful and unchangeable (70 per cent). It is interesting to note that 80 per cent of the recipients are sure that events from the past do not influence the future life. It is despite the fact that during their school and university learning students have such disciplines as History, Philosophy, Ethics etc. which are purposed not only to shed a light upon the past but also to show the cause-effect relationships between events and human deeds.

*5. Dependency on authority.* It was found out that only a small number of students are ready to work at a problem on their own and search for possible decisions on a problem. At the same time they are likely to take the information from the teacher for granted without an attempt to reach the sense of the idea.

*6. No authority criticizing.* In spite of the distinct indications about the students' dependence on the authority they also demonstrate an inclination to

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≤ 0,04), 9 (*Certainty that learning is quick* - φ* = 1,94 at p ≤ 0,04) (Table 1) (Sekret 2012).

**Table 1.**

**Students'Epistemological Beliefs in Experimental and Control Groups: Results of the Comparative Analyses.**

| № | Cluster | Sum of points | Control group 1 (1st year students, %) | Experimental group (3d year students – speciality Translation), % | Control group 2 (master students, %) | Control group 3 (2d year students – speciality Translation, %) |
|---|---|---|---|---|---|---|
| 1. | *Tendency to seek single answers* | 0 | 0 | **0** | 0 | 0 |
| | | 1 | 22,2 | **4,5** | 21,4 | 23,2 |
| | | 2 | 27,8 | **59,1** | 35,7 | 26,8 |
| | | 3 | 27,8 | **27,3** | 14,3 | 26,7 |
| | | 4 | 16,7 | **4,5** | 28,6 | 17,8 |
| | | 5 | 5,6 | **4,5** | 0 | 5,6 |
| | | 6 | 0 | **0** | 0 | 0 |
| 2. | *Avoiding integration* | 0 | 11,1 | **9,1** | 21,4 | 10,1 |
| | | 1 | 27,8 | **45,5** | 28,6 | 25,8 |
| | | 2 | 38,9 | **40,9** | 28,6 | 39,9 |
| | | 3 | 11,1 | **4,5** | 21,4 | 13,1 |
| | | 4 | 5,6 | **0** | 0 | 5,6 |
| 3. | *Avoiding ambiguity* | 0 | 0 | **18,2** | 7,1 | 0 |
| | | 1 | 33,3 | **45,5** | 28,6 | 31,3 |
| | | 2 | 33,3 | **27,3** | 35,7 | 33,2 |
| | | 3 | 22,2 | **4,5** | 28,6 | 21,1 |
| | | 4 | 11,1 | **4,5** | 0 | 12,3 |
| 4. | *Assurance that knowledge is certain* | 0 | 5,6 | **9,1** | 7,1 | 6,6 |
| | | 1 | 0 | **27,2** | 14,3 | 0 |
| | | 2 | 33,3 | **54,5** | 50 | 32,3 |
| | | 3 | 38,9 | **13,6** | 21,4 | 36,8 |
| | | 4 | 22,2 | **0** | 7,1 | 24,3 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 5. | *Dependency on authority* | 0 | 11,1 | **9,1** | 0 | 10,3 |
| | | 1 | 33,3 | **36,4** | 35,7 | 33,1 |
| | | 2 | 55,6 | **54,5** | 64,3 | 56,5 |
| 6. | *No authority criticizing* | 0 | 16,7 | **40,9** | 50 | 13,7 |
| | | 1 | 38,9 | **36,4** | 21,4 | 37,9 |
| | | 2 | 27,8 | **13,6** | 28,6 | 27,8 |
| | | 3 | 11,1 | **9,1** | 0 | 14,2 |
| | | 4 | 5,6 | **0** | 0 | 6,5 |
| 7. | *Belief that ability to learn is innate* | 0 | 55,6 | **50** | 50 | 52,5 |
| | | 1 | 44,4 | **50** | 50 | 41,5 |
| 8. | *Belief in learning the first time* | 0 | 11,1 | **9,1** | 0 | 12,1 |
| | | 1 | 38,9 | **22,7** | 28,6 | 37,7 |
| | | 2 | 38,9 | **54,5** | 42,9 | 39,9 |
| | | 3 | 11,1 | **13,6** | 28,6 | 10,3 |
| 9. | *Certainty that learning is quick* | 0 | 11,1 | **0** | 0 | 10,1 |
| | | 1 | 5,6 | **0** | 0 | 6,6 |
| | | 2 | 5,6 | **18,2** | 14,3 | 6,6 |
| | | 3 | 50 | **45,5** | 35,7 | 49 |
| | | 4 | 11,1 | **36,4** | 42,9 | 13,2 |
| | | 5 | 16,7 | **0** | 7,1 | 14,6 |
| 10. | *Belief that success is unrelated to hard work* | 0 | 0 | **4,5** | 0 | 0 |
| | | 1 | 55,6 (44,4 % couldn't answer) | **72,3** (18,2 % couldn't answer) | 93 (7 % couldn't answer) | 60 (40 % couldn't answer) |

*Source: own elaboration*

The fact that their results statistically differ from those demonstrated by the students from the control groups gives a ground to discriminate the influence of e-learning upon the student's epistemological beliefs as a determining factor. It proves that IT implementation into learning provides an opportunity to broaden students' outlook, bring up a more tolerant attitude and respect to

different standpoints, a more critical view upon the information and its source and confidence that learning is a prolonged process.

## CONCLUSION

The study laid out was purposed to investigate the impact of e-learning upon the students' epistemological beliefs in comparison to those which are developed under the influence of the traditional learning. In order to achieve the aim, the recent investigations on personal epistemology were analyzed. On that base it is concluded that personal epistemology is a formation which comprises a person's experience of getting knowledge about the world, previous experience of learning, ideas about knowledge, knowing and cognitive processes, strategies of learning and obtaining knowledge.

To conduct the experiment the students taught traditionally and those being in conditions of e-learning were questioned. Besides, their learning strategies and results were observed in a situation of natural learning. The results of the investigation showed that e-learning through broadening students' outlook by IT contributes to breaking a viewpoint that there is a single answer to each question, tendency to be dependent upon the teacher but brings up a tolerant attitude the others alongside with a more critical view upon the information and its source. Students believe that learning is a prolonged process and this position may become a good basis for life-long learning.

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# BUILDING DIGITAL CONTENT FOR E-LEARNING. INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT) COMPETENCE

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***Abstract:*** *Distance education requires other education materials than printed or electronic books. In the article the authors present results of their studies on how school teachers and professors evaluate their knowledge of ICT (Information and Communication Technologies) and indicate the main areas of ICT which require educational support: specialised applications to create materials for e-learning and multimedia development. Both issues are related to the problem of preparing a version for publication in WWW resource portals.*

**Keywords:** distance education, ICT in education, electronic publishing, e-learning.

## INTRODUCTION

E-learning in any given version requires participants to meet pre-conditions, which have been defined as a competence for the educational role. The problem is not new: in the classical education the participants are required to demonstrate foreign language skills, reading skills, literacy and etc. We will consider the classic roles of knowledge, its suppliers and customers and define competencies for e-learning participation in education.

## 1. E-LEARNING PARTICIPANTS

### 1.1 Recipients

The audience of e-learning includes students and pupils of senior classes in school. In the light of technological development of societies it is necessary to adapt new teaching methods, including distance education. The authors, in the light of the studies emphasise the need to work on ICT competences applicable in e-learning. This is consistent with the expectations of these groups.

### 1.2 Suppliers

The group of e-learning providers includes suppliers themselves (the person who prepares e-learning materials, but does not run the classes), instructors and the organisers of the educational process. It should be emphasised that the activity leaders must have competence appropriate for a given group of students. It is best if he or she was participating in courses previously conducted in the e-learning mode.

### 1.3 Tested groups of potential suppliers

For the purpose of the article a survey was conducted among the e-learning providers and candidates for e-learning providers. The group of providers included: 135 school teachers (various subjects), 30 academic teachers (mathematicians, computer scientists and medicine professors). Among the academic teachers (n=30 two groups could be distinguished: the members of **group A** were teachers, who had never used e-learning methods and had had no experience in this field (56.7%, n=17) and the members of **group B** were lecturers-practitioners or persons preparing to introduce the methods of e-learning in classes (they completed a course in this area) (43.3%, n=13).

Among school teachers (n=135) we had secondary school teachers (54.1%, n=73), high school teachers (college) (31.9%, n=43) and teachers who were in the course of post-graduate studies in computer science and information technology (14.1%, n=19).

Respondents (n=165) were also divided differently: the members of **group C** were those who had already participated in the courses online or electronic tests (52.1%, n=86) and the members **group D** were those who did not participate in such activities (47.9%, n=79).

A part of the studied group also included students (n=49) who participated in classes with the use of e-learning: medical students (n=30) and computer science students (n=19). Analysis of the test results on the population of e-learning users is beyond the scope of this study.

### 1.4 Statistical analysis – description of statistical methods

Continuous variables were compared using two-tailed Mann-Whitney U test since the data were not normally distributed (normality was checked by Shapiro-Wilk's test). For comparison of more than two groups, Kruskal-Wallis test was used. If statistically significant difference existed, the Dunn's multiple comparisons post-hoc test was applied. Unpaired data for 2x2 or larger contingency tables were analysed using the Chi-square test for independence, the Chi-square test with Yate's correction or the Fisher-Freeman-Halton test, depending on observed frequencies. All results were considered significant at $p<0.05$. Statistical analysis was performed using statistical packages of STATISTICA 10.0 PL (StatSoft. Inc.) or StatXact 8.0 (CytelStudio).

## 2. ICT COMPETENCE OF E-LEARNING PARTICIPANTS

The authors see the requirement to define the ICT competence of these groups, participants in e-learning.

### 2.1 Recipients

As shown by studies presented in detail in Chapter 5, individuals belonging to the age group of 19-26 years, have good competences in the following:

- Launching processes and applications.
- Understanding the flow of communication on the internet with the discernment of the used services.
- Detailed knowledge of communication protocol HTTP clients, commonly known as browsers.
- Installation and use of streaming media client software, commonly known as multimedia.

### 2.2 Suppliers

Only after getting aware as to competence of the recipient one can pass in a creative manner to the role of the supplier in e-learning. In this case the required ICT competence is much higher, particularly when the supplier performs the role of organiser in e-learning. The latter role will not be discussed as it deserves a separate study. The methodologically correct concept of separating technical function of preparing from their essential edition seems to be very difficult to implement. The main sources of problems stem from:

- lack of understanding between the technical editor (a specialist in informatics) and the essential editor (specialist in another field, e.g. a linguist),
- the requirement to spend a lot of time for communication,
- the need for repeated verification of the effects achieved in essential cooperation,
- high cost of the team work.

Increase in the ICT competence of employees can result in significant savings, especially at the stage of verification, modification, and all of the changes advocated by the recipients of the materials.

### 2.3 Electronic edition of the educational materials

Opinions of respondents about the difficulty of the electronic edition of learning materials are not compatible (p=0.004). As compared to high school teachers, secondary school teachers evaluated this task as difficult (p=0.01). We also detected significant differences between high school teachers and university lecturers (p=0.04). The worse than theoretically expected result of academic teachers reflected obvious reasons.

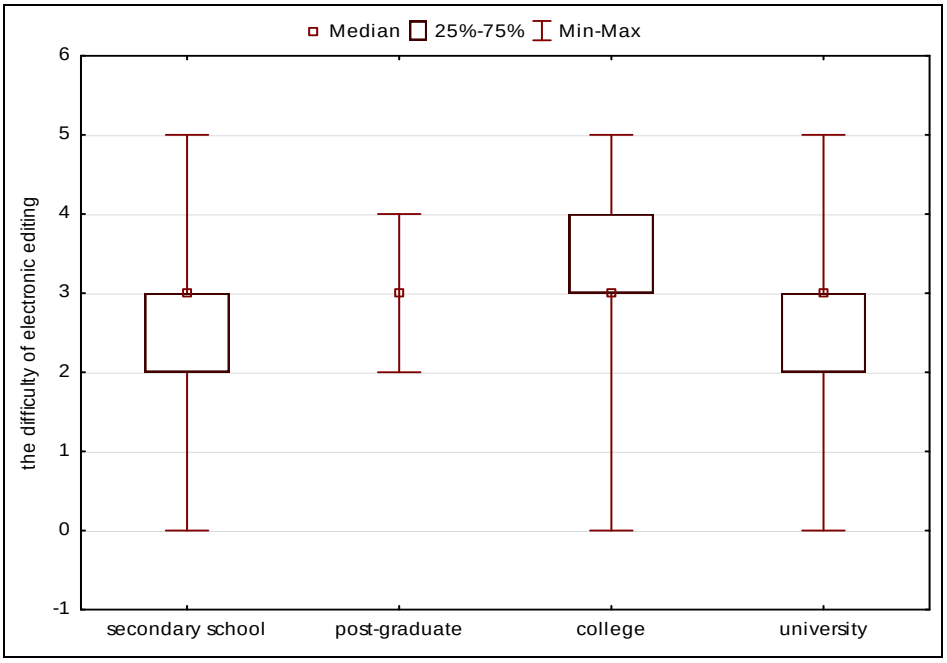


**Figure 1. Editing educational materials in the opinion of potential suppliers.**

*Source: own elaboration*

There has been done an analysis of the results between group C and D. These groups differ significantly (p=0.0005) in terms of opinion about the difficulty of electronic editing. The same result is received (p=0.02) when comparing groups A and B. Those who have participated in classes using the methods of e-learning evaluate educational materials as simpler as compared with people who do not have such experience. The results clearly demonstrate the need to supplement the learning opportunities for groups of providers of educational materials.

## 3. ICT COMPETENCE OF BUILDERS OF E-LEARNING MATERIALS

The results suggest the need to systematize the necessary information in the field of ICT to take this aspect into account in education of material suppliers for e-learning education. According to the authors, the three most important competences necessary to fulfill the role of the supplier include the ability to

1. edit text materials to be published on the internet,
2. edit graphics and multimedia materials to be published on the internet,
3. publish on the internet.

### 3.1 Typical editor

Let us skip the edition itself. Saving of the edited document is, in most applications, a two-step process:

- recording the editable version in an application native format (example: odt, doc, docx, ppt),
- saving in the format for a particular purpose, for example: to print pdf, for exchange with other editors rtf. Most applications can be saved in HTML format for e-learning as the most important as interpreted by the browser.

Office type applications save edited documents in multiple of formats. The answer to the question, why this is and what is the purpose of each of them is rarely known, but the topic is not appropriate in the training of ICT. The authors see a need for a broader knowledge of individuals engaged in this very comprehensive and multi-threaded topic.

### 3.2 Specialised editors

The difficulty of editing and writing the appropriate digital materials for e-learning led to the emergence of a whole class (and the commercial market)

of specialised editors. Usually, the file is saved in two formats: native (editable) for the application and publishing for e-learning (a set of HTML files and embedded files). All editors in this category write hypertext by definition designed to be read on electronic devices and not to print. These applications feature a rich set of editing templates, allowing you to quickly create easy to read materials. They include, among others, a functionality to create an interactive list of topics available on the main screen of the recipient. If we are satisfied with the standard layout of the proposed materials for e-learning – just fill in the information document substantive text and multimedia.

### 3.3 Development environments

Table 1 contains information comparing the free, integrated development environments, specialised for e-learning.

**Table 1.**

**Integrated development environments (free).**

| Application | Native Format | Publishing Format | Editing templates | Table of Contents | Software Ease of Use |
|---|---|---|---|---|---|
| eXe | .epl | Set of HTML files, SCROM | 12, extensible set of templates, easy to extend | Interactive | Intuitive |
| LCDS | Set of files XML | Set of XML files, files for printing, SCROM | 24, non-extensible set of templates | Interactive | Easy |
| Courselab | .wcl | Set of HTML files, SCROM | Numerous editing templates, described in object-oriented language | 6 built-in schemas to navigate the materials, ToC on request | Non-intuitive |
| Xerte | .rlo | Set of HTML files, | Large, extensible set of | built-in schemas to navigate the | Hard |

| | | | | | |
|---|---|---|---|---|---|
| | | SCROM | templates, with separate tools | materials, ToC on request | |

*Source: own elaboration*

In the second column (native format) and third column (publishing format) of Table 1, the authors would like to stress the features, the existence of which is necessary and often misunderstood:

- native format (for further editing and modification),
- a record of publishing formats (for placement in the resource on web servers).

The subsequent columns of Table 1 include information on build-in editing templates, ready to fill in the text or information on the file system for multimedia and graphic elements. Bullets are also very important, ready-made solutions, allowing readers to navigate the materials formed in these environments completely automatically.

As you can see, suppliers of materials are available to insert the content in the templates. Creating your own templates is possible but not necessary. Competence to effectively use each of these environments does not qualify to be regarded high, but they cannot be reduced down to the ability to support applications.

## 4. KEY ROLE OF THE E-LEARNING MATERIAL PUBLICATION STAGE

Preparation of graphics and multimedia materials for e-learning must take into account the fact that the target place of publication is a network environment. Therefore, using standard editing tools for raster and vector graphics (Photoshop, Gimp, Adobe Illustrator, Coral Draw, Inkscape, etc.) or using the elementary device for recording movies, it is important for both static and dynamic graphics, to draw readers' attention to the few key parameters:

- resolution of prepared image – clearly it should not exceed the standard monitor resolution,
- size of the graphics file, which determines the choice of the optimal format – format to be used with a high degree of compression while maintaining a reasonable quality,

– the possibility to load graphics to standard web browsers – in this case also it is important to choose the appropriate format.

Proper selection of these parameters requires a minimum knowledge of image processing and multimedia**.**

Networking between the publications of materials for e-learning also implies natural use of the general web application development technology, RIA (Rich Internet Application). Currently on the market there are three such technologies: Silverlight, which was created by Microsoft, Adobe Flash and developed by the Khronos Group technology WebGL. All of them offer the ability to create both two-dimensional and three-dimensional images. The Silverlight user interface is created in XAML, but the events are usually programmed in C#. The application of a three-dimensional image in Silverlight requires the use of Microsoft's XNA technology prepared independently as a tool for game development. Tools and libraries for creating Silverlight application are available in a free version, somewhat less advanced than the commercial one.

Flash technology is the oldest tool for creating network animations. Formerly it required the integrated Adobe Flash (formerly Macromedia Flash), which of course still exists today and allows preparation of many elements of animation with the mouse. Events in Flash program are handled in a fully object-oriented ActionScript 3.0. Preparing the Flash application is now possible by using the tools in the Flex group, forming an integrated development environment (Flex Builder), in which the interface components are described in MXML. For 3D Flash applications programming, it is convenient to make it by using 3D API Stage. In essence, this set of tools is based on the OpenGL ES library.

Intensively developed WebGL technology extends the capabilities of Java Script. Drawing takes place on the canvas, part of the HTML specification. Depending on setting the context it is possible to program a wide range of 2D vector graphics elements or 3D scenes described in OpenGL ES.

Using one of the described technologies allows us to create virtually any complex animation, including the complex physics simulation, because they are able to use hardware rendering support. Of course, the use of these technologies requires a much broader knowledge and skills, including at least elementary programming competence.

Unfortunately, at present the practical capabilities of potential suppliers of materials for e-learning in preparing the basic elements of graphic and multimedia in Poland are rather low, while in the design of RIAs they are

almost negligible. On one side it reflects the rapidly evolving realm of technology, on the other failure to adjust teaching programs during studies.

### 4.1 Streaming media, the primary method of publication

It should be assumed that each participant in the role of content provider has a number of multimedia recording devices, which he or she should be able to turn on the downloaded files to educational materials or publish the contents. There are three methods of publication used:

- embedding in an HTML file – libraries needed to play a file are required on the client side,
- inserting a video file as an integral part of the HTML5 file, interpreted by a new generation of browsers,
- streaming – playing up to date information downloaded through the network to buffer the recipient's computer.

The first two of these are adequate for the media with very small sizes, requiring transport to the recipient's computer files and start the whole process of playing. Awareness of the consequences such as an organised publication is minimal.

The third method requires access to streaming media server application, which is not yet widespread. The publicly available servers such as YouTube acting on Google's cloud computing are used occasionally. This server offers the possibility to publish the materials, it does not make everything as simple, but it generates a fragment of an HTML file, ready to copy and put in the target material. Using this method requires the knowledge of ICT at a primary level. Other streaming servers generate all the HTML files, ready to publish on the web resources. The authors noted a lack of competence in the field of ICT in all groups of suppliers.

## 5. RESULTS – THE STATE OF ICT COMPETENCES

### 5.1 Used in applications

The most frequently used applications by potential suppliers for e-learning is presented on Table 2.

**Table 2.**

**Today's applications.**

| Application | School n=132 % of users | College n=30 % of users | p value |
|---|---|---|---|
| PowerPoint | 75.6% | 80% | p=0.604 |
| Producer | 2.2% | 13.3% | p=0.025 |
| Word | 75.6% | 36.7% | p=0.00003 |
| MoveMaker | 6.7% | 0% | p=0.312 |
| Other free | 9.3% | 27% | p=0.025 |

*Source: own elaboration*

Although, PowerPoint in not a tool for creating/editing of materials for e-learning, this application is the most common tool used to create the substantive materials in school education and college. Another application, designed for other uses, and used in the preparation of materials for e-learning is MsWord. Surveys have shown differences in understanding the purpose of this application at the school level and university. Knowledge of development environments for editing educational materials for e-learning is significantly higher among the academic teachers. Questions concerning the application of integrated development environments (free), dedicated for e-learning (Table 1), prove little knowledge of these applications (5%) in all groups of suppliers.

### 5.2 The barrier of ICT competence

In the opinion of school teachers (% of respondents from a population of n=132):

- creating educational materials for the e-learning is too much work 34.8%,
- lack of skills needed to create educational materials declared 28.8% of respondents,
- lack of funding this additional work (editing your e-learning) discourages 33.3% of teachers.

In the opinion of college/university teachers (% of respondents from a population of n=30):

- the creation of educational materials for the e-learning is too much work 56.7%,
- lack of skills needed to create educational materials declared 26.7% of respondents,
- lack of funding this additional work (editing your e-learning) discourages 63.3% of lecturers.

Responses to specific questions from vendors demonstrated technological educational materials (teachers and professors) serious deficiencies in the understanding and conscious use of many technologies. This is contradiction with high self-esteem knowledge of high school teachers' ICT skills.

### 5.3 Copyrights problem

Knowledge of respondents on copyright issues of electronic documents are manifestly made public is highly insufficient, both in schools (83.9%) and universities (80%). Among the school teachers, 25.4% said that there is no knowledge, which is significantly different ($p=0.03$) than college/university teachers (6.7%).

## CONCLUSION

Future material's authors are trained by universities. Typical ICT subject offered in the education process essentially comes down often to prepare students for editing documents like diploma theses. Such documents have a printable form – the student has no chance of getting acquainted with editing and publishing of electronic documents. Moreover, materials for e-learning are related not just to an academic teaching, but also are used for courses in companies.

Lack of ICT skills at the end of education process generates quite a big problem because as a graduate it is not easy to obtain such qualifications outside the university. This situation implies the need for intensive work and time from a supplier of educational materials when such materials must be prepared. Moreover, the cost of commercially-generated course materials effectively eliminates the educational institutions from the group of commercial customers. This unfavourable, from the e-learning point of view, situation and felt by potential customers as highly hindering their education seems to be permanent.

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# ADVANTAGES AND DISADVANTAGES OF E-LEARNING IN UNIVERSITY EDUCATION

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***Abstract*:** *The use of ICT in the learning process is not an exception now, it is becoming reality. These media are technologically improved and their more sophisticated version is significantly changing the nature of education in school. This article is analysing the selected features of information and knowledge society. It is dealing with the analysis of selected positive and negative benefits of virtual education in the context of school-economic efficiency and humanization of education, student socialization, interaction in communication between students and teachers. The authors have attempted to point out some problems that can be presented by unilateral application of education in a virtual environment, since school is not just about teaching and learning, but also about teachers and students.*

**Keywords:** information society, knowledge society, e-learning, socialization, communication, economization.

## INTRODUCTION

The current society is permanently changing, which is reflected for example in various reforms in different areas including education. We notice the pressure (especially in tertiary education) on the output of educational organizations that are motivated to managerial governance which is aimed at achieving specific "tangible" results (economic etc.). This trend in the reform of educational systems is criticized for example by (Olssen, Peters 2005, Säfström 2005, Keller, Tvrdý 2008) who warn that the originally understood education as a public service is subordinated to the logic of the market mechanism. Schools are managed as companies and the requirements of contest and output are decisive. The criteria of success are measurable

factors where quantitative indicators (number of graduates, number of publications, educators, the ability of university departments to generate profits etc.) are preferred to the requirements of quality. Desired knowledge is the knowledge which can be economically utilisable. Reforms of the educational system are implemented according to the requirements of the labour market. The ideal of a knowledge society is enforced in practice in a reduced form (Kopecký 2009: 37).

So today's educational program is dictated by the market, globalization or finance. Education in which teaching to wisdom and also learning to coexist with other people was hidden; it is partially degraded to taking information without guidance and without contacts with other people. All the time there is stronger and more aggressive effort to reduce the flow of funds into education which forces educational institutions to search for such methods and such an organization of education which requires minimum costs. One way is the digitalization of education - although the initial investments are high but over time they will show their short or medium-term economic return. Our goal is to point out to the danger of underestimating the lack of interpersonal contact between teachers and students or students themselves in the whole process.

In his well known book about hidden curriculums at schools, M. Apple says: "... school does not merely provide knowledge, but it also teaches children" (Apple 1990: 15). His prompt idea is the key to our basic critical notes towards distant learning. The whole point of education is to raise children for the adulthood, in which they will be valuable members of society. There is much more than we may want from the system of education (e.g. anti-discrimination, to be open to everybody, beneficial...), but as we wrote, it is the basic definition. We can see that by education we usually mean information coming from educators to children. But there is one mistake what we usually do when we talk about education. We are not able to say which information given by educators was taken by children in and we are even more unable to say how children understand the information and interiorise it. The presence of teachers (scientists) in an educational process is the assurance of critical learning.

## 1. EDUCATION AS A CENTRAL CONCEPT OF KNOWLEDGE SOCIETY

Education is an important civilization phenomenon which is permanently getting stronger and changing its character in the history of humankind.

Nowadays, the importance of education especially in relation to the preparation of individual career and life success in the labour market is emphasized which in its principle is not a step forward into postmodern Central Europe society - the better one than the socialist one was. Today's "action slogans" are strikingly similar to the ones nearly twenty-five years ago defining school as a preparation for employment. However, according to Liessmann (2008: 40) "school has no other role than to teach clear thinking, careful judgment, consequent conclusions therefore it must leave aside everything that is not suitable for these operations, for example religion ... "

In the process of attending school at all levels of educational system, the individuals receive knowledge and skills needed for their life, they acquire values and attitudes characteristic of particular society and an educational system is a part of it. In the process of education, individuals simultaneously "grow" into society where they are socialized. The education fulfils also the culturing function, it leads individuals from the base of their biological naturalness to satisfying their social needs. Cultivation also means inducing new, higher needs which come after saturation of the basic needs and in the consequence with social development of the personality. So if education should fulfil its objective complexly it does not only educate students and pupils but it also socializes and cultivates. Achieved education, mainly the higher level one, has also a character of social status. It is connected with a social prestige and position in society although the relation between the level of education and social prestige is relative. This relation is dependent on the number of students, type of school, the place where the graduate can work, the sort and level of achieved education and so on. The exception in this status is perhaps only the bachelor level of study which has acquired the nature of "academic and professional mock" in the Central Europe countries after it was established by the Bologna process.

Professional and social status of the graduates in the first Republic is incomparable with the current one. Changes in position of higher education in Slovakia took place in a short period of time. Yet in the early 90s of the 20th century, the proportion of individuals from the population year who started university studies was around 8%. The decrease of this number is related with the changes in a demographic structure of the population in Slovakia and it is reflected in an increase of students accepted in tertiary education. According to the Institute of Information and Prognoses of Education of the Slovak Republic, the proportion of secondary school graduates continuing their studies at university in the academic year 2011/2012 was 54% (www.uips.sk).

## 2. DISTANT LEARNING AND E-LEARNING

We can say that the "digital time educates a digital generation". Under the influence of "planetary evolution", "a planetary human" is formed. Is school prepared for such a change not only as to the quantity but mainly as to the quality? Do we realize that it is about the education of a planetary human? Is this status reflected by teachers in general or only by a small group of enthusiasts called "cyber teachers"? The traditional role of teacher is changing and possibly developing. Current teachers educate „unknown children to an unknown future and to an unknown world." They are no longer able to control and influence the stimuli affecting students. Students have greater autonomy which enables them the access to information and to such lifestyle interpretations which go beyond what teachers can give them. However, teachers do not try to compete with the media or to eliminate them from the socialization and education; they teach their students to minimize their potential risks and maximize potential benefits. M. Prensky, a social critic, comes up with this provocative idea: "The most useful education for the future is not happening at school. It is happening in robotic clubs, on the Internet and in games after school. But none of these is in tests". This idea is worth a deeper analysis (Kalaš et al. 2009: 37).

The term e-learning comes from the English language and means electronic learning. The concept was introduced in 1999. H. Dichanz and A. Ernst introduce two possible interpretations of the term of e-learning. They distinguish between the technological and organisational interpretation of the word and the etymological and psychological one. According to the technological and organizational interpretation of this word e-learning is understood as an information and training package for the further intradepartmental staff training offered electronically or via CD-ROMs that is available independently of place and time. The etymological and psychological interpretation is based on the own conception of the term e-learning which can mean: Easy Learning, Effective learning, Entertaining learning, Elaborated learning, Electronic learning (Dichanz, Ernst 2001: 4).

The school loses its monopoly on information. As the traditional role of teacher is changing, the way of education is also changing and this happens just under the influence of penetration of ICT. Education is starting to move away from the traditional way which was the specific location, time, age, and the class-clock system etc. So this method is becoming obsolete and is gradually replaced for example by e-learning. Of course, it is needed to take

into consideration specifications such as age of pupils and students, level of acquired education etc.

It does not have a fixed equivalent in the Slovak language but we can meet the terms of electronic learning, electronic teaching or mostly education by ICT. In the English language there are related terms, e.g. WBL - web-based learning (learning via webs), CBT - Computer Based Training (training via computers), CBI - Computer Based Instruction, CAL - Computer Assisted Learning (learning supported by computers), CAI - Computer Assisted Instruction (teaching supported by computers) (Turek 2008: 412).

The differences in terminology are transferred to the heterogeneity in the definition of e-learning. In technical literature, we can meet more options. Technologically oriented definitions present it as learning provided by interactive electronic technologies, such as the internet (e-mail, web pages, electronic conferences) and computer technologies (the computer is the main source of learning) (Beetham 2002). According to Kopecky, it is understood as a "multimedia support of the learning process in which modern information and communication technologies are used and it is usually realised through computer networks. Its main role is to have a free and unlimited access to education in time and space" (Kopecky 2006: 7). According to another view, it is as a way of learning in which the knowledge acquisition and the use of knowledge are distributed and facilitated by electronic devices. It is still being developed and it is using various information channels (radio, television, satellite). E-learning can include complex learning courses, smaller learning modules or sub-topics. It can be distributed from the sources which are geographically and time independent, in terms of time synchronous or asynchronous (Wentling et. al. 2000, Meyen 2002 In: Sak 2007). So e-learning can be done by computer (internet, intranet, CD ROM, DVD etc.), television (cable, satellite transmission), audios and videos or mobile phones. According to the method of a computer connection to the network, we distinguish two types of e-learning:

1. off-line education – a student is not connected to a computer network and the teaching materials are available on CDs or DVDs,

2. online education – a student is connected to a network (internet, intranet) and the teaching materials are distributed through network media.

In terms of the way of communication between a student, curriculum and a tutor, we distinguish:

2a. synchronous communication (teaching) – students are in the contact with a teacher and with other students through video conferences, chatting, interactive communication or virtual classes. They can communicate from different locations.

2b. asynchronous communication (learning) - students work independently through information and communication technologies. They are not studying at the same time, they are studying through the websites, CD-ROMs, DVDs, e-mail, weblogs, etc. (Turek 2008: 414, Zacharová 2011: 156 - 157).

E-learning can be realised in virtual education. Virtual education is general education in the virtual reality which means education in any environment that is realised with the help of a computer. E-learning is gaining its popularity especially in the university environment and it is still developing and improving. E-learning as a form of monotonous and isolated learning from the screen is overcome and therefore universities or institutes of lifelong learning are choosing the blended learning applications - students meet at the the beginning and at the end of the course and keep working without a direct contact with a teacher or other students. Although modern Learning Management Systems have implemented tools for asynchronous and synchronous communication it still lacks the modules which support the social aspect – non-verbal stimuli such as gestures, facial expressions, touches and so on. Since there is lack of social interaction, there are alternatives in the form of 3D virtual worlds simulating reality which were created as an opposite to "inhuman" e-learning systems in which the interaction is realised through avatars. This is a multi-user virtual environment (MUVE). There are two types of virtual worlds - the game-oriented virtual worlds which usually have pre-defined "virtual culture" and an open culture of virtual worlds which are the most attractive for educational purposes. One of them is the Second Life Environment. It was founded in 2003 and currently has more than 17 million inhabitants. Learning in the Second Life has positive effects on users because instead of a text environment (enriched by multimedia) in conventional e-learning environments it takes place in areas that are known to users from the real world. Learning can take place even in traditional classes using blackboards, however, at the same time it can be enriched by elements which cannot be used in the real life for example for time or financial reasons. One example is the cooperation of schools from different countries, visiting virtual libraries, universities, cultural and historical monuments, creating virtual models, virtual communication, virtual labs, etc. (Marešová 2011: 52-54). E-learning represents a full-valued form of education but it cannot be the

only form of education. Students are provided information but they do not get well into its context as no actual reality simulation in virtual reality programmes offers such possibilities as reality itself does. Students are not in the real interaction with a teacher, they cannot see small changes in the meaning used by a teacher to enrich the lecture text and they are not in contact with classmates. It is not of course only about the contact during lectures and teaching. Students learn very important things necessary for life between lectures and classes. University studies are also about getting and forming the social capital (as defined by Bourdieu) and nowadays we often forget about it when we think about university education possibilities. Distance learning is disconnecting education from practice more than ever.

### 2.1 Distant learning and economy

"Informational age" brings a new view on education. Information and knowledge is what matters the most nowadays. The theoretical effort to grasp the changes in society and its perspectives of development is *The Concept of Knowledge Society* which emphasises the word *to know*. We can see this emphasis on knowledge in our society. If in the past the main part of people's status was their origin, nowadays our society more and more focuses on knowledge and the main part of their social status is the question if they *know* or *not*. *To know* is important in university lecture halls where professors are asking students if they *know*..., in the headlines of tabloids where journalists try to find out *"Where do celebrities go for holidays"*. In social sciences including pedagogy, there are intensive efforts which emphasise *knowledge* as a term and its importance in contemporary society. There is a necessity to distinguish *information, knowledge* and *cognition*. Information exists without a man, and it can be recorded; knowledge is acquired information in the process of cognition. Knowledge and cognition are natural to men and women and they depend on their individual interpretation. Information transmission is very easy and cheap thanks to new technologies but to acquire new knowledge is a long-term and difficult process.

Information and knowledge about something which others do not have make from a man or a woman someone with an advantage. J. Keller and L. Tvrdý (2008: 9-10) wrote: "Economy moved to another age. Instead of processing a huge number of material and energies, the emphasis is given on utilization of information and knowledge". We can see it in mass media – they offer a reward for new information about scandals, catastrophes, and so on. We can see it in national economics. The best paid economic segments are those ones which deal with information, their support, their replacement and their distribution. We can see the run for knowledge also in education and

educational systems in the first world countries in which there is a constant increase of students in tertiary education which is considered the highest education (and training) providing the best chances in "professional life" (Table 1).

**Table 1.**

**Numbers of students in tertiary education (in thousands).**

| | 1999 | 2001 | 2003 | 2005 | 2007 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|
| EU 27 | 15 569.5 | 16 517.3 | 17 761.8 | 18 530.2 | 18 884.2 | 19 470.4 | 19 846.6 |
| United States | 13 769.4 | 13 595.6 | 16 611.7 | 17 272.0 | 17 758.9 | 19 102.8 | 20 427.7 |
| Japan | 3 940.8 | 3 972.5 | 3 984.4 | 4 038.3 | 4 032.6 | 3 874.2 | 3 863.3 |
| Slovakia (V4) | 122.9 | 143.9 | 158.1 | 181.4 | 218.0 | 235.0 | 234.5 |
| Czech Republic (V4) | 231.2 | 260.0 | 287.0 | 336.3 | 362.6 | 416.8 | 437.4 |
| Poland (V4) | 1 399.1 | 1 775.0 | 1 983.4 | 2 118.1 | 2 146.9 | 2 150 | 2 148.7 |
| Hungary (V4) | 279.4 | 330.5 | 390.5 | 436.0 | 431.6 | 397.7 | 389.0 |

*Source: Eurostat (Education and training)*

In the definition of education mentioned above, we are writing about educators and children. They are the subjects of education. But today education is more and more degraded to "information transmission", without the support of mentoring, without "being the part of society". Here, the problem of distant learning is coming.

There are many forms of distant learning and e-learning, but they have one common feature. It is the absence of an educator in the process of taking and interpreting the information, which should be adopted. It is also true that distant learning and e-learning are mostly taking part in types of learning in which adopted information have "mechanical nature".

Philosophy, humanities and social sciences are considered redundant in the system of university education, because the graduates have low-profit economic return. There is the pressure to decrease public sources and increase private sources in the system of education. What is interesting is the form of this pressure. There are not any real political steps towards a bigger

proportion of private sector in the educational system. There are just statements of politicians all around the European Union, and also in the USA (Table 2).

**Table 2.**

**Private expenditure on education (% of GDP).**

| | 1999 | 2001 | 2003 | 2005 | 2007 | 2009 |
|---|---|---|---|---|---|---|
| EU 27 | - | 0.6 | 0.64 | 0.69 | 0.71 | 0.79 |
| United States | 1.65 | 2.22 | 2.05 | 2.32 | 2.58 | 2.03 |
| Japan | 1.17 | 1.17 | 1.23 | 1.53 | 1.65 | 1.6 |
| Slovakia (V4) | 0.09 | 0.11 | 0.45 | 0.7 | 0.53 | 0.72 |
| Czech Republic (V4) | 0.53 | 0.39 | 0.36 | 0.55 | 0.5 | 0.58 |
| Poland (V4) | 0.15 | - | 0.66 | 0.55 | 0.5 | 0.77 |
| Hungary (V4) | 0.63 | 0.56 | 0.56 | 0.49 | - | - |

*Source: Eurostat (Education and training)*

As we see there is a huge increase in private expenditure on education in the last years. (e. g. in the European Union there is an increase in total of 0.19 % of GDP from 2001 – 2009 from 2001 – 2009, and in the USA there is a decrease of 0.19 %) There is an increase in expenditure on education but it is in the public sector (Table 3).

**Table 3.**

**Public expenditure on education (% of GDP).**

| | 1999 | 2001 | 2003 | 2005 | 2007 | 2009 |
|---|---|---|---|---|---|---|
| EU 27 | 4.86 | 4.99 | 5.14 | 5.04 | 4.95 | 5.41 |
| United States | 5.23 | 5.55 | 5.61 | 5.09 | 5.31 | 5.47 |
| Japan | 3.6 | 3.62 | 3.64 | 3.48 | 3.45 | 3.61 |
| Slovakia | 4.18 | 3.99 | 4.3 | 3.85 | 3.62 | 4.09 |

| | | | | | | |
|---|---|---|---|---|---|---|
| (V4) | | | | | | |
| Czech Republic (V4) | 3.97 | 3.93 | 4.32 | 4.08 | 4.05 | 4.38 |
| Poland (V4) | 4.79 | 5.42 | 5.35 | 5.47 | 4.91 | 5.1 |
| Hungary (V4) | 4.66 | 5.06 | 5.91 | 5.46 | 5.29 | 5.12 |

*Source: Eurostat (Education and training)*

In the last 10 years, from 1999 to 2009, public expenditure on education increased in the European Union and also in the USA. In the European Union we can see an increase of 0.55 % and in the USA of 0.24 % of GDP. We live in strange times. On the one hand many politicians and analysts are talking about increasing the private expenditure on education; on the other hand states are increasing public expenditure on education. We can see just one purpose of these different statements and different acting. An ideology prepares the future state of being. S. Žižek (1989) said (wrote) it many times. Ideology is not a false consciousness but a reality itself. To put it more clearly: Nobody is cutting public expenditure on education; politicians are just preparing young generations for a new and "normal" state of funding schools and universities from private resources.

When the finances from taxes come to government and then to educational system, the government makes rules, decides about everything and control it. When the finances come from a private sector to educational system directly, the private sector does not have to respect interests of the whole society and it does not support financially also studies and sciences which make people cleverer but not more skilful in the labour market, more educated but not more economically successful, more critical and less obedient. This is obligatory for the government; they have to act for the common good. The escape of the state from this responsibility means to convey it to a private sector.

In university education, full time studies are often replaced by part time studies. The motives for it are as simple as they can be. This type of study is cheaper than a full time study.

**Table 4.**

**Part-time students in comparison to all students (in %).**

| | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **EU 27** | 14.7 | 15.4 | 16.2 | 17.6 | 17.9 | 17.4 | 18.0 | 18.8 | 19.3 | 19.4 | 21.6 | 19.9 |
| **United States** | 44.3 | 39.6 | 41.4 | 26.2 | 40.1 | 39.0 | 38.6 | 38.3 | 38.3 | 36.5 | 38.5 | 37.7 |
| **Japan** | 6.7 | 7.8 | 7.8 | 7.9 | 7.9 | 8.3 | 8.3 | 9.4 | 9.3 | 8.2 | 8.0 | 8.0 |
| **Slovakia (V4)** | 25.1 | 28.4 | 30.0 | 32.6 | 32.3 | 35.5 | 36.6 | 38.0 | 39.5 | 39.2 | 37.8 | 35.5 |
| **Czech Republic (V4)** | 5.8 | 6.6 | 6.6 | 9.8 | 3.4 | 4.1 | 4.0 | 4.1 | 3.7 | 3.6 | 3.6 | 3.1 |
| **Poland (V4)** | 44.5 | 45.6 | 46.0 | 42.8 | 41.8 | 40.2 | 39 | 44.0 | 46.2 | 46.3 | 55.1 | 54.6 |
| **Hungary (V4)** | 39.8 | 41.7 | 43.4 | 44.2 | 46.0 | 46.4 | 45.8 | 44.8 | 42.3 | 38.7 | 36.3 | 34.4 |

*Source: Eurostat (Education and training)*

As we can see in the table 4, the number of part-time students is still growing in the European Union countries. In Slovakia and Poland we can see the increase of part-time students in comparison with all students more then by 10 % in the last 11 years. In Hungary and Czech Republic, this type of study is decreasing in the last years. Even in the second a third world countries which are considered "being good", this type of study is also declining. In the European Union we want to have people more educated even at the price of poor quality study.

### 2.2 E-learning and communication at university

E-learning is a favourite form of education. However, what seems effective and favourite has also problems which is lack of communication between a teacher and a student. The word *communication* comes from Latin, and originally meant *accept and submit*. *Communication* can be specified more clearly by word *social communication.* Social communication is realised by people with other people and it enables us to understand each other, it shapes social relations. Social relations enable the exchange of information which we call communication. Communication in school has specific forms and it is called pedagogical communication (Zacharová 2010: 112). Social interaction in school has three aspects: *interactive* (mutual teacher-student impact and influence), *communication* (sharing the contexts and information), *perception* (perception of the teacher and schoolmates in everyday life in school). Pedagogical communication uses various tools of social communication. There are two forms of social communication: *verbal*

(communication by speaking or writing), *non-verbal*, *communication by act.* As to the process and content, pedagogical communication has three components: *cognitive* (it influences the cognitive development of student's personality), *affective* (it influences student's motives, it supports the creation of student´s required values and attitudes), *regulative* (it serves as a component of realization of chosen education and goals of education) (Prokešová 2009: 251-267).

If most of the education takes place in cyberspace, how can pedagogical communication, as a formative educational tool, function? In virtual communication (e-learning) some components of education are missing: empathy with students, respect and forming the student's personality, an interest in their true attitude, being a good example for them. To apply some sort of elements which are typical for verbal communication, as a tone of voice, speaker's attitude, colour of voice, speed of voice, pauses, is impossible in virtual communication. In verbal communication we often apply communicational skills, and one of them is listening. It is the most important active component of conversation. We do not only listen to others, but we also have to interpret and understand what they talk about. It is the pedagogical skill to be able to listen to and comprehend, e.g. if a child is complaining about stomach-ache and if this situation repeats quite often we should know when to call an ambulance and when it is not necessary because it can be a neurosis and then it is very important to search what causes it. To hear means to create new paths for conversation, it also gives the possibility to entrust and to show the willingness to help, if needed. Elementary tools for hearing are: ears – colour of speech, volume of speech, pauses; eyes – we can see the face of a partner of conversation; heart – the ability to feel emotions. (Křivohlavý 1993: 23-30).

Any type of social communication without the elements of non-verbal communication is not complex. It lacks its authenticity. The interpersonal contact consists of 55% of mimic expressions, 38% of acoustic non-linguistic acts and just 7% of words. In e-learning communication, face-play, gesticulation, naturalness, touch, motions are missing.

Now, we want to pay more attention to disadvantages of distant learning. P.Ondrejkovič (1998: 174-193) is writing about university students socialization. Students are coming through a process of (student's) role-taking; they have to develop their own strategies in (student's) role-making. Socialization at university is according to Ondrejkovič also socialization towards the professional role of forthcoming profession. Young medical students have to learn to be "doctors" (to be responsible, to be an expert, to be

attentive); students studying sociology have to learn to be "sociologists" (to have a sociological imagination, to be a good observer and an expert in this field). Inspired by the old works of G. H. Mead (1934) and The School of Phenomenology we can go a step further.

School is the place, where teachers and students are in everyday contact at lectures and in other different activities. It is an environment in which they express attitudes and opinions by speaking, but we can also talk about communication by acting. Teachers are not just sources of information for students, they are also colleagues for them; they both make up the educational reality by discussion and cooperation. Teachers are active participants of an educational system as a whole. Students create the reality by social and physical activity. Together with classmates and teachers students are authors of genuine products and they learn to understand different situations (Vyskočilová - Dvořák 2009: 52); this process of learning is full of emotions and humanity.

To study at university means also to meet people, who understand very well smaller or bigger piece of the world we live in. From the professors´ point of view it means to meet students and learn to ask basic questions, reformulate hypothesis and to find always something new in what was said "hundred times". To be in touch with professors means for students to learn critical thinking about professional problems, to be always behind the back of professors and to discuss with them everything what they are doing, and to see the world with the eyes of scientist. What we usually call "learning a critical thinking" is seeing the world from the specific paradigmatic and professional point of view.

Carrie Yang Costello (2001) shows us how more students can learn if they attend school every day. We know very well that in schools and universities official and hidden curriculums exist. Distant learning is a compound form of an official curriculum. What students usually learn at school much more than an official curriculum is a hidden curriculum. In her article, Carrie Yang Costello is writing about the impact of the small table forms where university donors are displayed on students who pass these small tables every day. These tables encourage them to donate money to the university (their Alma Mater) a few years later.

## CONCLUSION

The interaction between teachers (scientists) and students reproduced by generations is in the conflict with the new reality today, where socialization

of the individual takes a new face. The change of the character of education is coming hand in hand with Information and Communication Technologies. If the new form of education in virtual reality will be applied without a strict and reasonable consideration, the educational goals for 21st century (Delors concept) will be inapplicable. There are at least four pillars which will not be fully developed: *to learn to be, to learn to act, to learn to live with others* and to *learn and to discover*, because the goal of education will not be to fill up students' minds with information but to make them open. Uncontrolled support and preference of education in cyberspace will not fully enable school, as an institution, to accomplish its functions. We can add to these functions: qualification function, cognitive function, personalization function, socialization and integration function. To prefer just the economical goals of education can be dangerous.

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# III. PRACTICAL ASPECTS OF DISTANCE LEARNING. DISTANCE LEARNING AND LIFELONG LEARNING

## DISTANCE LEARNING IN PROFESSIONAL MILITARY EDUCATION OF THE POLISH AIR FORCE OFFICERS. LESSONS OBSERVED AND CHALLENGES AHEAD

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***Abstract:*** *With the introduction of Western standards to the Polish military, professional military education gradually changed in line with NATO standard and use of distance learning in officers' education started being discussed. Elements of distance learning have been blended with existing resident professional military education programmes to enhance their effectiveness. The article presents observations on integration of distance learning into resident professional military educational programmes for the Polish Air Force officers.*

**Keywords:** professional military education, distance learning, the Polish Air Force

### INTRODUCTION

Professional military education of the Polish Air Forces (PAF) officers has transformed significantly since Poland joined NATO in 1999. With the introduction of Western standards to the Polish military, notable efforts were made to make professional military education of the Polish Air Force officers comparable to that of allied nations. Respective curricula gradually changed in line with NATO standards, simulation models became available and the issue of introducing distance learning started being discussed. Ultimately, no separate, exclusively distance learning programmes designed for professional military education of the Polish Air Force officers were developed. Instead,

some elements of distance learning have been blended with existing resident professional military education (PME) programmes to enhance their effectiveness. External resources, both governmental and commercial, have constituted the majority of teaching material remotely available to the teaching staff and students so far. However, changes to operational environment encourage nowadays the development of one's own distance learning resources that better fit specific requirements of professional military educational programmemes for the Polish Air Force officers. Despite technological developments, implementation of distance learning in professional military education faces some problems related to organizational culture, access to classified information and operations tempo that limits time available to students and teaching staff. While, there is no intention to expand the share of distance learning modules in resident educational programmes for the PAF officers, efforts are being made to integrate available distance learning resources in a more efficient way.

## 1. EVOLUTION OF THE POLISH AIR FORCE OFFICERS' PROFESSIONAL MILITARY EDUCATION

An overall philosophy of professional military education of the PAF officers is tied to the NATO standards and mirrors solutions used in allied militaries. In line with the most of Western militaries, the professional military education in Poland plays an important role in personnel management policy. Military educational programmes, specialised military training and accumulated professional experience influence significantly personnel recruitment, development, retention and retirement. Due to the fact that officers lead armed forces at all (tactical, operational and strategic) levels and their careers last up to more than 40 years now, they are subjected to life-long development, including education and training. For decades, the key challenge for professional development programmemes in Polish military has remained a right balance of officers' training, experience and education throughout every step of their military service. The challenge has been even greater as education and training programmes tend to overlap and it is really difficult to view them as entirely separate activities. In theory, highly utilitarian, focused on a specific set of skills, training programmemes complement broader and more complex educational programmemes that aim at developing critical thinking habits. Specialised training constitutes a major component of junior officers' development, while for senior officers it is a professional military education. In practice, a prolonged transformation of Polish military, force reductions and increased operational tempo, adversely impacted the balance between education, training and professional

experience (Cieślak 2011: 48). Since 2002 graduates of civilian universities and academies were allowed a short term complementary military training to be promoted officers. After 2004 civilian diplomas were frequently recognised as equivalent to their military counterparts, which decreased the need for professional military education dramatically. As a result of those actions the level of specialised military knowledge and skills decreased among officers. To address emerging shortcomings, the MOD pushed for an increase in short term training programmemes in 2008 (Cieślak 2010). However, due to an increased operational tempo caused by Poland's military involvement in Iraq and Afghanistan, commanders were unwilling to let their subordinates attend relatively long (typically nine months to one year-long studies) and opted for a narrowly focused, and short term (less than three months) specialised training. As of July 2012, the imbalance between professional military education and specialised training still persisted. While the number of PME programmemes participants remained low, short term training courses enjoyed much larger audiences.

Polish military has adopted Western philosophy for timing and sequencing of professional military education. Officers' education starts with focus on tactical level, and gradually expands to operational and strategic levels. Generally, the scope of training and education for officer candidates and junior officers (up to the rank of captain) is tied closely to their respective service core competences and functions, specific weapon systems and tactical level of operations. Majors and lieutenants colonels are taught mostly operational level warfare, while only colonels and generals educational programmemes include broad discussion of policy and strategy. Such an approach bears some implications. While educational programmemes for junior officers may be run for single service communities, it is desirable to mix senior officers of different services to build ethos of jointness and allow a broader understanding of military operations. For the Polish Air Force it meant separate PME programmemes and seminars for junior officers, and participation in joint PME programmemes along with their Army, Navy and Special Forces counterparts for senior officers. Even if the number of the Polish Air Force officers participating in the PME programmemes varies over the years, it remains relatively low for a single service programmemes and even lower in joint programmemes. Such a situation shapes the conditions for using distance learning in the Polish Air Force officers' professional military education.

## 2. USE OF DISTANCE LEARNING IN PROFESSIONAL MILITARY EDUCATION. A BROADER PERSPECTIVE

Introduction of distance learning in professional military education is a relatively new phenomenon. First distance learning programmes were started in the U.S. military at the end of the 1990s. After 2000 distance learning was introduced in American professional military education and both intermediate and senior service schools started non-resident programmes. At the beginning, the potential offered by distance learning was somehow exaggerated (Leonard et al. 2001: 58-59). Distance learning was praised to enhance stability of service by reducing education-related separations from units and families, to save money and increase accessibility of training and education to military personnel. With a number of overly optimistic claims and promises made at the time of making distance learning reality, the need for a reality check came quickly. In 2003 and 2004 the U.S. Governmental Accounting Office (GAO) attempted to assess conditions for implementation and effectiveness of distance learning programmes. It was too early to provide a complex assessment of ADL effectiveness; nevertheless GAO reports were able to observe potential for economic savings offered by distance learning. More elaborate assessments were offered on challenges affecting the U.S. Department of Defense Advanced Distributed Learning programmes. The challenges were discussed for four separate groups: cultural, technological, policy and financial. Cultural challenges were predominant in 2004 as organizational DOD and service cultures were resistant to change created by emerging distance learning technologies. Senior leadership commitment varied and preference for a more traditional school-house-focused learning became apparent. The ADL was viewed with some kind of reluctance by service schoolhouses, which were afraid that it might undermine their funding by decreasing the number of in-residence students (U.S. GAO 2003: 29). Cultural challenges might be tied at least partly to the lack of overarching DOD's ADL policy and service regulations that could guide distance learning use for military education and training. While technological challenges related to bandwidth issues do not seem to be an issue nowadays, network security issues remain a valid concern that limits use of distance learning for professional military education and training. ADL faced also financial challenges as the long-term funding was not resolved and costs of developing and fielding military skills-related content proved more costly and difficult than anticipated.

The U.S. GAO assessments of advanced distributed learning related also to the effectiveness of distance learning. The findings described nonresident PME programmes (using ADL) as inferior to resident programmes "in

providing acculturation, interactive skills and simulations that are critical for professional development of officers" (U.S. GAO 2004: 16). Nonresident educational programmes were considered less desirable than resident education by both attending students and military authorities. The inferiority of distance and non-residence educational programmes was mentioned also by the U.S. House of Representative panel on professional military education a few years later. The resulting report, which was published in 2010, claimed that "those who attend PME through distance learning are not usually regarded as highly as those who are selected for in-residence education" (U.S. House of Representatives 2010: 114). Interestingly, it was not the case for the US Navy, which did not discriminate distance learning.

To overcome this cultural obstacle, many of the U.S. PME programmes started to blend distance and in-residence learning. Nonresident programmes were expanded with short periods of in-residence instruction, which helped joint acculturation of students. Conversely, portions of in-residence programmes started to be presented through distance learning. The report pointed also at one critical aspect of using distance learning in PME. It was argued that because of demanding operational duties officers enrolled in non-residence programmes may not be provided "the opportunity for systemic thought and reflection that occurs through the in-resident PME programmes" (U.S. House of Representatives, 2010: 159).

Distance learning remains of interest to the NATO and European Union. While professional military education remains primarily national responsibility, NATO schools and training centres play some role in it. Nowadays, both the NATO Defense College and the NATO School offer several distance learning courses along with resident programmes. The Alliance intends to transform the NATO education and training using modern educational tools, including distance learning, exchanges and simulations (NATO 2010: 40). The Alliance will use e-learning to create an effective learning environment. Beside the continuation of advanced distributed learning and computer-based training, the NATO will develop immersive learning, mobile learning and collaborative learning (NATO 2012: 5).

Limited research on the use of distance learning in the PME programmes makes definite conclusions almost impossible nowadays. However, judging from available assessments, and with all developments related to military training in mind, it is fair to assume that professional military education of officers will remain for some years to come a resident, seminar oriented activity with an increased, but carefully tailored use of distance learning technologies.

## 3. IMPLEMENTATION OF DISTANCE LEARNING INTO THE POLISH AIR FORCE OFFICERS PROFESSIONAL MILITARY EDUCATION. PRELIMINARY OBSERVATIONS

Implementation of distance learning into the PAF officers' professional education has been closely tied to distance learning developments in the U.S. military and the NATO. As interoperability with Allies became a priority after Poland joined the NATO in 1999, there was an urgent requirement to teach military personnel allied strategy, doctrine and procedures. To be interoperable meant also to know specialised military English. To fulfil both requirements it was necessary to gain access to respective documents and teaching materials. Initially, some teaching materials on CD-rom were made available to the National Defense University (NDU) teaching staff by their Western counterparts. Later on, after 2000, when the U.S. military created portals with training and educational resources, it was possible to access unclassified materials to support professional military education of the PAF officers. Because of limited knowledge of specialised English by Polish officers in the nineties, distance learning resources were primarily used by teaching staff. The situation improved after around 2003, when English skills became more common, and availability of distance learning resources increased. The advantage of remote access to academic and research materials started to be apparent, when the NDU got access to the Air University research portals and RAND Project Air Force. It gave insight for both teachers and students into recent research and helped to improve teaching quality. Reliance on public access to American military educational and training resources created some problems. When access to the U.S. military portals was temporarily restricted for computers from public domains, due to security reasons during so called "war on terrorism", the NDU teaching staff lost the access to at least part of teaching resources. However, disruptions did not last long thanks to the Freedom of Information Act and access to distance learning resources remained sufficient for professional military education of the PAF officers at the NDU. Nowadays, new formats of teaching materials (mp3 and mp4 podcasts) are available for downloading, which makes m-learning possible. After 2005, the NDU gained access to the NATO distance learning courses, which increased availability of teaching materials. The National Defense University established its own Advanced Distributed Learning team in 2009. In 2011 it was given the NATO Allied Command Transformation permission to run and certify more than one hundred ADL courses through the LMS ILIAS platform (Poczekalewicz 2011: p. 194). To some extent, research and teaching materials available through Virtual Library of Science (Wirtualna Biblioteka

Nauki) financed by the Ministry of Science and Higher Education have been also used for the PME programmes at the NDU since 2010.

The unique requirements of professional military educational programmes for the PAF officers have facilitated the use of distance learning resources published in English. Students and teachers have been able to gain both professional knowledge and improve their specialised English at the same time. Because of a rapidly increasing access to virtual research and teaching resources the key challenge for teachers nowadays is not to find and access distance learning resources, but to incorporate them smoothly into existing curricula. The U.S. and the NATO course modules available nowadays require typically between two and four hours of student's work and include multiple choice testing to ensure that course material was understood. Based on the experience of the PME for the PAF officers run by the NDU, such distance learning materials may fit both as introduction to resident courses or as a reinforcement and summary of knowledge gained during such courses. Virtual resources are well suited for elective programmes, when traditional printed materials are not available or the number of students is too small to make traditional paper-based publishing cost-effective. Availability of virtual resources improved also the quality of students' research papers required for the PME programmes. While the issue of protecting classified information still limits access to research resources, the remote access to unclassified research makes real difference and creates significantly better environment for students' and teachers' research.

The issue of developing distance learning modules by the NDU's Institute of Aviation and Air Defense has been discussed recently. Although the number of military students and the PME programmes for the PAF officers makes preparation of such modules problematic in terms of economy of effort, the decision was made to create a distance learning module on crisis response operations that might be used by both military and civilian students. As a result of Erasmus Intensive Programme "Aviation for citizen security and safety" planned for 2012 to 2014 a distance learning course in English will be developed and made available to IP partners in the Czech Republic, Estonia, Lithuania and Slovakia as well as posted on the NDU LMS ILIAS platform.

## 4. CHALLENGES AHEAD

Judging from the US military and NATO experience, the use of distance learning in military education and training in Poland will increase. It is likely that Polish military may face cultural, policy and financial challenges similar

to those that hampered development of advanced distributed learning in the US military, and then in NATO. Training and simulation packages developed for major weapon systems may be made available online providing that an appropriate level of information security is assured. The increase in use of distance learning in professional military education may be more challenging. Costs of development and keeping distance learning modules up to date may be prohibitive if Poland decides to create its own educational resources in Polish. Taking into account that the number of officers attending PME programmemes will decrease over next years as a result of force transformation and possible reductions, it is more likely that NATO developed courses may constitute major part of distance learning materials available to students and their teachers. Putting national pride aside, this will keep available distance learning resources up to date at a fraction of costs compared with those nationally developed. Using NATO distance learning modules will also allow the PAF officers attending PME programmemes to gain professional knowledge and improve their English skills at the same time. It is quite likely that conflicting requirements may arise as interested stakeholders such as decision makers, teachers, and participants will argue over the language of instruction. Pushing for making NATO distance learning resources available in Polish may create additional workload for teachers, but what is more important, it may also discourage military personnel from improving their English skills. It will take some time to build confidence of senior decision makers (who will remain "pre-internet" generation for at least a decade) that distance e-learning is as valuable as traditional classroom instruction. Blended learning seems to be a right way to enhance distance learning use while securing a portion of resident education to facilitate acculturation.

Development of NATO distance learning courses will have to accelerate if the Alliance wants to benefit from e-learning. Around one hundred of NATO distance learning courses does not look good if compared to thousands of the US military. International cooperation, including bilateral and multilateral projects, may be necessary to develop new courses in a timely fashion and to keep existing courses current. Such a situation creates both a challenge and an opportunity for Poland. Participation in allied distance learning projects will be cheaper than national programmemes. However; it will demand agreements on financing and courses content, which may be time-consuming. Furthermore, keeping distance learning resources responsive to changes in operational environment will require long-term investments and commitments that may be uneasy in times of financial austerity.

Development of distance learning modules for the PAF officers' PME may be hampered by the lack of consistent e-learning policy. Although one may argue that the Ministry of National Defense is working on the e-learning, it is hard to consider the results definite. Therefore, it will take significant efforts to shape a proactive policy on e-learning, and then translate it into consistent regulations and procedures.

## CONCLUSION

The use of distance, computer assisted learning in professional military education is quite new. After a decade of experience with distance training and educational programmemes, some general observations may be made. Distance learning did not make traditional resident educational programmemes obsolete and did not end classroom teaching with seminar discussions. However, access to virtual resources has changed resident educational programmes. It made them more responsive and provided both teachers and students with additional educational opportunities. The resident professional military educational programmemes for the PAF officers run by the NDU in Warsaw benefited from distance learning in several ways. Due to the NATO interoperability requirements it was possible to integrate available distance learning teaching materials in English into resident courses. Access to virtual teaching and research resources improved the quality of education. It required a careful selection of distance learning resources and their integration within existing PME curricula. As the development of new distance learning modules is resource consuming, the NDU will continue to use external resources made available within the NATO to support the PAF officers' professional military educational programmemes. Poland is likely to participate in international cooperation to develop distance learning modules. It may limit the costs of keeping distance learning resources up to date and responsive to changing educational and training requirements. While the development of distance learning for the PME of the Polish Air Force officers seems highly probable, it may face cultural, policy and financial challenges similar to those encountered by the U.S. military and the NATO a decade ago.

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# THE IMPLEMENTATION OF E-LEARNING IN TEACHER DEVELOPMENT. A CASE STUDY OF WWW.PWH.UMCS.PL

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***Abstract:*** *Increasing the efficiency of practical training and achieving an effective mix of theory and practice are the major aims of university teacher training programmes. Various methods and instruments have been applied so far to raise the quality of teaching practice experience. The aim of the present paper will be to evaluate the use of the e-learning component in teaching practice management and present solutions to the problems encountered during the first two years of the project. The presentation will illustrate didactic innovations introduced in "www.praktyki.wh.umcs", an EU-funded regional project aiming at preparation and implementation of innovative teaching practice curriculum at Maria Curie-Skłodowska University, Lublin, Poland.*

**Keywords**: e-learning platforms, teaching practices, teacher training.

## INTRODUCTION

The use of ICT tools has been permeating all spheres of human activity, including education. Together with free availability of online tools such as e-learning platforms, there have been ideal conditions for supplementing teaching and teacher training with online activities. The principles of "*www.praktyki.wh.umcs",* an EU-funded regional project aiming at preparation and implementation of innovative teaching practice curriculum at Maria Curie-Skłodowska University, Lublin, Poland, place great emphasis on that aspect of education, hoping that greater exposure to and engagement in online activities will help trainees become better teachers.

However, as it turned out after two years of the project's functioning, the implementation of e-learning as a supplement to teacher education is not as simple and straightforward as one might think. The present paper contains a reflection on the causes of inadequate use of e-learning, as well as solutions and recommendations for increasing the effectiveness of the e-learning component in teaching practice management.

## 1. BACKGROUND

### 1.1. Digital teachers and digital students – a generation clash

The process of teacher development in the contemporary digital age seems impossible without the use of cutting-edge computer-based means and resources. Student-teachers of today are generally 'digital natives' (Prensky 2001, 2004), in other words individuals who have grown with modern Information and Communication Technologies, take them for granted and use them to redefine their entire lives. According to Prensky, the most paramount problem of contemporary education is that 'digital immigrant' teachers, who use archaic language and concepts from the pre-digital era, attempt to teach the population of students who speak a completely new language and follow a new way of thinking. The clash of characteristic features and preferences of both of these generations creates an urgent need to reconceptualise the process of teacher development, in order to provide a new organisational model that would suit the needs of the young generation in terms of the training process, selection of methods and forms of work as well as the use of teaching aids. The summary below illustrates the characteristic features of both sides (Hojnacki 2006).

**Table 1.**

**Comparison of features of teachers and students in the digital age.**

| **TEACHERS – DIGITAL IMMIGRANTS** | **STUDENTS – DIGITAL NATIVES** |
|---|---|
| Find it difficult to understand the virtual space visible on the screen. | Can imagine and understand the virtual space visible on the screen. |
| Can imagine and understand the contents of a long linear text read | Find it difficult to understand a long and complex text. |

| | |
|---|---|
| from a book. | |
| Are better at understanding printed text. | Succeed at reading from a small screen. |
| Prefer text over image and sound. | Prefer image and sound over text. |
| Prefer linear thinking and serial information processing. | Prefer flexible, hypertextual and hypermedia access to information and parallel processing of data. |
| Prefer diligence, systematicity and expect long-term accumulated results. | Prefer accidental short-term learning, experimenting, multi-tasking, expect quick results. |
| Use basic standard functions of the mobile tools that are the same as in the traditional devices. Are suspicious towards new technologies. | Try to uncover virtually all the functionalities of the tools, think up their new creative uses. Treat new technologies in a creative and trusting way. Perceive their personal mobile tools as highly private things. |

*Source: own elaboration based on Hojnacki 2006*

The awareness of the discrepancies between the two generations, as the argument of Hojnacki goes, can facilitate understanding of some of the problems connected with teaching and upbringing, as well as applying remedial measures. This can also be a starting point for successful incorporation of mobile tools into the pedagogue's toolkit (Hojnacki 2006). It needs to be added at that point that m-learning has great potential for the process of developing and training future teachers. Hojnacki views m-learning (or mobile learning) as a whole range of educational opportunities opened up by the combination of mobile and wireless networks as well as e-learning technologies and methodologies. As such, this aspect of the educational process is not to be omitted when preparing future pedagogues at university. "We witness the process of profound changes in the phenomena related to the way the contemporary system of education is functioning; the changes that may lead to the emergence of a new digital gap inside school –

a gap between students and teachers. Great effort is needed thus to prevent this" (Hojnacki 2006).

Furthermore, it cannot be forgotten that a dominating trend in the education of the future will be, certainly, focus on active learning, creativity and non-standard thinking. All these features lead to a whole new learning culture, which, according to M. Plebańska (2011), necessitates constant development of one's competences and skills, building personal structures for continuous collection of data and exchange of experiences as well as provision of support in the constant process of learning. The recipients of the educational process will be largely constituted by the 'M generation' (*multitasking generation*), whose members find it easy and effective to perform a few simultaneous activities in the computer environment (e.g. writing e-mail messages, listening to music, doing homework, checking social networking tools such as *Facebook,* talking via communicators and learning – Cody, 2010).

### 1.2. E-learning in university education

What is more, many educational institutions start to perceive e-learning as a "valuable supplement to face-to-face instruction in Polish schools, hence it is essential that teachers should be provided support to become open to the implementation of online teaching and use the educational resources available on the Internet in their professional practices" (Infoteka, Serwis Cyfrowej Informacji Oświatowej**,** http://elearningwszkole.ore.edu.pl/index.php).

The importance of e-learning and m-learning in teacher education has been recently underlined also by the legal regulations. The ministerial decree on standards for teacher education specifies the following general educational aims that a fully trained teacher should have accomplished upon graduating from university:

- To demonstrate the ability to teach and develop one's repertoire of techniques with *the use of modern means and methods of retrieving, organizing and processing information and materials***.**
- To skillfully *communicate via various channels and techniques*, both with the targets of pedagogical activity and with other subjects cooperating or supporting the didactic/upbringing process.

These general concepts have been further refined as specific learning results in the following way:

*In the area of skills a university graduate needs*

- to use modern technologies in his/her teaching.

*In the area of Information Technology a university graduate needs to have*

- basic knowledge and skills of techniques of informatics, word-processing, spreadsheets, databases, presentation graphics, network services, information retrieval and processing;
- the ability to differentiate the applications of ICT tools to suit relevant teaching contexts.

As regards the function of technology in the process of practical teacher development, there are many possible areas it can cover to strengthen the message sent by the instructor and develop the skills already possessed by students (Otero et al. 2005):

- *Technology used as a cognitive tool* helps students understand concepts and solve problems.
- *Technology used as a communication tool* fosters discourse and collaboration among educators, students, parents, and the community.
- *Technology used as a management tool* increases efficiency for teachers and students.
- *Technology used as an evaluation tool* helps teachers reflect on instruction and provides feedback on student learning.
- *Technology used as a motivational tool* encourages and engages students in learning.

### 1.3. E-learning platform in teacher training – features of learning design

One of the best ways of applying all of the abovementioned functions is the use of an e-learning platform. The discussion below, based on the e-learning solution implemented within the project "Preparation and implementation of innovative teaching practice curriculum at Faculty of Humanities, Maria Curie-Skłodowska University", will start with defining what an e-learning platform is, what its functions are and how it is managed.

To start with, the e-learning platform is a computer environment which enables learners to study via the Internet and gives instructors the possibility to manage both educational resources and participants of the online learning process. Most usually, e-learning platforms consist of separate modules that are responsible for various aspects of management of online education, such as enrollment, communication, content delivery or testing.

The literature review finds a plethora of functions of e-learning platforms. The most straightforward division is most probably the one proposed by

Marlena Plebańska (2011), according to whom e-learning platforms perform three main functions:

- educational;
- knowledge-managing;
- resource-managing.

Each of these major types can be attributed a greater number of more specific applications. Thus, the educational function comprises the following:

- knowledge storage and grading (the platform is a repository of all kinds of data, text-based, graphic, audio/video, .html or flash);
- knowledge delivery (the instructors use the platform to publish didactic aids and materials in a synchronous way, for use in specific time, as well as asynchronous way, retrieved by learners at their convenience);
- knowledge assessment (testing the level of acquisition of content with various kinds of tests, either prepared on the platform with its in-built tools or made with external applications and imported to the e-learning environment);
- knowledge reporting (the platform has in-built tools for monitoring users' activity and scores, in individual and group dimensions, which can constitute data for reflections on effectiveness of a particular course or the student group's achievement level);
- learning management (users are reminded about the upcoming task deadlines or chat sessions, are informed about the course schedule, etc.).

The knowledge-managing function comprises the following specific applications:

- materials upload (the platform's databases are expanded by uploading didactic materials);
- materials publishing (making files available to users at a time specified by the objectives of a particular course);
- materials customization (directing resources to selected groups of users according to the objectives of a particular course by assigning them access rights).

Resource management, finally, encompasses three major uses:

- resource expansion (new users, administrators, teachers, facilitators, etc.)
- resource deletion (removing users, together with their course data and taskfiles, after a course was completed);
- resource customization (rather than removing users altogether, this means setting access rights in such a way that once completing the training its participants can only use the knowledge repository or the forum, but have no access to the training content itself).

## 2. E-LEARNING PLATFORM IN TEACHING PRACTICE MANAGEMENT – A CASE OF 'WWW.PRAKTYKI.WH.UMCS' PROJECT

### 2.1. Designing the e-learning architecture

The first step in the design of the e-learning architecture to support teaching practice organisation and management was a needs analysis conducted among school teachers and university instructors, which sought to answer the questions on the role and function of e-learning and online learning environment in school supervisor training and teaching practice management. The major findings from the needs analysis are given below:

- More effective and faster development of school mentors is needed, and e-learning might respond to that need as course participants gain access to training materials at convenient time and proceed with them at their own pace.
- The use of a modern Virtual Learning Environment makes multi-modal communication between mentors, student teachers and university supervisors feasible and efficient.
- Thanks to the application of self-study procedures the process of verifying and assessing trainees' work can be automated, organised and archived much more easily.
- The materials uploaded to a VLE can constitute examples of good practice for trainees during their practicum and a body of knowledge for mentors' methodology update.
- The e-learning platform should be a publishing space for projects, lesson scenarios, classroom tips for teachers and students.
- There is a need for safe teacher-friendly online spaces to organise

collaborative work of students on common multi-disciplinary projects, and the use of the e-learning platform might satisfy this need.

– The application of the e-learning platform will make school teachers accustomed to the use of ICT tools in their daily practice, which has become especially important in terms of digitization of school duties (electronic student roster books, among others).

The innovative added value of the "Preparation and implementation of innovative teaching practice curriculum at Faculty of Humanities, Maria Curie-Skłodowska University" project was, among others, the creation of a virtual learning space based on Moodle Learning Management System. The platform was supposed to be used before, during and after teaching practices to prepare students before they were sent to schools, monitor their work while serving their time at schools and providing feedback after the whole training experience.

The design of the e-learning architecture made the following modes of work available to teaching practice supervisors:

– Private communication: teaching practice supervisor with trainees, teaching practice supervisor with school practice supervisors.

– Public communication: discussions of trainees on a forum; exchange of teaching materials by trainees via a discussion forum.

– Individual study: personal professional development of school practice supervisors.

– Collaboration: making teaching materials online/offline and uploading them to group sections/wikis.

– Assessment: trainees' peer assessment of the materials uploaded to a forum by other trainees; delivering assessment of trainees' work by the university practice supervisor; giving trainees feedback on the quality of their teaching materials by the university practice supervisor.

### 2.2. Evaluation of the experience

The first experiences with the use of the e-learning platform for teaching practice management were very difficult. It turned out that both university lecturers and school teachers were anxious about and reluctant to become involved in online work in the Moodle-based environment. At the beginning, online work was highly limited and very few options opened up by

the platform were actually used. For instance, there was a highly skeptical attitude of teachers towards running teacher development courses online.

As for school teacher users, they proved to be much less active in the virtual learning space than it was expected. Quite surprisingly, a significant number of trainee users could not function properly in the online environment and had problems with using the educational resources, discussion forums or other planned activities. When taking into account the voluntary basis of the platform use, neither the ICT environment nor university instructors' verbal encouragement proved effective at encouraging those students to go and work online.

This situation necessitated profound reflection on the reasons for inadequate use of the platform and its lack of popularity among target users. Solutions to the problems of ineffective and inadequate use of the online component were thus sought. The diagnosed reasons for users' resentment towards online work were as follows:

- Over-enthusiastic and unrealistic assumptions of project management that the e-learning platform will be widely used by students-"Net Generation" representatives.
- Inadequate promotional activity that would publicise the characteristics, benefits, ways of functioning and modes of use of the e-learning platform.
- Too low motivation of project participants to use the platform, both as recipients of ready-made content and as co-collaborators in individual and group work of different kind.
- Treating the platform, contrary to what was assumed by the project, as a separate phenomenon, not an indispensable part of the teacher development process.
- Giving trainees too much freedom to decide whether or not to use the platform, which resulted in their perceiving online work as an optional extra rather than an educational requirement.
- Relatively low variety of resources uploaded to the platform, with inadequate amount of hypertextual information.
- Participants' (especially school teachers') preference for traditional methods of training and self-development, forms of communication and exchange of experiences.

- Participants' conviction that the educational solutions for teacher training used so far are sufficient despite the requirements posed by the ubiquitous knowledge society.
- Instructors' lack of enforcing student teachers' active participation in the online activities on the platform, which, in consequence, diminished the significance of the e-learning component in the training and self-development process.

### 2.3. Solutions and recommendations for the future

The diagnosed problems triggered the process of seeking solutions which could revitalize the platform and motivate its users to active work. To meet that aim, a more effective framework for e-learning use in teaching practice management was worked out as a result of the feedback obtained during classes devoted to project work and informal conversations with project participants (school teachers and student teachers). To start with, apart from the existing contents, student teachers started to be required to join the process of accomplishing objectives and executing tasks by selecting at least three activity areas to explore on their own. As the range of activities is open and flexible in its nature, also expandable by users-trainees and users-school teachers, future will show which of the areas prove to be most popular and get the highest place in the activity ranking.

Assessment of online work is the area which seems to have great potential for motivating student teachers and school teachers to greater participation in online work. As proved by the feedback given by the participants, most active, creative, communicative and inventive users should be rewarded for their willingness to collaborate, for sharing knowledge and teaching experiences with others, as well as for displaying true interest in the Project's activities as demonstrated with active participation in online work. It has become evident that without a certain amount of instructor pressure, student trainees will not have enough motivation to discover their own potential in the process of individual study in the online environment created by the Project.

Apart from the principles above, a number of ideas for enlivening the e-learning component have been proposed by the 'www.praktyki.wh.umcs' project participants. Each sphere has been given a clear label to denote the area of activity in which it is located.

- *Projects:* this area will contain selected lesson plans as well as other resources such as PowerPoint presentations prepared by trainees

during their teaching practice, which will add up to the overall teaching practice grade.

- *Reading room:* a set of publications to read (mainly research papers and teaching materials prepared by lecturers of MCSU as well as other publicly available resources helpful in the process of preparing trainees for their teaching practice) as a form of preparation for university class participation, school class teaching, teaching practice assessment, etc.
- *Together:* the area devoted to the publication of groupwork project results, for the topics available on the platform and/or proposed by trainees, for instance 'Assessment in theory and educational practice,' 'Games and plays in language learning,' 'Working with a more able student,' etc.
- *Current affairs:* sharing current news on the topics related to school and education in Poland and abroad, posting interesting website links with a brief description of their contents and justification of the selection, publicizing information about new publications.
- *Recommended:* posting reviews or opinions of trainees on various kinds of materials, such as books, articles, teacher newsletters, learner-related websites, etc.
- *My share:* trainees' participation in discussions running on forums or their free reflections on topics uploaded by the instructor, for instance: 'Reading – a blessing or a curse?,' 'Are books going to die out in the 21st century?,' 'How should students be motivated to read more than just school reading sets?,' 'The Internet – supporting or hampering teacher's work?,' 'Popular culture at school – yes or no?'.
- *What if?...:* written accounts of trainees' solutions to problem situations likely to occur at school, for instance: 'What if the student's parent undermines the proposed grade at the end of the school year?,' 'What if there is still much time left towards the end of the lesson but all the lesson objectives have been accomplished?'.
- *Dear diary:* diary-like accounts of daily teaching issues written by trainees as a form of sharing experiences, possibly also writing blogs individually or in collaboration with other trainees.
- *My question, your answer:* trainees sharing doubts or uncertainties connected with daily teaching and upbringing and proposing solutions for one another.

## CONCLUSION

Even though the modern Information and Communication Technology tools, such as e-learning platforms, open up great opportunities for teaching and learning in a variety of aspects, their effective use in the process of teacher development cannot be taken for granted and needs careful reflection and thoughtful implementation. The initial prospects of the increased impact of practical training achieved through online work that were assumed at the beginning of the "*www.praktyki.wh.umcs*" project proved to be too promising. As it turned out, without understanding, devotion and support on the part of the instructors as well as commitment of the students the e-learning supplement will not find its proper application in teacher development. It is to be hoped that the solutions and recommendations included above, when applied, will help to make e-learning an essential feature of teacher development at university.

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# DEVELOPMENT OF ADOLESCENTS' KEY COMPETENCES IN SECONDARY SCHOOL – EXPERIENCE GAINED DURING THE TWO YEARS OF THE IMPLEMENTATION OF THE "E-ACADEMY OF THE FUTURE" PROJECT

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***Abstract:*** *This article presents the results of two years of implementation of the "e-Academy of the Future" project. The paper presents the results of the project in terms of the work done by the teachers and the students. The article discusses such issues as the use of e-learning platform, the use of multimedia materials, the use of tools, e-learning platform, time spent on e-learning platform by students and teachers. The article shows the ability and effectiveness of building key competences through the mixed, blended-learning model, as well as the impact of participation in the project for a teacher's workshop.*

**Keywords:** e-learning, key competences, blended-learning, e-learning platform.

## INTRODUCTION

The Report of the Council of the European Union and the European Commission "Education and Training 2010" (Brussels 2004) has defined progress indicators benchmarks for education in Europe which states should achieve by the year 2010. The conclusions of the recent European Commission report indicating the progress of individual EU member states in this area are inconclusive for Poland.

The Czech Republic and Poland are leaders in minimising the number of young people dropping school too early - from 18 to 24 years of age (in Poland it is only 5%).

The data also shows that in Poland, up to 91.3% of people aged 20-24 received secondary education. This is about 20% more than the European average. That makes Poland come third, after Slovakia and the Czech Republic.

The report "Education and Training 2010" assumed that the number of MST graduates would increase to 789 thousand by the year 2010. While the EU-wide number of graduates increased by 33.6%, in Poland there was an increase of 12.2%. The leaders of the progress are Portugal and Slovakia.

OECD reports from 2008 do not allow to clearly define the position of Poland, because within the practice oriented education, and the actual needs of the market, Poland is still at the end of the OECD statistics. Poland also looks bad within higher education among the adults (over 24 years of age). In Poland, only 4.7% of adults participate in education or training, at an average rate of 9.5% in Europe. Poland is far behind countries like Sweden or Denmark, which exceeded the threshold of 30%.

Although the report indicates a significant reduction in the number of young people with a low level of core competences in Poland, we continue to score the average among OECD countries (international PISA study showed that in Poland, up to 16.2% of adolescents have low reading competences) (www.e-akdamieniaprzyszłości.pl)

The „e-Academy of the Future" project is funded by the European Union under the European Social Fund, supra-regional program to develop key competences, with particular emphasis on mathematics and natural sciences, information and communication technology (ICT), foreign languages and entrepreneurship. It is aimed at students and teachers of secondary schools. As a part of the project, "Secondary school key-competences developing program" has been developed to create a methodological basis for working with a student. The program aims to improve the situation of the Polish education. As a part of the project, many actions has been undertaken to encourage teachers to focus on individual learning, and to personalise learning programs. Learning takes place outside the classrooms. Students work in task groups, in an open social environment. Strong emphasis is put on the effective, conducted under the guidance of tutors, independent students' work.

The main goal of the project is to prepare middle school learners to function in a knowledge society. The project also tries to build the attitude of „lifelong learning" among the students. Nowadays, modern school should set and develop key competences for students, not only fulfil the core curriculum. So,

the mission of the project is to develop not only the student's capabilities, but also personality. Within a project, seven out of eight key competences indicated by the European Parliament and EU Commission are being developed:

1. Communication in the mother tongue**.**
2. Communication in foreign languages**.**
3. Mathematical competence and basic competences in science and technology**.**
4. Digital competence**.**
5. Learning to learn**.**
6. Social and civic competences**.**
7. Sense of initiative and entrepreneurship
8. Cultural awareness and expression**.**

A total of 972 schools from Poland took active part in the process of recruiting for the project in January 2010. Two hundred secondary schools were chosen, evenly from 16 provinces. The project has been implemented in the chosen schools since 1 September 2010. It will last to 30 June 2013. During the three-year training, the project is a subject to all first grade students beginning their education in the school year 2010/2011.

The Project is based on two basic methods of influencing the development of the above-mentioned key competences: e-learning and the project method.

E-learning platform is available for the project, on which 168 e-learning units are implemented within the following eight subjects:

1) Mathematics.
2) Physics.
3) Chemistry.
4) Biology.
5) Geography.
6) English language.
7) Informatics.
8) Entrepreneurship (WOS).

Each individual e-learning unit is a multimedia program consisting of three modules:

- Knowledge (learning content).
- Consolidation (exercises, educational games and simulations).
- Test – to examine the progress of skills.

The „e-Academy of the Future" project aims to support both the weaker students, and very talented ones. For this purpose, for students who have obtained a poor result from the test carried out after the sixth grade of primary school, school evening groups were created. These groups were conducted by form teachers using workshop methods, in the first semester of the school year 2010/2011. The purpose of these classes is to strengthen the basic skills associated with learning. Workshops are designed to develop students' abstract thinking, contribute to the awakening of aspirations and improve their self-esteem.

For gifted students, within the "e-Academy of the Future", Virtual Student Associations were established, led by academics. These students created a Virtual School. Students can take part in a five-day science camp in academic centres after the first and second year of the program. Virtual Student Associations provide students access to advanced methods of independent learning in contact with an academic teacher and other students via the web. Moreover, the students' research is conducted within Virtual Student Associations.

In order to develop the students' ability to diagnose and solve problems, there are four teams created in every school, whose task is to prepare, in cooperation with the local community, interdisciplinary projects that address environmental, social, economic or other problems in the region. Through participation in the local project teams, students reap positive incentives for growth, which effects in the peer group, that helps them acquire social and civic competences. Completed projects are published on e-learning platform. The best projects will participate in the national review.

The „e-Academy of the Future" project, with an attractive form of educational materials, affects the growth of interest in learning within secondary school students. With everyday use of modern information technology, students acquire the necessary competence in the modern world dominated by technology. Thanks to support system built into the project, students who have worse performance, as well and talented students, gain a sense of security and belonging. All participants increase their chances of achieving better results in the middle school exam, and through local project

teams they realise how important it is to integrate into the local environment. Increase of the prestige of the schools participating in the project is expected, because of a rise in qualifications of participating teachers. Teaching staff can use the acquired skills in their school practice. To fulfil project objectives, the whole school must be involved in its implementation - management, teachers and students. Project activities often go beyond the walls of the school, which affects its development. Key competences that are acquired and built in the project, will be participants' investment for the private life and the career.

## 1. CONCEPT AND AIMS OF THE PROJECT

The aim of the course is to prepare students to exist in knowledge society, and prepare them for life-long learning. Thus, the course is supposed to form seven basic key competences. Those competences help develop capabilities and personality of pupils, and allow them to fully function in modern society. The competences mentioned are:

- Communication in the native language;
- Communication in foreign languages;
- Mathematical competences and basic competences in science and technology;
- IT technology competencies;
- Ability to learn;
- Social and civic competences;
- Initiative and entrepreneurship.

The project is being implemented within the following eight subjects:

- Mathematics;
- Physics;
- Chemistry;
- Biology;
- Geography;
- English language;
- Informatics;

– Entrepreneurship (WOS).

As part of the project, "Secondary school key competences developing program" was developed to create methodological basis for working with a student. The program of developing key competences is enriched with enhanced didactic additions especially useful in building key competences, dedicated to both students and teachers. The didactic additions are:

– 168 e-learning units posted on the e-learning platform.
– 168 instructions for teachers to the above units posted on the e-learning platform.
– 336 open exercises for the aforementioned units (two exercises for each unit), posted on e-learning platform.
– How to build key competences? Methodological guide. Part 1, containing lesson scenarios. Some of the scenarios show how to use e-learning units during lessons. The guide is dedicated to teachers, to be used while teaching in the first form, and is available on the e-learning platform.
– How to build key competences? Methodological guide. Part 2, Part3, containing lesson scenarios. Some of the scenarios show how to use e-learning units during lessons. The guide is dedicated to teachers, to be used while teaching in the second and third form, and is available on the e-learning platform.
– The project method. Methodological guide published on the e-learning platform;
– An e-learning course for teachers on using the platform, posted on the e-learning platform.
– An e-learning course for students on using the platform, posted on e-learning platform.
– An e-learning course for teachers on the development of key competences, posted on the e-learning platform.
– Diagnostic tests on students' key competences.
– Program, didactic and training materials for:
    - School Evening Groups – transferred to school pedagogues;
    - Local Project Teams - dedicated to teachers, placed on the platform;

- Virtual Student Associations – dedicated to selected students, placed on the platform.

## 2. RESULTS OF THE E-LEARNING UNITS AFTER TWO YEARS OF THE „E-ACADEMY OF THE FUTURE" PROJECT

The teachers and students have worked with different intensity during the first and the second year of the „e-Academy of the Future" project. The total time spent by the user on the e-learning platform, dedicated to e-learning units and e-learning platform activities, has been taken for the average time spent on the e-learning platform. This parameter was determined by the number of logins to the e-learning platform. Figure 1 and Figure 2 show load of e-learning platform in the first and second year of the project. Analysis of the data shows, that the Podkarpackie and Mazowieckie regions worked most intensely in both the first and second year of the project. The Zachodniopomorskie, Opolskie, Podlaskie, Lubuskie and Pomorskie regions worked the least intensely during the first year of the project, while Opolskie, Podlaskie, Lubuskie and Zachodniopomorskie worked the least intensely during the second year of the project. The remaining regions worked at the medium level. The results present both the attitude of the school, as well as the quantity of schools that take part in the project. The fact that schools worked equally in both the 1st and the 2nd year of the project.

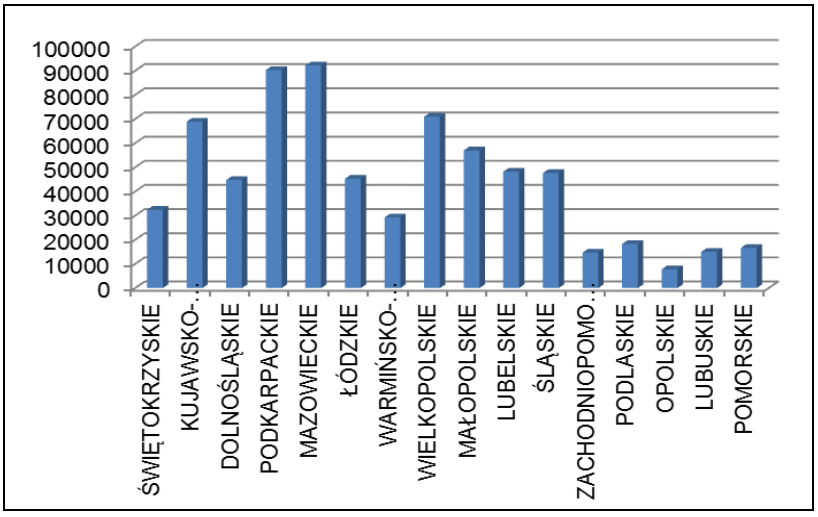


**Figure 1. Number of single logins from different regions in the first year of the project.**

*Source: e-Academy of the Future platform*

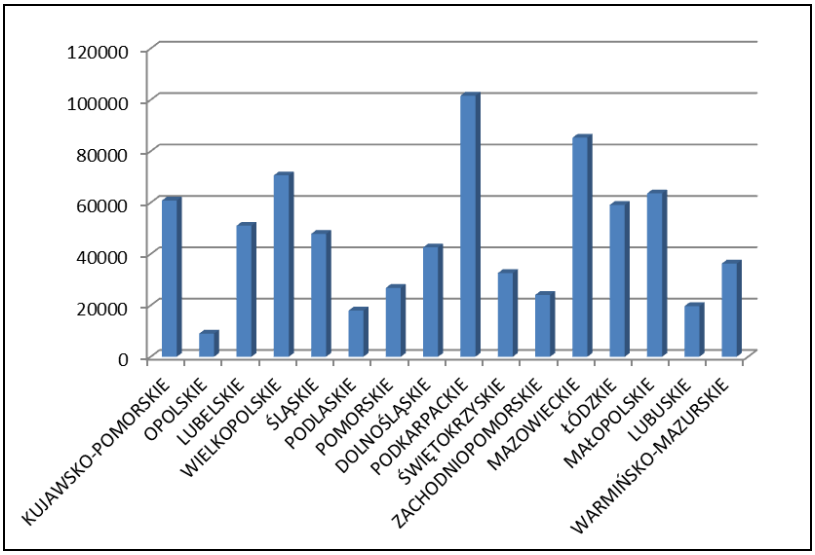


**Figure 2. Number of single logins from different regions in the second year of the project.**

*Source: e-Academy of the Future platform*

The following figures – Figure 3 and Figure 4 – present the average number of single user logons, divided into regions. The average number of logins in the region has been divided by the number of project members in the region. The comparison of data shows that there has been more work done in the second year as divided into teachers and students:

1. In the first year of the project:
   - On average, the teachers spent 2,0 hours per month on the platform,
   - On average, the students spent 2,4 hours per month on the platform.
2. In the second year of the project:
   - On average, the teachers spent 8,4 hours per month on the platform,
   - On average, the students spent 8,2 hours per month on the platform.

Measurements show that there was an increase in intensity of work in the second year of the project. Additionally, a decrease of difference between students' and teachers' work time has been noticed.

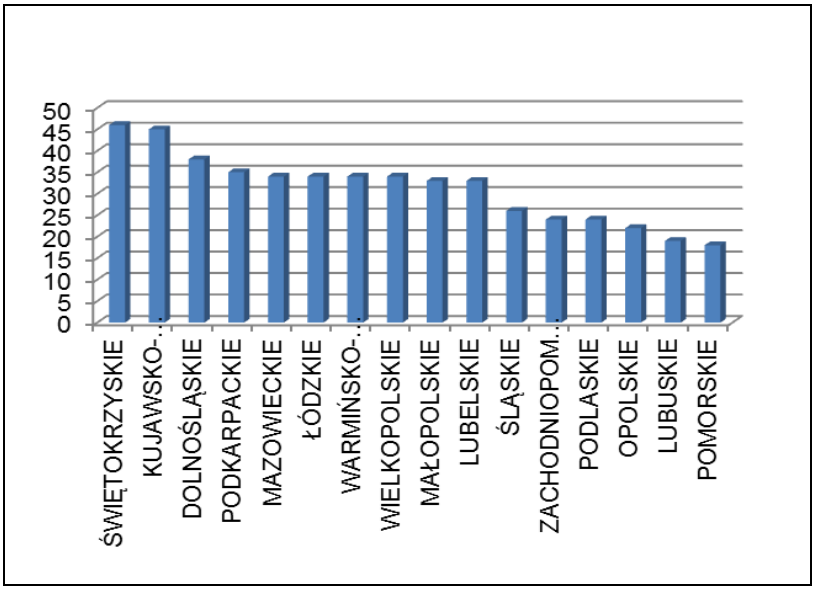


**Figure 3. Average number of logins per user in the first year of the project.**

*Source: e-Academy of the Future platform*

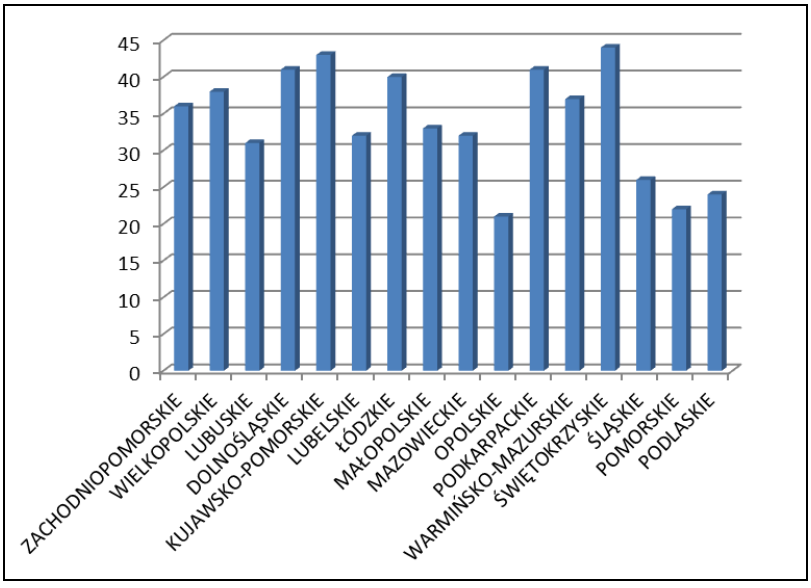


**Figure 4. Average number of logins per user in the second year of the project.**

*Source: e-Academy of the Future platform*

The e-learning platform and e-learning units on it were used by members of the Project at different times of day. Figures 5, 6, 7, 8, 9, 10, 11, and 12 present the use of the platform and e-learning units by pupils and teachers.

As presented in Figures 5, 6, 7 and 8, the teachers tend to use e-learning units between 8:00 and 15:00. That means that they were using units during normal classes, as a multimedia addition to stationary lectures. This number of hours has been noticed for both the first and the second year of the project. It turned out during interviews with the teachers (as part of the evaluation plan), that during classes students were using e-learning units themselves, and doing exercises in the Consolidation and Test parts that are in every units. Another active time was between 18:00 and 23:00, when teachers prepared to lectures analysing exercises, tests and checking exercises done by their pupils. An extended analysis of e-learning platform logs showed that teachers were using the Knowledge elements the most, rather than Consolidation and Tests.

Analysis of the students' activity – Figures 9, 10, 11 and 12 – shows that they were using the e-learning platform both during school hours (8:00-15:00), and after school (16:00-22:00), with an increased intensity during afternoon hours (16:00-22:00). This trend is noticeable in both the first and the second year of the project.

Lack of balance in the use of the platform by students is caused by the way the e-learning platform is used during lessons. Due to the lack of computers in classes, the students have worked mostly in groups. The teachers used to show the Knowledge units with a projector. The analysis of feedbacks showed that there is no access to the IT classrooms during lectures, where each student could work with the platform, and with e-learning units, separately. The only exception are ICT classes that are usually conducted in IT classrooms, which makes every pupil work individually on their own.

Therefore, the students worked the most intensively with e-learning units and other e-learning platform activities from home, realising Exercises and Tests parts of the units as instructed by the teacher. The other important factor is availability of internet access for both the students and teachers. Few schools have internet in every classroom, or Wi-Fi internet installed. Due to a tight schedule, it is not always possible to have non-ICT classes in IT equipped classrooms.

Detailed analysis of e-learning platform logs showed that in total, pupils used Test parts of the units, rather than Knowledge and Consolidation.

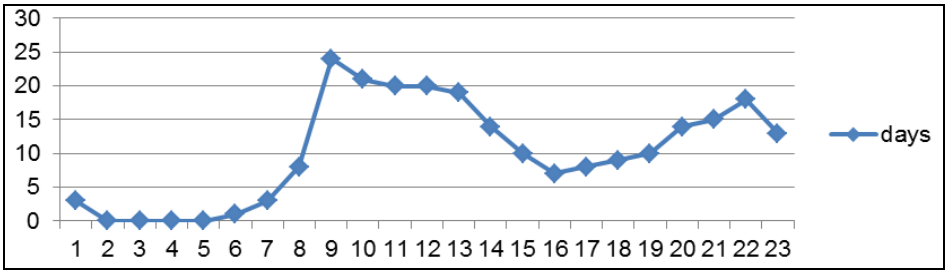


**Figure 5. Use of platform during day – teacher – first year of the project.**
*Source: e-Academy of the Future platform*

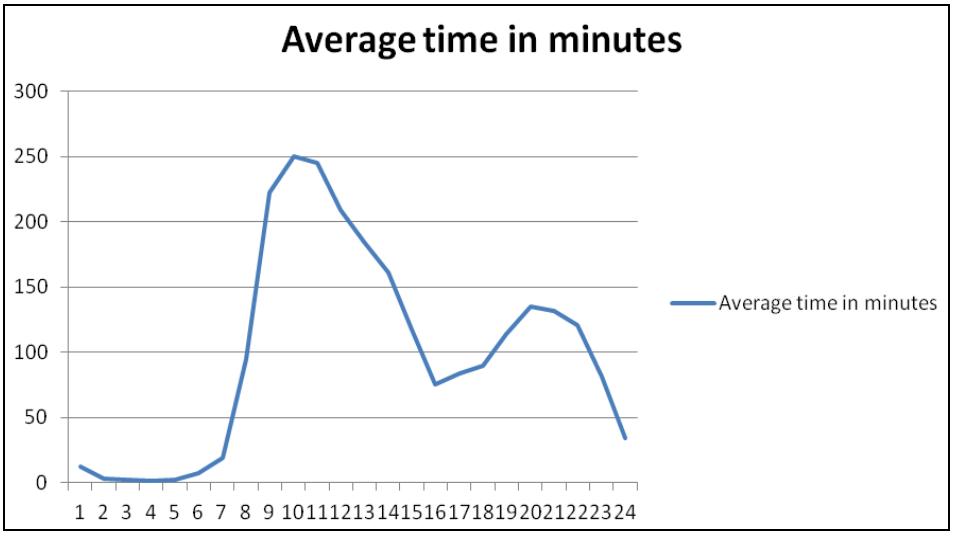


**Figure 6. Use of platform during day – teacher – second year of the project.**
*Source: e-Academy of the Future platform*

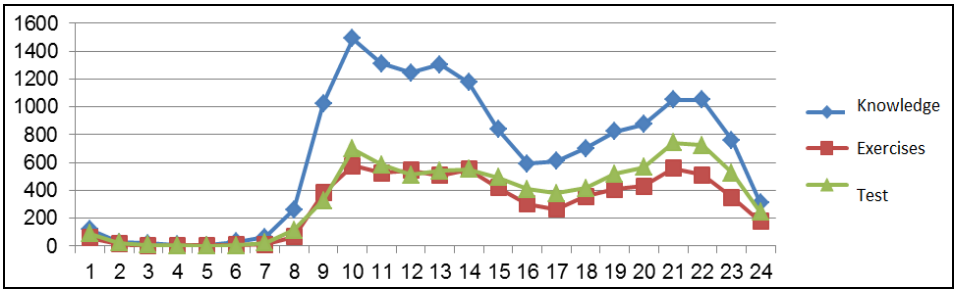


**Figure 7. Use of e-learning unit parts during day – teacher – first year of the project.**
*Source: e-Academy of the Future platform*

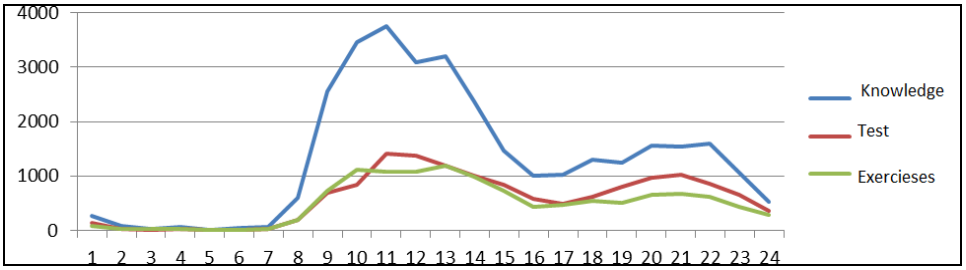


**Figure 8. Use of e-learning unit parts during day – teacher – second year of the project.**

*Source: e-Academy of the Future platform*

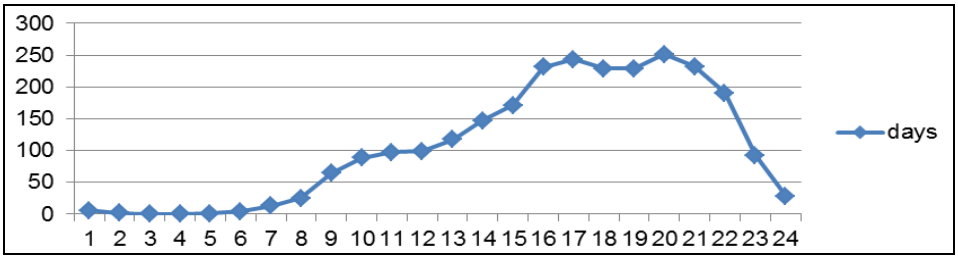


**Figure 9. Use of platform during day – student – first year of the project.**

*Source: e-Academy of the Future platform*

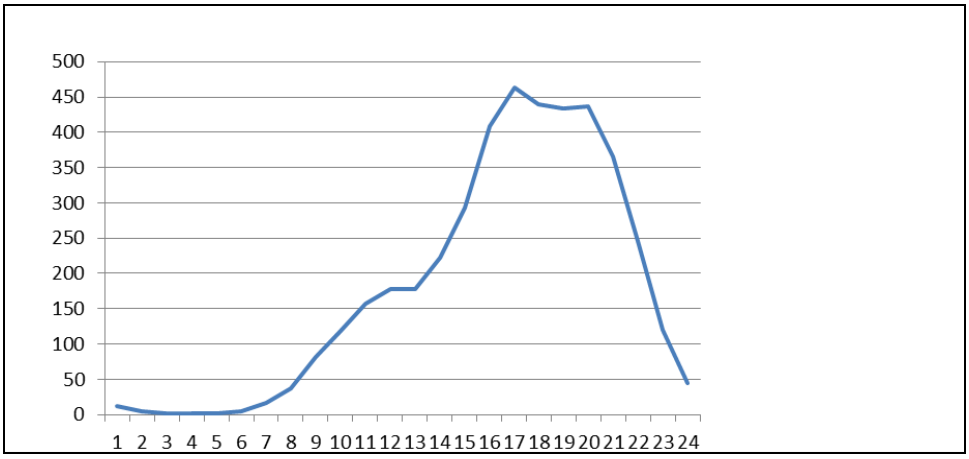


**Figure 10. Use of platform during day – student – second year of the project.**

*Source: e-Academy of the Future platform*

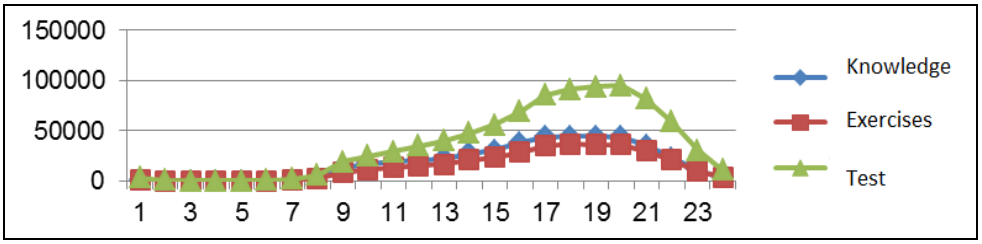


**Figure 11. Use of e-learning unit parts during day – student – first year of the project.**

*Source: e-Academy of the Future platform*

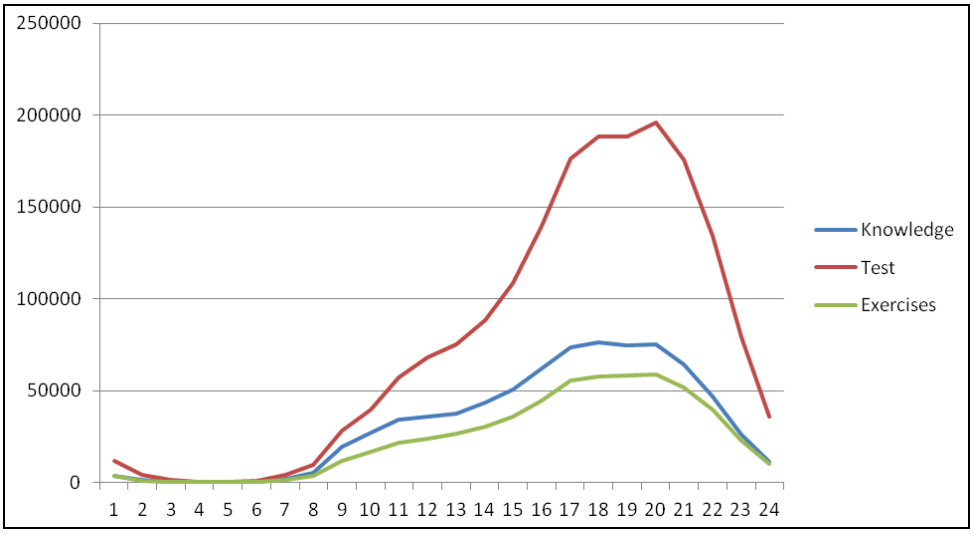


**Figure 12. Use of e-learning unit parts during day – student – second year of the project.**

*Source: e-Academy of the Future platform*

Differences in the use of units were also evident in the use of various parts of the unit (Knowledge, Consolidation, Test) over the years, both in the first and second year of the project. This diversity is not only seen in case of the use by the teachers and students, but also large disproportions in the use of unit parts in these two groups of recipients. The following Figures – 13, 14, 15, 16, 17 and 18 – show the use of Knowledge, Consolidation and Test parts of the units throughout the year, is divided into teachers and students.

Taking into consideration all the members of the project, the largest use of the units took place at the end of the school year in May and June. This trend applies to both the first and second year of the project. It is worth noting that in the second year of the project using all parts of the project is higher. This

is due to the fact that teachers and students used the units at the end of the school years as a summary of the material. This fact also follows the program of classes in schools. The core curriculum is implemented in a different sequence in schools, so the sequence and intensity of use of the platforms are different. The most important facts are:

- Throughout the year, the part of the units the teachers used the most intensively was Knowledge.
- Throughout the year, the part of the units the students used the most intensively was Tests.
- The least frequently used part of the units (by both the students and teachers) was Consolidation.

Analysis of the data shows also one more important fact: the Knowledge part was used as a material to lead normal classes in multimedia manner, while Tests were treated as homework to be done by students individually at home.

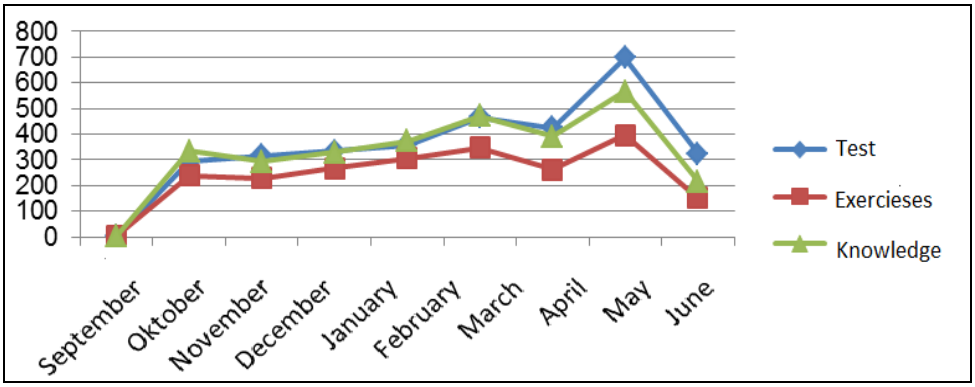


**Figure 13. Time spent using the units – all users – the first year of the project.**

*Source: e-Academy of the Future platform*

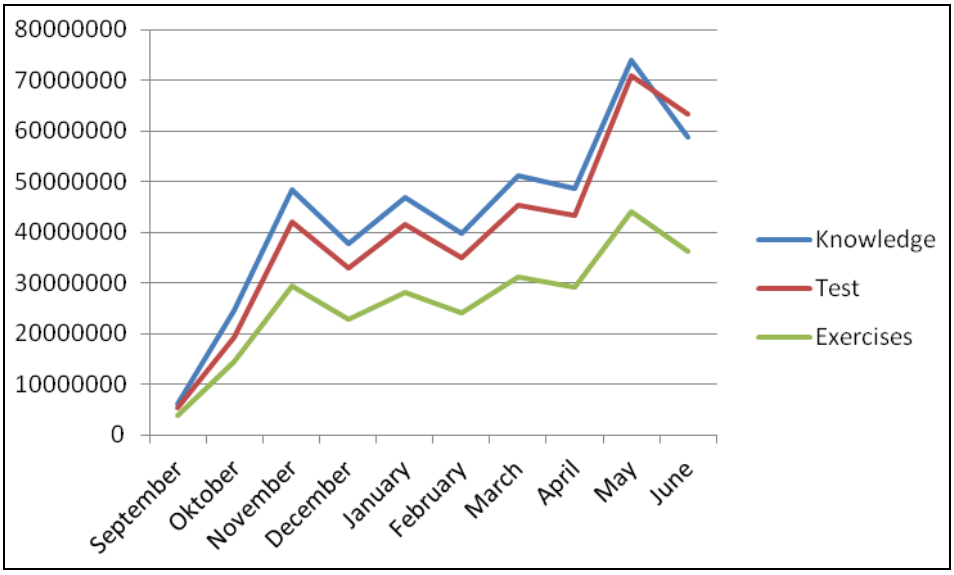


**Figure 14. Time spent using the units – all users – the second year of the project.**

*Source: e-Academy of the Future platform*

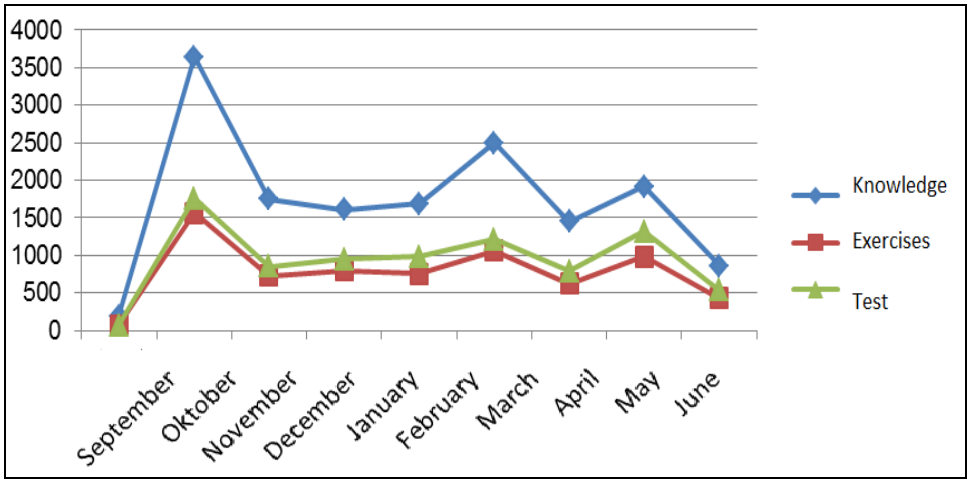


**Figure 15. Time spent using units – teachers – the first year of the project.**

*Source: e-Academy of the Future platform*

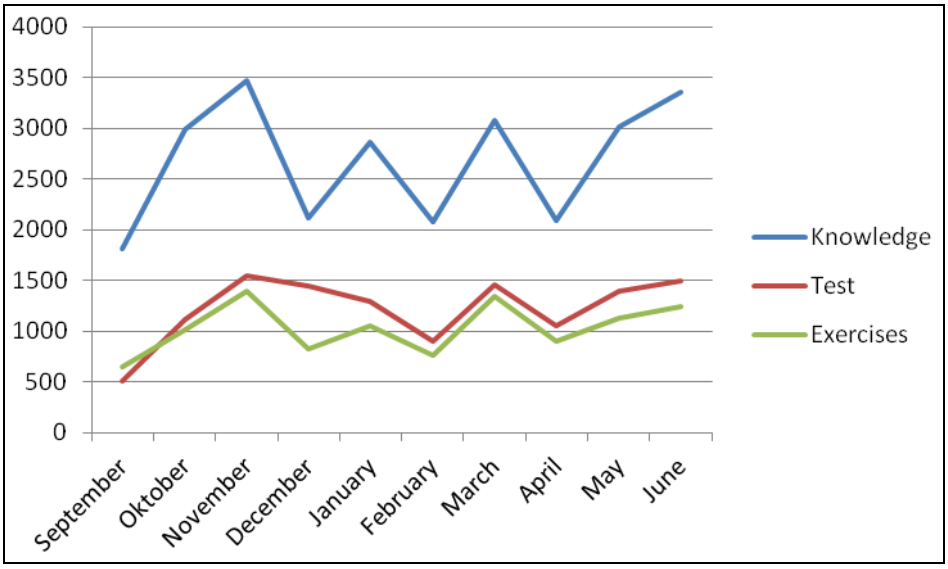


**Figure 16. Time spent using units – teachers – the second year of the project.**

*Source: e-Academy of the Future platform*

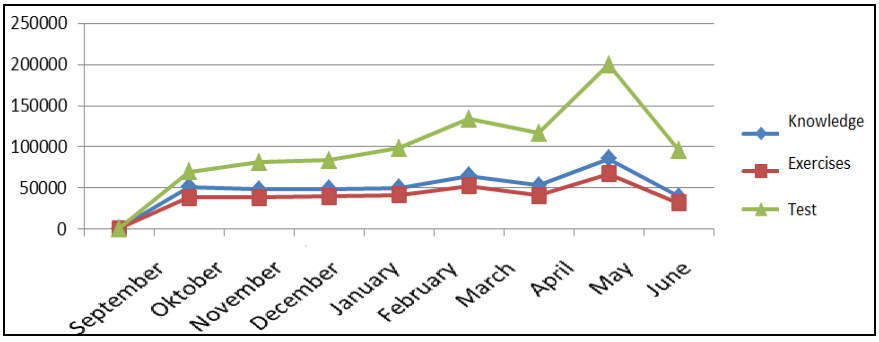


**Figure 17. Time spent using units – students – the first year of the project.**

*Source: e-Academy of the Future platform*

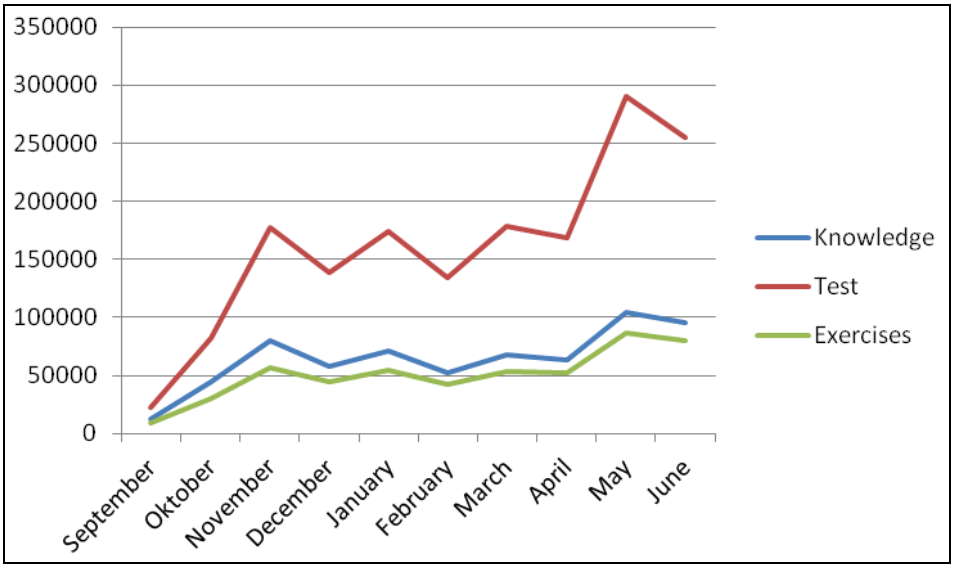


**Figure 18. Time spent using units – students – the second year of the project.**

*Source: e-Academy of the Future platform*

The last element of the analysis was the use of additional e-learning platform activities available for students and teachers beside the e-learning units. Using these features, however, was very low both in the first and second year of the project among both the students and teachers. In the first year of the project the users preferably enjoyed the functionality of the exchange of messages (Inbox - internal mail service for e-learning platform), while in the second year of the project participants the most intensively used the module My Tests.

Participants benefited the least from the remaining modules such as: Homework (the ability to create homework - the tasks are open to students), My Documents (possibility to attach additional educational materials in the form of documents on the platform), Chat (possibility of synchronous communication within the e-learning platform), Forum (possibility of asynchronous discussion). As shown by in-depth interviews with teachers, so marginal use of additional features of e-learning platform is due to low competences of e-learning teachers who do not know how to handle technically functionality mentioned above and how they weave them into the teaching process in working with the student. Therefore, the teacher should be continuously trained in both technical and methodical aspects of e-learning.

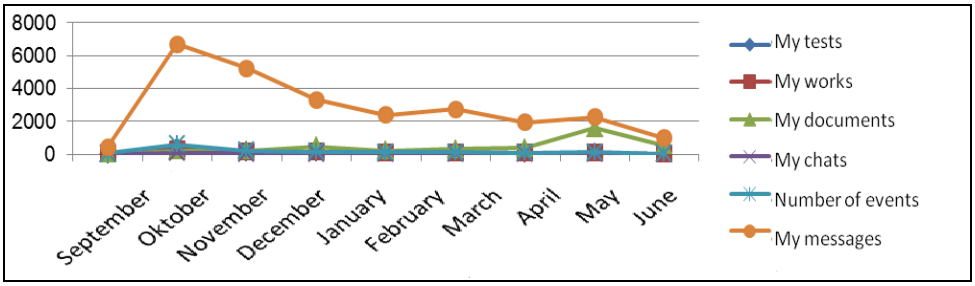


**Figure 19. The use of e-learning platform activities by students and teachers - the first year of the project.**

*Source: e-Academy of the Future platform*

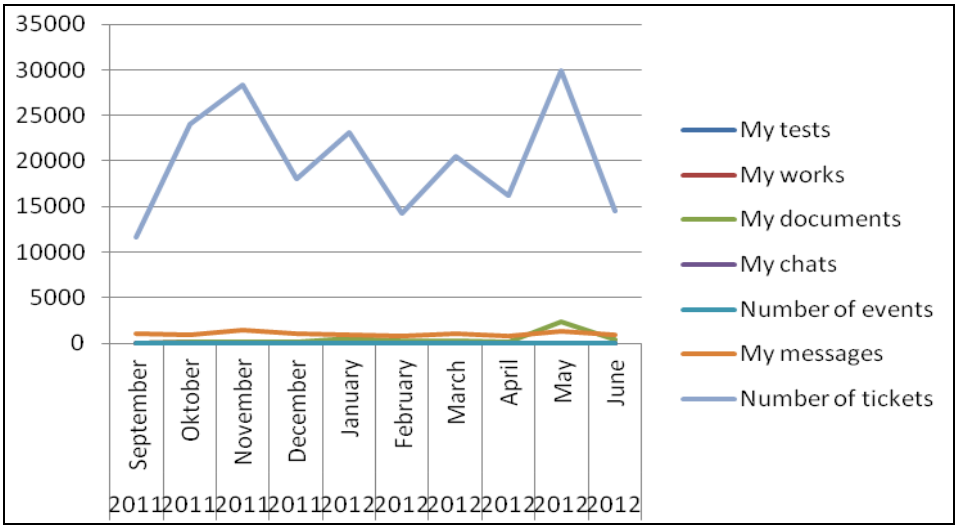


**Figure 20. The use of e-learning platform activities by students and teachers - the second year of the project.**

*Source: e-Academy of the Future platform*

## 4. PROJECT EVALUATION RESULTS OBTAINED AFTER TWO YEARS OF THE "E-ACADEMY OF THE FUTURE" PROJECT

The "e-Academy of the Future" project is evaluated on a regular basis, each year evaluation reports are prepared which summarise the work, experiences and feelings related to the project, both from the teachers and the pupils. The evaluations conducted are both quantitative and qualitative. This section presents the results of evaluation of the project by both teachers and students.

### 4.1 The popularity and usefulness of educational materials for teachers

The first issue analysed in the project was the popularity and usability of e-learning educational materials developed in the project. In the vast majority, the teachers indicated e-learning units (84.77%) responding to the question of which educational materials available in the project "e-Academy of the Future" they used (in the indication of the vast majority of e-learning: 84.77% answered YES). The inverse of this result are the indications for the use of programs and lesson plans for School Countervailing Groups (87.15% responded NO). School Countervailing Groups were determined and oriented to the specific purpose (to help adapt pupils who came to middle schools participating in the project with the lowest results after completion of primary school, to new conditions of the first form in the year 2010/2011). The low number of indications in the case of materials for the SCG probably indicates this fact.

The high number of indications for e-learning units, but still lower than 100% of the possible, should be interpreted in the context of subjects taught, and the role e-learning units used by teachers play in school as supporting material to work with the student during the lesson. Attention should be paid to the low rate of early-publicised, leading in material produced within the project for teachers - the handbook "Secondary school key competences developing program". 45.67% of the respondents use it. The teachers asked for feedback on the handbook stated that it is a valuable material. The book is a good guide to key competences in education (641 indications). It is written in a communicative way (625 indications), is useful in planning classes (602 indications), and its structure is clear (639 indications). The comments collected in the survey from the respondents resulting from reading and / or use of the textbook "Secondary school key-competences developing program" handbook could be divided into the following categories. Helpful in the interpretation of the popularity and usefulness of educational materials is the analysis of responses to the question about reasons to use of educational materials produced in the project. Two categories of reasons referred to by the majority of respondents, are:

- Usefulness the subject taught in education (65.5%)
- Looking for attractive forms of working with the student (63.4%)

The most congruent for both categories are e-learning units, which are conceptually closed, are new, modern in form, so they give an attractive way of working with students. Not without significance is the fact that they are ready to use in practical teaching tool that combines the transfer of

knowledge, defined methods of teacher and student work, and give the ability to verify the effectiveness of learning from a student's test point of view.

Teachers participating in the project are independent in their decisions to use or not offered teaching materials. Below the statistical error is the number of indications that relate to the fulfilment of the manager commands. This fact raises the question whether the directors of the schools participating in the project are adequately involved in the implementation of the objectives of the project in schools.

The teachers are mainly oriented to work in the usual school classes. Orientation to work with gifted and worse students, and usefulness in educational process, has been indicated at below 20%. Another analysed issue is the impact of teachers' participation in the project and the impact of the use of available materials in the workshop to enrich their work. 80.36% of respondents felt that the materials produced and made available in the project have contributed to the enrichment of their workshop. Respondents pointed to the knowledge as the area where they most enriched their workshop with materials produced in the project. Another indicated area is interpersonal communication. The least affected were indications of psychological knowledge.

### 4.2 Teachers' engagement in the development of key competencies

Another issue analysed in the project is the involvement of teachers in the development of key competences. The teachers indicated, that they get involved especially in forming the ability to learn (almost 65% of responses). The second most common indication, are mathematical competences (57%) and the third are basic competences in science and technology (50.41%). Noteworthy is the fact that the competence to communicate in their native language, which within the project has been assigned a characteristic prevalence, has been indicated as a conscious efforts target for 17% of the teachers.

Teachers pointed e-learning units as the most useful in the development of key competences (83.93%). Also diagnostic tests and a knowledge base play an important role in the development of key competencies. Those additional materials have been made available to support the work of a teacher in the classroom, such as lesson plans, open worksheet sets, etc.

### 4.3 The effectiveness of didactic materials in the development of key competences

The third issue analysed in the project is the effectiveness of using educational materials available in the project in the development of key

competencies among students. Teachers positively evaluated the effectiveness of using educational materials in the work with the student to build key competences. Just over 11% of the respondents expressed the belief that there is a noticeable relationship between the materials used and the development of key competences of pupils. Almost 60% of respondents with hesitation ("rather yes") answered the question, for 25% proved to be impossible to answer YES or NO. NO responses are below the statistical error. The positive evaluation of the effectiveness of educational materials in the development of key competences of pupils, is related to the previously signalled relationships, according to the teachers, between the fact of the use of e-learning units and the development of key competencies, high expectations resulting from this approach and the fact that the teachers had the opportunity to try out a few e-learning units. A positive assessment of the use of the educational materials available in the project also includes their diversity and complexity.

### 4.4 e-Learning platform - assessment of availability and functionality

The fourth of the issues analysed is the availability and functionality of e-learning platform. The teachers positively assessed the availability of e-learning platform on the technical side. Similarly, a positive opinion has been expressed about the ease of use of the e-learning platform.

### 4.5 Popularity of educational materials among students

The same aspects of the project, which were evaluated among teachers are also evaluated among students. The first analysis of the opinion of students is a popularity aspect of the educational materials available to students in the project. The vast majority of students (like teachers - 84.8%) indicated the e-learning units (87.6% YES responses). A very large group of respondents (54.3%) indicated diagnostic tests. The fact that 5.2% of students did not use any materials is remarkable, and for 33.6% of students no materials are interesting.

### 4.6 The usefulness of educational materials in the students' opinions

The usefulness of educational materials was investigated among students by means of two questions - one in relation to their self-esteem concerning the category of knowledge, the other with the ability to use it. Respectively the terms "I know" and "I can" were used.

71.34% of respondents indicated that as a consequence of working with identified educational materials (reminder: 87.6% indicated the individual e-learning, 54.3% indicated diagnostic tests) has enriched their knowledge of substance. 31.34% indicated the increase of knowledge in the field of

learning capabilities, and 22.19% felt that they knew more on information and communication technologies.

The most popular material among students (as well as among teachers) are e-learning units. There is also a great popularity of the diagnostic tests. The category of benefits, which shows the largest group of students, is the category of "subject knowledge".

Based on the data collected from the teachers and students, a hypothesis can be formulated for the project: secondary schools are schools where the education process is closely associated with the delivery and acquisition of classical subject knowledge. Changing this state is likely to require a much broader spectrum of activities than those that may be undertaken within the "e-Academy of the Future" project.

### 4.7 E-learning platform - assessment of availability and functionality

The availability and level functionality of e-learning platform available within the project was investigated also among the students. The students evaluated the functionality and availability of e-learning platform project lower than the teachers.

For 51.83% of respondents access is easy or rather easy, for 25.36% difficult to estimate, but for up to 22.81% rather difficult or very difficult.

## CONCLUSION

The teachers surveyed expect the materials to enrich their workshops. The main reasons to use the electronic materials by teachers is the search for attractive forms of work with the student and the usefulness in teaching the subject taught.

The teachers treat the use of electronic materials as necessary as a result of the changes taking place in reality.

The students surveyed expect the materials to facilitate learning by approximating the way of learning to the ways of spending free time, motivate to learn through an attractive form of materials (multimedia, interactivity), take into account the individual capabilities and preferences of each student, will enable independent work and fast self-control. 71.34% of the surveyed students indicated that as a consequence of working with electronic educational materials (e-learning units, diagnostic tests), they have enriched their knowledge on subjects, as well as study skills.

Final conclusions:

1. It is worth noticing that educational materials for teachers delivered within the project and their usefulness have been highly marked.
2. The teachers participating in the project are primarily oriented to enrich their workshop on the subject. Such an attitude implies the greatest interest in materials that can be used directly in the classroom (e-learning units).
3. Disturbing is the fact that only less than half the respondents mentioned the handbook "Secondary school key competences developing program" as material that is used at work. Given that this handbook is essential for achieving the objectives of the project, because it explains and illustrates ideas, and specific solutions in teaching, lack of knowledge (including critical knowledge) resulting from it may be an obstacle to a correct use of other materials supplied within the project.
4. e-Learning units are the only one widely known by teachers participating in the project educational help in teaching (education), and at the development of key competences.
5. The teachers are positive on the technology and functionality of e-learning platform.
6. The most popular material among students (and among teachers) provided under the project are e-learning units. There is also great popularity of the diagnostic tests.

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# SOME THEORETICAL AND PRACTICAL ASPECTS OF EDUCATIONAL PORTAL DESIGN BASED ON CMS SYSTEM

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***Abstract**: In this paper the authors describe and review their own experience as well as the experience of other countries in the use of of CMS for the development of educational portals. In addition, the paper includes a preview of system side requirements for such CMS as Joomla!, Drupal, WordPress, PHP-Fusion, Web@all CMS, Mambo and eXtreme-Fusion. The authors propose a concept of an educational portal that meets the needs of students, academic teachers, lecturers and administrative staff of the university. A description of the layers and target groups of this educational portal is provided, too. Moreover, the article examines results of a student survey relating to their expectations concerning the faculty's educational portal. The last section of the article provides advice for designers of CMS-based portals, based on the authors' many years of experience in the field and an analysis of the available examples.*

**Keywords:** CMS, Joomla!, Drupal, educational web-site, web-based learning environment, CMS users' authorization levels.

## INTRODUCTION

Until recently the development of thematic portals has been a very complex task requiring developers to have advanced programming knowledge in the field of software development for web sites. Free software developers were first to realise these deficiencies, so they embarked on Creating Free Software content management systems (Content Management System) in short called CMS. A CMS should be understood as a platform allowing the user to build on their own information service or an Internet portal based on

the pre-developed modules. The most well-known and popular CMSs include: Drupal, Joomla, Wordpress, Mambo and others. The Apache PHP Nuke is still used although it has lost some of its popularity.

## 1. REVIEW OF SOME EXPERIENCES IN THE AREA OF USING CMS

### 1.1. Some CMS experience in Poland

Depending on the specific type of CMS, the number of modules is different, but in all CMSs the following tools are always available: news, FAQ, Download, Links, Search, Surveys, and many others. To this list one can add other modules downloaded from the Internet or developed by oneself. Each module can be disabled at any time, or its availability will be limited to selected users. Blocks are elements of web pages that are displayed in the form of an independent frame. Modules are examples of such blocks (Smyrnova-Trybulska 2005, 2012). Today, access to various IT systems to support the content management – Content management System (CMS) (including Open Source such as Drupal, Joomla!, WordPress, etc.), the use of which does not require advanced programming skills, yet they provide a wide range of different functions and capabilities of their use, for example, educational resources can be placed on the portal server (news, articles, notes, papers, didactic multimedia materials and other projects, including possibility of copying on your computer (download)), creating a catalogued Internet resource links to support the theme, a discussion forum, chat, creating a glossary of terms, concepts (general and thematic), a vote (poll) on the topic of interest and much more. To participate in the development of this interesting and useful resource, you can bring the entire class of students or schools, but especially teachers, each of whom can find out the information and educational resources and services to interact and communicate (Chat, Forum, an internal messaging system, etc.) with users of the portal on your subject. An example might be sites such as http://erudyta.weinoe.us.edu.pl, www.interklasa.pl, www.profesor.pl, etc. The positive side of using this method is teachers' and students' knowledge of useful and modern multi-purpose tools as these systems are available, as well as the possibility of creating an educational portal of school or region that presents the achievements of the institution or region, as well as links to the most interesting and useful Internet resources.

For example, more and more Polish schools and universities are using CMS for developing their school web-sites:

- http://www.zs4.wroc.pl/joomla/index.php, http://www.zs2-gostynin.edu.pl/index.php?option=com_frontpage&Itemid=1, http://www.gim1.cieszyn.pl/, http://www.sp1.mielec.pl/index.php?option=com_frontpage&Itemid=1, other (based on CMS Joomla!);
- http://www.us.edu.pl, http://www.weinoe.us.edu.pl, http://krolowka.com/, other (based on CMS Drupal)
- http://www.szkola-liderow.pl/index.php, http://www.akcjadobrapolskaszkola.com/art/, other (based on CMS WordPress)

### 1.2 CMS experience in other countries

Currently, the use of CMS systems is global and universal. They are used, for example, for educational purposes, research, publishing, business, by librarians etc. Included below are a number of examples of CMS use in other countries as well as an analysis of the results of certain studies.

The study *"Web-based Learning Environments: Current Pedagogical and Technological State* (Mioduser, Nachmias, Lahav 2000) proposes and analyses a classification scheme which was developed and implemented for the study of 436 *educational Web sites* focusing on mathematics, science, and technology learning. Results indicate that many *educational Web sites* are still predominantly text-based and do not yet exhibit evidence of current pedagogical approaches. Suggestions for future Web-based learning environments are provided.

The study (Miles 2002) evaluated the science, mathematics, and technological needs of teachers in eastern North Carolina, establishing how to best serve their professional development needs. A survey instrument was constructed to collect information from North Carolina teachers who served as Professional Development Liaisons (PDLs). The survey consisted of 11 questions pertaining to general information about the teacher, teacher professional development needs, and Eastnet, an *educational Web site* for eastern North Carolina teachers. Analysis of data from 103 surveys and from follow-up interviews with 14 teachers indicated that the top three professional development items respondents mentioned needing the most were in the areas of *educational* technology, curriculum development, and inquiry. Most respondents indicated that the topic and location of the professional development workshop were the main factors deciding whether they attended. Over half of the respondents indicated that the best time for them to attend professional development workshops was during professional development days. The themes of *educational* technology and grant writing emerged during the follow-up interview.

The authors (Barnes, Fluke, Jones 2008) adopt the Web 2.0 paradigm as a mechanism for preparing, editing, delivering and maintaining educational content, and for fostering ongoing innovation in the online education field. Author reports on the migration of legacy course materials from "PowerPoint" slides on CD to a fully online delivery mode for use in the "Swinburne Astronomy Online" (SAO) program. Was to adopt a widely used, web based content management system, "Drupal," a web based media management system, "Coppermine," and own plug in code. Together, these form the basis of an entirely browser based course development and deployment infrastructure. In own report the author describe the new Web 2.0 SAO system, the "Virtual Cadet," which they developed to simplify content migration, and the "SAO Viewer," which is used by students to access the course material. They compare the merits of the "PowerPoint" and Web 2.0 formats of SAO, and describe the future innovations that are enabled by the move to web based content delivery. The arrival of Web 2.0 empowers content developers by rendering en-mass conversions of legacy content into web based content economically sensible, with potential for enhancing learning and teaching.

The study "Incorporating Competency-Based Blended Learning in a Chinese Language Classroom: A Web 2.0 Drupal Module Design" aims to create a blended learning environment, based on the concept of competency-based training, in a Chinese as a Foreign Language (CFL) classroom at an American university (Huang, Lin, Chiang, Yueh-Hui 2010). Drupal platform and web 2.0 tools were used as supplements to traditional face-to-face classroom instruction. Students completed various selective tasks and assignments and received the instructor's feedback through several online modules. Students and the instructor were polled at the end of the semester so that their opinions and experiences could be gathered and analysed. The findings revealed that the instructor and students alike responded positively to blended learning, suggesting that web 2.0 is a promising tool in promoting effective learning of Chinese.

The research "Rhetorical Savvy as Social Skill: Modeling Entrepreneur Identity Construction within Educational Content Management Systems" (Spartz 2010) focuses on one aspect of rhetorical training that writing instructors have an opportunity--if not an obligation--to inculcate (or at least introduce) in students studying to be entrepreneurs and taking their writing classes. Specifically, through the use of an open source Content Management System (CMS) (e.g., Drupal or Moodle), instructors are able to model, foster, and provide a safe place for students to practice constructing or cultivating an

"ethos," an entrepreneurial identity(ies) in response to the social demands of the course, its projects, and this disruptive technology itself.

The purpose of other research study (Ballard 2010) was to understand the construct of usability from the perspective of 74 students enrolled in six online courses offered by one online and distance learning program at a large, public university in the Midwest. Six courses, designed and developed by two different groups, professional and nonprofessional developers, were selected. The study used both quantitative and qualitative measures to record the experiences of students enrolled in the six online courses. First, the courses were evaluated using Nielsen's (1994, 2000, 2002) heuristics as operationalised by the "Xerox Heuristic Evaluation Checklist" (1995) as a standard measure of usability, then rank-ordered by heuristic evaluation score. Eachus and Cassidy's (2006) "Computer Use Self-efficacy Scale" was used as a pre-course survey to measure students' computer self-efficacy prior to beginning their online course. Stewart, Hong, and Strudler's (2004) "Quality of Web-based Instruction" was used as a post-course survey to measure student satisfaction with their online course experience. Among outcomes research was remarks the correlation between the self-efficacy score and error rate means was nonsignificant. The correlation between self-efficacy and error rate was small; very close to zero. There was a small positive correlation between student satisfaction and usability as measured by error rates. Based on the analysis of the study variables according to course development type, the results of this study found that Nielsen's usability heuristics, a respected evaluation tool used primarily to measure the usability of commercial web sites, can be used to evaluate instructional web sites and used to differentiate between levels of usability in the same way usability is judged by students.

The authors of the research (Willis, Baron, Lee 2010) look at the process of collaboratively creating and disseminating information resources, such as journals, books, papers, and multimedia resources in higher education. This process has been facilitated and encouraged by two relatively new movements, open-source and, especially, open access. The most definitive expression of the principles of open access is the Budapest Open Access Initiative. This study explores the different approaches to both creating and disseminating information resources for higher education and evaluates some of the most commonly used software options for supporting these activities.

The study (Wang, Yang 2012) examined the impact of collaborative filtering (the so-called recommender) on college students' use of an online forum for English learning. The forum was created with an open-source

software, Drupal, and its extended recommender module. This study was guided by three main questions: 1) Is there any difference in online behaviours between students who use a traditional forum and students who use a forum with a recommender?; 2) Is there any difference in learning motivation between students who use a traditional forum and students who use a forum with a recommender?; 3) Is there any difference in learning achievement between students who use a traditional forum and students who use a forum with a recommender? This study was a one-way quasi-experimental design where the independent variable was the type of forum (two levels: the traditional forum and the forum with recommender). The findings were as follows: 1) Students in the group with the forum recommender read online posts more frequently than the control group, and 2) students with the forum recommender outperformed their counterparts in their productive language test scores. However, there was no significant difference in learning motivation between the two groups. To enhance motivation for using the recommender, students offered their comments on how to revise the recommender, such as making the recommendation rating more personalized and explicit. This study is expected to provide empirical evidence to recommender research in education as well as broaden innovative insights into instructional recommender design.

### 1.3 The Use of CMS in a Library world

A lot of interest and attention has been given to the use of CMS in librarianship. Numerous publications and research have been devoted to the study of various aspects of this issue and present a positive experience.

For example, in the article (Coombs 2009) authors stressed that probably the best-known extension of *Drupal* in the library world is SOPAC, the social OPAC. Created at Ann Arbor District Library (AADL), MI, in 2007, it aimed to improve users' library experience by blending catalogue content seamlessly with the library *web site.* SOPAC also adds next-generation catalogue features such as facets, tags, book covers, reviews, and ratings to create a richer experience for library users. This article discusses how *Drupal* can work as a flexible framework that can be used to integrate with other systems or create interactive tools for users.

As the primary source of materials in the library (Westbrook, Watkins 2012) are digitised and made available online, the focus of related library services is shifting to include new and innovative methods of digital delivery via social media, digital storytelling, and community-based and consortial image repositories. Most images on the *Web* are not of sufficient quality for most media outlets, so what happens when patrons require high-resolution

versions of images for use in their print publications or projects? Until recently, patrons at the University of Houston Libraries used a clunky, paper-based request process for high-resolution images that was frustrating for them and time-consuming for staff. The authors of this article outline how an interdepartmental team of University of Houston Libraries staff used *Drupal* to develop an automated patron request system that is modeled after online shopping cart experiences and integrates with the CONTENTdm-based University of Houston Digital Library. The article provides suggestions for libraries with digital collections about how to create a system that efficiently captures patron requests and streamlines staff delivery of high-resolution files.

Elaine Chen described the Current Trends in Library *Web Site* Redesign with CMS/*Drupal* (Elaine 2010).

The authors (Battles 2010) stresses that intranets should provide quick and easy access to organizational information. The University of Alabama Libraries' intranet was only partially satisfying this basic expectation. Librarians could use it to find forms, policies, committee assignments, and meeting minutes, but navigating the libraries' intranet was neither quick nor easy, and it was only one of multiple sources for essential internal information. The Web Services Department of the University of Alabama Libraries was responsible for directing the redesign of the intranet. Moving to the open-source *Drupal* content management system (*http://drupal.org*), Web Services launched a revamped public Web site in January 2009. The intranet was slated for a similar redesign and conversion to *Drupal* by the end of the same year. The goal was to build a site that served as a center for information for library faculty and staff, provided a stream of information to keep librarians throughout the system connected, contained personalized features based on an individual's group memberships, and created a collaborative environment for all library personnel. The new intranet is a one-stop source for internal information and includes features to promote communication, professional development, and collegiality.

During spring quarter 2008 (Peterson, Haulgren 2010), the Western Washington University (WWU) Libraries established an interactive bloglike environment called "14 Days to Have Your Say" with the intention of gathering new ideas and feedback about the libraries from the university community. The environment was developed as a fairly simple Drupal site. The project was open for direct posting from anyone on the WWU campus for 14 days, from May 7 to May 21, 2008. The study describes the background of the project and how it was developed and launched.

Since launching its first website in 1997, the Arapahoe Library District (ALD) has constantly looked at ways to review and renew this vital tool for patrons (Kiyotake 2010). This study focuses on the process of redesigning the ALD website--the steps taken and decisions made in order to create a site that incorporates interactive elements and patron input and that uses an open source content management system (Drupal). The following information starts in the present and works its way back to the beginning of ALD's website development. Founded in 1966, ALD is a library district serving Colorado's unincorporated Arapahoe County. Located south of Denver, ALD patrons hail from the suburbs to the eastern plains of the state, covering 805 square miles. Resources offered by ALD include eight branch facilities, a bookmobile service, and outreach services within a correctional facility.

The days of top-down communication and controlled internal messages at a library organization are--or should be--behind us. Modern libraries must be fluid and flexible organizations with equally nimble internal communication infrastructures in place to keep up with the fast-paced environments that have been created in these organizations (Etches-Johnson, Baird 2010). As is the case at many institutions, McMaster University Library (about 100 employees) put a great deal of effort into public-facing resources and content, while the library intranet languished as an afterthought. Static *Web* pages were haphazardly created and linked to from the *site's* index page. As the *site* grew, the lack of global navigation, search functionality, and clarity about content ownership led to a large, confusing collection of pages that was increasingly difficult to maintain. In 2009, a project was undertaken to redesign the staff intranet and implement *Drupal*, an open-source content management system, to power the new *site*. This case study outlines the issues faced with the former intranet, requirements gathering, staff feedback, and usability tests performed to inform the redesign, *site* architecture, and *Drupal* modules implemented, features and benefits of the redesigned intranet, the use of the new intranet to corral existing *Web 2.0*/social media channels, governance, evaluation, and lessons learned from the project. Future phases of the project will focus on integrating other internal communication tools used by staff in their day-to-day work, including internal file-sharing drives, staff e-mail and instant messaging platforms, meeting scheduling software, and external document sharing tools such as Google Docs.

## 2. REVIEW OF CMS SYSTEMS

In the publication (Smyrnova-Trybulska, Stach, Fuklin, Staniek 2012) because of their popularity and accessibility upgrades two CMS systems: Joomla! and Drupal are presented. As the basis of use and ease of configuration and modular design allows the user to independently select parts of interest, we have decided to describe these two systems. However, bearing in mind the fact that in the market there are a lot of other CMS systems available that can serve as the basis for the creation of Web pages of various degrees of complexity, at the end of this publication we will mention a few of them. One of the main criteria for including a CMS in this list is availability on the free software basis, which means being available for free use for non-commercial purposes.

The number of free CMS systems is enormous and continues to grow. Choosing the right solution is therefore not an easy task. First of all, consideration should be given to the needs and requirements which the site will have to meet. What may be helpful in solving this dilemma is visiting the Open Source CMS website at: http://www.opensourcecms.com where you can find a description of more than five hundred content management systems (Figure 290 In: Smyrnova-Trybulska, Stach, Fuklin, Staniek 2012).

It is worth mentioning that through this website, without the installing a given system, we can view a sample homepage created with the system and use it to log into the control panel to see what options are offered (Figure 291 In: Smyrnova-Trybulska, Stach, Fuklin, Staniek 2012). The user needs only to click the link "Demo Main Page" or "Demo Admin Page" at the bottom of the page after selecting solutions of interest. In the other case, we enter “admin” as the user name, and the password “demo123”.

Turning now to the analysis of specific CMS systems, one should first mention WordPress, which is very popular with users. It is intended primarily for users who appreciate the speed and ease of adding new content to the page. This system works best in less complex portals due to the fact that it was designed as a platform for creating fast and efficient blogging. However, this does not reduce its educational potential. The project community is well developed, often there are new updates, and one can count on help from other users. The Wordpress project is based on modules, which means that users can freely choose interesting extensions. System configuration is very simple and in fact one can start work right after the installation process. It is worth mentioning that the entire interface is also available in Polish, which greatly facilitates the work. The graphical look of the main administrative homepage

of WordPress is illustrated on the next page (Figure 292 In: Smyrnova-Trybulska, Stach, Fuklin, Staniek 2012).

Another system - PHP-Fusion - has a slightly smaller capacity. It will be useful for users who appreciate simplicity and ease of use. It is available in a Polish language version, which greatly increases the comfort of less experienced users.

Just like WordPress, which is discussed above, PHP-Fusion is also based on the construction of additional modules. The system is being continuously developed and enjoys support from its enthusiasts, as a result of which in the Internet there is a great Deal of information on the installation process and troubleshooting. There are also alternative templates so you can easily customize the site to suit your tastes and preferences. The graphical look of the homepage sample is shown in (Figure 290 In: Smyrnova-Trybulska, Stach, Fuklin, Staniek 2012).

The last of the CMS systems presented in this review is the Web@all CMS. In the ranking created by visitors to the site Open Source CMS system comes second after Joomla. What receives special praise is the clear and intuitive administrative menu (Figure 294 In: Smyrnova-Trybulska, Stach, Fuklin, Staniek 2012). The system is available in Polish. With it, you can quickly create a simple Web site, fill it with content and to enable users to develop it further.

The CMS systems presented are only a part of the wide range of CMSs available at no charge on the Internet. Every administrator should choose an appropriate CMS according to their individual needs. Table 1 on the next page can be useful in choosing the right system. On the one hand a simple and less complicated CMS will allow you to quickly create content, share information, but on the other the ability to publish multimedia content can be significantly reduced. Taking the time to familiarise oneself with a more complex system such as Joomla! Drupal will undoubtedly result in the acquisition of skills enabling the user to create a high-quality website.

**Table 1.**

**The requirements on the server side for the CMSs listed.**

| CMS | Required version PHP | Required version MySQL | Modules, themes | Home page |
|---|---|---|---|---|
| Joomla! | 5.3 | 5.0.4 | YES | http://www.joomla.org |
| Drupal | 5.3 | 5.0.15 | YES | http://www.drupal.org |
| WordPress | 5.2.4 | 5.0.15 | YES | http://www.wordpress.org |
| PHP-Fusion | 5.0.0 | 4.0.0 | YES | http://www.php-fusion.org |
| Web@all CMS | 5.0.0 | 5.0.0 | YES | http://www.webatall.org |
| Mambo | 4.3.0 | 5.0.0 | YES | http://www.mamboserver.com |
| eXtreme-Fusion | 5.2.17 | 5.0.0 | YES | http://www.extreme-fusion.org |

*Source: own elaboration prepared by Staniek 2012*

## 3. A PROPOSED SITE CONCEPT

The basic structure of an educational portal is shown below (Figure 1).

When examining the educational portal of the Faculty of Ethnology and Sciences of Education in Cieszyn, University of Silesia in Katowice, which was created as part of a research project (Staniek 2012), one should analyse all of its components carefully. The portal was built on the basis of three main classes of users in mind, offering each class completely different features. The first main group of users comprises the portal maintenance and administration staff. Their responsibility is to ensure that the website functions properly and maintenance and repairs are carried out on an on-going basis. The second category of users are "teachers" and other persons authorised to publish their content. Students make up the last, third group of users that have access to the portal. Both users who do not have accounts on the system (and may not publish materials) and registered users may access free educational materials maintained in the portal. The structure of the Erudyta portal target groups is presented below (Figure 2)

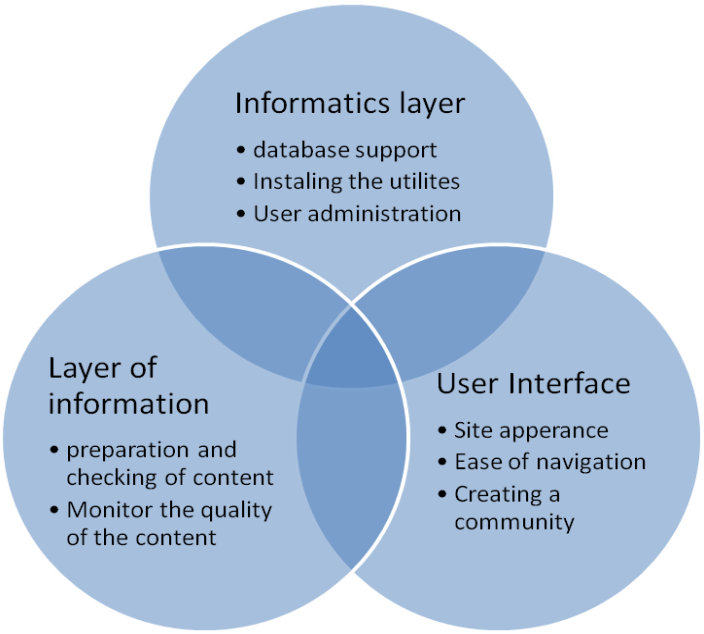



**Figure 1. Layers of an educational portal.**
*Source: own elaboration prepared by Smyrnova-Trybulska, Staniek 2012*

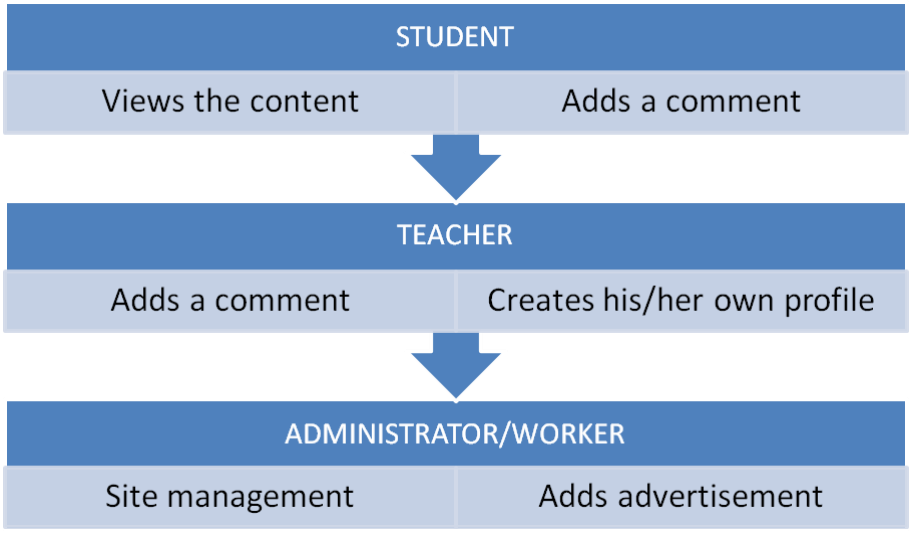



**Figure 2. Target groups of the Erudyta portal.**

*Source: own elaboration prepared by Smyrnova-Trybulska, Stach, Fuklin, Staniek 2012*

The Erudyta educational portal is built on the basis of a navigation menu containing the following categories:

News - contains a list of the latest materials published in the portal. The content is automatically arranged according to the dates and serialized in terms of date, and popularity (number of downloads),

For the student category - three pages, which include:

• *USOS* - a link that allows the student to jump quickly to the student support system,

• *Schedule of classes* - by selecting this link student can download the proper classes schedule for their study field.

• *Announcements* - This section has been designed to improve communication with students regarding events and other items related to the course of study. Authorised university administrative staff can publish announcements related to, for example, teacher absence, necessity to amend documentation related to student practice etc.

- *Academic teachers* - this section allows them to create their personal profiles and share teaching materials with their students,
- *Links* - contains a list of links to educational websites, related to the specific character of individual courses of study etc.
- *Database of educational materials:*
    - *Multimedia*
    - *Class scenarios*
    - *Educational Videos*
    - *Educational Programs*
- *the Library* - contains links to electronic library catalogues,
- *Student self-government* body - is a place where students can publish their content,
- *Scientific circles* - contains links to third party research groups operating within the department,
- *Academic conferences* - offers viewers access to a schedule of conferences and to proceedings of the conferences already held,
- *Distance learning platform* - takes the user to the faculty's Moodle platform,
- *Galleries.*

## 4. SOME RESEARCH RESULTS

Designing and launching an educational portal tailored to the specific needs of the target group (pupils, students or those attending specialist courses) requires careful preparing both in terms of IT aspects involving the selection of the right CMS, as well as the skills to efficiently navigate and administer a given tool, and, last but not least, the ability to identify the preferences and the needs of those visiting the website and using its resources. An intrinsic phase of the process of implementing such solutions involves carrying out research in order to provide answers to questions about the requirements on the part of teaching material users and to the question whether or not there is demand for utilising such solutions .

The results presented below refer to the research conducted among students of the University of Silesia Faculty of Ethnology and Education Sciences in Cieszyn as part of the preparation of the Erudyta educational portal. A preliminary section of the survey research was intended to identify the information sources most frequently used by faculty students and ways in which they evaluate the credibility of information published in the portal. We will only quote and briefly discuss the most interesting results of the study that take into account the specificities of this article.

As you can see the most of the WEiNoE students will search for interesting information in the Internet; materials obtained directly from the teacher come second. The traditional way of obtaining information, which is the use of the library and its hard copy collections ranks third (Figure 3).

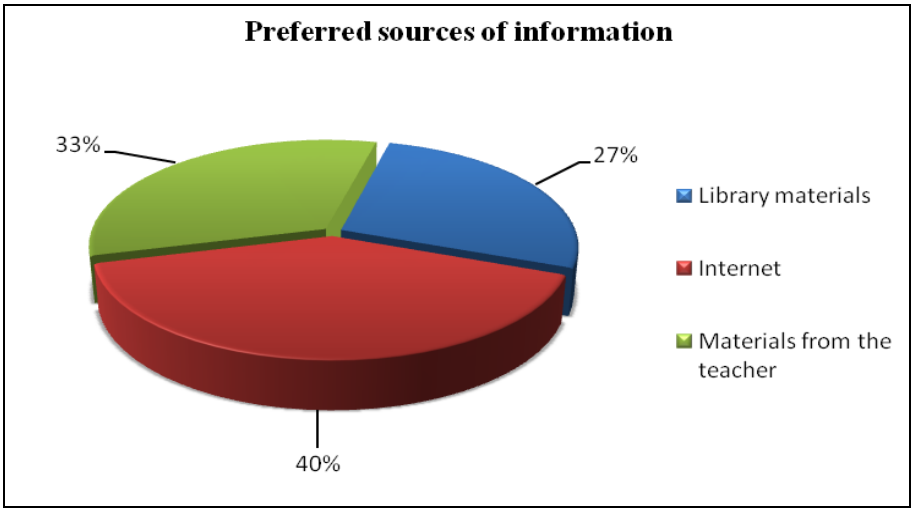



**Figure 3. Preferred sources of information.**
*Source: own elaboration prepared by Staniek 2012*

The researchers also looked into the information sources and forms of information exchange specifically on the Internet are the most popular with students (Figure 4). It is worth stressing that those surveyed showed a great deal of criticism in relation to online teaching materials whose credibility is low.

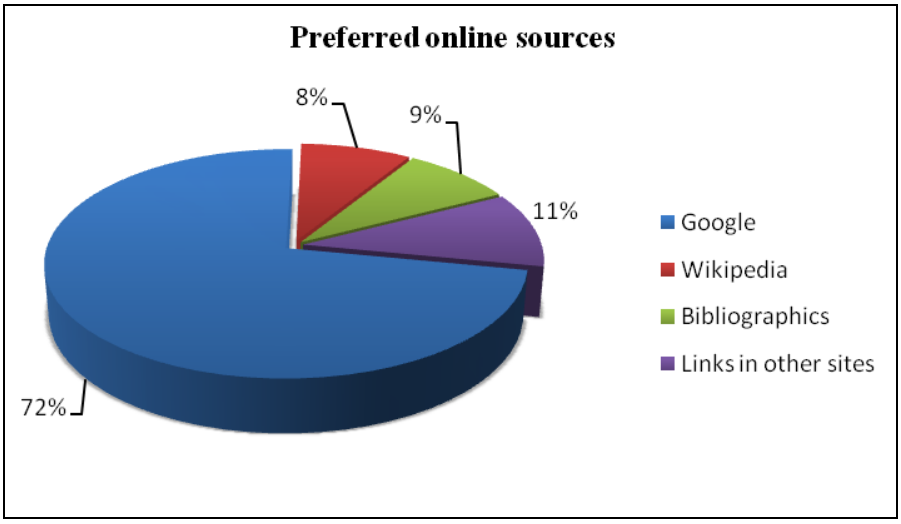



**Figure 4. Preferred online sources.**

*Source: own elaboration prepared by Staniek 2012*

The technological progress we are witnessing today, the development of IT infrastructure allowing access to the Internet from virtually anywhere in the world, coupled with the use of very popular mobile devices today encourages young people to search for teaching materials in this convenient and fast way. However, it should be remembered that in the case of the Internet, speed, quantity and availability does not always go hand in hand with high quality of the factual content available. Therefore it seems reasonable that schools, higher education institutions and other educational institutions engaged in training their employees and improving their skills are taking steps to create efficient information exchange platforms. One of the solutions to this problem is creating educational portals using free and readily available CMS systems.

The next stage of the research was to assess the level of knowledge of information technology resources used to further support the teaching-learning process among WEiNoE students. As the whole project pertained to a specific tool which is an educational portal, the students were asked about their knowledge of the essence of the tool and were also asked to provide a

definition, as well as to give the web addresses of popular educational portals which the student can recognise or uses. The results obtained indicate that there is a need for further promotion of educational portals, as only less than half of the respondents were able to correctly answer the questions (Figure 5). Nevertheless, the majority of the respondents said they believed that educational portals could be a useful tool for finding valuable and reliable teaching materials that can be used to prepare for the classes (Figure 6).

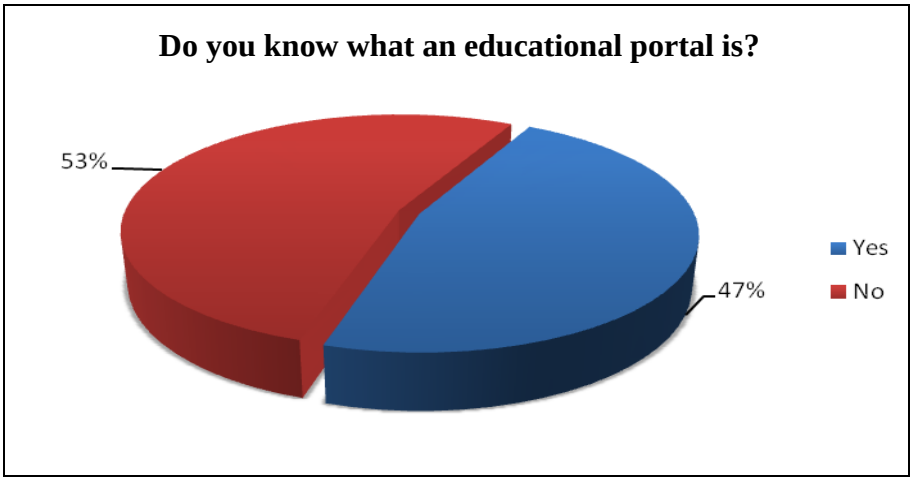



**Figure 5. Do you know what an educational portal is?**

*Source: own elaboration prepared by Staniek 2012*

The students also expressed their preference for the Erudyta faculty website which was being developed. The vast majority ticked the necessity to organize the educational portal in such a way as, on the one hand, to include quality content materials, on the other, to integrate multimedia content such as video, multimedia presentations and audio recordings.

This approach to education portals provides a strong rationale to conclude that the popularity of a source of information is increasingly determined by its multimedia-based attractive form. Providing the user with access to teaching materials in various and attractive formats seems to be a necessity. CMS systems, particularly those based on a modular structure are a really excellent tool to ensure their needs are satisfied. In the past, administrators needed extensive and specialised knowledge to integrate into the structure of a webpage video playback, real-time video conferencing or even audio materials. Today, this problem has been completely resolved, and such solutions have become available to a wide range of interested audiences, including teachers who have not attended IT training.

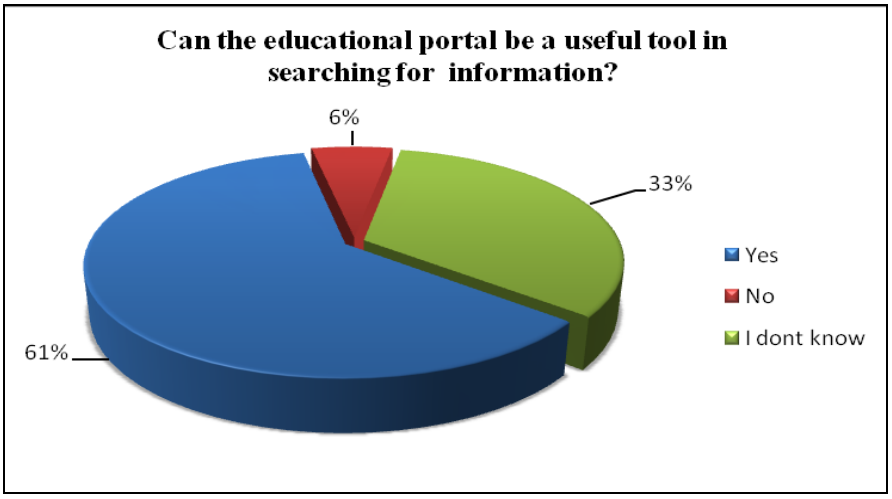



**Figure 6. Can the educational portal be a useful tool in searching for information?**

*Source: own elaboration prepared by Staniek 2012*

The students surveyed also stressed the need to ensure the copyright aspect of materials published in the educational portal is properly addressed (Figure 7). It is not without significance that the students rated highly the possibility of self-publishing their work in the educational portal and enabling communication with their academic teachers through the platform. Such an approach seems to confirm the growing sense of responsibility on the part of the students for the intellectual value as published on the Internet.

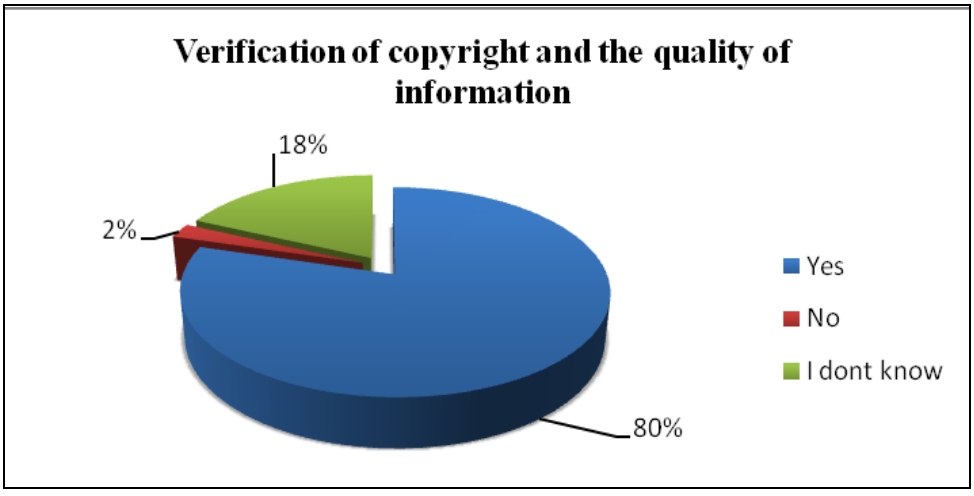



**Figure 7. Verification of copyright and the quality of information.**
*Source: own elaboration prepared by Staniek 2012*

An educational portal as a tool supplementing a distance learning platform should also meet the requirements of a very special group of users – people with disabilities. This can be done in many ways. The most popular of these is probably the removal of barriers to access, such as ensuring the possibility to change the contrast, enlarging screen font and also providing a tool reading items selected by the user . Many of these basic facilities can be implemented using the tools provided in ready-made CMS modules. An important advantage and convenience afforded by an educational portal is its independence of time and place, so that a disabled person can access its resources at any time without having to leave the house and to pay for expensive transportation etc.

Most of the students surveyed said that an educational portal is particularly useful for people with disabilities, which is a great motivation to take further steps to even better adapt the Erudyta portal to the requirements of this particular group of users (Figure 8).

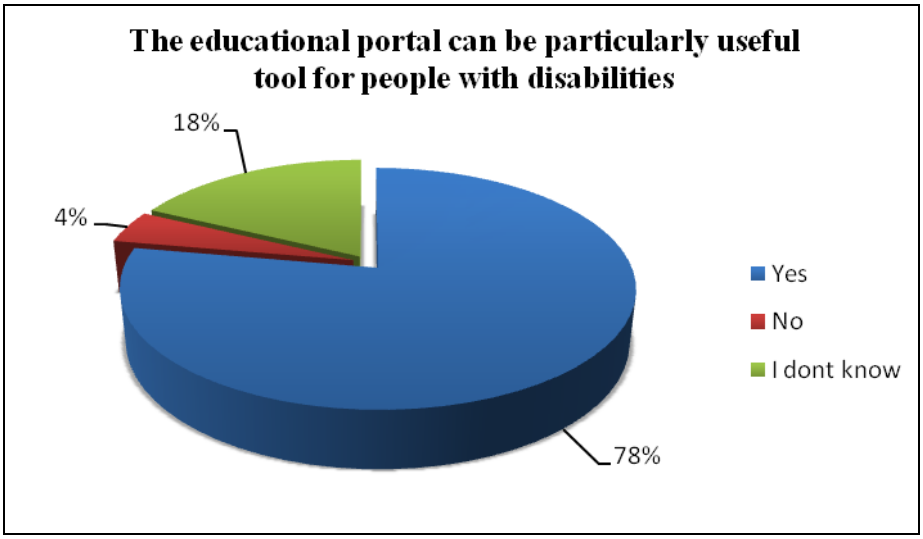



**Figure 8. The educational portal can be a particularly useful tool for people with disabilities.**

*Source: own elaboration prepared by Staniek 2012*

The multitude of available CMS solutions, as well as the increasingly evident fact that the teacher has to meet the challenges of today's changing world based primarily on modern technology mean that creating an educational portal need not be an arduous and time-consuming IT task, that it can be a simple task providing satisfaction to both the teacher and the students. In order to sum up the research carried out, it is worthwhile to provide the last

items of the data: 78% of the students said they would use the resources available on the Erudyta portal (http://www.erudyta.us.edu.pl) being created.

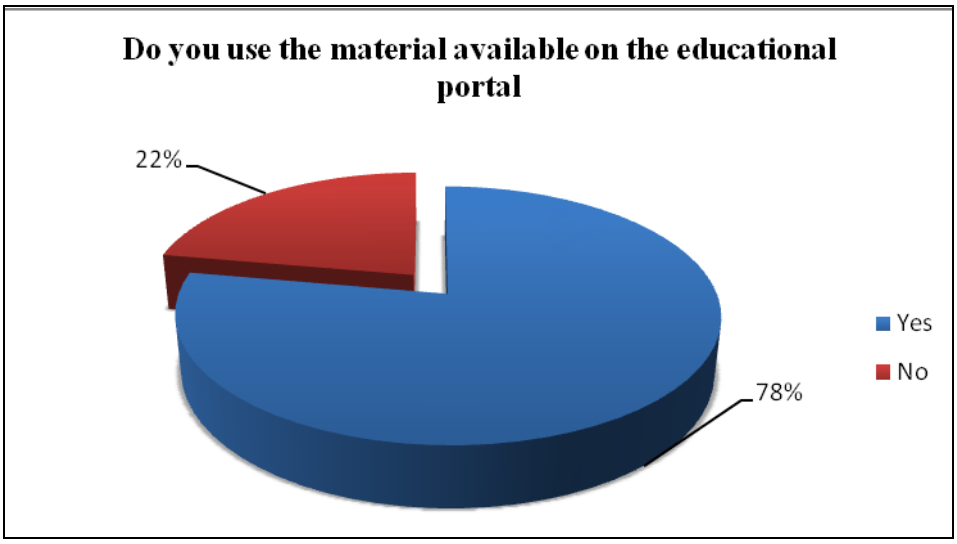



**Figure 9. Do you use materials available on the educational portal.**

*Source: own elaboration prepared by Staniek 2012*

## 5. ADVICE FOR DESIGNERS OF CMS-BASED PORTALS

A website designer not only has to be familiar with tools used for creating websites, but also should have a certain knowledge of website functionalities. A portal containing even very interesting information is doomed to failure if it is built without any plan or if finding information on it is too difficult. This chapter contains a few basic rules which beginner webmasters may use as guidelines (Smyrnova-Trybulska, Stach, Fuklin, Staniek 2012).

- Every website should be made for a specific purpose and have a target audience. Websites "about everything and nothing" are doomed to failure.
- You should keep in mind the subject and target audience of the website. Putting a clown on a website about legal acts or boring colours on a website of a disco club may confuse Internet users and cause the presented content to be viewed with mistrust.
- There is no point in adding unnecessary Flash or Javascript elements to your website if they are not going to perform any specific function. Although new technologies seem to be very attractive, too many of

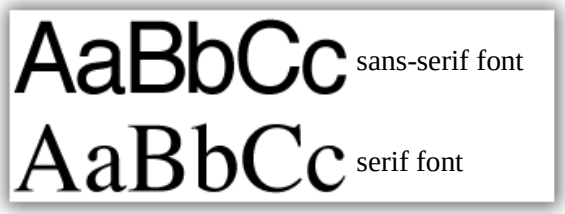
them or their unskillful use may effectively put people off. You should also keep in mind that every additional element on a website extends its loading time and their excess may make navigating the website more difficult.

- When building Internet portals, you should follow the three-click rule, according to which the user should be able to effortlessly access any area of the website from its other part with no more than three mouse clicks.
- It is worth remembering that each excessive graphical element extends the website's loading time. What is more, portals with fewer graphical elements are easier to index and more accessible to browsers integrated in cell phones or handheld PCs.
- The website's colours should be selected in a deliberate and consistent manner. Placing a brightly coloured text on a bright background is not the best of solutions. A blue font may be hard to make out for people with eye problems. You should also remember to be consistent with respect to the colour scheme and layout of the website. If each subpage is similar to the previous one, the user will have little difficulty in finding particular options on it, thanks to which he/she will feel much more comfortable. Naturally, not every designer needs to have a perfect feel for colour. Fortunately, you can easily find programs for selecting colours on the Internet, which are very useful tools for every webmaster.
- When constructing a website, you should always check the results of your work on main web browsers because frequently a website which looks perfect in one browser is displayed incorrectly in another. Testing the website in various environments and on various platforms as well as in different display resolutions will prevent potential errors and problems connected with the incorrect display of a website.
- When making a website, put the most important information in the first few sentences and the least significant at the end of the text. It is also good to know that multi-level headings greatly facilitate navigating the article's content.
- Conveying information can be much simpler if you use tables. You should remember, however, not to use too many colours in them because it will make them much less legible. Do not use more than four colours in tables (in extreme cases, this number may be increased to six).

- You should keep in mind that the frequent use of a bold font or capital letters in order to draw the user's attention may prove to be counterproductive: the web user will simply start ignoring them.
- Flashing and moving elements may be ignored by the user, who, as a result of sensory adaptation, may consider them to be advertising banners. That is why you should carefully think through the location and appearance of all animated elements of the portal before placing them. You should also avoid using images that look like Internet advertisements.
- You should definitely avoid creating subpages the user can go back from only by using the "back" ("Go back to the previous page") icon in the web browser. Additionally, on each subpage there should be an option to directly go back to the main page and to the area one level above.
- Keep in mind that a majority of users concentrate only on the part of the website which is shown immediately after the site has loaded and do not check its remaining content. That is why you should put all the most important information exactly in this place.
- A good practice is to include information about the size of files that can be downloaded by the user (for example films or PDF documents). Thanks to this information Internet users who also know their bandwidth will be able to determine the approximate download time.
- Although it might be tempting to create an original website, you should avoid changing the generally accepted layout of navigational elements. The user will be looking for information concerning navigating the portal in the left and upper part of the website. Changing their location may discourage Internet surfers and make them leave the site.
- Using the "you are here" option will make the navigation easier for less experienced users.
- It is a good idea to use the same images in a number of places in order to reduce the portal's loading time. Once loaded, the image stays for some time in the memory of the user's computer.
- A good idea is to use the search mechanism on all pages of the constructed website. You should keep in mind, however, that it should work only within a given portal and not search through the resources

of the entire Internet. The extension may also be used to monitor the website's most frequently searched information, thanks to which it will be possible to better highlight it.

- According to experienced webmasters, it is better to place more links leading to particular areas of the website than to minimise their number, thereby forcing the user to delve deeper into it by clicking on hyperlinks more and more frequently.
- Every website should have information about its designer in a prominent spot. Another useful tab is FAQ (Frequently Asked Questions), which will protect the webmaster from an excessive number of emails sent in by web users. However, when answering the questions, you should remember not to use a technical jargon, which is difficult to understand for a majority of Internet users.
- You should use sans-serif fonts (e.g. Verdana, Georgia, Arial), in which letters do not have decorative endings that make reading from a screen much more difficult. Moreover, using too many typefaces in one portal is not recommended. By default, one font type should be used to create headings and another for the rest of the text. You should also remember that reading a small font may be very difficult for people with eye problems.




- When setting the title of the website in <title> … </title> tags, you should keep in mind that it will be indexed under this name by web crawlers. Therefore, it is a good idea to insert a title that is relevant to the content of a given subpage between the tags.
- Avoid opening new subpages in additional windows. This causes chaos on the screen of the computer and is rather annoying to the user.
- Hyperlinks should not differ too much from the accepted pattern (underlined text), which users know well from other websites. Analogically, you should avoid underlining text which is not a hyperlink.

- Creating an image in the background significantly decreases the legibility of the website. Moreover, the appearance of images is pretty unpredictable because it depends on individual settings of each user, colour depth, the used screen, etc.
- Using a large number of empty spaces and substantial gaps between subsequent groups of information considerably improves the website's clarity and makes it easier to read. These "white spaces" on which the Internet users' gaze can stop when browsing the site reduce their weariness and allow them to rest their eyes for a while.
- One of the most frequent mistakes designers make is squeezing too much information into one webpage.
- If the website has hyperlinks in the form of icons or images, they should be selected in a way that leaves the user with no doubts as to where to click and what it will cause.
- One can note that frames are less and less frequently used in recent years. This is due to their not very aesthetic appearance and a much longer loading time of pages.
- You should definitely avoid creating the so-called "welcome pages", which direct the users to the website proper only after they have clicked on the link located on these pages. Such pages serve only to extending the loading time of the website and increase the web user's frustration.
- Always carefully think through placing advertisements on the website. They should seamlessly expand the website's content and smoothly fit in with its appearance instead of being just garish elements that obscure essential information included in the portal.
- At first, a majority of web users turn their eyes on the biggest or the most distinct element of the website, then quickly browse through the website noticing its general layout made up of the text and graphical elements, and finally begin reading specific words on the portal. Therefore, it is a good idea to design the layout of the website in a way that directs the user's eyes to the most important content.
- If the HTML/XHTML/CSS code is difficult to understand because of bad formatting (for example the whole code is inserted as a single string), it can be corrected manually, but downloading a HTML/XHTML/CSS editor, which should automatically improve the

legibility of the code by performing appropriate formatting, is a much better solution.

- When inserting images on the website, it is a good idea to choose the GIF format or interlaced PNG. Seeing them gradually appear on the monitor's screen is definitely more pleasant for the user than the ordinary loading of images.
- Changing default setting and using strong, frequently changed password may considerably improve the security of a website.
- The password should have at least one digit, one capital and small letter as well as at least one special character (for example @#$). It should not be a dictionary word or a word connected to your hobby, work, school, family, address, date of birth, etc.
- If the webmaster wishes to add a map of some place (for example from Google Maps) to his or her website, he/she needs to generate a code of this location (for example by using the http://www.map-generator.net/ tool) and paste it into a given article. Turn the editor off when inserting the map code (Smyrnova-Trybulska, Stach, Fuklin, Staniek 2012).

## CONCLUSION

Information society in which we operate is a dynamic system of numerous dependencies. In these times when access to information is easy and fast, when geographical and cultural boundaries are disappearing, development, by teachers, of a friendly environment for their students in which they can expand their interests, learn and explore new possibilities, and which at the same time is customised to their needs is a great challenge.

An analysis of examples of experience and research in the field of purposeful design and use of services based on CMSs and examination of student attitudes and preferences with regard just to the web tool which is an educational portal (Staniek 2012) yield a conclusion that young generations are assimilating modern technologies. This is an important clue for teachers, for whom teaching is not just a process of transmitting information, but also stimulating student creativity and self-reliance. Adoption, in the teacher's work, of the constructivist approach to the en tire teaching process, the use of distance education as an effective form of life-long learning are but a few examples of the lines of the development of contemporary education .

When analysing the possibilities for using CMS to create an educational and information environment, one needs to emphasise the fact CMSs open up new perspectives for teachers and educators. Their use is not limited to creating websites of one type only; thanks to the availability of additional module, the only limit of their development is the creativity and imagination of administrators.

Some of the research results presented in this paper have provided a number of guidelines and pieces of advice which will make it possible to further adapt the educational portal of the Faculty of Ethnology and Sciences of Education at the University of Silesia in Cieszyn to the specific needs and requirements of students and to implement the research results on a wider scale in the creation of educational or thematic portals in Cieszyn's and Silesian Region's educational institutions.

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# A MODEL OF FORMATIVE ASSESSMENT ON THE BASIS OF THE EXAMPLE OF E-STUDENT PORTAL

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***Summary:*** *Formative assessment, unlike summative, is aimed at increasing the effectiveness of the education by adjusting the teaching material to the student's level of knowledge and by preparing the student for the permanent learning. Therefore the authors of the educational portals are choosing this model of assessment more and more frequently. In these theses this method was used to personalise the e-learning portal e-Student and to establish the individual education paths, thus preparing the students to move in the knowledge-based society.*

**Keywords:** formative assessment, e-learning, personalization, classified features, implicit profile, education path.

## INTRODUCTION

Learning is a basic human skill developed throughout the whole life and its effects are being constantly evaluated. The knowledge assessment is also an integral part of the learning process. The assessment method which is more and more appreciated and is used more and more frequently is so called formative assessment, sometimes also termed "the assessment allowing to learn". Due to this type of evaluating students' knowledge the effectiveness of self-teaching process is increased.

The core of the method is gathering such information about the learner which allows the teacher to observe the learning process and to modify the content of the learning material as well as to pass the feedback to the student to help him/her learn. Formative assessment is a frequent, interactive evaluation of student's progress and his/her level of understanding the learning material

which enables the teacher to determine how the student should learn and what the best way to teach him/her is.

Analysing the methods of assessment available on the Moodle platform allows to establish that it is possible to use only summative assessment here, that is the feedback is given on the basis of a quiz results and determines only what material the student has learnt. Having analysed the definition of the formative assessment and having studied the factors taken into account during formative assessment it was determined that this method is more effective because it helps to design the whole learning process, not only to randomly check his/her knowledge with some accidental questions. On these bases, a new model of evaluating was created for the students who work on the content provided by the e-Student portal, based on the Moodle platform.

The main idea of the designed evaluation algorithm and directing the student to the right learning path is to determine the appropriate attributes – classified features, gathered during the realisation of the teaching process on a course and then using them in such a way as to establish the most effective way of learning for a student. The main aim of these theses is to introduce the evaluation method based on formative assessment.

## 1. FORMATIVE ASSESSMENT

Checking students' knowledge is the part of education which accompanies the teaching/learning process from its beginning. It is a task which is constantly changing with the evaluation of the teaching process. The summative assessment is the most often used model. It involves grading the students based on the results of tests and exams. The results are supposed to determine what the student has learnt and what knowledge he/she has assimilated. In that evaluation model the school is responsible for the level of the student's knowledge (Sterna 2006).

The most recent, revolutionary trend in evaluating is the formative assessment method. Contrary to the summative method it is supposed to improve the educational process and not only to summing up the student's knowledge. Formative assessment is therefore a frequent control of the student's progress and of his/her level of understanding the teaching content. It emphasises not only the final results but also the quality of the increase of his/her knowledge (Sterna 2006).

Formative assessment should be conducted in the form of a constant interaction between the teacher and the learner and should gather information

which enables observing the learning process, modifying further learning process and giving feedback to help the student learn (Sterna 2006).

This model of evaluation allows to adjust the teaching methods to the student's needs and to determine the best way for the student to learn and for the teacher - to teach. This method of evaluating students' knowledge makes them take responsibility for their education, leads to an increase in self-study effectiveness and further it is a perfect preparation to lifelong learning (Sterna 2006).

The concept of formative assessment does not assume the removal of grades. It, however, highlights the importance of feedback. The grade constitutes information about the level of mastering the educational material, it is supposed to help in the further process of learning. If it is not high enough, it means that the material has not been mastered well enough and maybe it needs to be revised. The grade itself does not, however, answer the question what should be revised. It is the role of the teacher to show the student the right tips for further work (Jastrzębska 2009).

The report of the Organization for Economic Co-operation and Development, OECD from 2005 proves the effectiveness of this method and its positive impact on the improvement of the educational results and on the preparation of the students for lifelong learning. Moreover, it also promotes the equalisation of educational opportunities.

The analysis of the benefits of this method of evaluation has influenced the decision to use this system of evaluating the students who are participants of the courses placed on the e-learning platform of the State Higher Vocational School in Krosno. It has been established that it will contribute to improve learning results, allow for personalisation of the e-Student portal and help to prepare students to function in the information society. In today's world the technical development has established that the flow and exchange of information are the main factors used in management. At the same time contemporary people have been forced to learn throughout their lives and to constantly upgrade their skills and qualifications (Toffler 1997).

## 2. THE ASSESSMENT MODEL ON THE MOODLE PLATFORM

Moodle is software used for creating and managing online courses. The courses consist of modules which include lessons, forums, chats, quizzes and assignments. The modules make it possible to control the progress of each student by defining classification rules. One of the possibilities of effective creating personalised courses is developing tests based on the

"Lesson" module. By creating a Lesson, you can use the "Dependent on" option, which allows you to set restrictions on the access to the lessons, depending on the student progress (Figure 1).

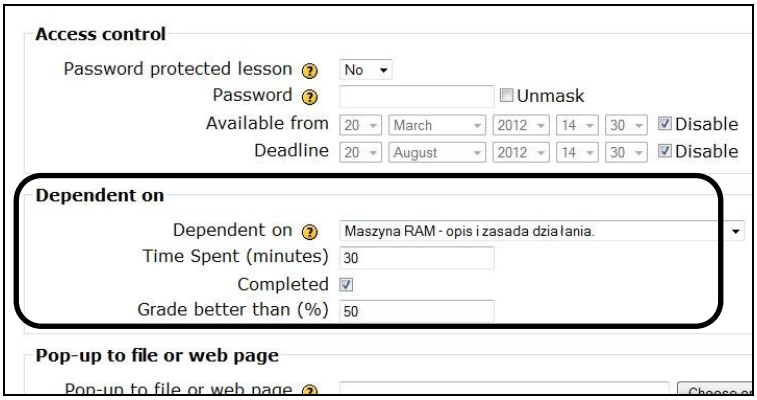


**Figure 1. Defining attributes enabling the classification of the student on the Moodle platform.**

*Source: own elaboration*

The attributes taken into consideration when determining the access to the lesson are:

- the time spent on the lesson module,
- the result of a test,
- the condition to finish the lesson.

In the field "Dependent on" you can select the lesson which you want to restrict access to. In the field "Time Spent" the teacher enters the expected minimum time (in minutes) that a student should spend when working with the module to sufficiently master the lesson material. The field "Completed" is ticked if it has been assumed that the student is to review the course material and then take the test. It should be noted that when selecting this option, you need to enter the exam questions based on which the student's knowledge will be evaluated after he/she has finished mastering the content of the lesson. In the last field "Grade better than" the percentage of the minimum number of credits that a student must earn in order to obtain partial credit for the course and move on to next lesson is determined. Of course there is no need to declare all parameters simultaneously. You can choose one, two or three features on the basis of which the classification will be conducted (Dębska, Kubacka 2012).

From the characteristics of the classification methods available on the Moodle platform it can be determined that this type of evaluation is the summative assessment method. After meeting certain requirements, in the "Dependent on" field you can provide the student with the next Lesson module. The student's previous experience and results are not taken into account, he/she is not advised what to do in case of unsatisfactory results. The grade is issued on the basis of test results and illustrates what the student has learned.

## 3. CREATING EDUCATIONAL PATHS ON THE E-STUDENT PLATFORM

Everybody wants to be treated subjectively. Therefore it is very important for the Internet portals, including educational portals, to personalise them. It supports a better match between the training content to a person, thus leading to a better assimilation and understanding of the material.

In order to individualise the educational process and to create the individual educational path suited to the needs and capabilities of the student, the model of formative assessment has been introduced. During the study a set of classified features, ie. attributes that are helpful in the description of the student profile were collected (Dębska, Kubacka 2011). The classified features are those implicit user data, which were obtained independently of him, based on the observations of his behaviour during the use of the site (Olszak, Olszówka 2007). These features include the following attributes describing the students:

- the current path of education,
- the results of the previous test,
- time needed to complete the test,
- number of approaches.

Next, the data are used to establish the most effective path of education for a student. He/she may be classified to one of three groups:

Group 1 - the weakest students

Group 2 – the average students

Group 3 – the gifted students

The classification occurs after each completed lesson. The current number of pathways is saved to the database and it becomes a feature to be considered at the next classification.

For the purpose of the program classification the Moodle database has been expanded by an additional table, called *block_treminder* (Figure 2), which apart from the student identification features contains a number of educational paths where he/she is currently.

| id | courseid | userid | itemid | grade | timeseen | attempts | rank |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 2 | NULL | NULL | NULL | NULL | NULL |
| 2 | 2 | 3 | NULL | NULL | NULL | NULL | NULL |

**Figure 2. An example of a table for the users who start a course on e-Student portal**

*Source: own elaboration*

The table is made for every student enrolled in a course. It consists of 8 columns with the information from other tables of the Moodle database as well as with the data saved after completing the test. The column Id is an identifier increased automatically. Courseid contains the identifier of the course, which is taken from the *courses* table. In the column Userid there is an identifier of the user, taken from the *users* column. Itemid is an identifier of a completed module taken from the *grade_items* table. Grade is a user's grade taken from *grade_grades* table. Timeseen is the time in which a test (quiz) was completed, expressed in seconds. Attempts is the number of approaches at solving the test, and the column Rank is the group number to which the student is assigned as a result of the classification by the classification algorithm. Figure 3 shows a fragment of a table containing the data recorded after completing a test by the students.

| id | courseid | userid | itemid | grade | timeseen | attempts | rank |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 1 | 3 | 5 | 879 | 1 | 3 |
| 2 | 2 | 2 | 4 | 3 | 989 | 3 | 2 |
| 3 | 2 | 3 | 2 | 5 | 678 | 1 | 3 |
| 4 | 2 | 5 | 2 | 3 | 878 | 2 | 1 |

**Figure 3. A table after completing a test by the students.**

*Source: own elaboration*

The assigned group ID is then used to provide the student with the appropriate lessons Modules. Depending on the group ID, students are provided respectively with:

1. The basic content when he/she was assigned to group 1, ie. the weakest students.
2. The enlarged content when he/she was assigned to group 2, ie. the average students.
3. The content enriched with additional materials and links, prepared for the best students, who were assigned to group 3.

The application *Klasyfikator* (classifier) that determines the number of the group is an external program that runs after the time that has been designed to deal with the content of a lesson module. Features that are included in the classification, have been given the following weights:

the test result – weight 0.4,

previous learning path – weight 0.3,

the time of completing the test – weight 0.15,

the number of attempts – weight 0.15.

In addition, to the student's current learning path, the time of completing and the number of attempts have been assigned points. The student in the group of the best students receives 2 points, in the group of the average 1 point, and in the weakest group 0 points. Besides, if the time of completing is between 0 and 10 minutes, the student receives 1 point. If he/she belongs to the range of <10 – 15> minutes, he/she receives 0.5 points, and the time higher than 15 minutes receives no points (0 points). The score for the attribute of the number of attempts is scored similarly. Discretisation rule is presented in Table 1.

**Table 1.**

**The score based on the number of attempts.**

| **The number of attempts** | **Points** |
|---|---|
| **1-2** | **1** |
| **3-4** | **0.5** |
| **More than 5** | **0** |

*Source: own elaboration*

After considering the above, the model of classifier algorithm is as follows:

$$nrank = grade*0.4+rank*0.3+timeseen*0.15+attempts*0.15.$$

In Table 2 there are some exemplary results, taken from a table monitoring the students' grades, comprising the values of the parameters included in the model and the outcome of the classification process.

**Table 2.**

**A fragment of a table comprising the attributes on which the learning path and the result of the classification is based.**

| | Klas1 | | | | |
|---|---|---|---|---|---|
| | 1 grade | 2 rank | 3 timeseen | 4 attempts | 5 nrank |
| 1 | 5 | 2 | 1 | 1 | 3 |
| 2 | 4 | 1 | 0,5 | 0,5 | 2 |
| 3 | 3 | 0 | 0 | 0 | 1 |
| 4 | 5 | 1 | 1 | 1 | 3 |
| 5 | 5 | 1 | 0,5 | 0,5 | 3 |
| 6 | 5 | 0 | 0 | 0 | 2 |
| 7 | 4 | 2 | 1 | 1 | 3 |
| 8 | 4 | 1 | 1 | 1 | 2 |
| 9 | 4 | 0 | 0 | 0 | 2 |
| 10 | 3 | 0 | 1 | 1 | 2 |
| 11 | 3 | 0 | 0,5 | 0 | 1 |
| 12 | 3 | 1 | 0 | 0 | 2 |
| 13 | 3 | 0 | 0 | 0 | 1 |
| 14 | 3 | 2 | 1 | 1 | 2 |
| 15 | 5 | 0 | 1 | 0 | 2 |

*Source: own elaboration*

In column 1 – grade is the grade a student received in a test completed after finishing the work with a current module. Columns from 2 to 4 contain the values of the features characterising the student, obtained by discretisation, and in column 5 there is the nrank – the group number calculated by the classification program. It is also the index of the learning path according to which a student will continue to study, learning the content of the next lesson module. It is evident, that in this algorithm, the most significant effect on the classification result is the grade received for a completed test, the weight of this parameter is also the largest. Another important attribute is the index of the current path of education. The lowest weights were assigned to the time of completing and the number of attempts.

## 4. THE RESULTS OF THE CLASSIFYING PROGRAM

The described classifier was tested on a group of first year students, enrolled in Computer Science in the State Higher Vocational School in Krosno. The students were the participants of a course "Algorithms and Data Structures". The classes were conducted in the blended-learning mode. It means that the

realised traditional education model (lessons in the type of lectures and training) was enhanced by the learning material placed on the e-Student portal. The research group consisted of 45 students. The course "Algorithms and Data Structures" was divided into 5 subjects (Dębska, Kubacka 2005). The first of them has taken the form of initial classification and allowed to check the level of knowledge of the student enrolling into the course. It includes testing and revision materials in the subjects indicated in the prerequisites for the course. The subjects are the basics of programming and theory of information science, Mathematical analysis and Probability. After completing all the tests in this section the student is subjected to a preliminary classification based on cluster analysis algorithm. The result of this method of classification is the initial number of learning paths. Next, after completing each of the other 4 modules, the student is subjected to further classification. Table 3 shows a fragment of an array of aggregated data, containing the numbers of consecutive numbers of learning pathways the student was on. In the last column "Grade" there is the ultimate grade the student received after the final exam. Analysis of the results shown in Table 3 shows that the number of learning paths is not constant and may change after every lesson. By comparing the final grades obtained from the exam with the numbers of learning pathways to which the student has been directed, it is seen that they are in some way correlated. A student who was directed to learning path number 2 or 3 normally received scores of 4.5 or 5 during the exam. In the case of students whose learning path was determined to number 1, they usually received scores of 3 in the exam.

**Table 3.**

**A fragment of a table including the results of the classification (2011) in the shape of the path number and the final grade received in an exam.**

| 1<br>Lp | 2<br>kkw | 3<br>k1 | 4<br>k2 | 5<br>k3 | 6<br>k4 | 7<br>ocena |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 2 | 2 | 2 | 4 |
| 2 | 3 | 3 | 3 | 3 | 3 | 5 |
| 3 | 3 | 3 | 3 | 3 | 3 | 5 |
| 4 | 2 | 1 | 2 | 3 | 3 | 4,5 |
| 5 | 3 | 1 | 1 | 3 | 2 | 4 |
| 6 | 1 | 1 | 1 | 2 | 1 | 3 |
| 7 | 3 | 2 | 2 | 3 | 3 | 5 |
| 8 | 2 | 1 | 1 | 2 | 2 | 4 |
| 9 | 2 | 1 | 2 | 3 | 3 | 4,5 |
| 10 | 2 | 1 | 1 | 2 | 2 | 3,5 |
| 11 | 1 | 1 | 1 | 2 | 1 | 3 |

*Source: own elaboration*

In the group, following the initial classification, 27% of the students were directed to learning path no. 1, 39% to path no. 2 and 34% to path no. 3. However, after completing the second chapter, which discusses the issues of *determination of time and calculation complexity algorithms*, 64% of the students were directed to the weakest group, and 18% to the average and to the best students. Observations of the results of the partial credits, resulting from several years of teaching the subject, show that this is the most difficult topic discussed in the course. A large number of people who have been directed to the lowest educational path after passing the module 2 test, confirm these findings. The results of assignment of students to different learning pathways for subsequent modules are presented in Table 4. Their analysis shows that the number of weakest students decreases during the semester.

**Table 4.**

**The percentage of participants assigned to the respective educational paths after completing the other modules.**

| Path no. | Module 1 | Module 2 | Module 3 | Module 4 | Module 5 |
|---|---|---|---|---|---|
| 1 | 27% | 64% | 45% | 7% | 14% |
| 2 | 39% | 18% | 34% | 52% | 41% |
| 3 | 34% | 18% | 20% | 41% | 45% |

*Source: own elaboration*

An increase in the number of students qualified for the second and third educational path can also be noticed. It could be said that this method of teaching helps the students to learn, encourages them to self-study and contributes to the overall improvement of the learning results.

## CONCLUSION

The introduction of the principles of formative assessment allows you to create a personalized web portal, corresponding to the growing demands of students. It greatly facilitated the design of the course in the subject of *Algorithms and Data Structures* as it allowed for automatic consideration of different perceptual capabilities of students. It allowed the weakest students to use extra materials explaining the content of the lessons and to use revision exercises and the best students were enabled to expand the knowledge of additional material not presented in the traditional classes. Analysis of test results, which the students obtained after completing each module, pointed out the shortcomings found in the structure of the portal, it was also an invaluable hint which elements should be extended further with additional

tasks or theoretical knowledge. It is also envisaged that higher number of the predicted results of students' individual learning paths, gathered in the following years, will allow to improve the work of the classifier and will thus promote more accurate results of classification. It will be possible to create an automatic classifier with better matching weights, the values of which will be determined by neural network trained by a supervised method.

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# REMOTE EXPERT SYSTEM IN THE TRAINING PROCESS FOR IT STUDENTS

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***Abstract***: *The article focuses on the use of remote expert systems in IT student's learning process and describes the system's architecture and basic principles of its operation.*

**Keywords**: distance education, learning expert system, artificial intelligence.

## INTRODUCTION

Adaptive and intelligent remote educational system (RES) provides an alternative to the traditional education system. RES attempts to be more adaptive by building a model of the goals, preferences and knowledge of each individual student and using this model throughout the interaction with the student in order to adapt to his needs.

## 1. EDUCATION AND INTELLIGENCE

The person is formed as a result of mastering certain content of training, which, in turn, is concentrated in corresponding textbooks. The training content is nothing else but concentrated experience of mankind, which has been saved up throughout centuries. It has settled in various creations of human work, from elementary instruments to modern machines. Descriptions of this experience and its publication in ancient manuscripts and modern typographical volumes form a certain branch of science. Acquiring this science, its continuation and development makes the main task of each new generation of mankind coming to life. Education would fulfil this task. There appears, however, an original vicious circle: science expands in a dizzy rate, but human possibilities of its mastering do not vary in time. Not varied over

centuries is also an established doctrine that education is mastering of the experience of previous generations. Immediately there arise a question: "The whole experience?" By this principle curricula and programmes in general education and vocational schools have been formed for centuries creating and invincible overload of pupils. To break this vicious circle is possible only on a basis of a strictly scientific approach to education and preparation of scientific information for studying in accordance with achievable purposes of training. A worldly-intuitive approach to education and its content with the Aristotelian concepts of preparation from each pupil to an "encyclopaedist" or medieval notorious "Renaissance man" today it is no more than a hopelessly out-of-date myth which traditional pedagogy cannot deny. Today society become "encyclopaedists" while an individual, even if he is expert and professional becomes only a "partial encyclopaedist" in a very narrow area of knowledge and activity.

## 2. REMOTE EXPERT SYSTEM

With the development of distance education issues of selection and assembly of learning material became critically important. Distance education makes a full use of information technology and computer tools. Moreover, that distance education lies in getting students to educational information in the form corresponding to their individual inclinations, methods of perception, in getting answers to their questions on the high level of teaching and research.

In the field of information technology there are tools to solve all the mentioned problems - a remote expert system.

The paper describes the experience of implementing the elements of remote expert system for the selection and shaping of the content of academic disciplines.

Remote Expert System (RES) ExpSys_2.0 (Figure 1) used in the training process for IT students. The system consists of three main modules:

1. Methodist module – main construction unit:
   - Construction and edition of teaching theory;
   - Creation and correction of tests;
   - Control of test validity;
   - Definition of the order of studied topics.
2. Tutor – control training unit:

- New student registration;
- Control of study results in studying process.

3. Student – theoretical and test module
   - Giving the theoretical material for student;
   - Testing the knowledge on the studied material;
   - Correcting students' knowledge by test results;
   - Keeping test result information for the teacher or methodologist.

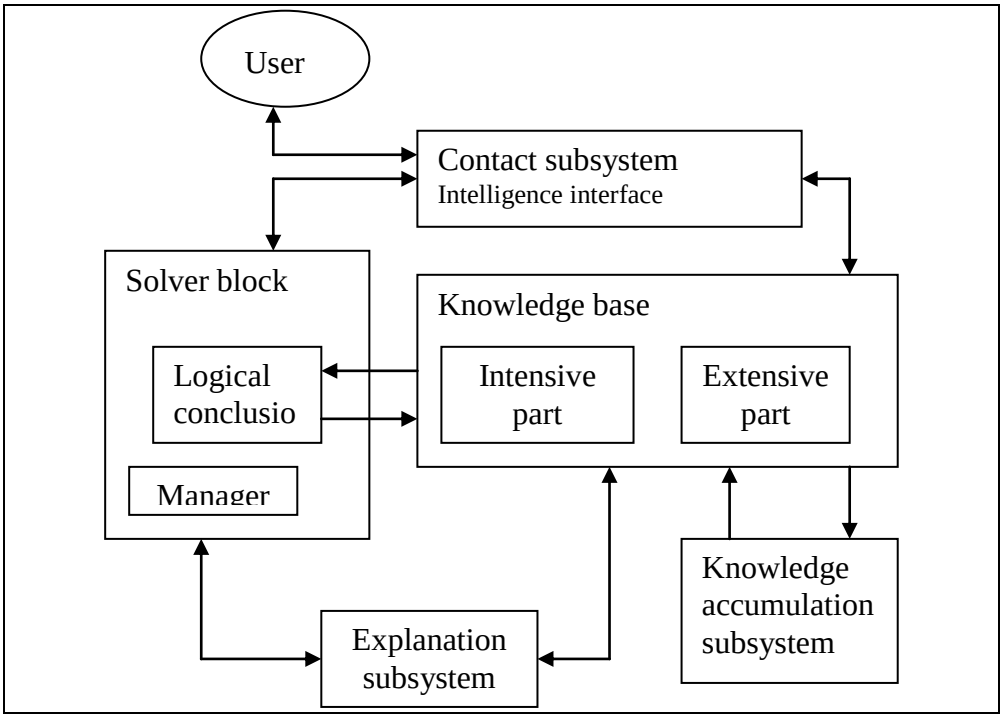


**Figure 1. The Expert system structure.**

*Source: own elaboration prepared by Sadchikov*

The theoretical module solves the important problem: students study the theoretical material by courses, which are similar to Artificial Intelligence, with the assistance of the Artificial Intelligence environment. We suggest students work from the beginning of educational process with the Artificial Intelligence program and watch the direct realisation of studying material in the practical program with the assistance of which the studying process is going.

## 3. THE STRUCTURE OF REMOTE EXPERT SYSTEM

The structure of Remote Expert System is similar to other expert systems.

The 1st block is an input data block. It is realised in the program module, called "Methodist". It is intended for filling system knowledge base with educational material and tests.

The topical material is placed as an HTML-document with possibility to include multimedia elements.

This gives more freedom to use teaching resources. Training material is constructed as a hierarchy of the following elements.

The subject - the top member of the hierarchy describes the teaching subject. An element of the system describing the object has the following attributes:

Theme – a basic education unit. Theme attributes are name and description.

Theory address – unit's address on the web server which describes the theory of the topic.

Level of difficulty – part of educational topic, containing elements of the same level of education uptake.

The number of questions into RES test - determines how many questions will be presented in an education element.

Threshold delivery of educational element in test – percentage of correct answers in an educational block.

Instructions for the test - text instructions that will be displayed during a test process.

Educational element - a education unit (theory block) that should be studied.

Name - the name of the theory block.

Question - test work. Every education block is assigned a number of tasks, sufficient for determining its assimilation.

Name - the name of the issue, which will be displayed in the editor.

Question text - the text of the question.

How many times participated in the test - an aggregate field is automatically updated by testing process.

How much time you get a right answer - aggregate field. Correlation values of the last 2 fields suggests the validity of the question.

The test work consists of two parts - the general part, which attributes are given above, and expansion part, defining the type of question (open, alternative, compliance, etc.).

New extensions of issues can be connected to the system as it evolves.

At this moment we are create a selective type of question.

Attributes of selective questions:

The number of correct choices in the instance of the issue - every time a question is involved in the testing, the system dials the specified number of correct choices in the corresponding list.

Number of distractors in the instance – like first attribute, but only for distractors.
List of true answers – presentation of correct answer implemented in text.

Distractors list - each distractor presented itself a line of text. These fields allow you to draw a conclusion on the validity of a particular distractor (Figure 2).

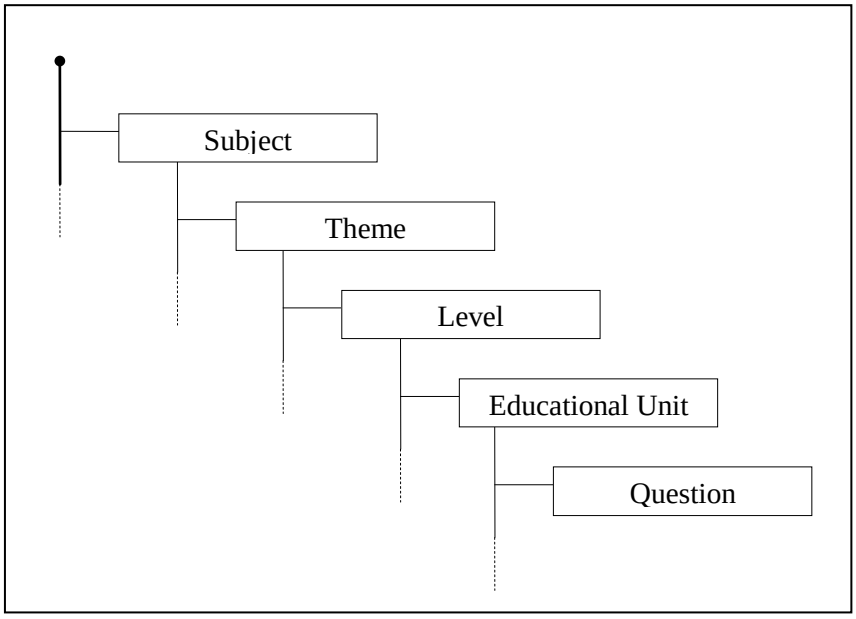


**Figure 2. Structure of educational material.**

*Source: own elaboration prepared by Suslova*

If authentication is successful, the student gets to the main window. The main window consists of two fields: "Objects" and "Results". The "Objects" field is a list of units created by teacher to the student. The student chooses a

subject and topic. Student's knowledge is assessed by the test control system. A student may continue to perform the test until he has answered all questions. A student cannot change the level of difficulty during the testing process.

The second block is a “Solver block”. It interprets data which is received by tests, for future theoretical material correction and work on mistakes by students. The block is realised in a program module which is named “Student”.

The student is identified by the system in the beginning of the work.

If identification is successful then the main program window is easily accessible to the student. The main program window consists of two fields. Their names are “Subjects” and “Test results protocol”.

The field “Subjects” is a list of subjects which are signed by the teacher for a concrete student.

When the student has answered all the questions in a test, he may click the button “OK”. If the test is passed then the system shows the window which contains the message about successful study at the current level and offers to study the next level. Otherwise, the system shows a window with theory on the topic and instructions on the gaps in the student’s knowledge.

After completing the test, the student can see the results. If successful, the student moves on to the next topic. In case of failure, the program generates a theory from parts of the poorly acquired material.

After the topic study the student moves to another topic. After successful study of all topics the subject is considered studied.

Block 3 – the knowledge base.

The block of Remote Educational System stores all important information for the learning process. The structure of the training material topics can be represented as a graph in which nodes - are concepts and arcs - the dependence relationships between them.

The body of knowledge should be organised to the following conditions:

1. A set of concepts must be ordered by the complexity from easy to difficult;

2. Any concept should apply to the base set of known concepts or entity shall be disclosed in the definition;

3. Mutual determination – to be excluded.

Independent Logical Relations concepts are grouped by level, so that the 0-th level is the input of knowledge, and at the last level there is target knowledge.

First we study the input of knowledge, then knowledge of level 1, and so on, up to the target at the last level of knowledge.

After studying each level the student is offered a test that contains the concepts discussed at this level. With successful completion of the test, the student is allowed to explore the next level. If the test reveals gaps in knowledge, the system offers a re-examination of the material, focusing students on the trouble elements.

At each level of study, students are offered questions that mention educational elements of previous stages

Arcs of net are relations between notions.

After studying each level the student is put to the test, which contains notions studied at this level. If the test is passed, the student may learn at the next level. If the test is not passed, the system offers to learn the material again and instructs the student on those educational elements which causes problems.

At each level given for the student part of the theory does not include educational elements from previous levels. So volume of the proposed material decreases in study process.

Between topics of one subject there exist relations which determine an order of the study.

Topics are related to each other by net of cross-links

The $4^{th}$ block is a contact subsystem. It is an interface, with the assistance of which students interact with the remote studying expert system.

The $5^{th}$ block is an explanation subsystem. It allows RES to explain to the student how it took a conclusion concerning his educational process.

The $6^{th}$ block is a knowledge accumulation subsystem. It allows the expert system to accumulate new data about the educational process.

The use of RES dynamically build a training session, depending on the student's progress and ensure that the material of the discipline would be examined.
In the case of self-study of the subject, or in distance learning RES becomes a basis of learning process.

## CONCLUSION

Only organised information can be educational. Remote expert systems technology allows for organising information structure and creating the course on individual qualities of students.

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# THE EXPERIENCE WITH USING E-COURSES IN VARIOUS FORMS OF STUDY

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***Abstract:*** *Nowadays, using the electronic support in education is quite common. On-line learning systems are mostly used in higher education. A lot of research is conducted to evaluate the effectiveness of using these systems. Regardless of the research, we try to point out some aspects based on our own experiences. We teach a lot of students in full-time, distance, complementary and lifelong learning modes of study in which we have used e-courses in a different way. The paper aims at summarising the authors' several years' experience with higher education studies mentioned above. We try to describe the good and the bad sides of using e-courses mainly from the teachers' point of view.*

**Keywords:** electronic support, e-courses.

## INTRODUCTION

Information and communication technology (ICT) can improve the operational processes of any business and the education industry is no exception (Stefanovic et al., 2011). As development in the ICT field is progressing rapidly, it is crucial not only to sustain the correct trend in education by using modern tools but also search for and implement newest methods and forms of education. Kostolanyová states that we live in a society in which information and communication technologies (ICT) are becoming a driving force for its development. E-learning is obviously a part of this (Kostolányová, Šarmanová & Takács 2011). Electronic learning (e-learning) environments offer possibilities of delivering communication, interaction and multimedia material that enhance learner-directed learning, especially in higher education (Stefanovic et al. 2011). However, literature shows that adopting e-learning does not guarantee improved learning. This is

because mixing technology and the content does not necessarily yield effective learning (El-Ghalayini, El-Khalili 2012).

Since the year 2006, on the basis of projects Leonardo, Operational program education as well as on National and university grants at the Department of Informatics, Faculty of Natural Sciences Constantine the Philosopher University (FNS CPU) in Nitra, there have been developed a lot of e-learning courses designed to support teaching, predominantly informatics subjects. Some of them were presented at various domestic and foreign professional conferences and competitions where they won several awards. In the article the authors describe their experience with e-courses in different forms of study – full-time study/extramural form of study, qualification study, lifelong education, etc.

## 1 EXPERIENCES WITH USING OF E-COURSE SUPPORT IN CLASSIC FORM OF LEARNING

In this part we will focus on summarising our own experience in education as well as in the scope of realisation of several projects. We will describe negative and positive aspects of using e-courses for various groups of students.

### 1.1 Bachelor and Master study program of the Department of Informatics

The Department of Informatics FNS CPU in Nitra has used LMS Moodle since 2006 as e-learning support (current version 2.3). Currently is this department involved in a project which is focused on the quality and attractiveness of content and formal side of e-materials and e-courses with regards to possibilities of applying it in the distance method of education (A-CENTRUM FNS CPU in Nitra – Center of Innovative Education, ITM 26110230026 – activity ICT Virtual).

Every subject of the study program of the Department of Informatics has its own e-course into which students are obligated to sign in at the beginning of the semester. By means of the on-line course we deliver in face-to-face study complex electronic support. The course in this form serves as the primary study material and source of learning aids, a medium of communication between students after lessons and a solution which facilitates administration related with monitoring learning activities of students during the semester, logging and analysing their results.

Courses have unified structure – introduction, learning lessons (thematic dividing is usually done according to number of weeks in the semester) and closing stage. Each learning lesson should involve electronic material used during the lecture, forum to the lesson, other study materials and set of resolved and unresolved tasks. Apart from learning lessons, the course contains informational lessons that include e.g. terms for exams, listing of sample test questions or discussion forum.

### 1.1.1 Difference between full-time and extramural form of study

The difference is mainly in the way of e-course usage during the education process itself. Because standard duration of semester is 13 weeks, the course length is adjusted to 13 thematic units. From the point of view of a full-time student the course is "growing" – every week a new thematic block is showed. The newest block is highlighted to which the student should pay highest attention. At the end of semester the entire course is available, i.e. all sources are accessible. Students know in each and every moment what the latest topic is and what will be practised during practical seminars. New information is also available in the form of discussion forums or via mass email by using services of virtual environment.

Unfortunately, many students count on the immediate information too much. They expect that exercises from practical seminars will be accessible immediately after the class. This would disrupt the learning process in other groups so it has to be avoided. Furthermore, they expect that they will have answers to questions asked via discussion forums (or via email) almost instantly, every hour, day or night. Providing electronic material has its disadvantages. Students usually rely only on what is and will be placed in the e-course and think that nothing else is needed for successful completion of the subject. They are not motivated to search for additional sources and as a result they lose critical thinking where they can develop and form their thoughts or techniques.

In the extramural form of study it is not important to open a new part of the course on a weekly basis as it is not possible to guarantee weekly lectures or practical lessons as with full-time students. Therefore, extramural students have the same type of course revealing as full-time students but it is displayed via thematic unit groups or the whole course. During several years of using e-courses we found out that extramural students tend not to actively use the e-courses – usually they access them just to get sources. Very problematic is communication as the extramural students do not make much effort to actively communicate or contribute to the discussion forums (they are mostly active before concrete deadline for handing in their projects or

exams, etc.). While enrolling every student obtains their own university email address to which he receives copies of every message from university portals. According to the setting of automatic replies we can easily find out that extramural students check the mail at this email address less often than full-time students. This often generates problems when coordinating deadlines and tasks which are being sent via email. Recently social networks are used for communication much more often. Hence, it is important to maintain contact with an active representative of a group of students who will distribute important information to other students via a closed social group.

A positive aspect from teachers' point of view is using students electronic portfolios during continuous monitoring of their learning activities (Palmárová, Lovászová 2007).

In the years 2010 – 2011 we realised an experiment focused on determining the quality and manner of teaching with the use of an e-learning course. The experiment was conducted sequentially, always in summer semester of the academic year 2009/2010 (control group) and 2010/2011 (experimental group). At the end of the already realised experiment we asked students to fill in a questionnaire, possibly adding a comment on what they were missing and what was overused in their opinion. We were especially interested in students' opinions not only on the formal aspects but also on the content side of the e-course. Overall 146 students, aged 18 – 50, were involved in the survey, respectively 73 students in the academic year 2009/2010 and in 2010/2011 again 73 students. The questionnaire included not only basic statistical information about students but also questions regarding evaluation of the quality and manner of teaching and electronic learning material.

We found out that the content and form as well as graphical design of the entire course is on satisfactory level. We were surprised by the fact that in their answers to the question whether the e-learning course was sufficient and whether they did not need the teachers' explanation, the participants answered definitely negatively. This fact has confirmed that e-learning course is an outstanding teaching aid but not always it can fully substitute direct contact between the teacher and the student. (Magdin, Turčáni 2012).

### 1.1.2 Bachelor's program of the Department of Nursing – extramural form

In years 2008 and 2009 were in LMS Moodle environment implemented all courses created in the scope of project E-learning in Community Care (further EICC), CZ/07/LLP-LdV/TOI/134001 (3 courses in Slovak and 11 courses in English language). The goal of this project was to create a program

of specialised education for non-medical health personnel in the area of community care with the help of modular system and prepare individual modules for e-learning form of study (Cápay et al. 2009). One of the functions of the Department of Informatics was to provide creation and fill in the courses where the content side was the responsibility of guarantors and tutors of particular partner organizations.

The courses were tested on the students of distance form of study at the Department of Nursing, Constantine the Philosopher University in Nitra as well as the students of detached department in Prešov and all the participants were at the time of study actively working in the various health institutions as nurses and/or midwives. The students were asked to fill in the questionnaire at the end of the course. Since the questionnaire was realised non-anonymously, we needed another, more objective sources that would enable us to evaluate real advantages and disadvantages of the designed form of study. Very interesting and useful course usage information was gained also from the log-on file analysis. The log-on file is created by LMS Moodle automatically and contains information of everything that happens in the e-course. That can help us better understand the behaviour of the student in the e-learning environment. Comparing the data got by two research methods it is possible to get more relevant information of the real process of participants' study, eventually also interpret the differences between the responses, system statistics and real behaviour (Cápay et al. 2011a, Cápay et. al. 2011b).

We found out that most of the participants preferred e-learning (63%) to traditional (23%) or combined (13%) education. As many as 90% of the students stated that they welcomed the opportunity to study at home. In the questionnaires, half of the students wrote they studied mainly in the evenings. The log file analysis showed (Cápay et al. 2011a) that the most access entries were between 4 pm and 5 pm, i.e. in the afternoon (Figure 1).

The pictures (50%) and videos (40%)| as the form of study materials were preferred in comparison to text, animation and audio (Cápay et al. 2011b).

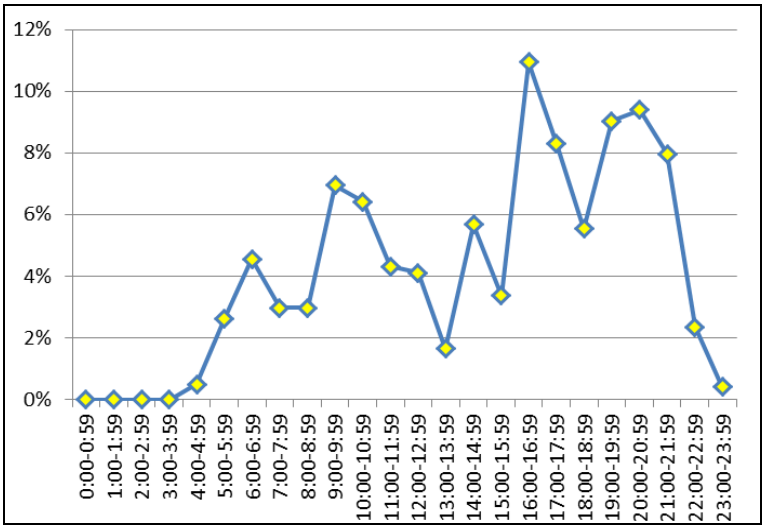


**Figure 1. Log on entries categorized by the time.**
*Source: own elaboration prepared by Cápay 2011*

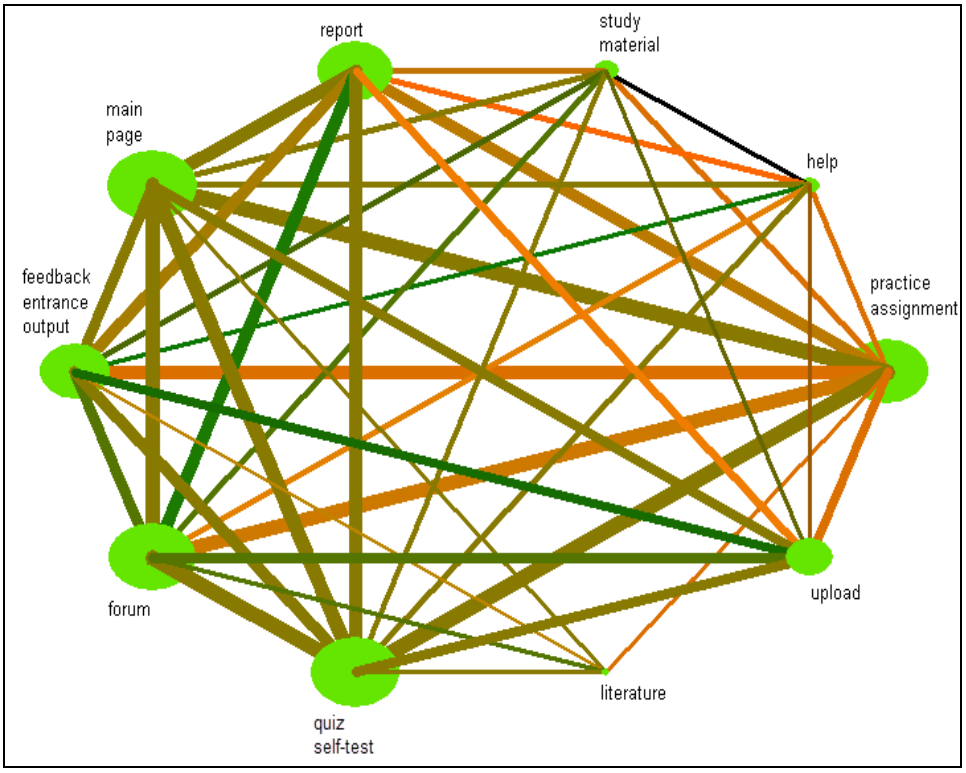


**Figure 2. Web graph – visualization of found rules.**
*Source: Balogh et al. 2010*

According to questionnaire answers the students most often accessed the activity "quiz". The second most common activity was submitting assignments. Based on the analysis of the logging file we can closely observe not only how often students really accessed individual materials but also in what order they access these activities or potentially how often these couples of activities occurred. The size of the node in the web graph (Figure 2) represents the support of an element (frequency of category accesses), the line-width - the support of the rule (frequency of occurrence of the pair of two consequently accessed categories) and the brightness of the line - the lift of the rule (specifies how many times more frequently the visited categories occurred jointly than in case if they were statistically independent) (Balogh et al. 2010). The most visited categories of the course components were: main page, quiz (self-test), forum, practice assignment, report and feedback entrance output as well as the combination of pairs of these categories. The least visited, on the other hand, were: study material, help and literature.

Work on the EICC project has showed us possibilities of how to create courses based on requirements of others. We found out that e-course usage is perceived very positively by teachers as well as by students during the pilot incorporating into teaching. Highest concerns had teachers during the transformation of classical materials into the electronic form. On the other hand, highly praised were statistics, discussions and possibilities of adding other on-line sources in the courses.

### 1.1.3 Virtual faculty

The cooperation among the faculties continues in another project. The project Virtual Faculty – Distance Learning at the Faculty of Social Sciences and Nursing of Constantine the Philosopher University in Nitra started in 2010. Its aim is to create virtual faculty that would be based on e-learning courses available for the students 24 hours a day, 7 days a week. Its effectiveness requires the involvement of pedagogues trained for e-learning education and able not only to manage the education but also to prepare appropriate materials and activities for this type of education. The processes and outcomes defined and verified at the level of one faculty can be, in case of successful realisation, applied also to the other faculties that are at the moment functioning rather individually. The project will finish in 2013.

## 2 EXPERIENCES WITH USING OF E-COURSE SUPPORT IN CONTINUAL LEARNING

Education at the Department of Informatics is not focusing purely on teaching students in bachelor's and master's study programmes. It also deals with educating teachers with pedagogical practice from primary and secondary school, high school and university surroundings. The most important projects that were focused on improving didactic effectiveness, knowledge and skills of teachers in the area of development and implementation of ICT in education were "Further education of the teachers of primary and secondary schools in the subject of Informatics" and "Confirm it using Enter!".

### 2.1 Further education of the teachers of primary and secondary schools

The project „Further education of the teachers of primary and secondary schools in the subject of Informatics (Ďalšie Vzdelávanie Učiteľov základných a stredných škôl v predmete Informatika - DVUI)" started in 2009 and finished in 2011. The objectives of the project were to design, prepare and realise modern further education for informatics teachers at primary and secondary schools supported by digital technologies and to equip participants in education with digital technologies needed for their education which they can further use in a teaching process. Each participant obtained a digital technology, laptop and data projector. Each teacher gets a new universal teaching aid and specialised publications. These materials, together with additional materials in the framework of e-learning support, were the basis for the education (Cápay et al. 2012).

Despite the fact that the main part of education were face-to-face encounters with participants, usage of e-courses allowed us significantly to manage the complex process of communication as well as assigning and evaluating tasks. Because there were more than 1600 people involved in the project (teachers and lecturers) it was necessary to handle organising contact meetings, coordinating deadlines, mutual communication (discussions), distribution of electronic support of education, assigning tasks, collecting solutions and finally evaluating and assessing. All this is done on a nationwide scale and despite this we need to have the ability to administrate also selected local groups of students. For this purpose the project portal was created (LMS Moodle) http://dvui.ccv.upjs.sk/kurzy/, available for the participants even after finishing the education.

Together there were approximately 90 active courses. Each e-course has a unified structure – discussion, electronic version of study material,

assignment (individually for every group) and final assessment. Every course is then individually differentiated by the amount of study support – tasks, supported materials, sample solutions, original teaching software, etc. Each target group had special courses for handing over closing papers at the end of study, testing along with getting feedback from the participants.

Consequently we can state that the most used activities were discussion forums, upload and tests. After an insight into the e-learning portal DVUI a year after the project ended it is evident that teachers no longer use it actively. From the statistics of randomly selected courses of all target groups we found out that visits are more sporadic. There are some courses where in the last year the amount of access was equal to zero. If the teachers stored materials from the forum into their computers, they have probably no further motivation to visit it (the portal is no longer updated). Discussion forum that could be used for communication with a limited group of participants remain blank.

Obtaining or broadening skills in virtual education tools and environment usage (e-learning, education and community portals, etc.) were by the participants in the questionnaire rated with marks 1,5 (1 TG), 1,7 (2 TG) and 1,8 (3 TG). From their point of view it was a topic they considered to be quite significant. In the answers for questionnaire collected a year after the project ended, participants' state that they also use on-line community portals. Regardless of this, e-learning as a type of teaching was used only by individuals. (Cápay & Magdin 2012)

### 2.2 Confirm it using Enter!

The objective of the project "Confirm it using Enter!" was to initialise and motivate the teaching staff of CPU in Nitra to acquire and deepen their competence in the area of ICT and multimedia with providing educational programme with e-learning support. Education was prepared as an activity without the possibility of allotting credits. The realisation was done with the combined form with the duration from May 2010 to October 2010 and it contained 6 thematic areas (ICT Basics; Education management; Graphics; Multimedia applications; Web page; Security on the internet and Copyright law). For each area an extensive electronic support in the form of e-course was prepared.

Similarly as with most of similar projects, also in this case the organizers (skilled workers of the Department of Informatics) have to cope with typical problems connected with time management as well as with the lack of effort and willingness of teaching staff to even participate in this kind of project.

Interestingly, before the realisation of the project 79 out of the 90 questioned respondents confirmed they were interested in educational programme with suggested thematic content (Burianová, Magdin 2010). From initially registered participants, the motivation to finish the project lost 60% of the responders.

Despite the initial lack of motivation for attendance in education activity only 12% participants at the end expressed that they would not be interested in this kind of education. (Burianová, Magdin 2010). While answering question: "Would you be willing to devote to this educational programme 2 semesters at university with a combined form of education?" the participants were not so unequivocal (Figure 3) (Burianová, Magdin 2010).

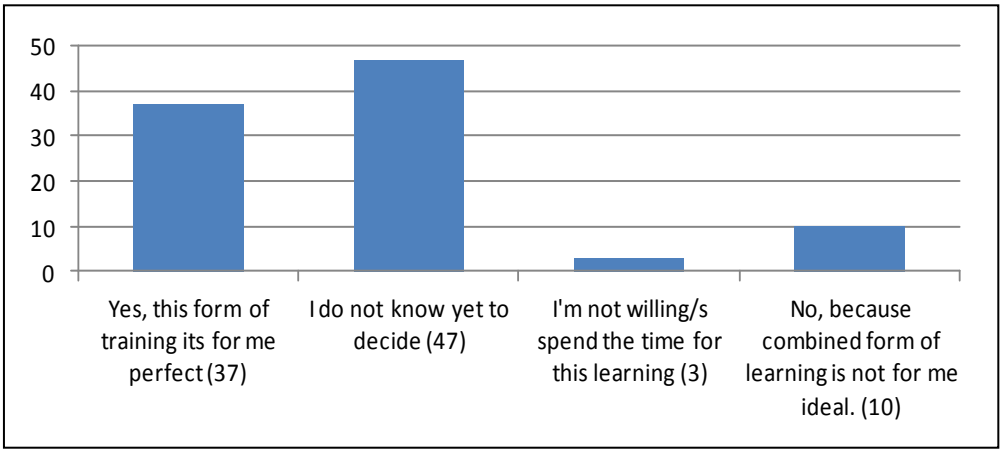


**Figure 3. Answers of the questionnaire.**

*Source: own elaboration prepared by Burianová, Magdin 2010*

The main contribution of the realised educational programme was in extending the offer in distance learning form (a combined form) with the support of e-learning at FNS CPU in Nitra. Prerequisite for its realisation was the fact that this, until now, not a fully appreciated form of education, can enrich with new factors not only students themselves but also the university education platform. With equal extent we assume that it will bring new knowledge and ideas contributing to enhancing the quality and effectiveness of education and expertise increase in one's own career growth for everyone involved. At the same time also according to the results which were closely presented in the article titled Aspects affecting the success of self-education of university teachers (Burianová, Magdin 2011), we can evaluate that participants of this form of education assessed knowledge and skills improvement after finishing this education highly positively.

## CONCLUSION

From our personal experience gained in the projects along with traditional teaching we can state that e-learning has its positive but also negative sides. E-learning in the current form is not possible to be perceived as a creation of e-course which we can afterwards use several years. E-course is not a printed publication and thus it is constantly updated and innovated. Update should focus not only on the content but on the student, from whom we need to gain feedback about his activity in the course, as well. We can assume that the questionnaire method is not relevant for gaining the information about the process of study in the e-course because the user can embellish the responses or sometimes he/she is not even able to say how often he/she accessed some parts of the course. Analysis of users' behaviour via the method of usage analysis seems to be one of more relevant possibilities of how to describe and visualise real behaviour of the user in the e-course (Cápay et al. 2001a).

The main positive aspects include the fact that the e-learning form of study is available and accessible 24 hours a day. Every student has his/her own routines and is used to studying in different time periods according to individual needs. From the teachers' point of view there are main positive aspects for teaching especially (apart from the distribution of study materials and efficiency improvement of education organisation) the usage of the student's electronic portfolio during continuous monitoring of his learning activities and results as well as in final examination (records about his activity in the system, hand in tasks, tests, forum entries, etc., everything is interactively available anytime). Simultaneously it is shown that students prefer illustrative and compact nature of information (educational videos prior to texts) and possibility of fast spreading of information in the form of sharing (social networks, data storage).

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# VISUAL SKILLS IN THE CONTEXT OF LIFELONG LEARNING

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***Abstract:*** *This article discuses visual literacy in the context of lifelong learning. The knowledge and ability to interpret images is one of the key elements of information literacy. A person is able to effectively communicate with others, to acquire knowledge about the world and create a new reality, thanks to information and visual competence. Therefore, there is a need to define more precisely and standardise the information and visual knowledge and skills to be used in education. The dynamics of development of technology and digital visualization involves us more and more in the world visual and multimedia communications. Modern methods and environments of learning should be adapted to these changes. The visual culture forces participants to acquire the skill of communication process necessary for the proper and lawful use of images. Clarification of visual skill set is the starting point for educational activities undertaken at different stages of human life.*

**Keywords:** visual literacy competence, visual knowledge, visual culture, visual educational content, information literacy.

## INTRODUCTION

Learning is one of the basic tasks and challenges for man. In broad terms, the process of education is understood as learning which is acquiring knowledge about the surrounding natural and physical environment, as well as the world of arts and culture. The information and skills which we acquire through experience enable building creative attitudes and functioning better in the surrounding reality. Achieving necessary proficiencies during school education or through self-development, honing talents and interests, enables developing one's individual personality and using one's qualifications on the job market (Janowski 2002). One of the essential proficiencies which allow unimpeded motility in the technology dominated environment are informational competences, which include visual competences as well. The possession of visual knowledge and image manipulation capabilities in the process of education and communication, in the age of dynamically expanding multimedia resources seems necessary. Image as a medium brings great – still not fully exploited – potential which is worth utilising in educational practice.

The ability of learning in the context of life is currently the basis for all human actions in the contemporary, constantly changing environment. It is the process of learning and acquiring necessary skills that enables adapting to dynamically evolving socio-economic circumstances, and properly functioning within them. Continual education plays an important role in the development of the individual and in the overall process of education and socialisation of the community as a whole. It is particularly visible now because the access to knowledge and new technologies is an important factor to sociological and economic development. Continual education allows keeping up with change and maintaining progress (Encyklopedia Pedagogiczna 1993).

## 1. CONTINUAL EDUCATION AND E-EDUCATION

The idea of continual education emphasises that the learning process should not be limited to the institutionalised framework of school education, but that it should last a lifetime, taking many forms. The term "continual education" is usually identified with the widely used term "lifelong learning". It usually includes the period starting from pre-school education and ending with various forms of further schooling at the retirement stage.

The definitions of continual education developed by numerous authors and institutions exhibit very little differences, according to the definition adopted by the European Commission in 2001 *lifelong learning* is "all learning activity undertaken throughout life, with the aim of improving knowledge, skills and competences within a personal, civic, social and/or employment-related perspective" (Commission of the European Communities 2001).

In Polish writing W. Okoń describes continual education as a continuous process of improving general and professional qualifications (Okoń 2001). In Poland, the term *continual education* is usually narrowed and relates only to formal and institutionalised educational actions undertaken by man through his entire life.

In turn, the commonly used term by UNESCO recognizes *continual education* as a series of educational processes,

- proceeding in a formalised educational system, functioning in the framework of educational institutions (formal learning);
- informal, functioning outside the area of institutionalised learning, not requiring any certification, but containing a certain framework and a structure of a typical process of education, with established goals, designated time, and an appropriate infrastructure, investigated from a learner's perspective (non-formal learning);
- incidental, consisting of an ongoing lifelong unorganised and unsystematic process of acquiring information, proficiencies, convictions and attitudes on the basis of everyday experience, and the external factors of the environment (informal learning) (Błędowski, Nowakowska 2010; Commission of the European Communities 2001).

Informal learning is usually related to the natural process of obtaining information and acquiring specific, and essential skills in a given time and place, and is usually connected to the sole learning activity, initiated for the purpose of self-development and obtaining necessary professional qualifications.

The necessity of promoting and developing various forms of lifelong learning was also pointed out in the 1990s, and 1996 was announced The Year of The Continual Learning by the European Commission. The undertaking of these issues was a result of the great technological development that had taken place over the last decades. The development of knowledge acquiring skills quickly outdated existing information and proficiencies.

Taking into account the dissemination level of continual education, Poland is clearly located at the bottom of the list in the national rankings. In an extensive OECD research conducted in 2001, the participation of Polish people was only 1.5 % (Błędowski, Nowakowska 2010). Since that time the situation has been systematically improving, there have been many initiatives in that field, and many projects have been initiated, many of which have been financed from the funds coming from the European Union. The research conducted in the 2009 shows that the participation of Polish people in the adult education system amounted to 4.7%. The same indicator for the citizens of the European Union amounted to 9.3%, whereas in Denmark it even reached 31.6% (Świt 2011).

The dissemination of lifelong learning is strictly related to the rapid development of information and communication technologies. The electronic information environment created a new base quality of the learning process. The technical progress in the field of computer capabilities, mobile devices such as cell phones, tablets and the dissemination of Internet access by means of the mentioned devices made learning possible virtually anywhere, anytime. Numerous courses and training programs with remote participation are organised. What is more, the number of ready made materials and teaching aids published online is constantly growing.

The term e-education can be viewed from a broad perspective and may take several forms depending on the different educational goals and tasks:

- e-learning,
- computer assisted instruction (added technology-enhanced learning),
- just-in-time learning,
- workplace learning,
- lifelong learning (Goban-Klas 2002).

New information and communication technologies also allow for a more individualised learning process, planning one's learning path, adapting to individual needs and capabilities. E-learning methods are particularly good in this field. Many of the professional courses shift to the Internet, allowing asynchronous learning and adjusting the mode (time and place) of learning for the participants. The popularity of m-learning is also growing. It is based on mobile devices such as cell phones, netbooks, smartphones, tablets, ipads, e-readers etc. College websites often make entire libraries of educational materials available which are designed for mobile devices.

Another advantage of the continual learning using ICT are ample opportunities of modifying and individualising the content of the course.

More and more courses are constructed on the basis of the modular model which means that it is no longer necessary to participate in the entire course; the user can choose the elements which he or she desires. In the framework of available courses, one can choose modules which will help to achieve own educational goals.

Among other useful features of e-education in the context of lifelong learning, it is essential to mention the potential for the diversity of communication in courses and educational materials. Thanks to digital materials, one can combine text, audio and audiovisual sources, which enable to individually choose materials, depending on personal cognitive preferences and used modes of learning. Better results in educational practice are achieved when one is able to choose preferred modes and styles of learning.

The process of education does not take place in isolation, building of learning communities enables sharing of educational goals, cooperating with others, completing projects and tasks. Contemporary means of communicating, with Internet at the forefront, provide the necessary tools for learning. For educational purposes one can use blogs, internet communicators, videoconferences or social networking services. Many of the dedicated e-learning platforms offer these types of services. However, there is still the informal field of learning which also enables to create a network of communications for virtual communities, often with the use of free tools and services.

The above outlined features concentrate on the continual learning infrastructure, its information and technical facilities, and aspects of methodological solutions. There is yet another important field that ensures the success of permanent education; these are competences in the field of operating the presented information in various forms and using it for educational purposes. The digitalised world demands the user to be skilled in using information recorded in various forms. These skills consist of the ability to efficiently handle text and image through the process of education and communication.

## 2. VISUAL COMMUNICATION IN THE EDUCATIONAL PROCESS

The interpretation of the traditional image requires skills in the field of iconology, semiotics, and symbolism – the entire spectrum of visual knowledge conditioned by cultural and cognitive competences. The contemporary needs in the field of interpretation of images used for visual

communication require research techniques which have their source in the traditional visual skills, as well as those typical for digital communication.

The definition provided by John Debes (Rochester, USA 1969) describes visual literacy as skills that allow for reading and recording of images: "What is Visual Literacy?

Visual Literacy refers to a group of vision-competences a human being can develop by seeing, and at the same time, having and integrating other sensory experiences. The development of these competences is fundamental to normal human learning. When developed, they enable a visually literate person to discriminate and interpret the visible actions, objects, symbols, natural or man-made, that he encounters in his environment. Through the creative use of these competences, he is able to communicate with others. Through the appreciative use of these competences, he is able to "comprehend and enjoy the masterworks of visual communication" (John Debes 1969).

The prevailing traditional education provides limited visual "study." During their development, the students acquire visual skills with respect to cultural models implemented by institutionalized educational requirements, environmental priorities and individual needs. Manipulation and ideological implications of visual statements, which take place in the visual environment of man, are also pointed out at this stage of education.

Currently, due to the elevated educational needs resulting from the disseminating visuality of the 21st century society, it is essential to develop visual language skills, similarly to developing verbal language, in order to decode visual meaning, (theatre, film, fashion, advertising, art, photography, public information and education). Visual literacy is an autonomous discipline which is not limited to the traditional history of arts, but with the interdisciplinary cognitive background it brings the technology and methodology of learning to education.

In order to efficiently decode and interpret images, and creatively encode and compose the meaning of visual communication, five stages of visual communication have been distinguished (Figure 2).

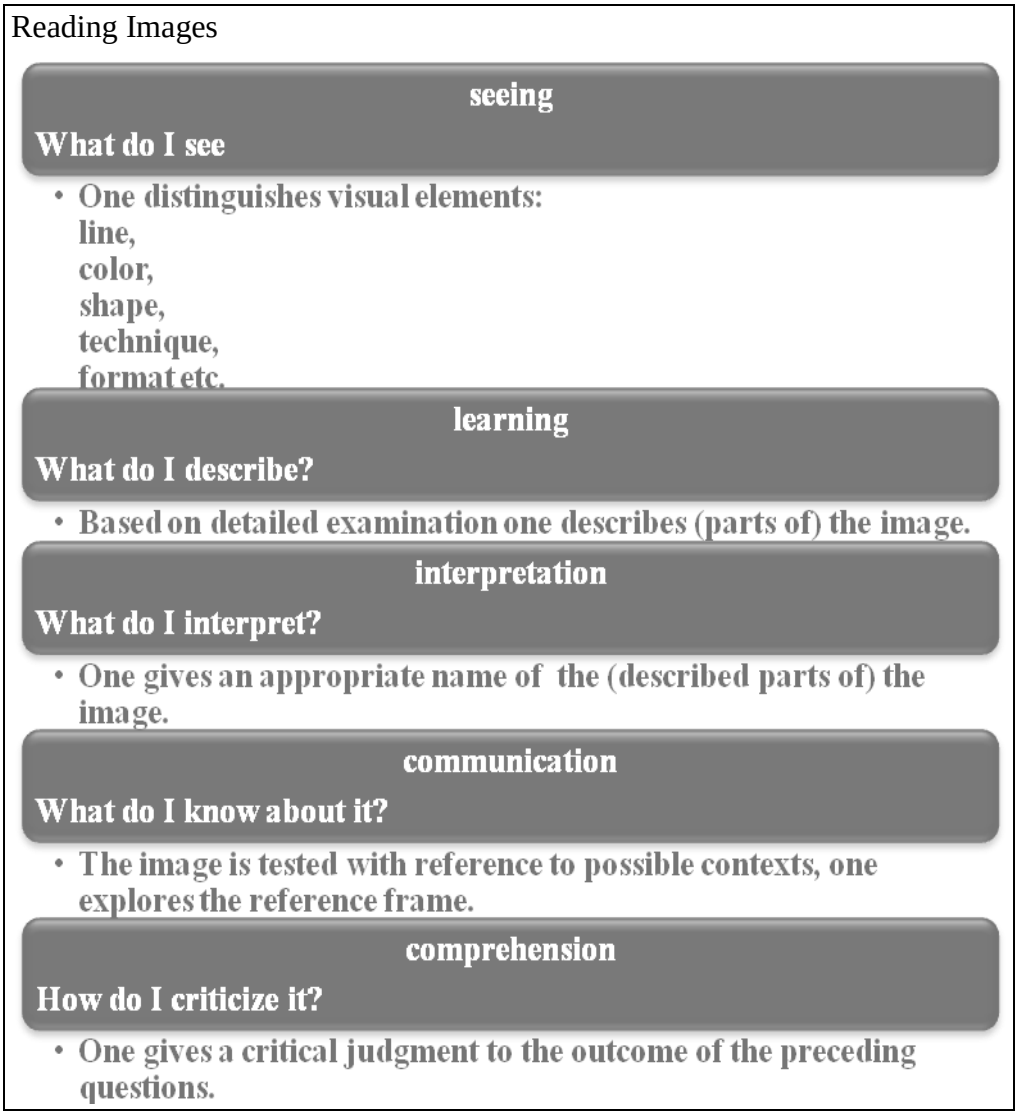



**Figure 1. Visual communication in the educational process.**

*Source: own elaboration prepared by Wieczorek-Tomaszewska based on Velders Teun, de Vries Sjoerd, Vaicaityte Loreta*

The first step is sensory perception – identification on the basis of individual experience – what I see through lines, colors, shapes and writing technique, in relation to the individual development and acquired knowledge about the world and perceived forms. The second step is the mental choice and a description of these elements which build the entire representation and how they influence the sense, and the meaning that is captured. In the

methodology of visual interpretation used in history of arts, both of these stages create what is called the pre-iconographic description. The next step is defining the meaning, naming the individual forms with respect to cultural references, semantic contents and iconographic formats (iconographic description). The next step of the iconographic analysis is finding references for perceived forms in a broad cultural and civilisational perspective, in various possible historical, social, political, educational and many other contexts. In the next step, described as a critical evaluation of the image, it is necessary to conduct a valuation of the meaning decoded in the previous stages, with reference to independent views, rules and values, as well as to confront with other interpretations and opinions of the same type. It has to be an analysis and evaluation of both good and bad sides of this phenomenon, its nature being that of an intellectual inspiration, presented from a point view with specified values, for example: ethical, scientific, cognitive, aesthetical and practical. It may concern content-related correctness, (content-related criticism and empirical criticism) formal correctness, (logical criticism) science, (scientific criticism) methods, (methodological criticism) etc.

Contemporary images which we encounter every day – in commercials, journals, magazines, electronic publications – are works of designers who digitally process photos according to graphic design rules, adapting the project for the needs of a visual message. These images are the outcome of numerous conversions and artistic manipulations which prevent the application of objective analysis that implies the shift of visual impressions and formal differentiation of the composition onto the meaning perception and the interpretation of the conveyed content. Reflection of the reality through the image becomes more complicated because of adding meaning and contextual references. Direct associations of the meaning of the forms depend on the intentions of the creator of the visual message as well as on the interpretative capabilities of the recipient i.e. the persons taking part in the communication process through image. According to the adopted interpretative scheme, it is assumed to conduct a formal analysis, during the pre-iconographic interpretation, which includes intuitive differentiation of the simplest visual schema, and attaching justified cultural and mental meaning afterwards. By occurring relations, they will be subject to an interpretation resulting from the context of the visual presentation, conveying the intended content. The quality of the information obtained by the recipient is subject to critical analysis, depending on one's communicational comfort.

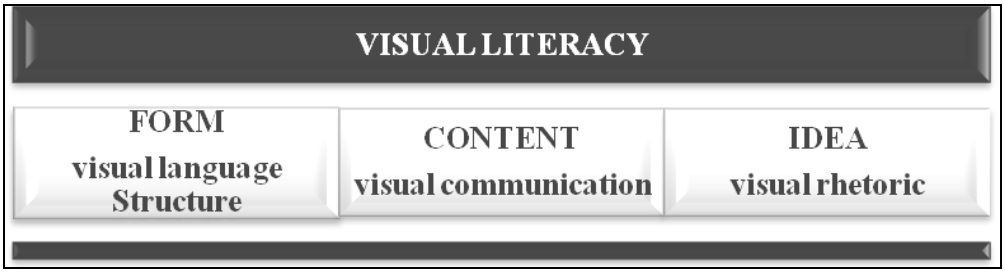
In the history of the visual message form there have been many styles and methods of recording images. Variability of historical reception, evaluation and influence of the visual works of art, coming from the changing ideologies

of the consecutive ages, is the source of the visual knowledge which currently is a component of a competence preparation of the contemporary society. When analysing a visual presentation, one cannot stop at the direct overview. References to our visual knowledge should occur automatically, introducing interpretation to contextual links, revealing immaterial visual content (form – content – idea).

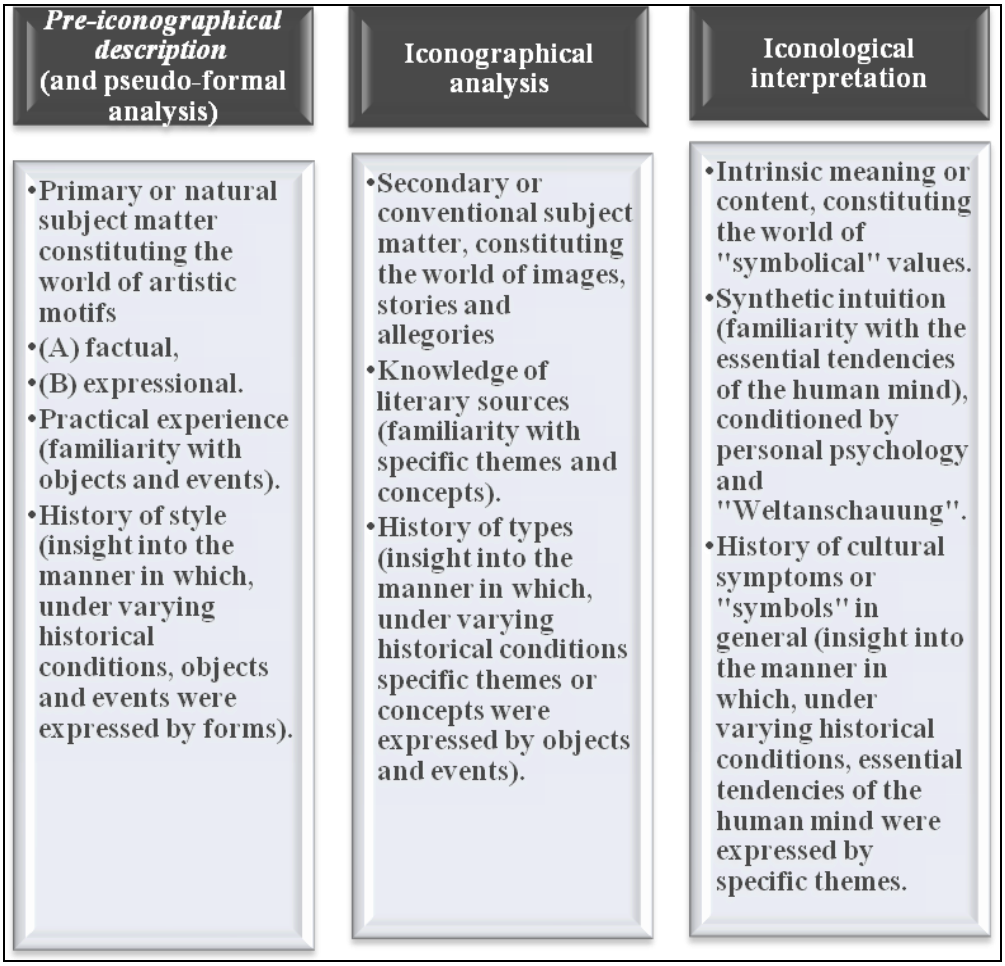
## 3. VISUAL LITERACY PROGRAM

Contemporary culture is currently increasingly dominated by visual communication due to globalization and the simplicity of using images, in contrast to verbal communication which requires the knowledge of national languages. The separation of language from the image, which has existed since the times of Gutenberg when the printed word dominated, has become less evident. Currently, conventional visual communication, i.e. iconography, illustration, schema, instruction manuals, charts, advertisements, comics, graffiti, websites – are combinations of verbal information and visualization. Mass visual communication based on this system is a mixture of knowledge and conventional images that are in general circulation and thus widely available. According to Teun M.A.Velders, Sjoerd de Vries, Loreta Vaicaityte, (Visual Literacy Program 2012) visual communication consists of syntax and semantics in order to create a form composed of visual elements, conveying specific content.

Visual communication in education corresponds to guidelines of learning which are focused on the method and the result. Below there is a scheme of reading, writing and communicating through image, consisting of a structure of undertaken actions with images based on the theory of image developed so far, in the context of educational and cultural needs. The three interweaving elements of visual communication: form, meaning and idea, find reference in the educational process, in creating visual messages at the message conveying level.




– in iconographic-iconology analysis (*Iconography. Iconology* 1999, 2012)



– in the educational process (Velders et al. 2012)

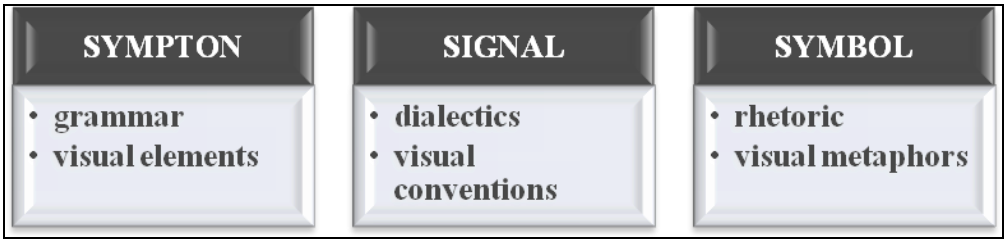



**Figure. 2 Visual communication in the educational process.**

*Source: own elaboration prepared by Wieczorek-Tomaszewska based on Velders Teun, de Vries Sjoerd, Vaicaityte Loreta, Iconography. Iconology, Woodrow and The University of Newcastle, 1999*

Similarly to the three levels of verbal language – grammar, dialectics, rhetoric – in the visual literacy program one can distinguish three levels of visual language, such as visual elements, visual dialectics and visual rhetoric (Velders et al. 2012).

Visual elements (form – pre-iconographic description – symptom) present phenomena through a system of perceived details. The basic elements outlined by the eye are: line, color, shape, as well as amplifying elements: form, space and composition, dependent elements: repetition, point of view and time, and material elements: texture, technique and innovations. Dialectics (content – iconography – signal) understood as a method of study and conversion of the world is the ability of having a dialog with the use of an image. It is based on the knowledge of signs and symbols used for visual communication which have a universal character. However, visual rhetoric (idea – iconology – symbol) is concentrated on images we use in symbolic communication in order to persuade someone. It is both the practical creation of persuasive messages and their analysis. The spectrum of exploration conducted with the use of visual images concerns the persuasive purpose set in the previous stages, when choosing form and meaning.

The construction of visual didactic statements in the framework of e-learning with the use of computer networks and the Internet is an original solution for the information architecture in such forms of education such as iconography, interactive and multimedia presentation and network visualizations. It is based on natural human cognitive methods of visual and verbal utterance – repetition, abstraction, schematization, integration, association, focus of

attention, comparison and profiling. In *Metafory komputerowe w e-kursach* (Kuszina et al. 2012) the authors identify an independent knowledge unit in a so-called computer metaphor. It is an illustrative form of projecting reality, a simplified version of content in a graphic form, possible for verbalization. As a visual form of information it conveys meaning and allows for immediate understanding in various symbolic systems. By means of visualisation or illustration, the computer metaphor is a way of combining object semantics (describing meaning) with semantics of its surroundings in the form of a shared graphic model. Its purpose is to evoke mental activities, for example: concept structuring in the field of graphic elements such as: map, diagram, concept hierarchy, hypertext or semantic network (Kuszina et al. 2012).

In the face of continual learning, e-learning methods meet the needs of different age and professional groups in the framework of required knowledge and planned professional actions of the students. Every kind of activity – cognitive, psychomotor and emotional, takes place when interpreting terms presented in the visual form, their analysis and intellectual deduction based on the ability to self-study. Psychomotor abilities serve as tools for observation, simulation and processing of the graphically illustrated reality and virtual reality. Emotional activity, which is experiencing and building values, is evoked by carefully designed computer metaphors which are manifestations of attitudes towards the surrounding reality. Simultaneously with the acquired knowledge, the emotional background is also created, which can influence its durability.

The contemporary visual message is structured as an integrated system, differentiated with respect to the level of difficulty and functionally categorised. It consists of a network of intellectual links and references to mental meanings of high level of symbolism and abstraction. The cognitive approach to the role and function in the current educational system allows for using the visual message as an independent knowledge unit in message conveying. Being the modern form of communication, visualisation faces the cognitive needs of the contemporary society; the changing lifestyle forces the creation of adequate means of communicating knowledge, adapted in form and functionality for more demanding users in the framework of lifelong learning.

## 4. VISUAL LITERACY IN INFORMATION LITERACY

In formalised education around the world, the reference to educational actions in higher education is a set of standards which precisely explains the competences required for working with information at the academic level (Wieczorek-Tomaszewska 2012; *Information Literacy…,* 2000). A similar document dealing with visual skills was created in 2011, in academic environments in the USA: The Association of College and Research Libraries (ACRL) – *Visual literacy Competency Standards for Higher Education* (Chicago 2011). It describes a set of dispositions concerning abilities such as: searching, interpreting, using, creating, describing, spreading (according to law) of visual content, which are a part of visual communication.

Among the visual communication standards in force at the academic education level, the following skills appear in the document:

1. Defining one's informational needs, including types of necessary visual materials.
2. Effective and efficient searching for images and visual media in the available resources.
3. Interpreting and analysing the meaning of images and visual media in the cultural, social and historical context.
4. Evaluating of images and verifying their sources.
5. Using image forms in order to effectively visualise terms, phenomena and processes.
6. Designing and creating own visual messages.
7. The knowledge of ethical, legal, social and economic issues related to the process of creating and using images and visual mass media, including the familiarity of the legal systems defining the scope of copyrights (Wieczorek-Tomaszewska 2012; *Visual literacy* 2011).

In *Standards*, the attention has been focused on the awareness of individual informational needs in the scope of visual materials through defining the situation, in which such needs evoke the efficient use of images. The conscious user of visual materials is able to independently define the criteria for the selection of concrete presentations, and specify the goals of these actions (illustration of terms, process models, construction schema, and photography). He can also identify the available visual resources and types of media.

The unlimited capacity of the World Wide Web is the source for creating collections of visual materials, potentially meeting the cognitive and creative

user needs. In the framework of visual competences, the ability to find images and graphic materials in many different sources plays a fundamental educational role. In order to take advantage of this ability, what is necessary is the knowledge of sources; where they are, what the limitations are, and what are the conditions of using them – in order to do this one can use search engines for photos, images, clip arts etc. The choice of the appropriate search engine is for many people a substantial difficulty, similarly to a properly edited works cited section.

Apart from the awareness, the searching ability and the description, the next step within a specific competence in the framework of visual communication is image perception, decoding of meaning and interpretation along with the analysis in the context of existing conventions, environmental, social or cultural conditions. The interpretation occurs on the basis of the visual knowledge, the context and the intertextuality of the meaning. The visual knowledge is constructed along the process of education and socialisation of man; it can be acquired through interaction with other members of the society, i.e. through gathering opinions and establishing terms. It is an element of knowledge and cultural competences, a cultural capital, a component of unit's habitude as a member of the society in which he lives and grows up.

Thanks to this knowledge one can conduct an analysis and an evaluation of the content from different perspectives, position the message in informational, cultural and historical contexts. It is connected to another competence skill in the scope of visual communication i.e. the evaluation and verification of the sources of the visual messages. It results from the need to shape informational consciousness with respect to the used procedures, allowing for manipulation of data and facts. In this case the estimation of credibility of the recorded sources, the origin of the images and visual messages constitute basic visual qualifications.

Information consciousness is a state allowing for creative and efficient use of visual representations in a form that is appropriate to context, i.e. as a quotation, illustration of an object or term, proofs of claims and hypotheses, visual models, phenomena visualisation. Information consciousness is also an independent unit of knowledge built according to its internal structure which purpose is to accomplish the cognitive objective. In the framework of a creative use of visual forms there is a possibility of going outside the known schema and experiment, enriching own work, giving it an unconventional scientific character through using visual thinking skills in order to explain and solve problems.

The next area of competence concerns workshop and technological skills allowing independent preparation and construction of graphical forms to deliver the informational and educational content. It is an element of the visual knowledge where, apart from cultural, content-related and informational knowledge, there exists a condition of technological efficiency which ensures effective communication. Because of this, there will be a possibility of building single messages or entire narrations in visual form, i.e. iconographies, posters, schema, presentations mind maps etc. The rules for designing informational visual messages regulate competence conditions of correctly constructed images, including disposition of the sender, as well as perceptive skills of the recipients, for whom the message will be adapted. Currently, the professional informational statements in visual form are works of artists and computer graphic designers. Such materials are used by the educational, public and industry sector (Pulak, Wieczorek-Tomaszewska 2011). It should be assumed that with the spreading of graphic software and the increase of the technological skills of the society there will be a shift of graphical design skills as a voicing element in many areas of life, including education and science.

The successive competences covered in *Standards* are ethical and legal conditions concerned with acquiring and using informational material from the web. The need for shaping competences in the field of understanding legal issues, the familiarity of license regulations that ensures the appropriate use of information, visual as well, is currently, in the light of global social protests (ACTA 2012), a subject of prioritised educational treatments. The habits of illegal copying, downloading and abusing copyrights are common and indicate that there is a necessity of making users aware in the field of issues concerning intellectual property and its practical use in conjunction with social, economic, ethical issues. The appropriate use of images and visual media, identification of typical license limitations, allowing for appropriate use of image and the awareness of personal laws as the creator of the image for intellectual property is a subject of study conducted by the two authors in the further part of the presentation.

The presented visual literacy scope of competence, developed for higher education by ACRL defines the level of skills and the spectrum of knowledge. It allows the students to search for visual information, conduct formal and iconographic analysis, give visual presentations, read contexts and applied conventions within scientific disciplines and understand cultural references. As a conscientious user of information, a student, one should recognize the need for using visual forms, and as a participant of digital

culture one should have the knowledge to acquire necessary images for creating own documents and studies, one should be familiar with publically available visual and audiovisual resources, and one should be able to select visual materials using adequate evaluation criteria. Preparation with respect to information technology and computer graphics helps to define the appropriate data format, to design own visual materials using numerous graphics editors, as well as to use visual forms as a supplement for textual messages. The entirety of these behaviours will be called informational behaviours and the visual information, and working with it, in this context will constitute an element of the information culture of the contemporary society building its standards of behaviour with respect to own cognitive needs for learning, through entire life.

## 5. INFORMATIONAL COMPETENCES AT THE HIGHER EDUCATION LEVEL AND IN THE CONTINUAL LEARNING.

The contemporary needs and challenges within communicational and media competences in Poland were discussed in *Edukacja medialna i informacyjna w Polsce – raport otwarcia* (Cyfrowa Przyszłość…, 2012). This report presents the scope of the informational and media education issue in the context – required today – knowledge and skills. It deals with the issues concerning the ability to use information presented in various forms and using media language. It shows the relations occurring in media environment, examples of creative behaviours in using digital media. It takes on ethical and axiological issues occurring in the process of communication using media. It discusses the economic and legal aspects of media activity as well as the level of safety in the web.

There are specific age groups in the presented research (children, teenagers, students, professionally active adults and seniors) which were characterised according to their behaviours towards using new communication and information technologies. From the perspective of lifelong learning, the issue undertaken in this study, it seems plausible to compare two groups of users: university students and professionally active persons. The choice of these groups results from the common need to undergo continual learning for the purpose of self-study, development and supplementing knowledge.

According to previous research, both students (97%) and working persons (71%) have access to popular technologies such as cell phones, the Internet and computers. They use them mostly at home, at the university or at work. The average time spent on the Internet is clearly higher among students and

is about 23 hours a week, whereas among professionally active adults – 15 hours a week.

The goals of using new technologies in selected age groups are connected with learning, work, entertainment and communicating with others, and are shown in Table 1. The data quoted in the report comes from the research conducted between 2007 and 2011 by different research institutions, and that is why there may be certain inconsistencies with the present situation, still they allow observing relevant tendencies and the dynamics of behaviour.

**Table 1.**

**Purpose of ICT.**

| Age group<br>Purpose | Students | Professionally active adults |
|---|---|---|
| Learning | 46% | 30% |
| Work | 24% | 80% |
| Entertainment | 40% | 50% |
| Communication | 10% | 30% |
| Finding information | 16% | 40% |

*Source: own elaboration based on Cyfrowa Przyszłość*

Analysis of user behaviour in each age group includes the most typical actions in the network. From the perspective of lifelong learning the activities that are important are used for

- acquiring information, including web browsing, gathering materials for educational and professional purposes,
- communicating with other users (e-mail, messengers, forums and social networking sites),
- creative activities such as creating and publishing own media messages.

The scope of activities within these actions is comparable for both groups. Statistics show that the Internet may be the base for the resources helpful in accomplishing own path of self and professional development. It allows to construct a comfortable communication environment which enables to create virtual relationships with others and to form local societies that jointly pursue educational goals. Although the quoted research consists of a low level of

individual creativity i.e. publishing of content and web pages, blogging, presenting visual materials (photos and videos), currently with the development of Web 2.0 there is a noticeable rise in the activity in this area. It is worth mentioning that this kind of signal is a positive phenomenon, carrying great educational potential.

Informational and IT competences of students and adults are built on the basis of needs resulting from their activity. High skill levels and informational consciousness are characteristics mostly of the students who are up to date with the modern technological standards of the digitalising society. This age group is the first stage of adulthood and creates its awareness in the field of individual educational needs. In formalised schooling it is the institution that dictates educational goals. At the academic level of learning it is the student (at least in some respect) who takes the responsibility of the personalised learning process. The university only provides assistance; it is an inspirational guide to form own goals and to take action. The ability to set goals and the way in which they are pursued is the basis for continual learning, within which one can pursue their own path of development.

## 6. THE LEVEL OF INFORMATIONAL AWARENESS OF UNIVERSITY STUDENTS IN USING VISUAL MATERIALS BASED ON OWN REASEARCH

In order to illustrate the utilisation level of visual materials in education by students of pedagogical specialisations as well as the level of awareness of the visual culture, a survey in May and June of 2012 was conducted. It was a pilot study participated by 71 students of social and humanistic specialisations at two levels of academic education (BA and MA program).

The results describe attitudes and behaviours of the young generation towards cultural and informational consciousness.

In the light of the conducted research, Google resources are irreplaceable sources of obtaining visual materials. Besides Google, the second most popular graphic search engine is Bing. Google resources are the first choice in the process of searching for visual presentations; this is presumably the result of the common use of these search services. Approximately 25% of respondents browse the collections on web pages of official institutions which acquire the visual culture heritage (library collections, online galleries, museum and gallery sites). The method of acquiring photos and multimedia materials from websites such as Flickr and YouTube is more or less the same.

A relatively high percent of students (33%) reported the source of used graphical works as own graphic, photo and film resources. Such works are gathered by them in albums available online (Figure 3).

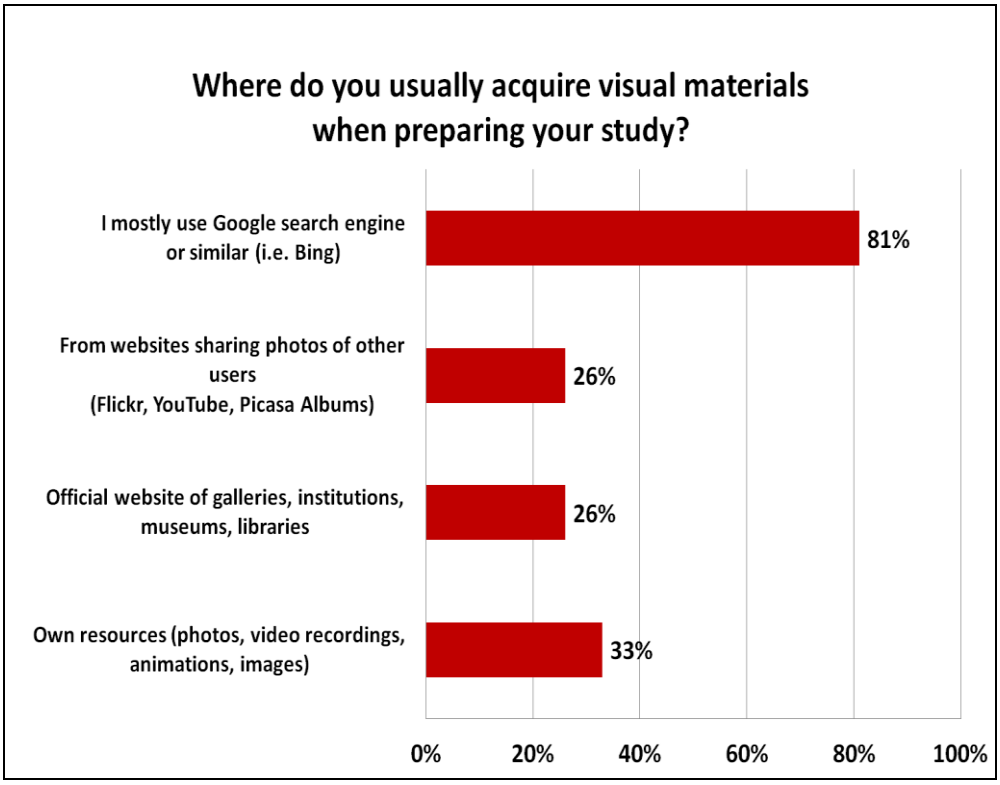



**Figure 3. Sources of obtaining visual materials used in students' works.**

*Source: own elaboration prepared by Pulak, Wieczorek-Tomaszewska*

The basic indicator of the digital culture is the level of using various graphical materials. Respondents admit that *often* or *very often* they try to use visual forms in their studies (74%). The detailed data is illustrated in Figure 4.

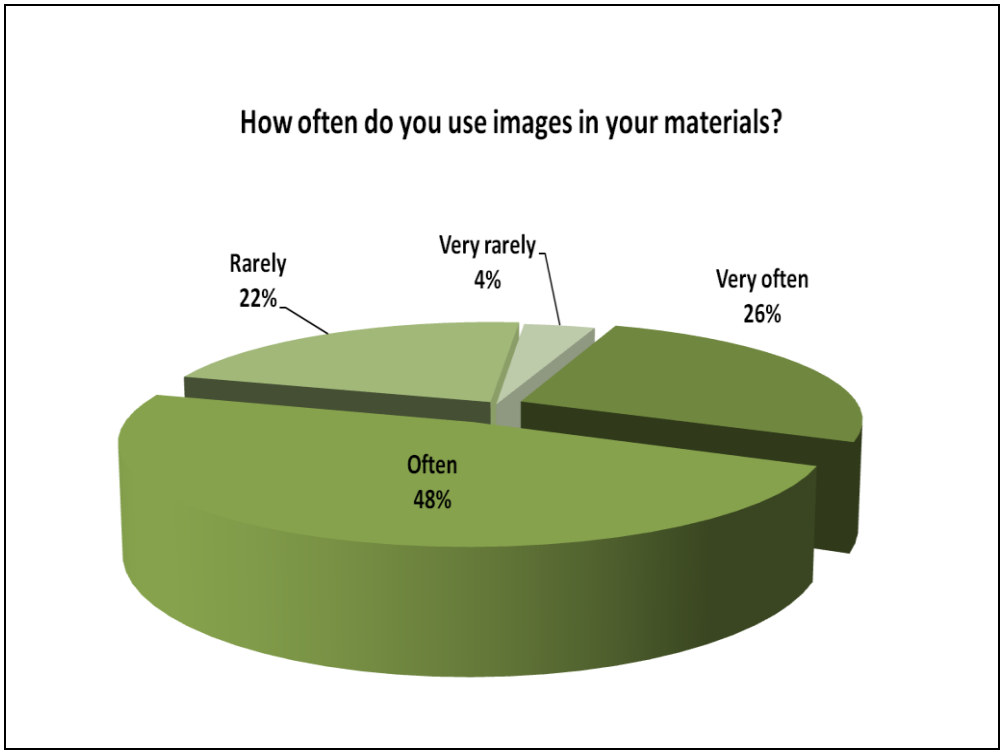



**Figure 4. Use of visual materials in students' works.**

*Source: own elaboration prepared by Pulak, Wieczorek-Tomaszewska*

Using images for educational and private purposes requires the knowledge of licenses as well as their verification. One must have the knowledge of the licensing restrictions and the rights of use of the images published on the Internet. Meanwhile, as the research shows, the use and processing of visual materials with copyrights and licensing infringement is becoming widespread. Approximately half (44%) of the young people *never* check the license of the published images and photos which are later used by them (Figure 5), and 33% of them check this *rarely.* Some respondents refused to answer the question, presumably because they were aware of the infringement.

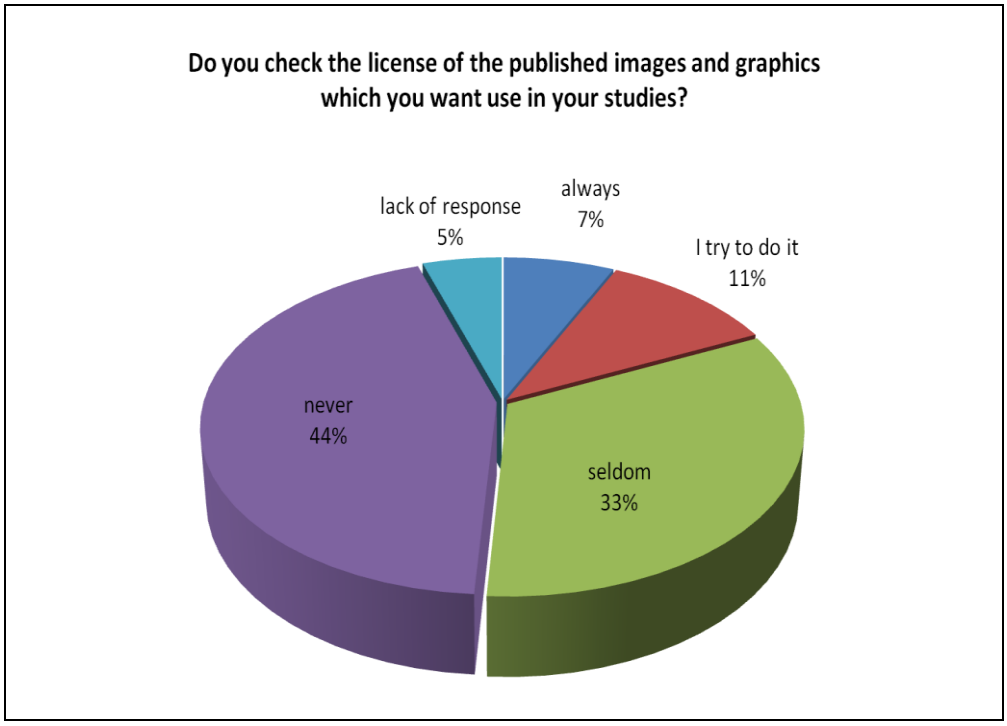



**Figure 5. Checking image license used in students' works.**

*Source: own elaboration prepared by Pulak, Wieczorek-Tomaszewska*

In the case of using audiovisual materials, the research shows greater awareness among the respondents, than in the case of copying images and photos. Approximately 41% of the respondents using video materials adhere to the requirements resulting from using materials accordingly to a specific license. Most probably, it is the outcome of the greater availability of the texts informing about postulates and license restrictions (Figure 6).

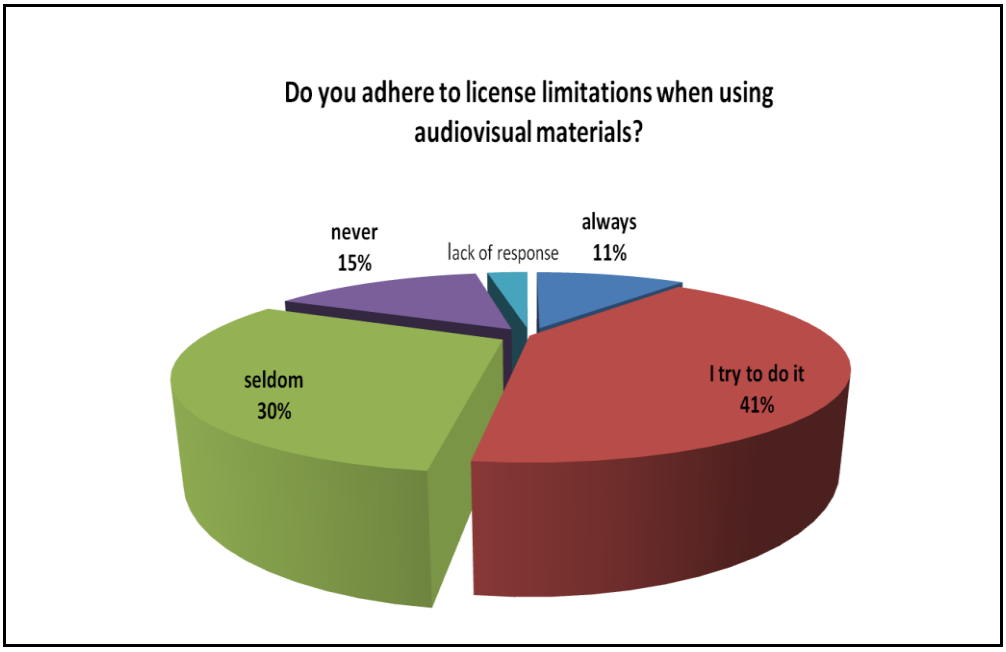



**Figure 6. Checking licenses of audiovisual materials used in students' works.**

*Source: own elaboration prepared by Pulak, Wieczorek-Tomaszewska*

Another worrying phenomenon is the frequent attitude of respondents when quoting visual materials acquired from the Internet. Only 15% of the respondents *always* give a source description of the used images and graphics. In the context of analysed social attitudes it is definitely not enough. "Relatively" correct behaviour was shown by 52% of the respondents – they are aware of the need to supply the works cited but because of different reasons (lack of skills, convenience) they not always do it. The 4% indicator of *never* which defines the group of people rejecting social norms within using visual information is worrying. The large percentage of the answer *rarely* (30%) indicates a low informational awareness and requires education actions to take place (Figure 7).

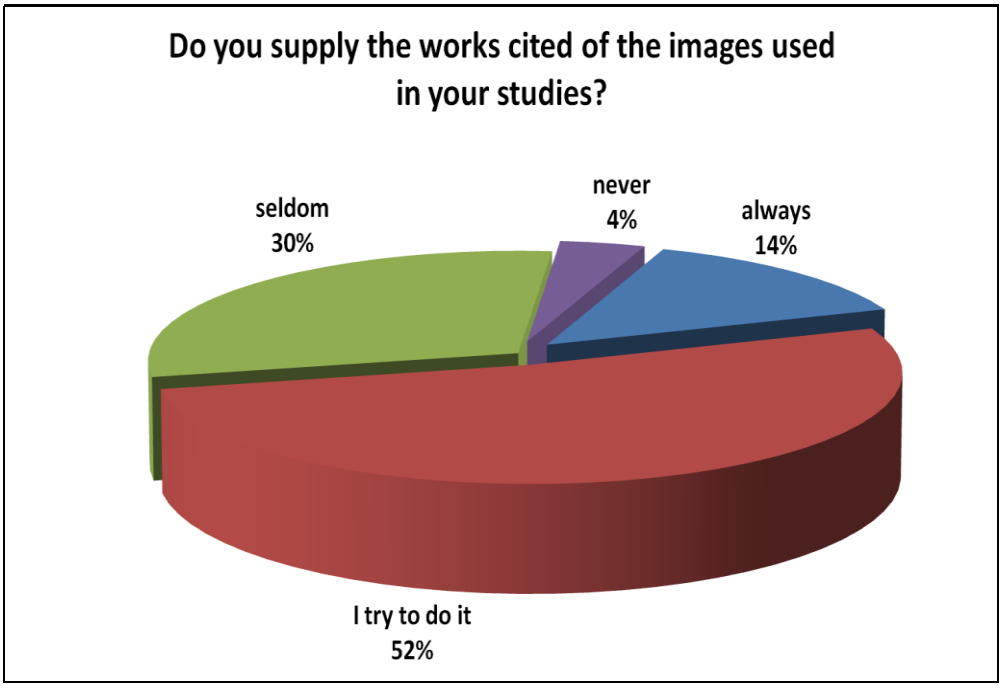



**Figure 7. Supplying works cited under used images.**

*Source: own elaboration prepared by Pulak, Wieczorek-Tomaszewska*

The quoted results show a pessimistic image of the modern young generation which does not possess the adequate knowledge or the skills in handling images. It indicates the need for further exploration of the discussed problems and issues within shaping information and visual competences. Currently, the strategy of introducing academic standards of *visual and information literacy* developed on Polish ground should be implemented on the basis of previous educational experiences in other countries. The convergence of various media that is taking place in the modern world brings the need for competence convergence which would be practical. The use of technological tools, understanding, critical reception and creating information in text as well as in visual and audiovisual form, the knowledge and the use of law in the scope of media, is the basis for any informational, educational or communicational activity. Programs introducing visual and informational literacy must be constructed in a complex and consistent manner. The world of word and the world of image cannot be artificially separated due to the fact that it requires multiliteracy. The holistic and culturally conditioned approach to informational education allows for the appropriate and competent level of

education adapted to the needs of society. Special attention should be devoted to the informational competences of students which prepare them for lifelong learning, which is currently the necessary condition for self-development, increasing qualifications, both general and professional, as well as everything that is connected with it, that is effectively arising in the competitive market.

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# E-LEARNING AND FOREIGN LANGUAGE TEACHING: THE CHALLENGE OF A NEW STUDENT-TEACHER RELATIONSHIP

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***Abstract:*** *With the evolution of the approaches in Didactics in Foreign Language, the role of the teacher has constantly evolved, and thus his relationship with the learner. E-learning already represents a two-sided evolution: not only the learner and the teacher have to adapt to the tool by itself, but they must also work out what should be their respective positions in the learning process. But Foreign Language teaching requires more than a Master/disciple or a technician/user relationship, especially in the light of the CEFR (Common European Framework of Reference for Languages). Through the analysis of the now two-year experience of the implementation of an e-learning module for beginners in the French language at the Romance Institute of Warsaw University, we will try to show the difficulties arisen and the ways taken to try to work out what we hope to be a better communication and relationship between the two parties of the learning process*

**Keywords**: e-learning, relationship, foreign languages

## INTRODUCTION

So widely used in Foreign Language Teaching nowadays, e-learning redefines the relationship between the teacher and his students. This learning tool allows to put in action the action-oriented approach of the CEFR (2001: 15) where the students are considered as social actors. This is why the backbone of most of the present elearning pedagogical design is mostly, just like the CEFR, the cognitivism and the constructivism (Mayes, de Freitas 2004).

In 2010, the Romance Institute od Warsaw University decided to start to recruit a new kind of students: beginners in the French language.

To help face the challenge of bringing these students to the level required for the bachelor's degree and to do this within the classical three years of study, it had been decided that an e-learning module should be created. To do so, a new platform developed by the French University of Lyon 2, Spiral, was used.

In this paper, we would like to show how some of the elearning theories were implemented, through the perspective of the teacher-student relationship.

## 1. DETERMINATION OF THE RELATIONSHIP: THE GOAL OF THE MODULE

### 1.1 E-learning: what for?

The reason for the choice of an e-learning solution will greatly determine the relationship between the student and the teacher. Usually, it is implemented because of time, distance and/or financial constraints Shapiro (Shapiro 2000: 45).

In our case, time was the essence. Within the three academic years, our beginners do not only have to learn the language, but also to learn all other Philology subjects, such as literature, linguistics, Latin etc. As a result, the intensity of lessons is huge. Students have to progress fast.

For this reason, it was important to help them to learn how to organise their time, to find the best learning strategies for them and to develop information searching techniques in order to learn by themselves. That was why we decided to create an e-learning module. The goal was to help them become autonomous learners.

All of this implies two very specific roles for the teacher in charge of the module. The first role is the one of an expert in the selection and the choice of contents, as well as their division in time. This is needed so that the teacher can observe and evaluate the progress of his students, or see what their needs and expectations are. Thus, the teacher has a second role: to be *an advisor, a "co-communicator"* (Germain 1993: 206).

The impact on the relationship is then obvious: being partners in the learning process, intense communication between the teacher and the sudents is required. It also *requires a good explanation to the students*. This part was one of the major difficulties which arose.

We first thought that a general gathering at the beginning of the year would be enough to clarify the objectives of the module.

However, a survey made among 70 students (50 of the first year and 20 of the second) after the end of the 2011-2012 academic year clearly showed that the goal of the module was not clear enough to them. To the multiple choice question "what is the main goal of the platform?", only 16 anwers matched the goals intended by the teacher. This result and the comments on "how to improve the module" led us to some changes that we will see further in this paper.

### 1.2 E-learning: building the environment

The environment built for the learner will have a great impact on the relationship between the teacher and the students. If the content is purely in the form of exercises to consolidate what was done in other lessons, and automatically corrected by the system, then the role of the teacher will become very limited and so will be the need of a strong relationship with the students.

The goal of our environment will be to move from a “learning as passive reception“ where the knowledge is directly delivered, to a “learning as a guided construction“, where the learner plays an active role in the learning process (Shuell 1992).

In the case of our e-learning module, we decided to use multimedia tasks with an increasing number of open questions. Each task requires of a student from 2 to 3 hours of work, and a period of two weeks is given to do it. Each task is composed of activities providing the necessary tools to reach the goal, we followed here the principles of Robert Gagné (1985) and the spirit of the CEFR: starting with simpler activities to more complex leading to a required coordination of all the previous activities. Thus the student discovers and has to master first the basic skills and then the more complex ones, the result of this being the gain of higher order thinking skills. The content is deliberatly independent of the syllabus of other courses attended by the students in order to push them to look for the information. The content would also regularly "trap" some information searching techniques so that the students could reflect on the techniques they use and on the necessity to crosscheck the information gathered.

The impact on the level of communication is huge: *the teacher not only has to provide a correction of the task, but must also advise and push each of his students to reflection*. Indeed, as Cowan underlined it: reflection in Higher Education is crucial (Cowan 1998), and that is why it has to be a central piece in the the tasks given.

## 2. RELATIONSHIP MODIFICATORS: TECHNOLOGY AND DISTANCE

### 2.1 Technology

The use of technology in Foreign Language Teaching is far from being a new factor. Indeed, the audio-lingual method (1930-1960) and the structuro-global method (the early 1950s) already changed the perception of the role of the teacher. The introduction of such technologies as the tape recorder and the language laboratory made the teacher become more of a technician assisting the progress of the student (Barthélémy 2007: 155-157).

This characteristic is also obviously present in the e-learning: both the teacher and the student have to master the required skills to make use of it. But unlike the language laboratory at its time, the ICT are usually used on a daily basis by students in their private life and to such an extent that these generations are named net generation (born in the 80's) and i-generation (born in the 90's) (Rosen 2010).

To avoid a too huge disparity in skill between the students and the teacher, the direction of the Romance Institute decided to recruit the teacher among their PhD students in didactics, a person who would already have a solid background in informatics. The specialty in didactics was important as the teacher had to create the content from scratch, and therefore had to select it, organise it and then create the tasks. To be able to fulfill his role as a technician, the teacher was trained on the platform by its creator and has maintained constant contact with him. The teacher is then also the link between the students and the creator of the platform in order to solve potential technical problems.

### 2.2 Distance

Distance teaching is not a new factor and has been existing for a century thanks to the use of mail, radio, television, videotapes. This factor has a special impact on motivation. This was a problem at the launch of the module in 2010. If, at the beginning, the novelty of the module seemed to be enough, it very quickly appeared that, because of the huge amount of work connected with the traditional methods, the students started to consider the module as not important. This was made evident by two elements: the number of people who did the tasks and the number of attempts (a task can be redone as often as the student wishes up to the deadline) progressively decreased, and the percentage of people who did the task on the very day of the deadline increased.

**Table 1.**
**Realisation of the first 4 online tasks by the first year students in 2010.**

| 2010 | Task 1 | Task 2 | Task 3 | Task 4 |
|---|---|---|---|---|
| Number of attempts | 72 | 81 | 41 | 56 |
| Number of people not doing the task (out of 34 students) | 1 | 1 | 3 | 6 |
| Percentage of people trying only at the deadline | 5 | 17 | 42 | 63 |

*Source: Spiral platform (2010-2011)*

We suppose that the fact that there was no mark for the module, just a validation, had an impact on the students' motivation. Therefore they seemed more focused on the subjects increasing their average mark and to have the tendency to put aside a subject where they did not have a classroom contact. For the year 2011, we decided to give a mark for the module, and we reminded regularly that without a validation of the module, students were not allowed to go to the final exams.

This being the only major change, the results for 2012 seem to confirm our supposition that the mark was indeed a motivation factor.

**Table 2.**
**Realisation of the first 4 online tasks by the first year students in 2011**

| 2011 | Task 1 | Task 2 | Task 3 | Task 4 |
|---|---|---|---|---|
| Number of attempts | 101 | 117 | 96 | 232 |
| Number of people not doing the task (out of 48 students) | 7 | 2 | 2 | 3 |
| Percentage of people trying only at the deadline | 23 | 21 | 30 | 32 |

*Source: Spiral platform (2011-2012)*

Another problem linked to the distance and the motivation is the contact with the teacher. The fact that we offer some ways (decribed further in point 3 of this paper) to communicate with the teacher does not mean that students will use them. The tradition of quite a big distance between the teacher and the student makes it harder for the student. They either do not dare to write to the

teacher (except for a very important matter), or they do not see what they could write or what use it would have.

## 3. COMMUNICATION TOOLS: OVERCOMING THE DISTANCE

To choose the communication tools to be used, we decided to follow the five stage described by Gilly Salmon (Salmon 2011) and see which tool could be used for which purpose. This model also helps to underline the role in communication required of the student and the teacher.

**Table 3.**

**The five stage model**

| STAGE | STUDENT ACTIVITIES | TUTOR ACTIVITIES |
|---|---|---|
| Stage 1<br>Access and motivation | Setting up system and accessing | Welcome and encouragement<br>Guidance on where to find technical support |
| Stage 2<br>On-line socialisation | Sending and receiving messages | Familiarising and providing bridges between cultural, social and learning environments |
| Stage 3<br>Information exchange | Carrying out activities<br>Reporting and discussing findings | Facilitate structured activities<br>Assign roles and responsibilities<br>Support use of learning materials<br>Encourage discussions<br>Summarise findings and/or outcomes |
| Stage 4<br>Knowledge construction | Conferencing<br>Course-related discussions<br>Critical thinking applied to subject material<br>Making connections between models and work-based learning experiences | Facilitate the process<br>Asking questions<br>Encourage reflection.<br>Tutor is very active at this stage. |
| Stage 5<br>Development. | Use of conferencing in a strategic way<br>Integration of CMC into other forms of learning<br>Reflection on learning processes<br>Students become critical of the medium | Supporting<br>Respond only when required<br>Encourage reflection<br>Tutor is less active and hands over to the students |

*Source: own elaboration*

As Jones and Peachey (2005), we preferred accomplishing stage one as a face to face meeting. However, the small amount of time and the size of group did not allow us to skip stage two (according to them if the first stage is successful, there is no further need for socialisation) as they advise.

In the beginning of the year, a general meeting was organised with all the students. During the meeting the first stage of the model was carried out: the teacher welcomed the students, explained how the environment works and gave all the necessary indications as which communicating tools would be used. The availability of the tools among the students was also checked:

Among our 70 e-learning students at the Romance Institute of Warsaw University in 2012, 100% had a computer and an Internet connection, and 65 had a Facebook profile, and some (estimated at 25) had a smartphone with a mobile Facebook connection (all of which the teacher was equipped with, too). Considering the amount of communication required in order to have a successful module, we decided to open a lot of different channels.

### 3.1 E-mail: asynchronicity to help

Email (and later the forum) is the most common way of communicating. It was used for the second and third stages of the model, as well as to welcome the late arrivals and perform online the stage one for them. Thanks to its asynchronicity, "*the learner has time to consider what others have been 'saying', to reflect, to consult books and other sources, in preparing their own contributions* " (Goodyear 2001)

As all the students have an e-mail address, this way was used during 2010 and 2011 to send the individually commented correction of the tasks and to remind them about the deadlines. The asynchronous aspect allows students to think over what they will write. However, very few people used this method to communicate with the teacher. Was it so because they are part of a generation wanting the information right now as suggests Rosen (2000: 32)? Maybe. The practice indeed seems to show that e-mail is not used by them to communicate, rather to get information, as required in stage one.

### 3.2 Facebook forum and chat: building the community

The biggest element of the Web 2.0, part of life of the net-generation and i-generation (Rosen 2010: 13), we decided to use Facebook, the network our students most often use and also available on mobile devices, allowing the teacher to be even more available. This also seemed to be the most efficient way to integrate the communication required by the third, fourth and fifth stages of the model and thus build the community. The process of building

this community is also helped by the length of time the students will belong to it: two academic years.

As most students are present on Facebook, the idea was to give them the possibility to integrate the chat with friends while being able to check the news and to chat with the teacher, allowing multitasking.

A closed group forum was created for each year, each animated by the teacher (who had a professional account on Facebook). On this forum were published different items of news, jokes (humor always present), links to videoclips. This was done for two purposes: the first one was to build an e-learning group identity, the second was to push the students to share their knowledge of Francophone culture with the rest of the group.

Another use of the forum was to launch polls and small surveys. This way, students directly contributed to the evolution of the module, and results could be checked.

When shown as connected with his professional account, the teacher was fully available for any discussion with the students, regardless of the time (usually in the evenings) and the day.

At first, very few students contacted the teacher, and therefore the approach was a bit changed: if a student did not come to the teacher, the teacher would come to the student. This had to be done with caution, in order to respect the private time of the students. After each deadline, most of the online students were approached by the teacher on the chat in order to see if they wanted to improve their score on the task. This way they were given an opportunity to get extra points if they corrected some answers and gave them during the chat. Thanks to this link, the teacher was able to engage a conversation (for the first semester conversations were only in the students‘ mother tongue) on the grammar rules not understood or other reasons for mistakes. Very often, this then led to a more informal conversation, decreasing the fear of speaking with the teacher. The fact that the online chat is a one to one conversation makes it possible to avoid the pressure of the group. The chat is also convenient as the student is behind his screen in his chosen environment and therefore feels secure. This way, when the relationship was built, most of the students started to communicate more freely.

The main problem here is what boudaries are to be set up? To this question we agree with Goodyear (2001: 140) when he underlines that *The networked learning tutor is faced with a set of dilemmas concerning the maintenance of boundaries, such as the boundaries around the tutor as: leader; designer and establisher of learning settings; repository of knowledge; representative of*

*the university (etc); evaluator/assessor (keeper of rewards and punishments). The tutor's work involves a continual revisiting of these dilemmas; it is not a finite search for solutions.*

### 3.3 Gadu gadu and Skype: failed integration

Two other ways of communication were offered to the students for the stage three and stage four, especially to those who do not have or want to have a Facebook account. All the students not having a Facebook account (5 out of 70) had a gadu gadu account. However, only two used it and only from time to time.

A vote was made on the Facebook forum to know if the students wanted to have the possibility to communicate with the teacher via Skype, allowing them to speak to the teacher and to switch from the written language to the spoken one. This experiment lasted only a few weeks, as only one student tried it once. This proved to be a bit surprising at first, as it was a request from the students themselves. After some chat with several students, it appeared that they did not use it because they felt more exposed to their mistakes and because they could not think of what topic they could discuss with the teacher.

### 3.4 Toward a more blended learning solution: class meetings

Even with all of this, despite the huge time spent by the teacher online, almost all the 70 students (67 of them precisely) expressed in the survey the need to have some meetings in the classroom. For the academic year 2012-2013 it was decided to allocate one hour per month in class for the e-learning module. There will be discussed the issues and the learning strategies used. This will also facilitate new projects added to the platform such as work in groups on video or Internet projects.

## CONCLUSION

These first two years after the implementation of an e-learning module showed us that, in order to work well, the teacher had to create a new environment. Not being as close physically as in the classroom, the teacher had to reduce the distance in another way: by being somehow omnipresent. Our experience shares the conclusion of the research on the Romanian E-learning: „*The teacher becomes a guide that will show the student the correct way of extracting, selecting and using the information available on the Internet.*" (Banciu, Gordan, Stanciu, 2012).

His role of not being simply a corrector or technical support but also a partner in education, acting as Brown and Voltz (2005) wrote „*as facilitators and mentors“* , or even as psychological support. The teacher is no longer on a class basis, but on a one to one relationship basis, each student requiring a different care. This implies also very good social contact from the teacher, and the emergence of a less classical relationship with the students.

Therefore the amount of time, availability and skills required of the teacher is huge, but it is at this cost that it can work the best.

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# IV. E-LEARNING IN THE DEVELOPMENT OF THE KEY COMPETENCES. METHODS, FORMS AND TECHNIQUES IN DISTANCE LEARNING

## LEARNING OBJECTS IN E-LEARNING SYSTEM ARCHITECTURE

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***Abstract:*** *Knowledge management should be a fundamental objective of any educational institution, as learning is its core function and should be reflected in how the organisation operates. By means of knowledge management the organisations can improve their cognitive basis of decision support by including existing and also present tacit knowledge in the company. In the academia environment, knowledge management and e-learning represent a substantial tuple for distance form of education. For e-learning method, heterogeneous and distributed architecture is one of the most prominent features. In a learning environment different kinds of information resources are shared. Its demands can be fulfilled by means of local intelligence using multi-agent systems. This paper presents a layered multi-agent architecture of e-learning environment including basics of its implementation. Learning objects and learning objects repository are used for facilitating intended learning outcomes, and can be extracted and reused in other learning environments. Agent structure, general framework and workflow were designed in order to simplify information and knowledge flows with the aim to keep system overhead as low as possible.*

**Keywords:** e-learning, learning objects, multi-agent, knowledge management, implementation.

## INTRODUCTION

E-learning as a part of distance learning could be seen as an important part of knowledge management (KM) both in academia world and in business firms. KM can be interpreted as "systematical process of knowledge retrieving, selection, organisation, concentration and presentation in order to increase the level of understanding of concrete domains by employees of an organization" (translated from Kelemen et al. 2007). This definition, even if valid for business world says that KM concerns people and processes with the aim to develop a common knowledge basis in a company. Hence, KM could be a powerful tool of company strategy helping develop and strengthen its position on the market if used properly. Knowledge represents an intangible asset of each company. KM and KM systems have been studied intensively in recent years (see e.g. Alavi & Leidner 2001, Urbancová & Urbanec 2011, and others.). The characteristic feature of KM in business is that it is interconnected both with process management and employee education.

In academia environment, distance learning represents important parts of education generally, distance education particularly. Education is a process of systematic knowledge and habits acquired by learning. It includes a cognitive, operational and value perspective. While the cognition part of education represents a process of acquiring knowledge, the operational part includes mastering of operations and skills. From this point of view, KM forms a part of education management. Two basic parties take part in the education, namely the teacher and the student. While the teacher performs the teaching and delivers learning pre-requisites such as literature, learning support materials, videos or other forms of visualization etc., the student acquires the knowledge and proves his/her abilities during the tests. In so called "present" learning the knowledge is presented to the students and, very often, the ways of the testing. In distance education this is not the case, as the students get mostly the orientation and support for their study, especially when the e-learning type of distance education is used. The second important feature of e-learning is the type of the student. In case of e-learning the teacher meets with people who have already set up their life priorities and attitudes.

The presented paper deals with possibilities of multi-agent environment supporting e-learning activities of students. Learning objects paradigm is used in order to minimise some negative impacts of teaching (e.g. the leaving of institution by the teacher). It is organised as follows. Section 1 presents tacit knowledge, learning objects and generic structure of the e-learning

system. Section 2 describes main features and properties of multi-agent systems. Section 3 presents the framework and description of multi-agent environment architecture supporting e-learning activities of students. An implementation of such architecture and the workflow is depicted in section 4. In conclusion, further research directions in this field are discussed.

## 1. KNOWLEDGE MANAGEMENT IN E-LEARNING

In each business company, two types of knowledge can be found: tangible ("normal") knowledge and an intangible knowledge layer – the tacit knowledge. To acquire at least a part of this knowledge, which is hidden as experience of "knowledge employees" and use it in company management is an important part of any KM. In a very general way, KM and education environment can be presented as in Figure 1.

Here, an important feature is that the process management is combined with KM. This feature results in acquiring the knowledge, saving it in a knowledge database and use the knowledge for further employees' development by means of education and learning. During knowledge acquirement, the parts of tacit knowledge are retrieved and transformed into tangible knowledge and used in the education. In academia, the tacit knowledge can be found in the experience and knowledge of the teachers. No direct connection and / or feedback from the praxis exists.

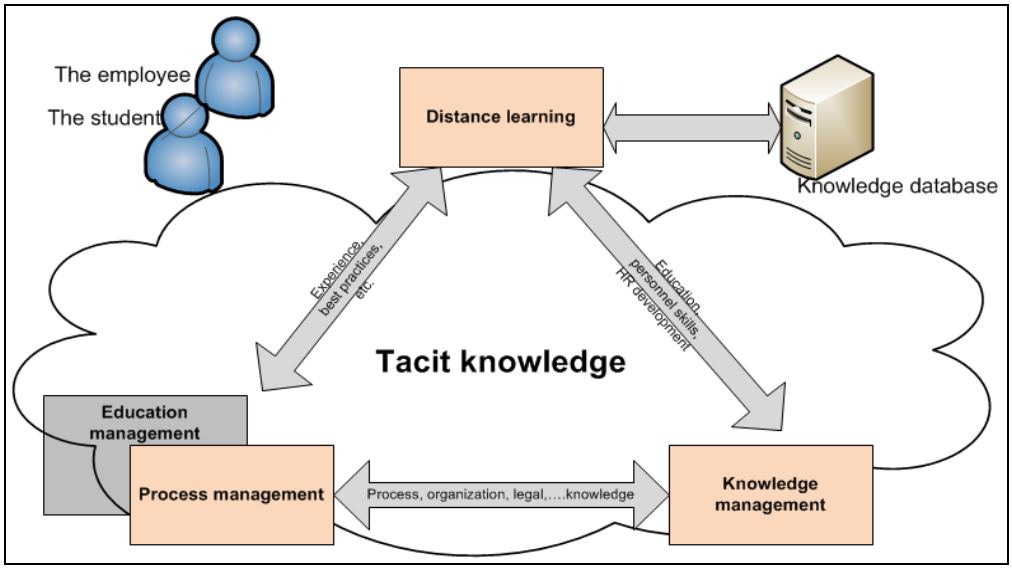


**Figure 1. Knowledge management and education environment.**
*Source: own elaboration*

This is why the basic features of distance learning at the universities are to be set up in a different way as in case of "present" learning.

- Teaching often takes place either completely over distant communication channels or by means of tutorials where the students get the basic orientation. The basic form of knowledge acquisition is accomplished and complemented by self-study.
- Learning prerequisites are presented as electronic resources both over networks and, even more often, over Internet.
- The course seminary works, essays, projects etc. are prepared by students in electronic forms and delivered by means of network communication. The evaluation of students' works and knowledge is usually done by electronic tests as well.

The distance learning of today is based on the learning over Internet with a strong tendency to cloud and mobile computing. This type of learning support, using computer networks of educational institutions, or in broader sense, including Internet, enable students to access learning resources anywhere, any time. Such type of learning is generally called e-learning.

This tendency enforces some means of unification that bring students simple interface connecting them to underlying structures. There exists the same necessity exists for teachers, who deliver the learning materials in all forms. Last research shows the advantages in sharing and unification of knowledge used for education by means of ontologies. To be able to send messages across e-learning environment correctly, there must be some ontological knowledge framework that is used in the shared communication. The term ontology was originally used in philosophy to describe the doctrine of being and its general principles. Later it was well received in the computer science, particularly in the communication domain. Ontology contains specifications and definitions of concepts and relations, intended for the description of the problem areas in terms of the significance of symbols contained in the received or sent messages. It represents a set of knowledge "on background" and allows you to deal with the information with a very brief message.

The years of e-learning practice caused that the organisation of data and information used in e-learning today is rather complex. This is due to the structure of the courses themselves, supporting materials used, such as videos, links to other Internet resources, needed interconnectivity of resources that need to avoid duplicities etc. These complex structures have led to adequately complex access methods in order to exploit such resources. We assert that in case of business organisations we can meet similar

difficulties. Thus, flexibility in organising and treating e-learning resources belongs to important KM and e-learning tasks.

Most curriculum design and development is not implemented systematically and is often specific to a particular course or teacher. This could lead to potential problems (Butcher 2007):

- Lack of cost effective curriculum design and development which may result in investments in this area being halted.
- A curriculum design and development process that is hard to understand and is often implemented inefficiently.
- Large investments in curriculum design or development are often quickly lost when an individual leaves an institution.

Learning Objects (LO) are a way to store intellectual property that may help overcome these issues. LO is originally an e-learning concept. Sandy Mills's (Mills 2002) definition provides a useful starting point: "A learning object is an object or set of resources that can be used for facilitating intended learning outcomes, and can be extracted and reused in other learning environments." LO that is well designed, appropriately stored and accurately catalogued in a database, is likely to be useful for applications beyond its original audience and educational context. The development of LOs is considered very important to KM strategies for education as the reusability of knowledge resources is a central KM concept.

Learning Object Repository (LOR) stores LOs digitally. Typically a LOR brings together a collection of LOs for a defined community or organisation, storing them in a single location. LORs make learning resources readily accessible to students and teachers, and are usually databases accessible to users via the Internet or some other form of computer networking. Some LORs are open access systems while others are intranet facilities available only to specific users. Still others are commercial repositories from which LOs can be purchased. The need to share learning content across institutions and systems is becoming increasingly important, both to make use simpler and more streamlined for students and teachers, and to reduce duplication of effort. Movements on an international level are attempting to define common standards for describing educational content so that the content in various LORs can be more easily shared across different repositories. (Butcher 2007)

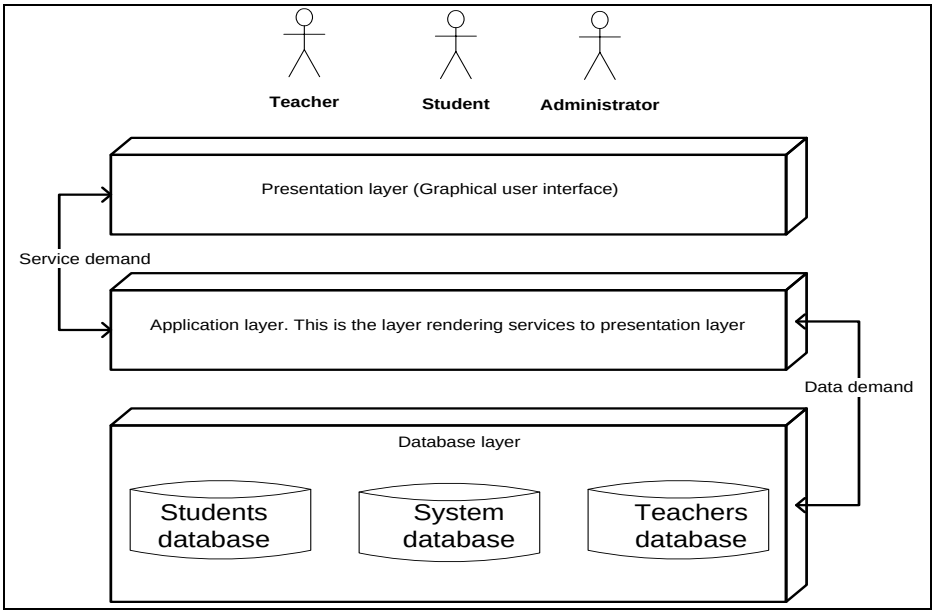


**Figure 2. Generic structure of e-learning system.**
*Source: own elaboration*

In order to accomplish the aforementioned basic aims, the architecture supporting e-learning process should include at least following properties:

- Layered structure with clearly defined interfaces between the individual layers.
- Certain degree of local intelligence enabling sufficient flexibility.

In Figure 2 we present a structure of such an e-learning system. There are three groups of e-learning system users: the students, the teachers and one or more administrators. The students work with the distributed databases of courses, support documents, students works etc. The teachers use courses under construction, students' tests and statistics, support documents under preparation etc. The tasks of administrators include maintenance of databases, administer logins, security, archives and others. The system intelligence is concentrated in the application layer containing mainly user, system and data handlers as well as the knowledge records based on user profiles. It is obvious that we are handling distributed intelligence, which records the priorities of the students, delivers customised proposals to them while enabling the teachers to administer the presentation of learning pre-requisites flexibly. These demands can be met by the multi-agent approach. In the next sections we present a multi-agent system aimed at solving some

needs identified at the School of Business Administration in Karvina (Vymětal & Vaněk 2009).

## 2. MULTI-AGENT SYSTEM

The agents are topics of many discussions and papers. In our paper we are using the software agents – the software modules based on the agent's paradigm: (Bellifemine et al. 2003):

- Agents are autonomous - they can control their own actions and under circumstances can take decisions based on their goals and priorities;
- Agents are proactive - they do not react in response only, but they can have own goal-oriented behaviour and /or take initiative;
- Agents are social - they are able to interact with other agents in order to accomplish their task and achieve the complete goal of the system.

An important characteristic of an agent is the ability to perform tasks requested by other agents or by states of the environment. Also important is the autonomy of the agent – the possibility to take over the task or to refuse it based on its own preferences and targets. Agent may have the ability to answer questions, to provide information about its condition, to solve differential equations, to transfer goods with certain size and weight, to look for metal objects and to avoid obstacles etc. In our case, an intelligent agent exists in the form of interactive software component. Its features decide not only on what role it can perform, but also how it can communicate and cooperate with other agents. Wooldridge (Wooldridge 2009) stresses, that the agents can be looked upon as means of solving the greatest challenge of the start of the 21st century – the development of software systems exploiting the potential of interconnected multiple computer systems.

A well-arranged agents classification and basics of formal description was published by Kubik (Kubik 2004).The agents have social behaviour leading to their mutual communication. To take this property into consideration is an important task of the designers. Multiple agent types and their communication methods is not a simple challenge for a multi-agent system designer. This problem invoked several initiatives of standardisation. The best known initiative is the Foundation for Intelligent Physical Agents (FIPA). FIPA published the reference model of agent platform in the years 2002 and 2004 (Bellifemine et al. 2003), (FIPA 2002). This first part of reference model published in 2002 deals with abstract architecture specification, the second one describes the rules of agent communication

using peer-to-peer model and defines the ACL - agent communication language.

General agent architecture is often based on a layered agent structure in order to simplify the design and information flows and avoid the computer resources overload and to keep system overhead as low as possible. In this paper we propose a layered architecture presented in Section 3.

## 3. E-LEARNING ARCHITECTURE WITH LEARNING OBJECTS

In this section we propose an e-learning framework, its core functions and operations. Many e-learning tasks, for example logging in the course, reading the content of the course, changing course elements etc., could be completed by agents as to reduce the cost of data movement and storage (see e.g. Yong et al. 2010). The proposed design consists of three sections, namely the framework, agent descriptions and the workflow of the system.

### 3.1 System description

We divide the e-learning system into three layers (for analogy see e.g. Rui 2006), namely user interface layer, agent layer and data layer (see Figure 3). The user interface layer serves logging into an e-learning system, the standardisation of user requests, the visualisation of service results, and the intellectualisation of service. After logging into the system the user agent, teacher agent or admin agent is created, depending on the selected role of the user. Next, the agent layer fulfils service demands (query, analysis, comparison and presentation of selected content of the course) from user interface layer. Agents in this layer are also responsible for creating, combining, distributing, retrieving and sharing knowledge. An important part of this layer is sharing knowledge module and user profile base. Sharing knowledge module is a set of knowledge records and represents also the domain ontology - the set of knowledge elements and learning objects (text, video, sound etc.) to be delivered to the user. The user profile base represents the user ontology, which covers domains of interests, learning goals, etc. The user's history behaviour records are stored in the user profile base. The main tasks of data layer are to provide data services to the agent layer and to maintain local metadata.

There are nine types defined, namely user agent, teacher agent, admin agent, user management agent, task agent, course agent, learning objects agent, data management agent and data source agent.

- User agent, teacher agent, admin agent. These agents are located in the user layer, created by user management agent when user logs and destroyed when user exits. Concrete agent creation is depending on the role selected by the user. The main function of these agents is to aid users to acquire e-learning services better. That includes: the sending request to the request list, clarifying service request by an interaction with the user and displaying the results in the form of user's preference.
- User management agent. This agent is located in the agent layer and mainly achieves the following function: managing the user agent, offering the query of sharing results, managing user profile base and sharing knowledge base, finishing certain tasks instead of user according to analysing user's historical behaviour record and carrying out some intelligent services (e.g. collaborative recommendation). This agent is also responsible for accessing the user ontology in order to provide the appropriate instructional strategy, an adaptive curriculum adequate to the user's level of expertise, to the user's goals, etc. This ensures to keep interest and qualification profile of the user, and to organise a user's agenda. The tasks of the user management agent are also to save, to retrieve and to update the knowledge from the knowledge sharing module. It can crawl to the available information sources if necessary and personalise the retrieved information according to the user's interest profile. It monitors the changes in the knowledge sharing module and determines the most favourite alternative based on preferences.
- Task agent. The main function of this agent is to assign the tasks based on the matchmaking between requests and services. That includes: assigning request to the corresponding service unit based on matchmaking between the user's requests and service items and managing the request list and service list.
- Course agent. The main functions of this agent include: aggregating the relevant data in the form of the course content according to the the user's request, and providing the presentation function, such as opening the lessons, testing the users' knowledge, presenting the learning documents, providing a place to send homework, analysing the studying results etc.
- Learning objects agent. Based on our experiences, contrary to our older structure, we introduced a new agent type – the learning objects

agent. This agent is responsible for creating, storing and retrieving of learning objects.

– Data management agent. The main functions of this agent are routine maintenance and implementation of the tasks. Routine maintenance achieves the monitoring of various data sources, integrating the metadata through the ontology mapping, summarising the local metadata of various data sources, establishing the global metadata stored in the metadata base which provides the call for other service units and maintaining and updating the metadata base. Implementation of tasks receives assigned task about the data query, sends the task to the corresponding data source agent and integrates the results.

– Data source agent. This agent manages the various types of data resources. That includes structured, semi-structured data and unstructured data. It provides services to upper layers. The main functions of this agent are receiving the calls of the data query, to provide the data sets for query and analysis... It also establishes and maintains local metadata, and sends the local metadata to the data management agent.

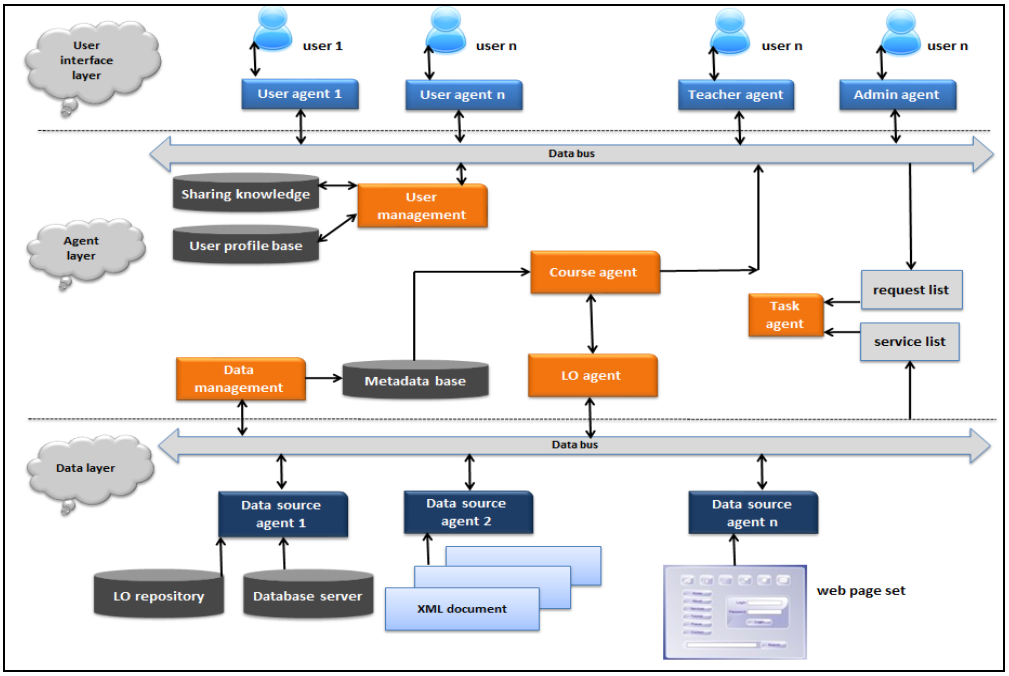


**Figure 3. Architecture of e-learning system.**
*Source: own elaboration*

As mentioned herein above, the user interface realised by user, teacher and admin agents is concentrated in the upper layer. The system intelligence achieved by user management, task, and course and data management agents are placed in the agents layer, while the data handling provided by data source agents is placed in the lower layer. The layers are interconnected by data busses by means of the agents' messages and provided results are transported.

### 3.2 Workflow description

We implemented the principles of our architecture with the Microsoft .NET platform. The proposed architecture of e-learning system based on the multi-agent approach runs according to the workflow as follows. (Figure 4).

After the user's logging on the e-learning system his identity is verified. The user management agent automatically creates a user agent, teacher agent or admin agent for every user according to the selected role. The user agents are also responsible for the standardisation of service requests and the visualisation of results. The user agent's lifecycle ends when the user exits the system. When a user requests the service, the user management agent receives the request message from the user agent and tries to retrieve the similar sharing knowledge from the history stored in the sharing knowledge base. If it exists, the user management agent returns the result to the user. This avoids the negative impact on the system performance when similar requests appear. Otherwise, the request is sent to the task agent for further processing. At the same time, the user management agent can predict the service requests of the user according to the user's history behaviour records stored in the user profile base.

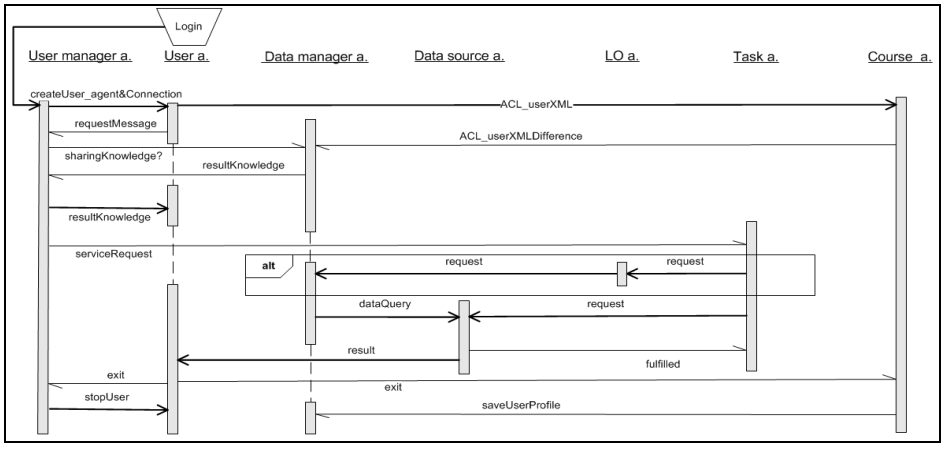


**Figure 4. Sequence diagram of the e-learning workflow.**
*Source: own elaboration*

After logging in the e-learning system, the user agent is created. Then it establishes the TCP/IP connection and sends an ACL message with XML elements from XML user file to the course agent. XML user file consists of many elements describing the users' content of the e-learning course (type and position of menus etc.). This ensures storing the users view of course content for each users logging into system. The course agent after the receiving of ACL message from the user agent compares the elements from XML user file (custom values) with the elements of XML course file (default values) and highlights the differences. This ensures the highlighting of new elements for the user. The XML user file is unique for each user and the course. The content of the XML course file could be changed only by the teacher agent or admin agent and it is unique for each course. When the user exits the course the XML the user file is saved with actual values of the course elements. When the teacher or admin exits the course the XML course file is saved with actual values of the course elements.

The task agent puts the received service request into the request list, and then sequentially matches the description of the request in the request list with the record of service in the service list. The task agent sends the request to the corresponding agent according to the degree of matchmaking and the assignment strategies. The task agent is also responsible for the learning objects usage. If there is a request including learning objects content, the task agent specifies needed LOs and sends the request to the learning objects agent. The learning objects agent is responsible for the LOs maintenance and for the communication with data management agent. Agents receive the service request sent by the task agent, complete the assigned tasks and directly return the result to the request initiator – to the user agent. The results are also stored in the sharing knowledge base.

## CONCLUSION

Distance learning support is confronted by resource heterogeneity and by the ultimate aim to configure the e-learning tools in such a way that it takes the students' habits and priorities into consideration. To cope with this challenge, we proposed a system with distributed intelligence, based on software agents instead of typical hierarchical system common to typical e-learning applications. The proposed platform includes several types of agents fulfiling specialised tasks and using internal intelligence and mutual communication placed into three layers. It creates possibilities for management of different knowledge domains and for integration of different types of learning objects. The presented solution will be a topic of further research into optimal

computer resources exploitation with minimal overhead and also into agent intercommunications based on FIPA standards. The next step of this research is towards optimising the support for real time collaboration and knowledge sharing process between the users and the real time intervention of different agents. Future research motivation includes new interface design especially for better guidance of the users.

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# NEW TECHNOLOGIES IN THE PROCESS OF MILITARY EDUCATION AT THE NATIONAL DEFENCE UNIVERSITY

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***Abstract:*** *This paper describes fundamental considerations of shaping operational and tactical imagination of commissioned officers with the use of modern technology. Implementation of novel technical and organisational solutions in educational process on the basis of contemporary technologies makes the process have a different nature. Striving for lowering costs of education results in application of innovative technologies for educational process becoming the necessity of today and makes a challenge for the future. The paper includes basic considerations that are arguments for utilisation of novel technologies in the educational process of the armed forces. It seems, however, that in spite of dynamic development of innovative educational technologies, certain general framework being requirements considering shaping operational thinking of commissioned officers remains constant. They refer to shaping features providing commissioned officers with conditions for the aware and independent solving of problematic situations, obtaining comprehensive and complex general knowledge.*

**Keywords:** new technologies, military education, operational imagination, future education.

## 1. NEW TECHNOLOGY IN EDUCATIONAL PROCESS

Introduction of novel technical and organisational solutions into the educational process on the basis of modern technologies makes the process take on a different substantive and methodological aspect. Implementation of modern technologies results in sweeping changes in numerous areas. Advanced distributed learning (e-learning), medical consultations or videoconferences make a teacher, a knowledge expert available without any

distance or time limitations. Taking such sweeping changes into account raises the following question: what factors make the military more and more widely use innovative technologies, not only during military operations but also in the process of training/educating military personnel?

Official duties of a commissioned officer include a wide range of responsibilities, which results from necessity of directing subordinates, organising and conducting training activities, fulfilling competence tasks related to a post occupied by him/her and continuous professional improvement. Meeting such complex duty requirements is, of course, neither easy nor simple because management skills need to be combined with the necessity of personal development. Proper fulfillment of tasks is connected with adequate education, both general and professional, including highly specialised expertise resulting from professional military specialty such as intelligence, electronic warfare or air-mobile forces. The necessity of a new view on educational requirements of the military arises in the process of numerous changes considering the concept of use of armed forces and plans of the military capabilities utilisation. There is no doubt about the wisdom of the thesis that increasing requirements considering commanders (managers) result in increasing effectiveness of the whole educational system preparing participants of a future military operation for actions carried out in a network-centric environment characterised by information warfare conditions (Ścibiorek, Kaczmarek 1995).

Giving up the draft and introduction of contract service instead, accompanied by increasing professionalisation of operational force units, application of new detection, reconnaissance and delivery assets based on innovative technologies remarkably widen needs for educating commissioned officers both in terms of practical aspects and military theory. Moreover, the participation of the Polish Armed Forces units in many military operations (peacekeeping/making and stabilization) conducted abroad creates new tasks for military educational system. Including our military in the NATO structure determines the necessity of adequate preparation of military personnel for specific tasks fulfilled at home and abroad. Striving for lower educational costs results in implementation of novel technologies in teaching process becoming necessity of today and creating a challenge of the future. The considerations mentioned above are the essential arguments indicating validity of using innovative technologies in educational process run by the military.

Additionally an important argument supporting new technologies applied during preparation of commissioned officers for conducting tasks in

contemporary conditions is the fact of changing value judgments related to concepts of numerous definitions including, for example, redefining "potential enemy/threat".

The past understanding of military threat as confrontation of two opposing pacts has been replaced by asymmetric threats, actions conducted by irregular armed formations that do not have a central management. In many situations military operations carried out by detachments and armed groups functioning independently are inspired and financed by local chiefs and political leaders. The presented situation enforces necessity of a new view on the process of preparing personnel for conducting operational tasks in peace, crisis and war. Education for the future, even assisted by modern technology, is still a complex issue because the future vision of military activities contains a number of unknown elements (Ścibiorek 1999). It is nowadays difficult to predict problems faced by the officers after they complete programmed educational process organized and conducted by an academic institution, what tasks they will carry out and what conditions they will use acquired knowledge and skills.

However, it seems that in spite of dynamic development of combat technology and new ways of using specific combat means, a certain framework - requirements considering training commissioned officers in terms of operational thinking - remains invariable. The framework deals with shaping features providing officers with conditions for conscious and independent solving problematic situations and obtaining comprehensive, multilayer general knowledge, which results from a unanimous belief of numerous teachers that general education makes the basis for logical reasoning.

## 2. OPERATIONAL THINKING

The term "operational thinking" may be considered in two aspects: as a definite state of knowledge and as a process of intuitive prediction of the future or consequences of decisions made in action (combat and operation) (Dęga 2003). The former meaning includes understanding basic set of terms, claims and regularities considering combat system and processes taking place in various political and military conditions, and within different, as experts emphasise, structural and organizational solutions. Operational thinking analysed in its latter meaning is perceived as the whole of processes enabling anticipation of the situation regarding activities of subordinate units in military and peace time conditions. It is assumed that operational thinking is

naturally realised through the educational process by a combination of theory (operational and tactical principles of planning and conducting activities) and practice (utilization of experiences acquired during exercises and analysis of conclusions drawn from previous armed conflicts).

The currently realised education of commissioned officers is a comprehensive process that may be divided into three levels:

- basic level - realised at military colleges and training centres, which will lead to attaining professional qualifications in a definite specialty (platoon leader, company commander);
- advanced level - courses and specialised studies within improvement of officers resulting in obtaining higher level of specialized qualifications (battalion commander, chief of tactical level staff cell);
- higher level - postgraduate studies (unit commander, chief of section/department, senior staff officer).

Considering the characteristics of officers' education, one can distinguish: theoretical education (e.g. lectures, seminars) and practical education (e.g. participation in exercises and training activities). It should be emphasised that in particular situations we deal not so much with the above mentioned kinds of education - literally perceived - but with a combination of them characterised by predominance of one of them. It results from the fact that each education, especially education within a wide profile of military knowledge, contains a general professional (military) aspect and a specialised one both in theoretical and practical dimensions. Therefore elements of command-staff exercise may often be observed during group training and within paper-discussion seminars other teaching forms may occur.

The development of operational-tactical imagination is not a one time action. It consists of a complex of teaching undertakings that allow officers to develop capability of abstract thought, to form a habit of searching for links and relations within analysed military operations. It needs to be underlined that the understanding of battlefield phenomena meaning recognition of correlations enables drawing proper conclusions concerning the future type of potential enemy's activities. Learning characteristics of individual kinds of combat activities makes an element allowing for recognition of series of operational-tactical conditions that should be created in order to achieve a definite combat objective. It should be indicated that the process of threat evaluation is one of the ways to shape operational thinking. Drawing conclusion considering future actions of potential enemy must be consistent and supported by logical arguments. Computer simulation applications are

tools enabling realisation of teaching tasks within this area. Modern technology is irreplaceable in solving multaspect problems of contemporary military operations. It allows for carrying out a simulation of staff and operational unit performance in the near-realistic-activity way. Simulation system enables not only scenario wargaming but also replay of its course indicating mistakes made by players.

Observations made during command post exercises and group training activities show that information about political and military situation are received by staff officers conducting analysis of troops' position in diverse ways (different interpretations). The phenomenon is connected both with the aspect of correlating received information sets and understanding its content in terms of overall operational-tactical situation. Assuming that threat estimate and forecast of subordinate forces' activities is a decision making process conducted with information shortage, one can draw a conclusion that analysts largely go by obtained experience and intuition (operational-tactical imagination). If owned information set is incomplete then its completion is intuitively done by officers through correlating certain characteristics of other potential elements (distinctive features) belonging to analyzed set (e.g. enemy forces mobilisation time or overall situation in area of operation). Intuitive perception of officers is based on association processes (cause – effect), which affects perception of not only objects in operational space themselves (e.g. elements of battle formation) but also their capabilities concerning current and further activities. It is of a special importance during the threat evaluation process in aspect of performance possibility (courses of action) identification. These are elements allowing commanders to make right decisions. Of course apart from operational-tactical imagination, sensual perception is crucial for the process of threat evaluation and activity forecast. It is another area where novel technology supports officers' activities. Computer systems supporting staff work are capable of determining possible capabilities of own troops and potential enemy. Due to application of modern technologies database resources containing aggregated information about characteristics of combat equipment, manoeuvre, firepower or physical-geographical conditions considering area of operation enable situation imagery and determination of effective proceeding ways.

Information perception, both sensual and intuitive, is conditioned by personality features of commissioned officers - analysts dealing with operations on information. It is true that many characteristics may be shaped during the process of education. However, the way and range of knowledge obtained during education period largely depends on individual features of each man (officer in this case). In reference to analytic and operational

activity, especially issues of the utilisation of information sets in the process of threat evaluation and activity forecast, validity of heuristic method application should be indicated and emphasised since the method leads to discovering new facts, their relations and thus generating new truths. Heuristic forecast means anticipating events taking place in the future that may unnecessarily be described by the use of analysis of the past. The heuristic method, commonly known as the intuitive one, is based mainly on intuition, imagination, thorough knowledge and experience of commissioned officers. Therefore it may be applied only by personnel having relevant expertise, habits and skills. One cannot possess command of operational thinking without long-standing education, practical involvement in activities of staff teams during numerous specialised training activities and various exercises including complex operational-tactical situations that enforce nonstandard, "out of the doctrinal box" solutions. Teaching practice proves that using intuition and heuristic principles should be noticed in the situation when remarkable information shortages occur and the enemy conducts intensive disinformation operations. Experts in military teaching emphasise that the greatest drawback of the method may be routine because long-standing experience may cause a template type situation estimate which may be characterised by a serious error. In the complex process of shaping tactical-operational imagination of officers, computer applications of command and control process support enable recognition of a situation but do not release from rational decision making. Situation progress scenario and way of likely action are developed on the basis of heuristic methods and reviewed by simulation systems. COA errors and drawbacks, identified during the simulation process, are now eliminated and corrected in the way limiting level of operational risk to minimum.

## 3. MILITARY EDUCATION – NEW CONDITIONS

According to opinions of many academic teachers and some operational commanders, the utilisation of innovative technologies in support of previously tested teaching solutions, especially in the context of shaping operational-tactical imagination, is a very desired phenomenon. The process is realised through comparison of enemy COAs in individual exercise stages or limiting amount of information about enemy troops in order to create adequate level of operational risk. It needs to be underlined that officers are able to improve their knowledge of "art-of-war" principles through proper estimate of threat. Analysing potential enemy activity scenarios generated by computer system they also notice mutual correlations among factors of time,

forces engaged in combat and operational space. Because each military situation is built on the basis of operational activities of opposing forces, officers participating in simulation game have a chance to consolidate command of principles conditioning use of arms components and conditions for utilisation of service branches.

In the personnel education process it is assumed that each officer graduates from an appropriate preparatory (qualification) course before he or she takes over his/her new position. Officers of different military specialties that are expected to take up new posts are sent on a career development course. Such courses have the following goals:

- develop operational thinking skill, general knowledge of officers and shaping their personalities and abilities that will enable them to occupy staff and command positions;
- deepen and supplement expertise and general knowledge ensuring efficient professional performance on duty posts;
- familiarise with novel organisational and technological solutions in terms of proper management and efficient organisation of military activities.

Deepening knowledge and skills of commissioned officers takes place on courses mainly through realisation of undertakings included in course programme and also independent studies of latest theoretical materials during so-called self-education. Classes, lectures, seminars, etc. are carried out with the use of multimedia presentations developed with support of modern technologies. Interactive computer applications enable evaluation of officers' preparation/readiness for their future duty post tasks. During self-education students explore electronic libraries and virtual information resources of specialised publishing houses.

During seminars course participants can freely express their thoughts and opinions, which encourages logical reasoning, imagination development and shaping operational thinking. Students have to prepare presentations illustrating described issues for each seminar. Deepening officers' skills in independent estimate of situation and drawing final conclusions takes place during group training activities and improving exercises. Improvement achieved during education process also deals with an ability of working on a computer map of terrain and development of appropriate tactical solutions on the basis of specialised calculation applications/spreadsheets (comparison of combat potentials of conflict sides, determination of strength ratio).

It should be noted that in spite of introduction of new technologies into teaching process still the most serious shortages may be observed in planning process considering operational-tactical activities. Planning activities requires a creative combination of obtained theoretical knowledge and practice, intuitive understanding of the terrain, operational thinking - not only in terms of a given unit commander but staff officer noticing and understanding advantages of exploiting different service branches as well. Moreover shortcomings may be observed in terms of expertise, especially considering application of assets that should be deployed in operational space in order to fulfil assigned tasks. The conducted analysis of drawn conclusions allows for proposing the thesis that noticeable shortcomings occurred during teaching-learning process as a result of not following the principle of student's individual preparation of basic operational-tactical calculations and reasonable arguments justifying decisions they make. Results of computer simulations are excessively utilised instead. In this way students lose their abilities to improve principles of conducting activities by tactical and operational formations/units. Conducted experiments show that conversatorium classes or seminars are effective forms of education because students develop recommendations for undertaken solutions on the basis of acquired knowledge and skills concerning staff work, hence the conclusion that excessive trust in new technologies, especially systems supporting decision making process, may lead to decrease in the level of operational-tactical imagination.

In many cases officers improving their professional qualifications go on NDU courses. In such a situation it seems to be advisable to conduct education process in accordance with a different programme that allows for the necessity of providing officers with a specialist knowledge. A way to achieve this goal consists in including e-learning in programmes of chosen specialist courses. Thus novel technologies are used in teaching process as a tool of transfer and review of basic military knowledge. The courses run within an ADL programme framework are recommended by NATO training centres.

In the process of officers' knowledge quality enhancement the attention is focused on graduate and postgraduate studies. Currently studies include managing, directing, commanding and leading issues in terms of national and multinational structures. Study programme assumes that a graduate will present thorough knowledge and definite abilities concerning fulfilment of command and control or staff functions in contemporary and future military activities. During studies the officers participate in exercises assisted by automated C2 (C4I) systems and computer simulation applications.

The following claim seems to be a regularity: development of armed forces is unthinkable without continuous professional improvement of commanders. The officers, through obtained knowledge and experience, are able to creatively shape AoO structure and in case of emergency to properly estimate status of opposing forces and forecast scenario of operation.

The essential reasons for application of modern technology in the education process of the military includes the thesis indicating necessity of preparing commissioned officers for the creative solving of new, previously unknown operational-tactical problems. This conditioning results in a need for building complex scenarios of command/staff exercises. Introduction of novel technologies enables reduction of time required for exercise development, its modification later on and, what is most important, flexible management of exercise course through adjusting the flow of data available for exercise players.

## CONCLUSION

Recent turbulent years have brought a lot of changes, gradually implemented, fundamentally affecting conditions of education in military academic institutions. The system of officers' education has undergone transformation which resulted in structural and programme changes. The military education system has been reorganized, a number of military colleges has been reduced and training centres have been established. The education system of NDU - command-staff academic institution of the utmost importance in the officers' education system - has also been modified. Therefore in the situation of dynamically changing conditions there is a need for application of novel technologies. However, teaching practice shows that it is necessary to go back to the specialist training. Plans and concepts developed by students need to be reviewed in practice, which means in the field. Only reconnoitring a probable area of operation enables comparison of planning effects with real conditionings of environment. Then, during practical training, operational-tactical imagination may be shaped in near-realistic conditions.

Commanders and representatives of tactical formations/units strongly support the option of practical education of personnel because they need experts in staff work. Numerous arguments include the thesis that specialist education makes the foundation of each profession. This principle applies to a physician, an engineer and a driver whose most important concern is with driving technique (operational tactics) and command of road traffic principles and regulations. Such theoretical knowledge and practical skills make him or

her successfully drive his or her car even through the most crowded city streets.

Changes implemented in the education system resulted in the fact that civilian academy/university graduates became another group of officer candidates. The arguments presented in this paper support necessity of introduction and utilisation of modern technologies in the long term process of gradual shaping operational thinking. They allow for advancing the thesis that, in terms of teaching principles of warfare and understanding phenomena occurring in armed warfare system, the educational effects considering the above mentioned group of commissioned officers will be satisfactory. The process of shaping operational-tactical imagination among the group of the officers must be spread over time and supported by professional experience, participation in exercises, training and deployments within peacekeeping contingents. Only then knowledge understood as theory and practice of operation may make "operational thinking" not only an academic term.

Analysing the conclusions presented in this paper, one can say that modern technologies introduced into the process of shaping operational-tactical imagination are very helpful tools. However, their excessive use in teaching practice may, in case of education creating operational-tactical imagination of officers, result in a reduced efficiency in realisation of basic staff activities. One cannot forget that man is a supreme value for each organisation. Nothing can replace human thought, imagination, ingenuity and creativity in operation.

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# APPLICATION OF VIRTUALIZATION TECHNOLOGY IN EDUCATIONAL ENVIRONMENT TUTORING FOR SOLVING PROBLEMS OF E-LEARNING

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***Abstract:*** *The paper deals with the management of the installation and maintenance of software in the computer classrooms of educational institutions. Control system is described complexes of virtual machines in the infrastructure of the company to automate the process of delivery and deployment of virtual machines with network load, the intensity of personal computers and the timing of delivery of software on the workstations.*

**Keywords:** Virtualization, Information - Educational Sphere, VMware, Virtual machine.

## INTRODUCTION

The basis for the use of e-learning in educational institutions at various levels is traditionally specialised computer audience. These classroom activities can be conducted using both the information and educational services, protection, and other products of educational value and other software packages.

The main problem of the use of computer class is the need to install the software in the same type of configuration on multiple computers. Traditionally a huge variety of software products is used in the learning process. One of the options for effective solution of software management in the computer classes might be the use of virtualization technology

Today it is very well known that virtualization is a highly topical and relevant technology. In short, virtualization is the creation of a single physical server or computer multiple "virtual" machines, each of which may be running its own environment - the operating system and applications and

user settings. These virtual machines are functioning as completely separate physical computers. Virtualization can significantly improve the efficiency of existing equipment, making it possible to produce aggregation of tasks and workloads. Being an open system, it can be used on any number of computers that allows you to optimise the use of hardware resources and reduce operating costs.

Virtualization technologies can improve operational efficiency of the system:

- the complete isolation of applications in virtual machines is organised, which allows to carry out any experiments on the configuration and administration without fear of data loss or failure of the client operating system;
- the virtual machine work can be stopped at any given time saving the state of the computer's memory on the hard disk;
- to resume the virtual machine work at the right time, you can reallocate your PC, so it would be a priority in terms of the user's virtual machine to be implemented quicker;
- the transfer of the image of virtual machines from one physical storage to another allows you to clone the image machine to work with it on other computers;
- the complete unification of the equipment for the guest operating system and applications can always use the same set of hardware.

Using virtualization technology, instead of installing all the necessary software on a computer they allocate a separate virtual machine for each new task, for example, a virtual machine to use with office suite, and another one to work with raster graphics. The above approach allows us to provide good insulation of unrelated applications, which significantly affects the security and stability. Since with the increasing number of the required software:

- there exponentially grows the amount of the costs of creating, deploying and managing software packages;
- the whole infrastructure is becoming poorly controlled, a larger amount of time is spent on maintenance, updating and configuring the software;
- the problem of compatibility is eliminated, which will certainly arise when using different versions of the software.

Currently there are a number of systems to manage and deploy virtual machines in the infrastructure business. In such systems the decision of delivery and unfolding of virtual machines is made manually by the user or administrator on schedule and at a certain hour. This method of control does not allow to use network and computer resources, such as network load, CPU and disk subsystem in an optimal way, which can significantly reduce the response speed of personal computers or completely paralyse the local enterprise network and the ability to work on the computer during a mass scan of virtual machines.

It is possible and topical to take the next step: the management of virtual machines complexes in infrastructure companies should automate the process of delivery and deployment of virtual machines with network load, the intensity of personal computers and the timing of packet delivery to workstations. Given the value of the staff time using computers, these systems will implement a flexible and effective management strategies, dynamic and, using the resources of the network infrastructure appropriately.

In the use of computer technology in education there is a particularly acute question of support and management of software products which are required in the learning process. Computer classes are used to work with the office suites, software design and 3-D modelling, training, programming and administration, as well as, in other directions. There is a need to have different versions of the software, the versions of which are often not compatible with each other or out of date to work with the computer's operating system. This leads to a large number of software packages installed on one computer. Specialised software for proper work, as well as the specifics of the implementation of some labs require full administrative rights on the computer which is not acceptable in the computer classrooms where students work. Even an acuter problem arises with installation, maintenance and modification of already-installed software on all the computers in the computer labs of the institution.

## 1. THE ARCHITECTURE OF THE SYSTEM

For solutions of the designated goals and objectives in the introduction, they implemented virtual machine management system (VMMS). The architecture of virtual machine management is based on the classical architecture of software distribution systems (Figure 1).

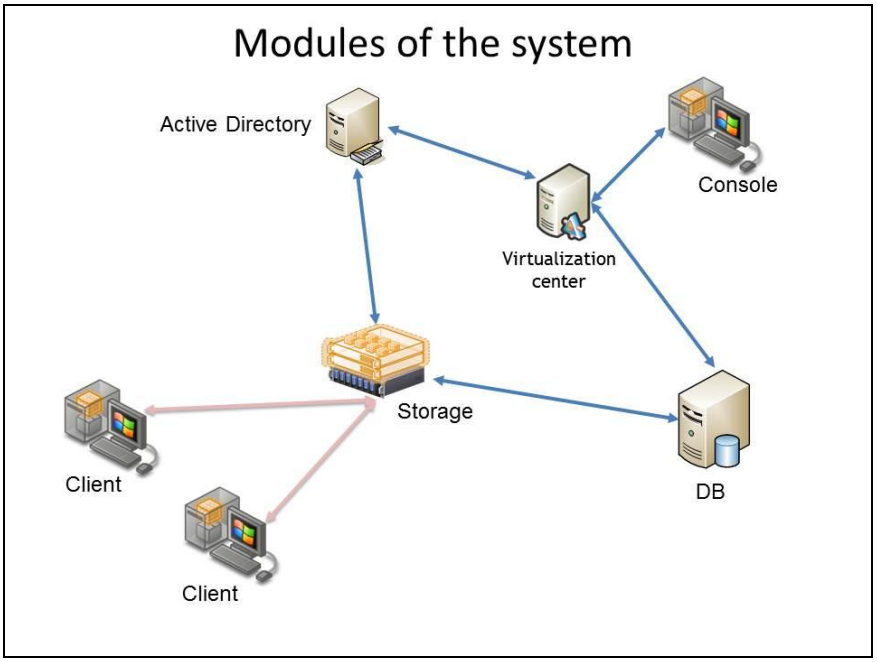


**Figure 1. System architecture.**
*Source: own elaboration*

VMMS includes the following modules:

1. The managing service is designed to manage customers by processing client requests. Service Manager collects statistics and provides access to information on virtual machines.
2. The database provides storage SUVP statistics and data on virtual machines.
3. The storage of virtual machines is designed to store files of virtual machines and operating system images.
4. VMMS customers include a special service, which provides background VMMS operations to work with files of virtual machines, as well as, the console for VMMS work implemented in the form of a graphical interface.

### 1.1. Managing service

Managing service is designed to manage customers by processing client requests. All kinds of client requests are processed on a layer of services according to the contract operations and kinds of messages (Figure 2). Software implementation service layer is based on the technology of WCF. A layer of services in this case is the only software interface of the managing service.

The business layer contains all the application logic. It is equipped with an internal programming interface of the high level of working out in detail - a facade. Also the business - layer contains the software implementation of operations such as adding virtual machines to the repository, issue of client assignments, etc.

Data access layer uses different components of the object-relational mapping. All the work with the VMMS data base is implemented using ADO.NET Entity Framework. VMMS storage also acts as a data source, but work with it is implemented through the control component.

Cross-cutting includes the security built-in authentication and encryption, as well as, operation management allowing you to maintain records of operations and to diagnose management services by using standard Windows means.

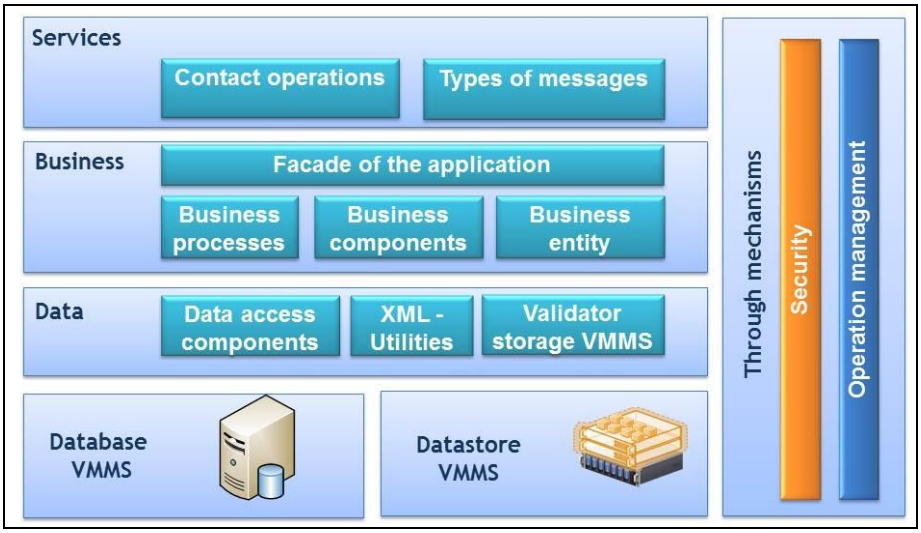


**Figure 2. Architecture of the managing service.**
*Source: own elaboration*

Managing service performs the following operations:

1. Registration of a new operating system (virtual machine). Upon receiving a request for registration of a new virtual machine the managing service creates a new record in the corresponding database table. If the request for registration will come from an account that does not have administrative access to perform this operation the client will be denied.

2. The provision of the list of operating systems and virtual machines. This operation is carried out at the request of any customer that has passed authentication domain.
3. Provision of the list of tasks. This operation can be performed in two ways. The first method of provision of a list of tasks allows to generate a sample for a specific computer, if it exists in the list of client computers. The second method is available for users with administrative rights, it forms a sample of tasks for all the client computers.
4. Registration of an assignment is only available for users with administrative access rights. When you register you must specify a virtual machine, the target computer, and the deadline. Depending on the due date, the task is assigned a particular priority.
5. Collection of statistical reports from each client service. Client service sends information on its condition at the time of synchronization with the control service. Based on these data it becomes possible to analyse network loading and forecasting the state of virtualization system.

### 1.2. The database of virtual machine management system

The database of construction with the use of technology with MS SQL Server. The database of virtual machine management system contains information about the following objects (Figure 3):

- Virtual machines.
- Operating systems.
- Disciplines.
- Client PCs.
- Status of the cache of client PCs.
- Scheduled tasks.
- The speed of VM download.

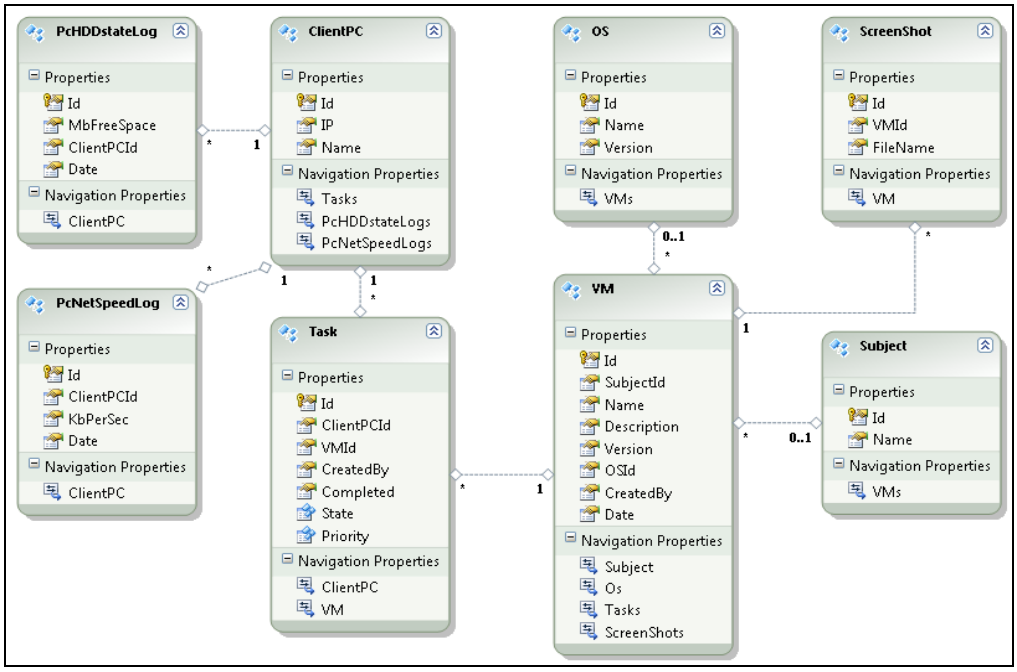


**Figure 3. Model Database VMMS.**
*Source: own elaboration*

## 1.3. Storage of virtual machines

The storage of the virtual machine has a simple structure, shown in the figure (Figure 4). Stability and easy work with the repository, thanks to technology provided by DFS.

The most rational way to store files of virtual machines is their division into two parts: the image of the operating systems and the software image installed on this operating system. This storage method saves disk space storage, as multiple virtual machines often use the same operating system.

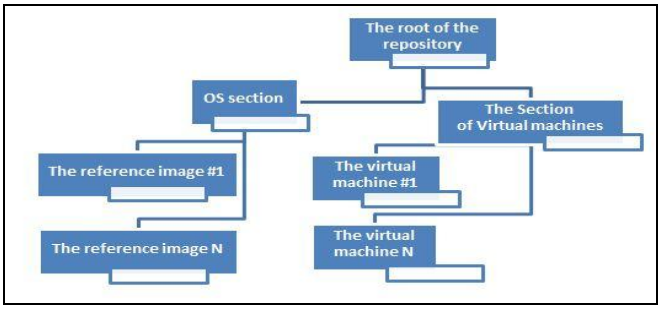


**Figure 4. Structure of the file storage of virtual machines.**
*Source: own elaboration*

The storage of the virtual machine consists of two sections: the section of virtual machines and the section of operating systems.

VM Section contains N directory, where N is a number of virtual machines. Each directory contains a zip-file image files of virtual machines, as well as, a logo file, and any number of screenshots.

OS Section is subsidiary and it contains the reference images of operating systems. Each directory in this section includes the archive of the operating system and the file logo.

### 1.4. Client Service

The client service performs tasks for the specific computer needs of virtual machines. Transportation is carried out using the data service of BITS (Background Intelligent Transfer Service). The architecture of customer service is provided in the figure (Figure 5).

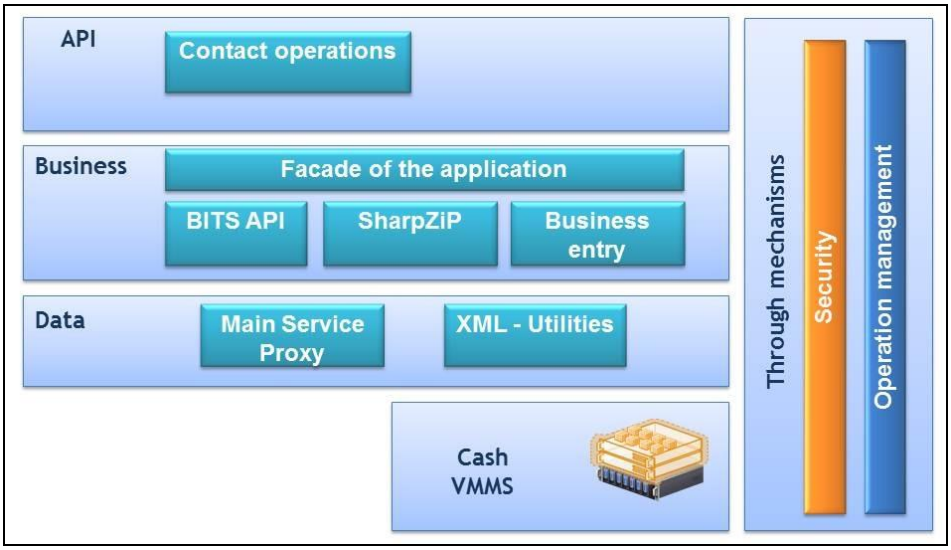


**Figure 5. Architecture of customer service.**
*Source: own elaboration*

Thanks to the use of WCF technologies, customer service is the main source of data for VMMS console. Customer service has its own API, implemented as a WCF-service.

Customer service is implemented as a system service on Windows, which allows easy work in the background, even during an idle computer.

Client service performs the following operations:

1. Synchronization of operating system images. This operation is performed if the results of the query list of operating systems indicate that you upgrade one of the images, or the appearance of a new image. An additional condition for re-synchronization of operating systems is the presence of damage of any image on the client computer.
2. Synchronization of virtual machine images is performed according to the assignments. If the request to the service manager will return a sample, in which the number of tasks is greater than zero, the process of their performance is initiated. Assignments are performed according to the priorities established by the manager of the service.
3. Formation of reporting. This function is implemented by sending data on the status of the client computer on the management server. Reports are sent on the network load during the boot files after downloading compiles reports on free disk space in the client computer.

It should be noted that the tight integration with the BITS service can rationally distribute the load on the network during the boot image files of virtual machines, and also provides fault tolerance to the various failures in the transmission of data. BITS service is one of the most reliable mechanisms for delivery of files, it provides not only the work of third-party applications, but also the update of Windows components.

In addition to the intellectual service of delivery of files over the network, the layer of the business - customer service logic uses components to decompress the zip-archives without using third-party software solutions. At the heart of these components there is a freely available library Sharp Zip Lib created for NET-applications.

The console system is a graphical interface that allows users to interact with the system of managing by virtual machines. This utility allows you to get connected to both the client and the managing service.

The console interface is implemented by using the technology of Windows Presentation Foundation. The special feature of the software implementation of the system console is to use a design pattern Model - View-ViewModel (Figure 6).


**Figure 6. Template Design Model-View-ViewModel.**
*Source: own elaboration*

Popular design patterns made the life of people easier living after the first steps of creating of users' interfaces of programs.

For example, the pattern Model-View-Presenter (MVP) was popular at different platforms of programming of users' interfaces. MVP is a kind of template, the model-view-controller, which has existed for several decades. All that is visible on the screen - this view: the data that appear is a model and the presenter brings them together. The Presentation needs the Presenter to fill in the data of the model, the response to user's input, provision of the check of the input and other tasks.

## 2. DEVELOPMENT ISSUE

### 2.1. The general operational principle

To be able to use VMMS it is necessary to prepare the virtual machine image, load it into a file storage, distribute among the clients, this should take the following steps (Figure 7):

1. The system administrator of virtual machines creates a new virtual machine image. The new image is formed on the basis of the reference image of the operating system pre-loaded in the VMMS, it can significantly reduce the amount of disk space.
2. Then they install the software into the newly created image which is necessary for work and also the necessary adjustment of the operating system is carried out.
3. The resulting virtual machine image file from the installed software product is archived in a ZIP file, it allows to get greater reduction in the amount of disk space.
4. The supporting information is added to the compressed file of the virtual machine image: the text of description of the virtual machine, virtual machine icon, screenshots.
5. The compressed file with the accompanying information is copied to the server of file storage.

6. They create a list of available packages for virtual machines with the new virtual machine.
7. The new list of available packages of virtual machines at the request of client services is delivered to the users' computers.
8. Upon the user's request, the archive file of the virtual machine image is copied to the client computer.
9. After copying of the archive it is unpacked on the client computer.
10. After unpacking the image, the run of the file of the virtual machine image is carried out by means of VMware Player program.

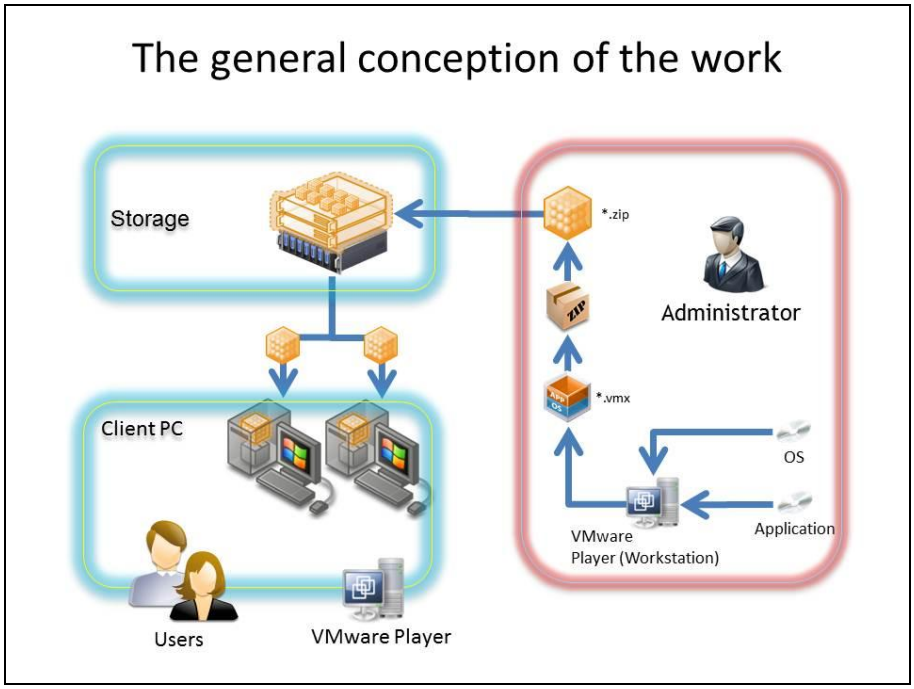


**Figure 7. The general operational principle.**
*Source: own elaboration*

## 2.2. Implementation of file storage

To achieve fault tolerance DFS technology is used. DFS Technology (Distributed File System) provides access to network file storage, providing fault tolerance and easy access.

DFS Namespaces provide the possibility of combining shared folders located on different servers into one or more logically structured namespaces. Each namespace appears to users as a single shared folder with a set of nested

folders. This structure increases the availability and automatically connect users to shared folders. All network storage, united in a common namespace, synchronizes the contents between servers using the mechanism of replication. In case of failure of one of the servers, the requests will be redirected to another server transparently to the user and without downtime VMMS.

Taken on a separate server from the organization structure of the DFS store files is as follows (Figure 8):

In the catalogue of "OS Section "files of images of the virtual machine of the operating systems and reference companion file to verify the integrity of the archive (format XML) are stored in archived form (ZIP)

In the catalogue "The section of virtual machines" they store in an archived form (ZIP) files of virtual machines with installed software products in them. In addition icons of virtual machine package (format ICO) and screenshots of virtual machine package are stored (format JPG).

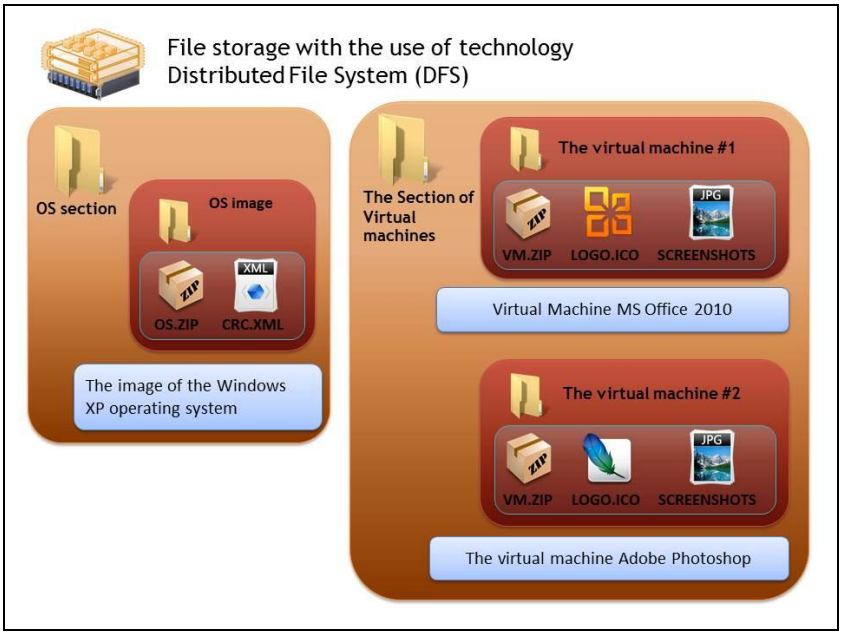


**Figure 8. Organization of storing files on the server.**
*Source: own elaboration*

## 2.3. Virtual machine management system

The developed virtual machine management system in the infrastructure of the enterprise (Figure 9).

The Active Directory domain is used. It provides authentication and authorisation of the users of the system when working with VMMS.

Storage of files of virtual machines images is organised using DFS technology with the integration in the domain network. The structure of the repository includes several file servers, synchronizing data with one another, thus providing fault tolerance.

Virtualization centre makes up tasks for clients and collects statistical data on computers in the system. The resulting statistics can generate reports on network utilisation and distribution of virtual packages.

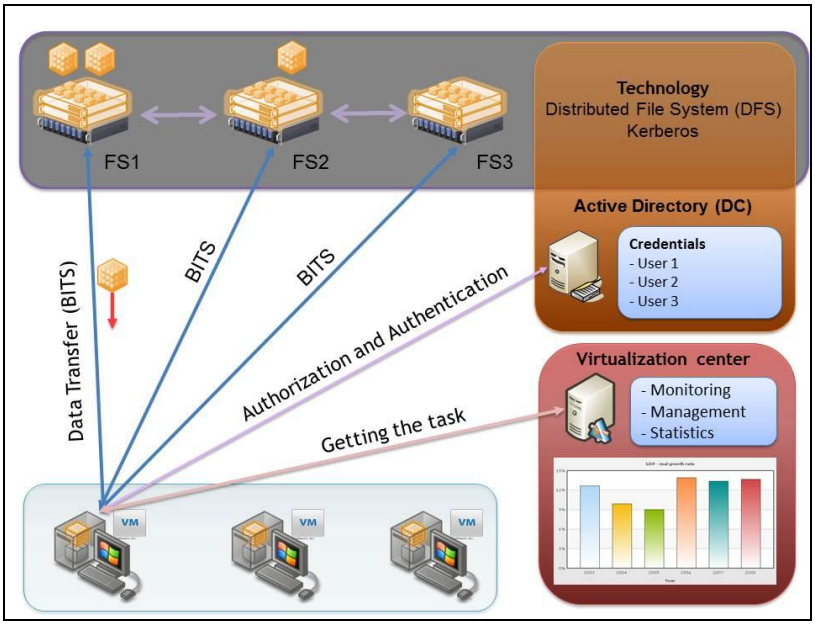


**Figure 9. Scheme of VMMS work.**
*Source: own elaboration*

A special service is installed on the client PCs providing receiving tasks from the virtualization centre and sending statistical reports on the status of your computer. Customer service allows you to manage the BITS service, through which the transportation of VM images and traffic prioritisation are carried out.

Also the console of the system of virtual machine management is installed on client PCs allowing users the access to the required functionality.

## 2.4. Synchronization of Client and Server

Synchronization occurs using the protocol of SOAP. SOAP (Simple Object Access Protocol) is a protocol for exchanging structured messages in a distributed computing environment. The protocol is used to exchange arbitrary messages in XML format and is an extension of XML - RPC. This implementation uses SOAP over HTTP.

The client application of virtual machine management is constantly synchronised with the Virtualization Centre via SOAP (Figure 10).

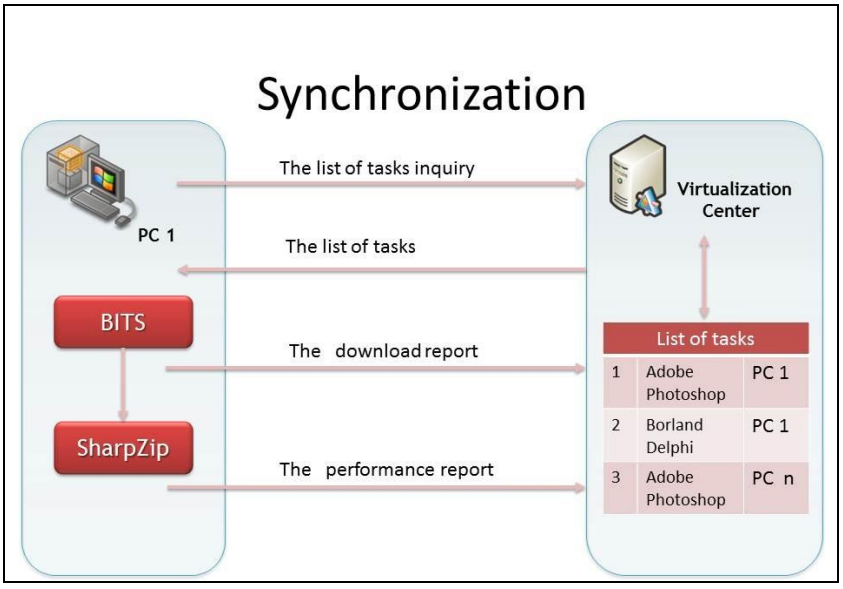


**Figure 10. Synchronization via SOAP.**
*Source: own elaboration*

1. When you start or update a client VMMS application requests the Virtualization Centre a list of tasks assigned for the given computer.
2. The Virtualization Centre determines whether the load of package of virtual machines was assigned for the given computer. If the task exists, the client application is sent a response indicating the start of loading.
3. The client using BITS technology starts downloading the package of virtual machines.
4. Upon completion of loading a report is sent to the server virtualization management on the time spent on loading and the average download speed.

5. The downloaded archive image files of virtual machines begin to be unpacked on the client computer.
6. After successful unpacking the server a report is sent to the server of Virtualization Centre that the package of a virtual machine is successfully installed on the client computer.
7. The Virtualization Centre gets the information about the successful completion of the task for the given computer.

## 2.5. Provision of security

Designed VMMS product uses a single, centralised security system provided by the domain of Windows.

The use of Kerberos and NTLM provides user authentication, authorisation is based on security group Active Directory. Protection from possible interception and modification of packets in the transmission of data between the centre virtualization and client computers is through encryption protocol TLS (Figure 11).

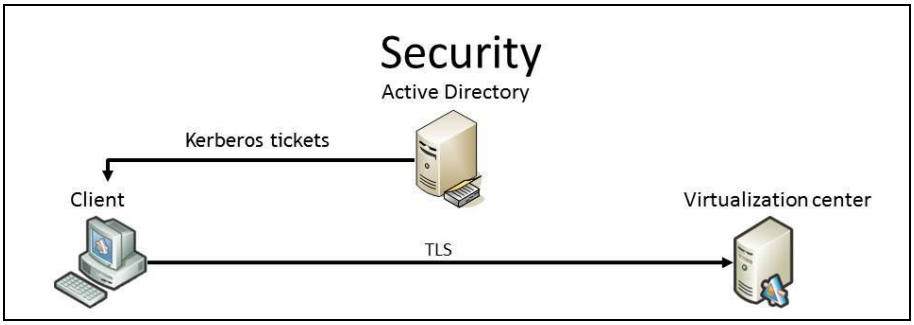


**Figure 11. Security VMMS.**
*Source: own elaboration*

Kerberos is a network authentication protocol which allows data transfer through unprotected network for secure identification. It is focused primarily on client-server model and provides mutual authentication – the both users confirm identity of each other through the server. This model is a variant of Needham-Schroeder authentication protocol based on the trusted third party and its modifications

TLS (Transport Layer Security) is a cryptographic protocol that provides secure data transfer between nodes in the network. TLS uses asymmetric cryptography to exchange keys for symmetric encryption codes of confidentiality and authenticity of the message to preserve the integrity of messages.

System administrators are in the domain VMMS Active Directory with full rights to read and change files of virtual machines.

System users are able to upload the images only the virtual machine file storage with no possibility of changing or deleting information.

If it is necessary, there is a mode of work with the VMMS system only for authenticated users in an Active Directory using a login and a password. This provides protection against unauthorised access to the virtual machine management system.

## 2.6. Transportation of files of virtual machine images

Transportation of virtual machines packages on the client computers is carried out using BITS technology.

BITS - Background Intelligent Transfer Service is a Background Intelligent Transfer Service from the company Microsoft. It provides data transfer between clients and servers in the background at the expense of unused bandwidth. This service is part of Windows.

The general scheme of VMMS with BITS technology is presented in the figure (Figure 12).

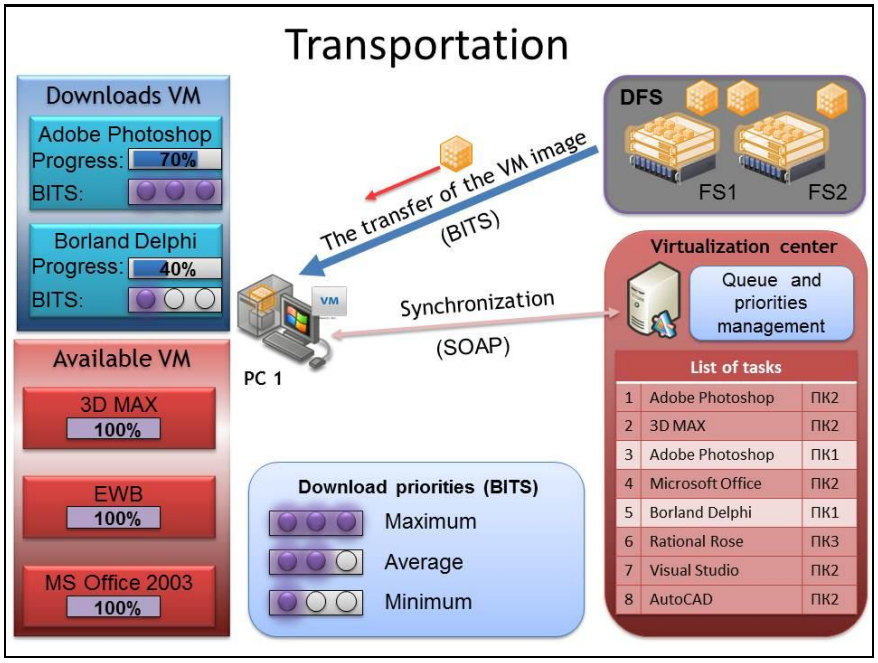


**Figure 12. Diagram of the BITS technology to VMMS.**
*Source: own elaboration*

BITS service allows the use of a PC failure to perform background downloading files. The presence of priorities allows efficient use of network bandwidth to manage its workload.

There are three priority levels: minimum, average, max. With the highest level of priority BITS uses all available network bandwidth to download files of virtual machines. Simultaneous loading of image files on multiple computers with the highest priority can significantly degrade the quality of the local network or completely paralyze the work.

Virtualization Centre is responsible for assigning priorities and sequencing downloading files of virtual machine images, depending on the timing of the work.

Virtualization Centre appoints a separate priority for each task of downloading files of virtual machines for each computer operating system. All this allows to preserve the work of the local network and the execution of users' requests to download packages of virtual machines on the client computers.

## 2.7. Gathering statistics from client computers

Virtualization Centre provides statistics on the status of client computers. This information is stored in the database MS SQL Server for further analysis and reporting using standard office tools (Figure 13).

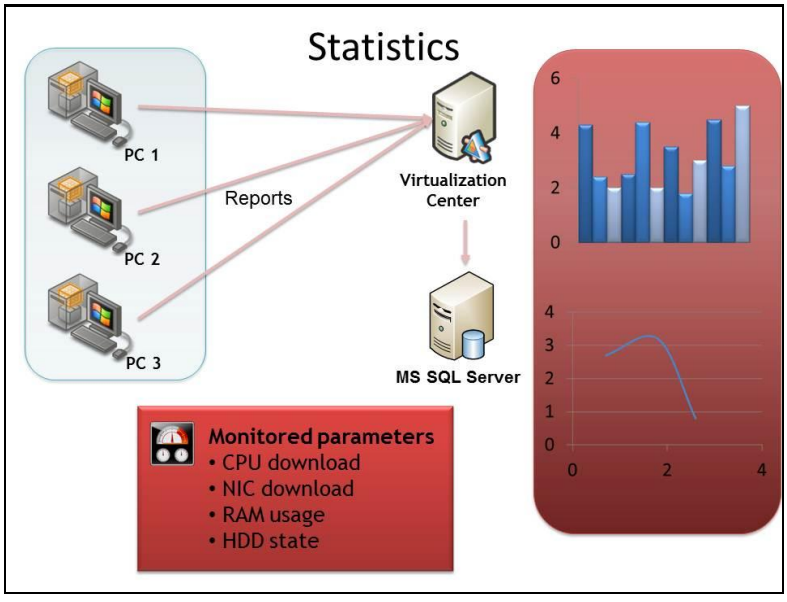


**Figure 13. Collection of Statistics.**
*Source: own elaboration*

The following parameters are monitored on a computer VMMS customers:

- the average time and time intervals of the CPU computer;
- the average time and timing of loading the network interface on your computer;
- the average value of available RAM when working with virtual machines and everyday computer;
- the average value of free space on computer hard drives.

All these values are analysed in the centre of virtualization and help predict the time required for deploying virtual machines on a specified client computers and the use of priority protocol BITS.

Also thanks to the actual statistical information, the administrator of the system during the formation of a new virtual machine can be guided by the available hardware capabilities of the PC fleet.

## 2.8. The Interface of Management Console

The interface of the console of the virtual machine management system is developed in the environment of Expression Blend. In the main window of the program there is a list of packages of virtual machines which are available for the user at the moment (Figure 14).


**Figure 14. List of available packages of virtual machines.**
*Source: own elaboration*

When choosing the right package of virtual machines the following information is displayed:

- The name of the software installed on a virtual machine;
- The description of the software product;
- The screen shots clearly displaying the software.

The control buttons on the right side of the window allow you to perform the following steps:

- To start the installation of the selected package of virtual machines. There happens a download from a file server of an archiving file of the virtual machine image and the subsequent decompression.
- The Start of VMware Player using the already pre-downloaded file of the image of the virtual machine.
- Copying of the advanced downloaded file of the virtual machine image on an external storage device for subsequent transfer to another computer.

In the process of downloading of the package of virtual machines an indicator notifies the user about the status of the end of the operation (Figure 15). Any actions with the package of virtual machines which is currently loaded, are not possible.

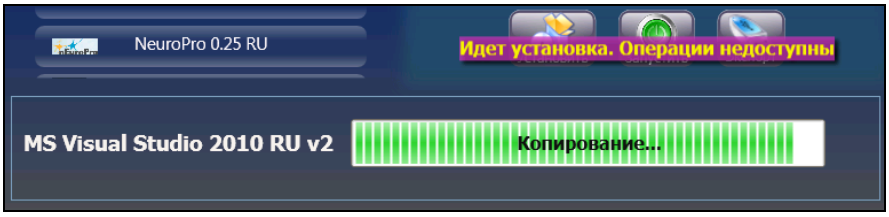


**Figure 15. VMMS uploads the package a virtual machine on the client computer.**

*Source: own elaboration*

Running VMware Player using already downloaded file of the image of the virtual machine the user can choose how much RAM to allocate to a virtual machine (Figure 16). You can select predefined settings "Maximum", "Normal", "Minimum", which corresponds to 1024MB, 512MB, and 256MB of RAM or set the parameter selection of memory manually.


**Figure 16. Allocation of memory to run the virtual machine.**
*Source: own elaboration*

The allocated amount of memory depends on the available free RAM on the client computer. "Heavy" software packages require more RAM, and with its lack of speed in a virtual environment can be significantly degraded.

The VMMS Administrator while appointing the package of a virtual machine on the client computers must take into account the technical requirements and technical capabilities of computers.

Windows management is intended to the VMMS administration allowing you to manage the following settings (Figure 17):

- Access of packets of virtual machines for VMMS users;
- Change of the name and the description of packets of virtual machines;
- Adding / deleting of new standard images of operating systems;
- Loading and deleting of packages of virtual machines in VMMS system.


**Figure 17. VMMS Administrative Management.**
*Source: own elaboration*

When a file image of a virtual machine is successfully downloaded and decompressed on the client computer and VMware Player virtualization program is run, the virtual machine is loaded (Figure 18).

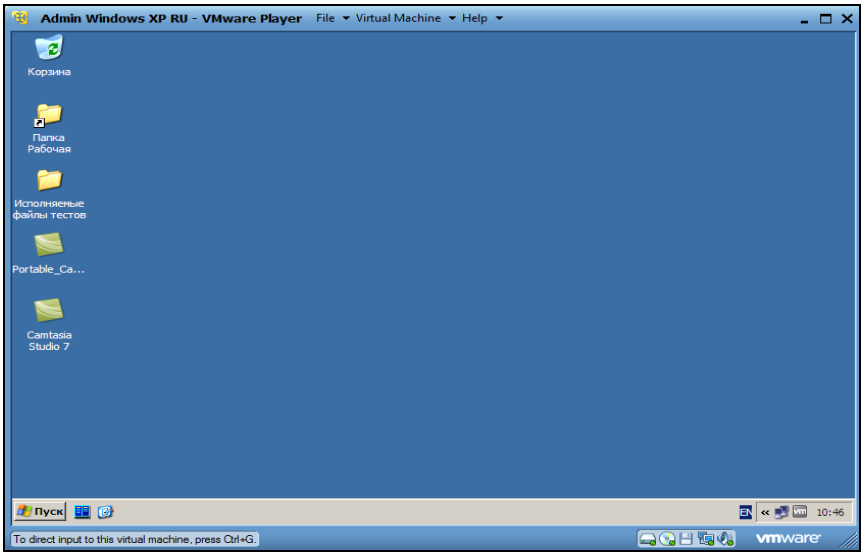


**Figure 18. Running virtual machines.**
*Source: own elaboration*

You can work with a running virtual machine like with a full-fledged computer, run or install programs, modify the operating system. When finished, the user closes the VMware Player program and can select a different virtual machine package for subsequent download and run.

## CONCLUSION

In the Russian State Vocational Pedagogical University at the Faculty of Informatics working with virtual machines the virtualization technology with hardware acceleration is used. All these opportunities allow to carry out the learning process at the Department of Computer Science courses on network administration, database, computer graphics, as well as, other resource disciplines with a minimum loss of productivity.

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# KEY COMPETENCES IN CHEMISTRY TEACHING USING BLENDED-LEARNING METHOD

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***Abstract:*** *Today's world, described by P. Drucker as the turbulent era, can be characterised by the ongoing change which affects every life domain: human contacts, relationships, communication, entertainment and also education. Therefore modern education systems must use the achievements of technology to increase the amount of acquired knowledge and to make learning content more and more interesting. These objectives are being achieved by the usage of the hybrid model of education (blended learning), which involves a combination of traditional teaching methods and distance education. This paper presents a mode of action, objectives, organisation and results of the project based on blended learning.*

**Keywords:** Key Competences, chemistry, blended-learning, Avatar, platform.

## INTRODUCTION

The world as we know it today and the situation in which we operate today P. Drucker describes as the turbulent era that is characterised by: technology race, globalization and a competition growth (Drucker 2005). New realms require new skills and abilities as well as the new educational system for those who grew up surrounded by technology and digital media, so called "digital natives". Virtual reality is treated by them as a supplement to real contacts. Digital generation cherishes values such as innovation, individuality, openness, cooperation and freedom of action. Through intensive use of new technologies, they have produced new models of learning, relationships and cooperation.

The result is the increasing popularity of education via the Internet (i.e. e-learning) which provides an opportunity to use this form of education in a number of educational projects. Passing messages through various media (Internet, CD-ROMs and DVDs, PCs, iPads) is one of the newest methods of teaching known as e-learning. This method allows the completion of the course, training and studies even, without being physically present in the classroom or school, at any given time and for any length of time. E-learning has become known due to companies that offer training on their websites, but today the area where e-learning plays an increasingly important role, is knowledge management. E-learning tends to take two forms of training: based on computer technology, addressed to a particular person and online training, also known as On-line Learning, addressed both to a single person and to a group of people. And although it usually takes one of the presented forms, there are other known variants associated with technology such as satellite and video techniques.

In remote teaching, the user has a constant access to the material that is the subject of training, which allows to use it anywhere and at any time. Moreover, the pace of learning can be adapted to student's own needs, and - if necessary – have the revision of the material. Internet newsgroups and email lists facilitate contact with other participants and the training instructor, who oversees and supports the learning process. Such a broad boundaries allow e-learning to comprise both education conducted via the Internet and educational programs installed locally on a computer student. As a training method, e-learning is independent of or complementary to the traditional ways of learning. While using this method the learning process allows the transmission of both theoretical knowledge and practical skills.

## 1. PROJECT e-ACADEMY OF THE FUTURE

Although studies show that more and more teachers want to participate in online courses, many of them point out a number of deficiencies of a remote form of training. The most important drawbacks are connected with the lack of time to prepare attractive e-learning lessons, which requires prior consideration, a detailed plan and having skills which allow to prepare different types of animation and visualization (Burewicz, Miranowicz M. 2005, Burewicz, Miranowicz M., Miranowicz N. 2004). These factors probably have an impact on the number of applications for the e-Academy of the Future conducted by WSiP Sp. z o.o. in collaboration with Combidata Poland, with 972 schools from Poland in the recruitment process. By drawing

lots 200 middle schools which were an even representation of schools from all sixteen regions were selected (Dadacz, Kołodziejczyk 2010).

### 1.1 Assumptions

The main objective of the project is to prepare middle school students to function in a knowledge-based society and to create an attitude of lifelong-learning. To accomplish that the e-Academy of the Future is shaping the seven Key Competences that will help students develop skills, personality and the best performance in modern society:

1. Communication in the mother tongue.
2. Communication in foreign languages.
3. Mathematical competence and basic competences in science and technology.
4. Digital competence.
5. Learning to learn.
6. Social and civic competences.
7. Sense of initiative and entrepreneurship.

The European Parliament defined key competences as a combination of knowledge, skills and attitudes appropriate to the situations that everybody needs for personal fulfillment and development, to be an active citizen and for social integration and employability (Dziennik Urzędowy Unii Europejskiej 2006). The European Reference Framework in the context of lifelong learning defined eight key competences. The above mentioned seven of these competences are included as part of the project e-Academy of the Future. Creating Key Competences takes place during lessons, optional courses and pupil's individual activities.

The project has been implemented in schools for three years - from September 2010 until the end of the school year 2012/2013. The project e-Academy is participated by:

- 200 schools;
- 1600 teachers;
- 19000 pupils.

The Project is implemented during chemistry, math, physics, biology, geography, English, IT and business lessons. An e-learning platform was specially launched to enable carrying out the project on which pupils' and

teachers' materials are uploaded. The students can use e-learning units placed on the platform either on their own or supervised by their teachers. Additionally, they can communicate with their peers across the country. Each teacher and student has continuous access to the platform regardless of place and time. In this project, work is done via EduPortal, an e-learning educational platform.

### 1.2 Substantial content – creating key competences in the framework of chemistry lessons

Creating Key Competences in the framework of a chosen subject will take place will take place by using 168 e-learning units, including 21 units regarding chemistry. Their topics are:

1. The world of chemistry.
2. Metals and metalloids.
3. Separation of mixtures.
4. Types of chemical reactions.
5. Gases and their mixtures.
6. Water and aqueous solutions.
7. Water pollution.
8. Acid rain.
9. Reactions of selected metal oxides and metals from water.
10. Hydroxides – properties and applications.
11. Acids, their properties and applications in everyday life.
12. Neutralization reactions.
13. Construction and the names of salt.
14. The precipitation of salts.
15. Salts – summary.
16. Hydrocarbons.
17. Alcohols and their application in everyday life.
18. Esters and their application in everyday life.
19. The importance of fats in human life.
20. Proteins and their properties.

21. Sugars (Bartoszewicz, Gulińska 2010).

The e-Academy of the Future involves training in the hybrid model (blended learning), which involves a combination of traditional teaching methods and distance education. This is a particularly advantageous form of teaching science because during the lesson in a classroom student acquires abilities such as experimentation and research skills.

Bearing in mind the objectives of the project and the mode of their implementation, 21 scenarios of e-learning chemistry units has been prepared. It is considered to be particularly important that the student could use this knowledge to understand the processes occurring in the world around him and realise that the knowledge of chemistry acquired at school is often useful in everyday life situations.

### 1.3 Unit "Water pollution"

As an example, a knowledge part from the unit "Water pollution" from the e-learning platform will be discussed (Bartoszewicz, Gulińska 2011).

Each individual e-learning unit as intended in the project is focused on the implementation of key competences.

### Introduction

The first screen lists the main and secondary skills that will be schooled while working with the selected unit.


**Figure 1. A sample of the unit "*Water pollution*" from the e-learning platform.**
*Source: own elaboration*

For each unit e-learning prerequisites were prepared. On their basis students themselves or with their teacher's help should recall the signalled problems in order to take advantage of the prepared e-learning materials.

The third screen of each e-learning unit contains objectives that students should achieve after its completion.

### A problematic situation

Each e-learning unit begins with a problematic situation. In this case, during a picnic avatars sense an unpleasant smell. Due to disturbing changes in the river they decide to take a sample of water.


**Figure 2. A sample of the unit "*Water pollution*" from the e-learning platform - indication of a problem.**

*Source: own elaboration*

### In the Laboratory

Later, in the laboratory avatars describe in detail the sample of water and determine its colour and the sample's transparency.

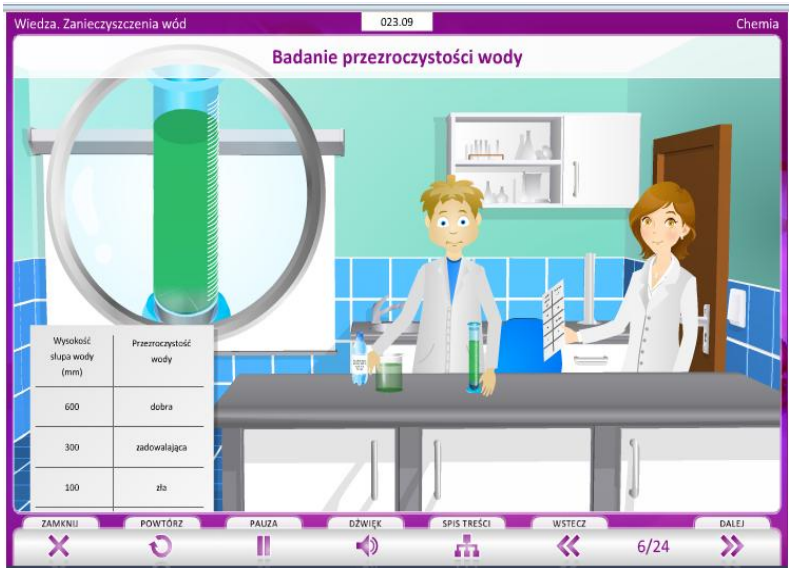


**Figure 3. A sample of the unit "*Water pollution*" from the e-learning platform - water transparency test.**

*Source: own elaboration*

Afterwards Avatar determines the smell of water sample. The other Avatar reminds him of health and safety rules and informs what types of fragrances he may feel. Avatars examine the sample's pH. They are clearly worried about the results.

**The sanitary-epidemiological station's**

A sanitary-epidemiological station's employee alerted by avatars comes to the river bank and performs basic research with the help from avatars.

During the next meeting the employee of the sanitary-epidemiological station shows avatars the study of the content of organic matter dissolved in the water, explaining his research.


**Figure 4. A sample of the unit "Water pollution" from the e-learning platform - water quality of the river in Avatartown.**
*Source: own elaboration*

**Public debate**

Avatars assumptions turn out to be correct, the water intake is closed, and all residents are informed about the situation.

During the discussion, one of the residents shows a film about removing oil from the surface of the water.


**Figure 5. A sample of the unit "*Water pollution*" from the e-learning platform – information about water quality of the river in Avatartown.**
*Source: own elaboration*

### Eutrophication of lakes

Whilst thinking about the causes of pollution of the river, avatars reach the lake where the situation does not look better. It can be seen that someone recently released waste oil here. Avatars sprinkle the stain with sawdust according to the instructions shown in the movie and notify the sanitary-epidemiological station's employee, who informs them about the research that will be carried out. Avatar realises that she also uses the rapid tests for detection of nitrates when she tests water in her aquarium.


**Figure 6. A sample of the unit "*Water pollution*" from the e-learning platform – information about water quality of the river in Avatartown.**

*Source: own elaboration*


**More information**

Additional screen regarding concepts and causes of eutrophication.

### Public debate

During another meeting with the residents avatar informs about the lake's disturbing state.

The sanitary-epidemiological station's employee presents his study of nitrate (V) presence in the water from the lake, explaining the stages of work and informing about acceptable emission class.


**Figure 7. A sample of the unit "*Water pollution*" from the e-learning platform – information about water quality in the lake in Avatartown.**
*Source: own elaboration*

The sanitary-epidemiological station's employee presents his study of nitrate(V) presence in the water from the lake, explaining the stages of research and informing about acceptable emission class.

The next screen 16. during the discussion residents find water polluters.


**More information**

Additional screen regarding water pollution, its types and division.

**Public debate**

During the meeting, everybody wonder how water can be protected from pollution and whether it is possible to live in the lake when the water freezes.


**More information**

Additional screen regarding the lake's reclamation.

**Exercise 1**

Its aim is to consolidate the information presented above.

Please select the temperature of the water in the lake at its various depths in the winter and in the summer.

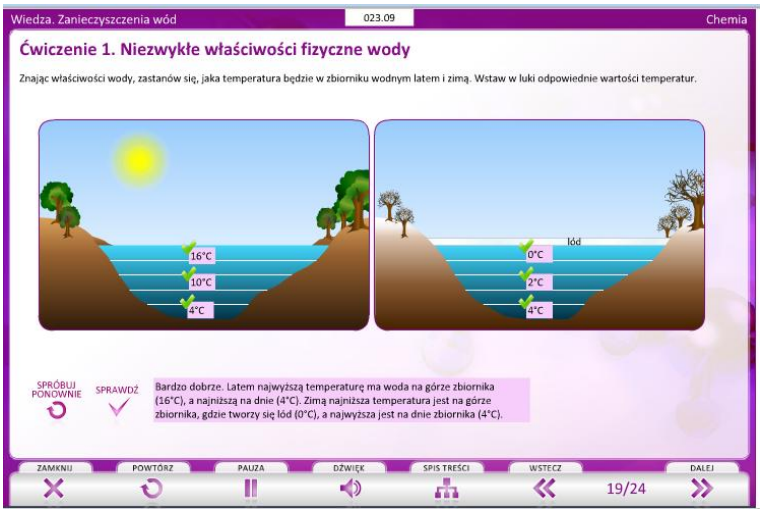


**Figure 8. A sample of the unit "*Water pollution*" from the e-learning platform – exercise 1.**
*Source: own elaboration*

**In the Laboratory**

Avatars go back to the lab, where they mechanically clean water, talk about the water filters used in households.


**Figure 9. A sample of the unit "*Water pollution*" from the e-learning platform – mechanically clean water.**
*Source: own elaboration*

**Home**

Avatars recall how the water purification process is carried out in sewage treatment plants.


**Figure 10. A sample of the unit "*Water pollution*" from the e-learning platform – cleaning water mechanically.**

*Source: own elaboration*

Lack of water encourages avatars to reflect on how much water they use every day and to search for information on the average daily water consumption.

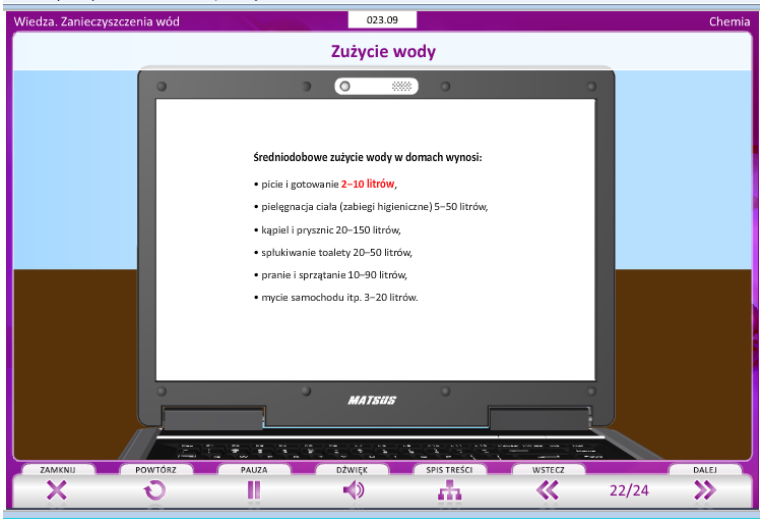


**Figure 11. A sample of the unit "*Water pollution*" from the e-learning platform – water consumption.**

*Source: own elaboration*

The next part of the lesson is devoted to the rational use of water.

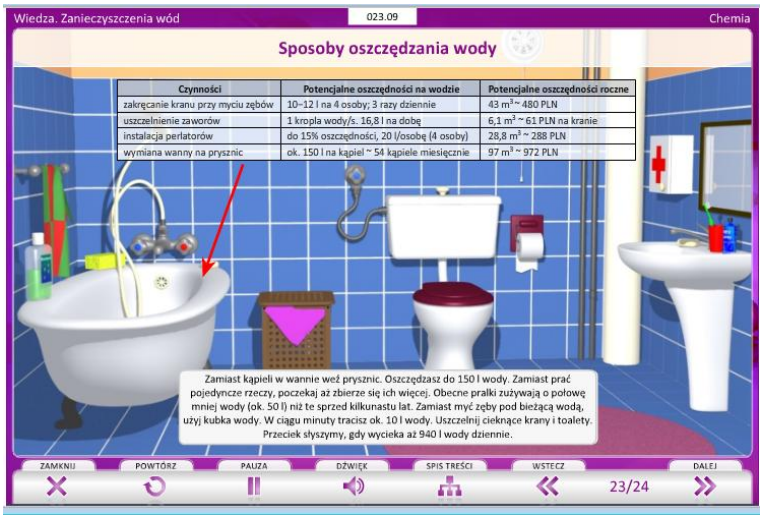


**Figure 12. A sample of the unit "*Water pollution*" from the e-learning platform – ways to save water.**

*Source: own elaboration*

**End**

Avatars recall briefly the most important issues, which were mentioned in the unit and invite to exercises and the test.


**Figure 13. A sample of the unit "*Water pollution*" from the e-learning platform – end.**

*Source: own elaboration*

Each e-learning unit consists of three modules: knowledge (discussed above), tasks (exercises, educational games and simulations), and a test consisting of 10 questions (this part examines acquired skills). In the test module, unlike in the tasks module, students can no longer resort to hints, or return to the solved tasks.

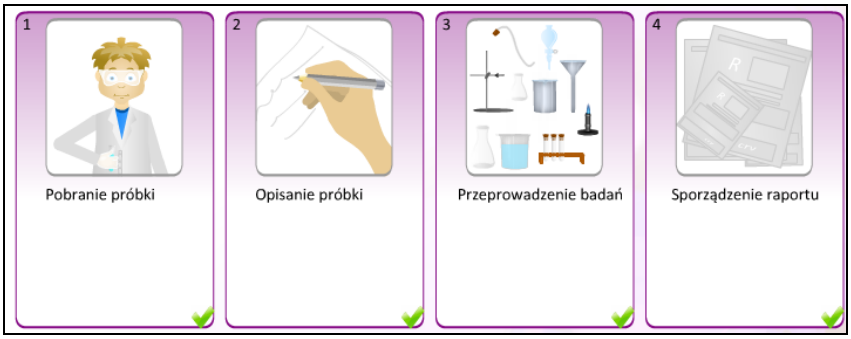


**Figure 14. A sample of the unit "*Water pollution*" from the e-learning platform.**

*Source: own elaboration*

Validation of performance of the tasks immediately after their solution is helpful not only to the teachers, but also to the students who can fill educational gaps and return to this part of the material, with which they had problems. The specially prepared educational platform may be also helpful (Okońska-Walkowicz, Plebańska, Szaleniec 2009). As it turns out, for some students it is much easier to ask a question on the online discussion forum, chat room or by e-mail than in a direct contact. Virtual Reality, which is accompanied by the complementary teaching ensures that all pupils have free access to these modules.

## CONCLUSION

The effects of a mixed mode of the organization of the educational process are promising. Due to a considerable rise in the level of individualised teaching-learning process, an increase in its effectiveness can be expected.

The undoubted benefits of the project is the increasing interest of the project participants in the content of classes. Teaching through the development of key competences allows students to realise the presence of chemistry in the different spheres of life. Implementation of the project through complementary learning is a great supplement to the knowledge and skills

gained in the classroom, which due to the nature of science that is the chemistry could not be acquired only through distance teaching.

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# THE MODE OF CURRICULUM PUBLICATION AND DEVELOPING KEY SKILLS: THE POLISH CORE CURRICULUM WITH COMMENTS AND THE AUSTRALIAN CURRICULUM

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***Abstract****: The Polish "Core Curriculum with Comments" was published in 2009. It consists of three preliminary documents and eight printed volumes, relating to the main school subjects. The preliminary documents mention key skills including "an ability to use modern information and communication technology". The whole document is also published as a PDF on the Internet. The "Australian Curriculum" was published in 2011 as a web page for only four learning areas. But the bookmark "General Capabilities" also lists seven key skills, including: "ICT capability". The student develops them while using the electronic document. Therefore the Australian curriculum better than the Polish one develops key skills connected with digital comptetences.*

**Keywords**: curriculum, copetence, key skills, ICT.

## INTRODUCTION. CIVILISATIONAL CHANGE AND NEW CURRICULA

As a result of civilisational change, not only new textbooks, but also new national curricula have been developed. Curricula do not specify only the resource of knowledge for graduates, since this becomes obsolete very soon. On the other hand, they list the key skills which will serve students for competent functioning in areas important for modern people and societies. These are areas of key skills and key competences.

Therefore, the very mode of publication of the Core Curriculum can develop key skills. This applies in particular to those which relate to independent search and development of the information in the digital environment. These are very important skills. They allow for independent, active, innovative

performance and communicating using the latest ICT equipment. With this competence students may also be subjects of learning. The role of the teacher today is increasingly limited to facilitating young people to learn through the collection, processing and application of knowledge. There are also created alternatives to traditional education – virtual schools. They allow for individual speed and more individualised learning. They also limit the negative interactions of some students and teachers in order to increase the objectivity of the assessment.

Therefore, the publication of the curriculum in a digital and interactive form, in a clear layout, with hyperlinks – prepares students for learning and functioning in today's digital environment, because key skills are developed. Teachers facilitate the shift from traditional teaching to digital education.

## 1. EUROPEAN KEY COMPETENCES. KEY SKILLS IN POLAND AND AUSTRALIA

In a document entitled *Key Competences for Lifelong Learning* recommended by the European Parliament on 18 December 2006 eight key competences were formulated:

1. Communication in the mother tongue.
2. Communication in foreign languages.
3. Mathematical competence and basic competences in science and technology.
4. Digital competence.
5. Learning to learn.
6. Social and civic competences.
7. Sense of initiative and entrepreneurship.
8. Cultural awareness and expression (European Comission 2007).

These competences enable students to make wise and responsible actions in various spheres of human life. They are the result of having key skills and experiences gained in the exercises. The competences consists, therefore, of integrated Key Skills Qualification (intellectual and motoric) in the designated area – important component of contemporary education.

In the Polish *Core Curriculum with Comments* published in 2009 the following seven key skills are enumerated:

1. The reading experience.
2. Mathematical thinking.
3. Scientific thinking.
4. The ability to communicate in the native language and foreign language.
5. Ability to use the modern information communication technology.
6. Learning skills.
7. Ability to work in a team.

In the Australian Curriculum published in 2011 in the bookmark *General capablilities* the following seven skills are included:

1. Literacy.
2. Numeracy.
3. Information and communication technology (ICT) capability.
4. Critical and creative thinking.
5. Personal and social capability.
6. Ethical behaviour.
7. Intercultural understanding.

Therefore, between the Polish and Australian key competences there are many similarities: in both considered the most important are literacy and numeracy. In both countries the importance of ability of scientific/critical thinking is recognised. Also important is the cooperation with other people, in multicultural Australia extended to a maximum of three skills. It is also noted that the key competences, as well as the key skills always include ”digital competence”, “ability to use modern information communication technology or “ICT capability”, because they are abilities which are necessary in personal and social life of every contemporary individual. With the use of digital competence it is easier today and often at all possible to search and produce information, be creative and innovative. It should therefore be considered how the way the curriculum is published affects the education of the key skills.

## 2. THE MANNER OF CONDUCTING RESEARCH

Polish and Australian curricula show many similiarities. There are also differences because both states feature many civilisation differences. The objectives of education in both countries are different: in Australia – communicating in a multicultural society, in Poland – the development of links with the Mediterranean and the national tradition. Both documents list the key skills, related to ICT.

In order to examine and compare the development of these key skills through a mode of curriculum publication there are summarised relevant entries of the *Core Curriculum with Comments. Polish Language,* 2009 related to teaching Polish with corresponding excerpts from *English* in *The Australian Curriculum* published in 2011. To ensure comparability materials relating to the Polish secondary school and the Australian *Year 9* and *Year10* were taken into account. The test was carried out on 31 July 2012 when they were downloaded and examined:

1. *Core Curriculum with Comments* from the page of Polish Ministry of Education (MEN).
2. Resources from the portal *The Australian Curriculum*.

These documents underwent qualitative analysis. It was hypothesised that the Australian document contains more tips, related with developing key skills in the areas of analysis, interpretation, use and creating electronic resources for the needs of the modern man and contemporary society.

## 3. MODE OF PUBLICATION OF CURRICULUM IN POLAND AND AUSTRALIA

*The Core Curriculum…* was published as three preliminary documents included in eight printed booklets, relating to the main school subjects. It also functions as a text in PDF version on the webpage of the Ministry of National Education (Ministerstwo Edukacji Narodowej) in bookmarks: ”Training and Staff” / ”General Education” / ”Core Curriculum” / *Appendix 4 – Core Curriculum of General Education for Middle and Secondary Schools, Whose Completion Enables Obtaining a Certificate Mature after Passing the Matriculation Examination* as well in the bookmarks: „Education and Staff” / „General Education” / „Core Curriculum” / „Polish Language” (“Kształcenie i kadra” / „Kształcenie ogólne” / „Podstawa programowa” / *Tom 2. Polish Language in primary school, middle school and secondary school*). As an official state document it was published as an printed text with a PDF version

in the Journal of Laws. The Polish *Core Curriculum* is therefore published as an information about the activities of national institutions.

The Polish *Core Curriculum with Comments* functions as printed text with a PDF version, and therefore as a successive pages, which rigidly structurised educational content for the subsequent stages of education, which makes it difficult to compare or combine particular stages. The texts are not equipped with hyperlinks. There are no propositions of implementing the teaching content in various classes, therefore in practice the chronological model prevails. Black and white colour of the document displayed on the screen differs from the aesthetics of modern audiovisual transmissions and suggests that the content of the curriculum is obsolete. As a result general capabilities listed on page 15 of the *Core Curriculum…,* are likely to be missed while searching for information in the booklet.

The *Australian Curriculum* was published in 2011 as a website. To get to the information, the user must find and choose the year level and the learning area, or demonstrate a basic knowledge on the subject and skills of computer support. *General capabilities* are enumerated and placed on the main bar hyperlink. Most importantly, it does not disappear from the screen when using the Australian portal.

In the scope of *English* there are three sub-bookmarks: *Rationale / Aims* (which also include guides to resources: the multimedia presentation and video with the statement of Professor Peter Freebody, University of Sydney), *Organisation* (information about resources and their organisations), as well as *Foundation to Year 10 Curriculum,* with the content of teaching the subject from *Year 1* to *Year 10.* For each year level the material is arranged in the sections: *Language, Literature, Literacy* At each year level there are specified requirements, standards of achievement and provided examples of tasks for students. Thus created names of twelve sections were applied consequently in different stages of learning. Therefore, this material is transparent and predictable to the teacher, as well as to the student. This allows for the use of a document to construct the distribution of the material, working on lesson planning, resolving doubts, organising tests and examinations and preparing for them.

**Table 1.**
**The layout of the content of the documents of the Australian Curriculum and Assessment Reporting Authority *The Australian Curriculum. Year 9. English* i *The Australian Curriculum. Year 10. English.***

| Language | Literature | Literacy |
|---|---|---|
| Language variation and change | Literature and context | Text in context |
| Language for interaction | Responding to literature | Interacting with others |
| Text structure and organisation | Examining literature | Interpreting, analysing, evaluating |
| Expressing and developing ideas | Creating literature | Creating texts |

*Source: own elaboration*

Consequently, the Polish and Australian documents show many fundamental differences. Australians treat and present the text in such categories of communications that allow for modern media: verbal transmission has been enhanced with movement, colour, sound, interactivity, filters, hyperlinks, internal search engine, etc. The Polish document remains white at the verbal categories, black and white colours and a rigid system, dictated by PDF format.

Moreover, the *Core Curriculum* was composed centrally, chaired by the Ministry. Instead, the *Australian Curriculum* was founded on the basis of the previous experience of bodies in various States composed of democratically elected delegates of the teacher associations, trade unions, associations of various kinds of schools (e.g. Catholic, ethnic). Poland does not have this type of tradition yet. Therefore, the centralist approach has been adopted. The Ministry employed designated specialists to develop a document. In society, aspiring to democracy, it raises controversy, especially that the role of organisations and associations have been reduced to proposing amendments and expressing opinions. In Australia the issue of the reform of education was treated as a bottom up project, created by an independent, democratically elected representatives of society, although their activities were coordinated centrally.

**Table 2.**

**Mode of publication of the *Core Curriculum with Comments: Polish* and *The Australian Curriculum: English***

| | **Poland** | **Australia** |
|---|---|---|
| **Place of publication** | Site of MEN | Specially created site *Australian Curriculum Assessment and Reporting Authority* |
| **Volume** | Stages of education III and IV 19 pages | *Year 9*: 20 internal hyperlinks<br>+ 31 for explanations + 70 to the definition<br>*Year 10*: 16 internal hyperlinks<br>+ 31 for explanations + 81 to the definition |
| **Type of publication** | Booklets, PDF documents | Web site, hyperlinks, PDF documents<br>with examples of tasks |
| **Created texts** | Verbal | Verbal, multimodal |
| **Method of formation** | Central | Local and central |

*Source: own elaboration*

## 4. DIGITAL COMPETENCES COVERED IN THE TEXTS OF BOTH DOCUMENTS

### a. Core Curriculum with Comments

In this document have been formulated, among others, the following skills, gained by the student in education in middle school and secondary school: *5) ability to efficiently use modern information and communication technologies, 6) the ability to search, filter and critically analyse information* (*Core Curriculum…*: 19). Although not specified, the provision contains a reference to a skilful use of the Internet, which in later parts of this document is treated primarily in terms of one of the sources of information: *An important task of the school on the III and IV stage of education is to prepare students for life in the information society. Teachers should create conditions for students to acquire skills to search, organise and use information from*

*various sources, using ICT, during classes of different subjects. The implementation of the above objectives, should be supported by a well equipped school library* (…). *Because the media play an increasingly important role both among society and individuals, every teacher should devote a lot of attention to media education, proper reception and use of media* (*Core Curriculum…*: 12).

These provisions treat the Internet as a library: a reliable, one-way means of communication. This is a recognition out of date, based on the classic sense of the communication process as a one-way transmission within the meaning of Harold Laswell. According to the beliefs of late nineteenth / twentieth century intellectuals (Gustaw Le Bon, Ortega y Gasset, Serge Tchakhotine 1939) it refers to the omnipotence of propaganda and persuasion.

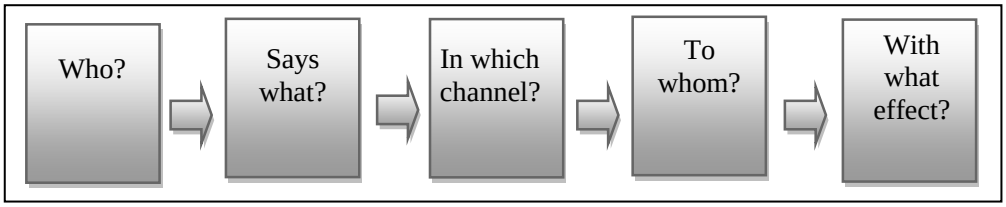


**Figure 1. Model act of persuasion by Harold Laswell, 1948.**

*Source: own elaboration based on Goban-Klas 2005: 57*

Entries, relating directly to the Internet, have been placed in the section *Content of the curriculum – Specific requirements. The basic range* which means that they are also compulsory at the extended level. Chapter *I Reception of expression and use of the information contained therein* contains individual points which say:

1. *Self-education and reaching out to the information*: *Student: 1) is looking for literature useful to the development of various issues, selects it according to specified criteria (in the resource library he uses both the traditional library as well as records and electronic media, including the Internet)* (*Core Curriculum…*: 12).
2. *Awareness of language. Student: 3) is familiar with the concept of an act of linguistic communication, and indicates its components (sender, recipient, code, message, context), recognizes and discusses today's changing the model of linguistic communication (eg, differences between traditional oral or written communication and communication via the Internet* (*Core Curriculum…*: 12).

3. *Creates the database containing the information captured in the course of science; 4) draws up the bibliographic description of the book and article, electronic records, bibliography of the chosen topic* (*Core Curriculum…*: 12).

*4.* However, for an extended level of education stated in section 1.: *Reading and listening. The student compares a linear text and hypertext understood as a discontinuous, non-linear pronuncement which is a system of related elements, combined freely by the user of language in each act of receiving* (*Core Curriculum…*: 11).

It follows from this that the detailed description of the expected abilities of students is supported by the concept of one-way flow of digital information presented in the introduction of the document. It follows that in the Polish *Core Curriculum* the Internet is treated as a source of information. The effect of training is such perception of the Internet by students. Are not sufficiently analysed aspects of Internet communication, though the records relate to learning the mother tongue. Reflections on the hypertext are provided only for the extended level of secondary education.

**b. The Australian Curriculum. English**

The Australian document was published on a special website *Australian Curriculum, Assesment and Reporting Authority*. The presentation of materials for different year levels is preceded by general information, which contains set learning goals, including not only reading, writing, speaking and listening, but also: *an ability to view* (…) *create and reflect on increasingly complex and sophisticated spoken, written and multimodal texts across a growing range of contexts* (ACARA: „The Australian Curriculum English*"*). On the other provisions of the document states that it is among other things media contexts: *Students develop a critical understanding of the contemporary media, and the differences between media texts* (ACARA. *The Australian Curriculum Year 9. English*). The desired shape of media messages is indicated in the most noteworthy example: *Informative texts represent a synthesis of technical and abstract information (from credible / verifiable sources*) (ACARA. *The Australian Curriculum Year 9*). Thus it is suggested that the teachers should observe with students construction of transmission of information in the media, which largely determine its meaning. Technology affects the knowledge users about the world, that is the functioning of the individual and of society, as Marshall McLuhan stated in the famous sentence: *Medium is a message – since transmitter determines and controls the scale and scope of human activity and human relationship*

(McLuhan 1975: 46). However, in a prophetic way it was deformed by spelling on the cover a book, published in 1967: *Medium is an massage* – therefore consistently and intensively affecting the user's perceptions of the world, forming his emotions and identity. The Australian document directs attention of teachers and students for technical determinants of modern communication, deliberate creation of fields of interest, the role of the sources of our information about the world and recalls the need to verify it. The transmission by media is concerned not so much with terms of educational impacts as it is the case in Poland, but on receiving behaviour. Media communication is examined not in terms of the sender and receiver, but the creators and consumers - as described in 2004 by Davis Foulger.

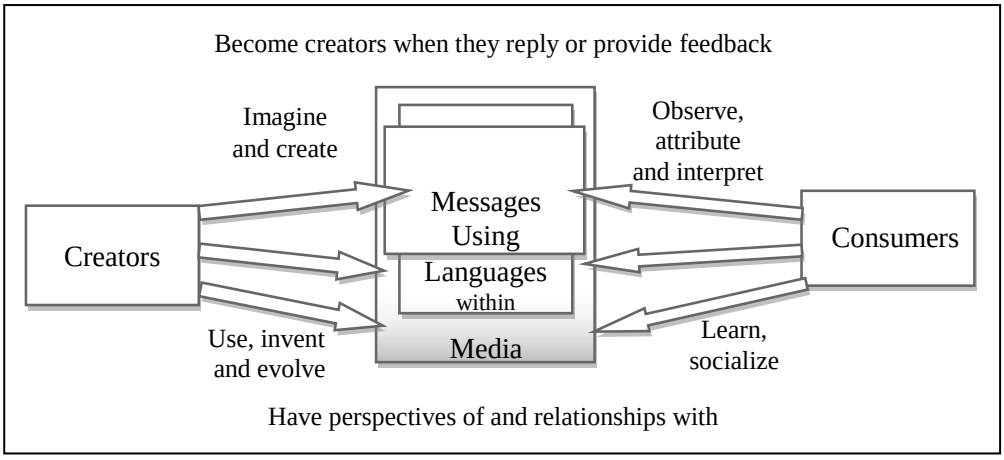


**Figure 2. An Ecological Model of the Communication Process by Davis Foulger 2004.**

*Source: own elaboration based on Fougler 2004*

According to Foulger's model, consumers become creators, when they reply, give feedback. So rightly is stressed the need to refill the transmission of messages in the modern language by the graphics and visualisation, i.e. *representing*: *various types of graphics presented in visual form* (ACARA. *The Australian Curriculum Year 9).*

## 5. DIFFERENT DEFINITIONS OF TEXT

### a. Poland

In the *Core Curriculum…* the definition of text is as obsolete as the one-way model of communication. In the part of the document concerning language, the language components are listed: *pronunciation, grammar, vocabulary,*

*and knowledge of literature and culture, skills and social behaviour and communication, as well as important educational matters* (*Core Curriculum…:* 60). In the literary part the document referred no more than to the verbal and literary texts, because education was founded only on four basic skills: speaking, listening, reading and writing: *Polish is the subject of school education, which is based on literary texts and, more broadly - texts of culture, in media such as cinema, theatre, radio, television, and in the last decade the Internet. The core curriculum, taking into account the records of all these media, however, puts the focus attention on written and spoken text* (*Polish Core Curriculum…:* 85). As examples of cultural texts, therefore, also mentioned were essays, political and popular texts, television programmes (*Polish Core Curriculum…*: 11), advertising (*Polish Core Curriculum…*: 12) and works of popular culture: movies, cartoons, songs (*Polish Core Curriculum…*: 8). However, what is missing here is websites, radio, audio and video files in digital formats. There is lack of most of modern means of communication, which most students use today. For middle schools there are even entries with the dominant ethical content instead of teaching activities: *[The student] is aware of dangers of online communication, easily offending strangers, ridiculing and shaming others through the dissemination of images of them in embarrassing situations, knows the consequences of lying, manipulation, irony; consciously, responsibly, selectively uses (as a receiver and sender) electronic means of communication, including the Internet* (*Core Curriculum…*: 39). The emphasis was therefore on the user's helplessness and behavioural problems, apart from constructing the contemporary educational problems as audiovisual media content, its impact on customers, the reliability of visual media, violence, etc. This is a very important issue for the students in their personal lives. It also appears during the secondary school presentation of Polish language and the oral matriculation examination, when the student presents not only a verbal statement, but very often supplements it by fragments of audiovisual texts.

### b. Australia

Following the adoption of a newer model of communication than in Poland, Australia adopted a more adequate for contemporary needs definition of text. It takes into account the technical considerations, experience and needs of human communication in the 21st century. The authors of the document consistently involve reading, writing, speaking and listening with digital texts, and in consequence they define in hyperlinks the word text in the following way: *Text: the means for communication. Their forms and conventions have*

*developed to help us communicate effectively with a variety of audiences for a range of purposes. Texts can be written, spoken or multimodal and in print or digital / online forms. Multimodal texts combine language with other systems for communication, such as print text, visual images, soundtrack and spoken word as in film or computer presentation media* (*ACARA. The Australian Curriculum Year 9).*

The authors propose a definition of text, e.g. at *Year 9* in the description of skills *Literacy / Interpreting, analysing,* referring to Internet communications: *identifying whether two texts may share a common purpose or audience, for example a feature article on a particular website or in a particular newspaper analysing how issues are debated and reported in the media in different countries, and the possible reasons for this, for example 'whaling' in Japan and Australia* (*ACARA. The Australian Curriculum. Year 9*).

A referrence to modern means of communication (website, newspaper) meant that the document created for a multicultural society, emphasised different points of view. This facilitated the use of the English language, which has a global reach, but also power to integrate the Australian society. Also been recalled an important and timely issue, because in May 2010, Australian Prime Minister Kevin Rudd announced that the lawsuit Japan to the International Court of Justice in The Hague of State for whaling in the Southern Ocean, conducted under the pretext of scientific research. In this way, the teaching of the English language was closely linked with current reality and actual media transfer. Therefore the use of the Internet led to embedding teaching English in recent times and, consequently, linking the subject with environmental education, which reflects the characteristic of Australians concern about protecting natural environment from the destruction of civilisation and integrating learning materials with different subjects.

The document states among other things.: *In Years 9 and 10, students interact with peers, teachers, individuals, groups and community members in a range of face-to-face and online / virtual environments. They experience learning in familiar and unfamiliar contexts, including local community, vocational and global contexts* (ACARA. *The Australian Curriculum. English*). Therefore, the Internet is treated in The *Australian Curriculum* according to daily experiences of modern man: as a communication environment, enabling local, professional and global communication in different directions.

To the literary, informational and persuasive texts, analysed, interpreted, created, staged and discussed in class were related media texts, including

digitised texts, which clarify the records, serving as a clue for teachers when organising classroom work (so called *Work sample*). For example, at Year 10, the last year of training before an Australian maturity examination (the next two years are devoted to preparation for it) provides for the exercise, consisting of watching and discussing TV documentary *Who's Afraid of Designer Babies* (BBC 2004), concerning genetic modelling of children. To structure the discussion, a list of trained skills were mentioned, and four issues were proposed to be considered:

- *How is a documentary different to a feature film?*
- *What are some of the features of a documentary?*
- *What is the issue being explored in this documentary?*
- *What are the ethical dilemmas presented in this documentary?* (ACARA. *Work sample…*).

Classes are facilitated by posting on the Internet some parts of the film and some dialogues in print.

In the detailed description of language skills there is a passage which defines varieties of language use in interpersonal relations: *identifying the various communities to which students belong and how language reinforces membership of these communities (the intimate language of family members, the jargon of teenage groups, the technicality of some online communities…* (ACARA. *The Australian Curriculum Year 9…*). The conclusions which follow from this do not relate simply to language. Because it is based on a true belief that - in accordance with the experience of the modern young man - participation in a community of family, peers, or on-line may be so significant that it contributes to change in the language. This demonstrates good recognition of the needs of students and education actually need in their daily skills. The language used on the Internet is actually very different from the applicable within the family or in groups of youth. Jan Grzenia cites as its characteristics: dialogism, spontaneity, colloquiality, situationality, multimediality, hypertextuality, hierarchicality, automatization of the process of creating of forms of expression, dynamism (easiness of updating or deleting), environmental or global coverage and technical durability (Grzenia 2006: 97-119).

The adoption of the Internet has allowed Australians to develop important skills in a multicultural society: to identify different points of view: *analysing and interpreting assumptions about groups that have shaped or influenced representations of people, places, events and things; identifying*

*how listeners, viewers and readers are positioned by these representations, and supporting identified points with examples* (ACARA. The Australian Curriculum. Year 9). Rightly considered important are the learning skills: *identifying or commenting on the author's approaches and use of techniques, design, form and style* (ACARA. The Australian Curriculum. Year 9…). Then a reference is made to *technic, design,* which in practice means to digitised texts, including the Internet. They also appeared at the level of the *Year 10* with the entry *Language for interaction / Understand how language use can have inclusive and exclusive social effects, and can empower or disempower people* (ACARA. The Australian Curriculum. Year 10. English…). This term was, inter alia, further elaborated in the following way: c*reating texts that represent personal belief systems (such as credos, statements of ethical judgements, guidelines, letters to the editor and blog entries* (ACARA. The Australian Curriculum. Year 10. Engli*sh*…). These entries are well integrated with the psychological needs of the modern man, including especially Internet user.

While the entry *Text structure and organisation* are related to modern media: *reproducing and adapting existing print texts for an online environment and explaining the reasons for the adaptations (for example accounting for the navigation and use of hyperlinks as structuring principles in hypertext narratives* (ACARA. The Australian Curriculum. Year 10). Should also be pointed, *how paragraphs and images can be arranged for different purposes, audiences, perspectives and stylistic effects* (ACARA. The Australian Curriculum. Year 10. English). Is was recommended *analysing and experimenting with combinations of graphics, text and sound in the production of multimodal texts such as documentaries, media reports, online magazines and digital books* (ACARA. The Australian Curriculum. Year 10. English…). Similarly, the notion *Responding to literature* is defined as follows: *identifying and analysing ethical positions on a current issue debated in blogs or online discussion forums, including values and / or principles involved and the strengths and weaknesses of the position in the context of the issue* (ACARA. The Australian Curriculum. Year 10. English…). In chapter *Literacy / Interpreting, analysing, evaluating* attention was paid to the development of skills: *choose a reading technique and reading path appropriate for the type of text, to retrieve and connect ideas within and between texts* (ACARA. The Australian Curriculum. Year 10. English…) as specified in the following way: a*ssessing the impact of hyperlinked text in a website's navigation using appropriate metalanguage associated with digital technologies to analyse reading pathways on websites* (ACARA. The

Australian Curriculum, Year 10, English…). This record is concerned not only with techniques of reading of online texts, but also with their valuation.

It follows that the teaching of English in Australia is closely linked to the Internet, and therefore real needs of modern man, who communicates every day with an electronic intermediary relays, especially the Internet.

## 6. CREATION OF TEXTS

The *Core Curriculum…* contains a passage on creating expression. However, at stage IV (secondary school) expression is not associated with an electronic servo or the Internet. The authors focused on the general regulations of composing and delivering expression, and its editorial elaboration (Core Curriculum…: 14-15).

While in *The Australian Curriculum* with regard to the creation of the texts it was noted at the level Year 9: *Use a range of software, including word processing programs, flexibly and imaginatively to publish texts; applying word processing functions, for example outlining, standard styles and indexing* (ACARA. The Australian Curriculum, Year 9, English…). This statement was put in the group of skills that relate to competence in information and communication technology, whose icon is a miniature laptop. The authors appropriately adjusted the passage to the communication needs of today's students.

Level *Year 10* includes: *Create sustained texts, including texts that combine specific digital or media content, for imaginative, informative, or persuasive purposes that reflect upon challenging and complex issues* (ACARA. The Australian Curriculum, Year 9, English…). There are also a *Review, edit and refine students' own and others' texts for control of content, organisation, sentence structure, vocabulary, and / or visual features to achieve particular purposes and effects* (ACARA. The Australian Curriculum, Year 9, English…), which specified as follows: *reflecting on, critiquing and refining students' own texts prior to publishing for an authentic audience, such as uploading a movie to a website, contributing to an anthology, writing texts appropriate for the workplace, or delivering a presentation* (ACARA. The Australian Curriculum, Year 9, English…). These skills are closely linked to technical, so the last rule, about creating text, says *Use a range of software, including word processing programs, confidently, flexibly and imaginatively to create, edit and publish texts, considering the identified purpose and the characteristics of the use*

(ACARA. The Australian Curriculum, Year 9, English…). This entry specifies as follows: *designing a webpage that combines navigation, text, sound and moving and still images for a specific audience* (ACARA. The Australian Curriculum, Year 9, English…). As well as at the level of the *Year 9,* this record – the last – was also accompanied by an icon of a laptop and a reference to the competence, connected with the information and communication technologies.

It follows that for Australians teaching English as their mother tongue is completed when they also know the modern techniques of communication and creation of the texts, both at individual and at social scale. It allows for defending their own rights and interests, forming personal projects, and functioning in socially heterogenous groups cooperating with others or magaging and resolving conflicts.

## 7. POLISH FREEDOM AND AUSTRALIAN PRECISION

The analysis and interpretation of research material confirmed the hypothesis: *The Australian Curriculum* contains more than *Core Curriculum…* teaching tips, related to developing key skills to analyse, interpret, use, and create electronic resources for the needs of the modern man and society. The Australian document indicates the approach to education, named by Allan C. Ornstein and Francis P. Hunkins managerial: based on the set of rational principles, the logical consequence, collaboration groups, and local control, attention to conditions for the implementation of the curriculum rather than on its content – because their selection asigned to the States and teachers. While the Polish *Core Curriculum…* presents the attitude, named by Ornstein and Hunkins academic (traditional, encyclopedic, intellectual, knowledge-oriented), presenting the historical and philosophical point of view, not focused on the contemporary social problems and ties (Ornstein, Hunkins 1998: 27).

The analysis shows that both in the Polish core curriculum as well as in the Australian curriculum reference was made to the Internet as a context, important in the contemporary teaching of mother tongue. However, placing the Australian document on the Web made it possible to clarify consequent record through hypertext and practical presentation of exactly these forms of communication as those referred in the document and which are well known and required students in their future life as the most characteristic for the present. The program document, allowing to see in the various systems and contains numerous internal hyperlinks, allows the user to know the whole

concept of the structure, which is very important both in the planning of teaching by the teacher and student learning.

Technical problems resulted from the parallel publication of the Polish core curriculum in the "Official Gazette" as a regulation, in the form of printed brochures, and yet on the website of the Ministry of Education. It was placed online in a special bookmark *Reform Program* initially in a single PDF file, and then in three parts hidden under three hyperlinks. This caused the problems arose in finding documents and the assessment of their news. Therefore, the Ministry announced that *its new website MEN replaced the existing home page and subpages „Joyful school" and „Reform Programs", that from the day of its run will no longer be updated. All the information which previously appeared on those sub-pages can be found on the following tabs: information from the "Reform Programs" tab, "Training and Staff" in subbookmarks "General Education" and "Supervision of Education" (Ministry of Education).*

However, further doubts arose: the text, the message were not dated. It was entered on the operating website with address containing the words "Reform Programs" It was not known, therefore, whether placed on her version of the curriculum is still valid. In a new location whereas made available document in PDF format, which could be browsed or download only in the shape of portions of a whole document. This eliminates the technical problems arising from the handling of very large file. The most important thing is that in this way the document associated educational content with each stage, making it easier for teachers to compare and binding.

How to use the Australian document is consistent with the needs of today's communication habits. While Polish *Core Curriculum*... was published on the website of the Ministry of National Education in the same format in which functions in a printed form. The electronic format makes it easy to search, copy and store the document. But are not being used – as in Australia – many other possibilities to electronic communications media.

## CONCLUSION: EDUCATION AS AN INHIBITOR OR AS A CATALYST?

According to critical pedagogy, education should recognise the importance of significant areas of the experience of students, who are subjects of education (Giroux, Witkowski 2010: 319). It should not exclude them. Contemporary communication takes place in a media context, therefore ignoring the fundamental questions *Who is speaking and to whom? Under*

*what conditions?* results as removing the formal education from contemporary needs and as resistance to school.

Differences between the mode of publication the Polish *Core Curriculum with Comments. Polish Language…* and *The Australian Curriculum. English* reflect the main goals of education in both countries: the need for strengthening the national identity of Poles by the hermeneutic reading of literary classics and consolidation Australian society through modern English language, especially used online – operating the associated cultural references.

The great social role of school makes strong committment of education authorities in its modernization. Meanwhile, school in the Polish and Australian societies serves a different social purpose. In post-communist Poland education acts as an inhibitor of social change (Śliwerski 2009: 313). However, in the post-colonial Australia, school became a catalyst for social change, relating to the clearance of the national past and unite the society around the myth of a happy new state.

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# MAXIMISING KEY COMPETENCES IN FOREIGN LANGUAGE CLASSES. ELEARNING IN THE DEVELOPMENT OF THE COMPETENCE OF COMMUNICATION IN FOREIGN LANGUAGES

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***Abstract**: As the importance of the development of competences, including the Council of Europe's key competences is emphasised in many aspects of contemporary reality they deserve proper focus in education. Competences should be treated as essential learning outcomes and in the area of foreign language learning and teaching it is practicable provided that appropriate methods and techniques are used. Research shows elearning considerably improves the effectiveness of competence oriented educational efforts. The article deals with the idea of developing the key competence of communicating in foreign languages by focusing on language skills practice during elearning platform aided foreign language classes.*

**Keywords**: elearning, Moodle, key competences, communicative competence, linguistic competence, language skills, communicating in a foreign language, foreign language teaching and learning.

## INTRODUCTION

In his speech addressed to e-learning conference participants, Miroslav Adamiš, Head of Cabinet for the Commissioner for Education, Training, Culture and Multilingualism emphasised that aiming at achieving goals of Lisbon, such as integrating ICT into education and learning, improving learning, increasing efficiency and modernising systems we must pay particular attention to some vital needs. He said: "we need to support our youth to acquire the key skills and competencies they will need for a digital world; we need to support our current workforce to skill and re-skill for

continuous employment; and we need to encourage and support lifelong learning for all" (Adamiš 2009). Apparently, skills, competences and readiness to change, develop and learn seem to take priority nowadays. This article aims at outlining competence-oriented education in the area of foreign language teaching and learning and discussing its effectiveness in the context of the use of distant learning methods and techniques on the basis of the author's research findings.

## 1. TOWARDS COMPETENCE-ORIENTED EDUCATION

### 1.1 Competence as a category

The idea of competence, defined most broadly as "a range of one's knowledge, abilities and responsibility" (Słownik Wyrazów Obcych PWN 2010) has become part of today's social life. References to competences, necessity of having as well as developing and improving them, are present at various stages of education, in the context of seeking employment and staying in the labour market, as well as in many psychological, social, cultural aspects of contemporary reality. We can observe focus shifted to learning outcomes: knowledge, abilities and competences in the educational systems of EU countries and other countries as well. Competences are linked to the idea of standardisation and standards of educational achievements and the term *competence* is regarded as a paradigm in contemporary pedagogy (Dudzikowa 1997). In one of its definitions, competence is based on knowledge which may be considered at three levels: knowledge in its usual sense (declarative knowledge), abilities (procedural knowledge) and attitudes. This can be rendered as knowing what, knowing how and being able to perform as well as being ready and willing to do it (Kossowska, Sołtysińska 2006). Thus defined competences should integrate three components: intellectual, action-oriented and motivational, referring respectively to conscience and knowledge, skills and abilities and beliefs and attitudes to actions (Furmanek 1997). Considerations on competences can be put in a broader context of the postulated necessity of shaping cognitive independence as a mark of one's communicative and cognitive qualities. The benefits of such independence are expressed and strengthened by metaphors showing its various aspects: "open mind", "cognitive receptivity" and "intellectual brightness". It has found its pragmatic expression among others in discussions on the vital importance of the development and improvement of various intellectual skills for the purpose of achieving successes in the demanding and rapidly changing labour market (Rembierz 2010).

In view of subject-related knowledge rapidly becoming obsolete and increasingly commonly accessible encyclopaedic knowledge there arise well grounded questions of essential components of the education of contemporary man, all that helps call him an educated person. (Furmanek 2007). There have been attempts at creating catalogues of essential, key competences and unifying the model of a competent individual. As a set of qualities of subjective nature, competences must be considered in accordance with psychological models of man, including behavioural, cognitive and humanistic models (Furmanek 2007).

### 1.2 Key competences

According to the document "Recommendation of the European Parliament and Council on key competences in lifelong learning" competences are regarded as a combination of knowledge, abilities and attitudes relevant to a context. What makes them key competences is the fact that they are needed by every individual in order to enjoy self-realisation and personal development, assume an active, civic attitude, achieve social integration and find employment. Starting from the early stages of education and training young people should have enough key competences to prepare themselves for their adult life. This is not a dead end process – key competences should be further developed, maintained and updated within lifelong learning. The document provides a catalogue of eight such competences: communication in the mother tongue, communication in foreign languages, mathematical competence and basic competences in science and technology, digital competence, learning to learn, social and civic competences, sense of initiative and entrepreneurship, cultural awareness and expression.

### 1.3 Communicative and language competences

Among these most important competences, being able to communicate tops the list. Communicating as a behaviour consists in verbal and nonverbal communications in the form of words or looks, posture, sound of voice, gestures or facial expression as well as thoughts of the recipients (Sztejnberg 2001). In a general sense communication is a cultural and social phenomenon, but also, looking at how new media work, it is a phenomenon of a natural foundation. As a cognitive process communication determines the way people perceive the world. J.Pleszczyński notes that "a human being is not only *Homo sapiens,* but first of all *Homo communicans*." (Pleszczyński 2011). Communicating is evidence of communicative competences, which are of a personal, subjective nature and refer to a concrete individual's abilities (Kielar-Turska, Białecka-Pikul 1993). Communicative competences cover knowledge and linguistic performance

understood as language skills. They are also conditioned by one's pragmalinguistic abilities. Communicating, as W. Furmanek notes, is a process of complex structure, with such fundamental elements as: linguistic competence, which we need to understand and generate grammatically correct sentences, linguistic functional abilities allowing us to adopt to situations, cognitive abilities which are necessary to be able to move in space; abilities of conscious expression of emotions, social abilities, interactive abilities (both linguistic and non-linguistic) and cultural abilities allowing us to function within a given culture, tradition, custom, etc (Furmanek 2007).

The notion of communicative competence introduced by Dell Hymes in 1972 should be distinguished from the idea of language competence. Although they are separate, they are strictly connected with each other. According to I. Kurcz, what distinguishes them is the biological foundation (the inherent component: universal grammar and the theory of mind), social conditions (the overt component: metalinguistic knowledge and metapragmatic knowledge), functions (representative and communicative), and possible disorders (Kurcz 2009). Normally both competences are acquired in parallel and there are mutual relations between them.

### 1.4 Communicative language competence

In the *Common European Framework of Reference for Languages: Learning, teaching, assessment* prepared by the Council of Europe there appears an idea of communicative language competence, in which employed was a action-oriented approach in the description of the use of language and which highlighted the social character of the competence (Poszytek 2005). What marks the communicative language competence is the level of mastery of language functions or skills, i.e. the user's language proficiency, in the qualitative dimension (how many spheres of life, functions, situations, topics or roles the user can cope with while communicating) as well as in terms of quality (to what extent communication, sending and receiving messages, is effective, including such parameters as precision, cohesion, fluency, accuracy). The Council of Europe distinguishes three constituents of the notion: communicative competence (including linguistic, sociolinguistic and pragmatic competences), activities (including receptive and productive language skills (oral and written), interaction and mediation) and language strategies.

### 1.5 Communicating in a foreign language

Communicating in a foreign language is defined by the Council of Europe as "the ability to understand, express and interpret ideas, thoughts, feelings, facts and opinions in both oral and written form (listening, speaking, reading and writing) in an appropriate range of societal contexts – work, home, leisure, education and training – according to one's wants or needs" (European Reference Framework 2007). What complements this dimension of the second key competence is mediation and understanding cultural differences. The competence may be mastered to a different extent within four language competences: listening, speaking, reading and writing. The degree of mastery is subject to a specific foreign language, it is conditioned by the social and cultural context we live in, our environment. Besides, it can also be influenced by our needs and interests.

## 2. ELEARNING IN THE COMPETENCE-ORIENTED EDUCATIONAL PROCESS

In light of this remarkable shift of focus to learning outcomes since the beginning of this century, the role of teaching has lost its dominating position while learning has gained emphasis. The role of a teacher has undergone thorough change too. What seems to be fitting this process is e-learning which was developing independently aside the "mainstream" methods and techniques of education. As a result of the development of information and communication technology e-learning has all the qualities of an essential constituent of an educational process. In its official documents the European Commission recognises the necessity of considering the change in educational processes in the information society.

### 2.1 Theoretical foundations of the use of elearning in the competence oriented educational process

Related to the computer supported development of competences are various psychological theories describing intellectual processes accompanying learning as well as pedagogical theories enabling to formulate directives (Huk 2008). Pedagogical literature provides recognition of the fact that the computer assisted process of learning - teaching is based on solid theoretical foundations which are characterised by its wide range, from the behavioural theory, through humanistic, to the constructivist theory and other contemporary threads such as connectivism.

The majority of contemporary theories of cognitive psychology are founded on the assumption that learning requires an *active attitude* of the learner who

constantly acquires and reconstructs previously gained knowledge alike Jean Piaget's child learning the world. In his cognitive model Leo Wygotski concentrates on *social interactions* during which our cognitive competences are developed. The use of information and communication technologies falls into Seymour Papert's concept of the process of learning / teaching. For this theoretician of cognitive constructivism computer supports mental processes in an instrumental and conceptual way. In addition, in his theory of learning, Jerome S. Bruner points to the *active character of the process of learning* in which the learner selects and processes information used during the implementation of a task. Justification for the use of computer in education can be found in Wincenty Okoń's concept of *multilateral learning*. His theory integrates different ways of learning with mutually completing methods of teaching and strategies of acting in accordance with the established structure of scientific knowledge and possible attitudes.

Using the behavioural model of teaching in elearning boils down to the use of solutions allowing for the *automatisation* of the process of education, first of all in accordance with the concept of programmed teaching (the linear and branch models) according to B. Skinner and N. Crowder. This model of learning / teaching assumes a considerable role played by *memorisation* of the material prepared by the teacher who controls the process of acquiring knowledge by means of a range of IT tools. To balance it out, the humanistic approach in education referring to humanistic psychology represented by C. Rogers and A. Maslow allows for stimulating creative actions in the process of learning; the student reaches for his experiences while solving problems creatively, realises himself through collaboration in a group with no pressure of competition. In many respects elearning allows a human being to enjoy freedom and opportunity for self-realisation.

The variety of tools and applications corresponds with more and more often used active learning methodology based on Dewey's learning by doing. Guided by the recommendation of complementarity of different concepts of education and taking a polimethodological approach the teacher has now more room for manoeuvre and is more aware of the fact that the choice of methods and techniques results in the learner remembering when thinking instead of thinking when remembering (Klus-Stańska 1999).

## 2.2 The role of elearning in the process of developing language competences in light of research

The dynamic character of the development of information and communication technologies makes the methodology of teaching catch up with the latest trends. It is constantly adapted but left one step behind due to

the pace of introducing new solutions. The existing scientific research into the effectiveness of the methods and techniques of distance education is of a general nature and does not respond to many questions posed by the practice of using them (Stachowiak 2010).

Nowadays no-one questions the usefulness of the computer assisted and Web mediated forms of education in the process of learning /teaching. The application of them is increasingly wider and their technological side is better and better. In the area of foreign language teaching numerous benefits and advantages of different forms of CALL (computer aided language learning) is emphasised, in particular in the form of blended learning in academic foreign language teaching (Piasecka 2009). However, it should be noted that the success and quality of distance learning, as E. Smyrnova-Trybulska points out, "largely depends on the effective organisation and methodological quality of the materials used as well as the coordination and competence of the pedagogues involved in this process" (Smyrnova-Trybulska 2009).

However, despite the accessibility and functionality of distance learning educational forms, their use is still giving way to the traditional forms of teaching and self-education. An indication of this can be found among others in the results of the survey carried out by the present author in June 2012 in which respondents were 132 students of the University of Silesia taking a certification examination in foreign languages at B2 level, who represent a group of a selected, well motivated, uniform group on a similar level of language proficiency. The survey aimed at comparing the students' achievements with their foreign language learning experiences after the end of the university foreign language course. Responding one of the questions the students had to indicate the elements of foreign language education which influenced the result achieved during the B2 Certification examination ranking from number one with the biggest influence and the following respectively (Figure 1).

Among all the students who answered the questions, 33% of them pointed to an e-course on the elearning platform, available internet forms of education, the Internet, discussion forums. The majority of the students (68%) indicated their own work which greatly contributed to their language education, of whom 86 % accounted for the students benefiting from elearning platforms and internet forms of learning. In this group the ranking is as follows:

1. School classes before university.

**2. Own work.**

3. University foreign language classes.

**4. Available internet educational forms.**

5. Staying abroad.

6. Additional language course.

7. Private language classes.

**8. E-course on the e-learning platform.**

9. Others, such as watching films, reading books, etc.

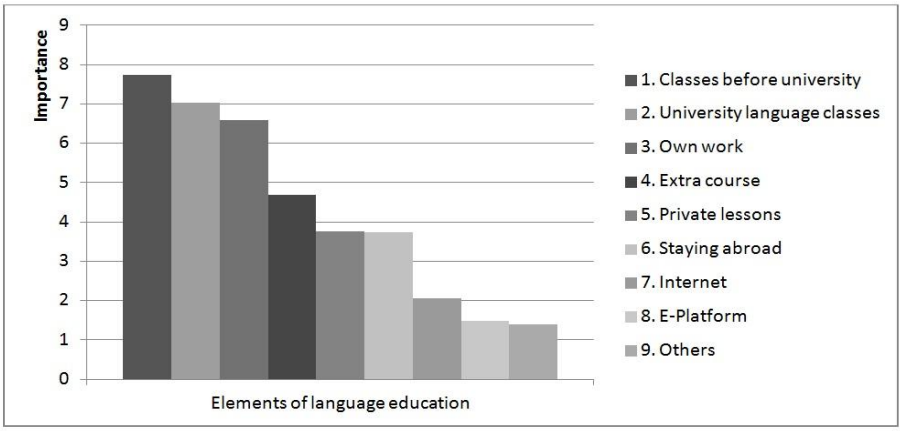


**Figure 1. Ranking of particular elements of foreign language education influencing the examination achievement according to the survey respondents.**

*Source: own elaboration*

In this group focus is slightly different: students' own work ranks second, and internet educational forms were indicated in the fourth position. This group of represent students who concentrate on their individual work and show independence and autonomy. The role of the e-learning platform remained on the far eighth position, but it may be due to the fact that the instrument is not commonly used yet.

The analysis of responses to the remaining questions of the survey allows to conclude that the consideration of the Internet and elearning in foreign language learning does not make any difference in respect with perceiving levels of difficulty of particular parts of the examination. Both groups of respondents consider the lexical and grammar part checking the practical use of English to be the most difficult element of the examination, and then the remaining parts respectively, speaking, writing, reading and listening.

In the context of experience in foreign language learning, the respondents divide into two halves, one part of the students took their maturity examination at extended level (or who took other examinations in foreign languages and won certificates stating B2 level) and the other part of those who took basic maturity examination and scored between 70 – 100%. The division is the same in the case of the part of the respondents who considered the contribution of the Internet and elearning. The average amount of time the students spent learning languages was 3 hours 20 minutes. However, the students pointing to the influence of the Internet and elearning did not spend as much time as those who emphasised the traditional ways (2 hrs 51 mins and 3 hrs 34 mins respectively).

On the other hand, the results of another survey carried out by the present author show that having experienced English language learning with the support of the university elearning platform, the most of the students were eager to learn foreign languages this way. In the survey 69% of the 95 law students using the elearning platform regularly as part of the language course (during the academic year 2011/12) answered positively to the question "In the future, would you like to learn foreign languages using the possibilities of the elearning platform?".

The generally positive attitude to using an elearning platform presented by this group of students (64%) is related with their reflections on the learning outcomes in respect of particular language activities: listening, reading, speaking, writing and interaction. Except for speaking in respect of which the students could not decide clearly, they tend to see some progress in developing their communicative language activities after the e-platform aided course. Also, in reference to concrete elements of their linguistic competence the students had a similar opinion, especially in the case of developing their range of vocabulary, while being more sceptical about mastering pronunciation and using the rules of polite language. Concerning language strategies influencing effectiveness in undertaking language activities the respondents noted that learning a foreign language via an elearning platform they had to use to some extent or to a great extent such strategies as planning their written or oral expression, replacing words or expressions with synonyms, using correct language and providing self correction when communicating and relaying, inferring or interpreting meaning included in a communication or message, collaborating and being involved in interaction, processing texts. They were in doubt only in the case of taking notes and asking for clarification.

| Question | Positive answers | Neutral answers | Negative answers |
|---|---|---|---|
| **Has your attitude to using an elearning platform changed?** | Yes, it has changed very positively, rather positively, I have still the same positive attitude: 69,5% | I have still the same neutral attitude: 24% | Yes, it has changed negatively, I have the same negative attitude: 6,5% |
| **In the future, would you like to learn foreign languages using the possibilities of an elearning platform?** | Yes, I would like very much, I might as well: 69% | Hard to say: 15,5% | No, I would rather not, absolutely not: 15,5% |
| **In the future, would you like to learn other subjects using the possibilities of an elearning platform?** | Yes, I would like very much, I might as well: 53,5% | Hard to say: 20,5% | No, I would rather not, absolutely not: 26% |
| **Average attitude to using an elearning platform in general** | **64%** | **20%** | **16%** |
| **The survey participated by 95 law students was conducted in the academic year 2011/2012 after the end of a university English language course run in the mode of blended learning.** | | | |

**Figure 2. Summary of the results of the survey**

*Source: own elaboration*

The results of the survey lead to a question of whether the students' reactions correspond with real foreign language learning achievements made during the university foreign language course run with the use of distance learning techniques. Answer to this question can be provided to some extent by the results of an experiment conducted by the present author among a group of over 100 law students learning English for two semesters of their first year of studies at the University of Silesia in the academic year 2011/2012. The students in both groups: control and experimental groups shared a similar level of language competence confirmed by the results of the placement test (B2+), the same syllabus which included an ESP component in the area of legal English and using the Communicative Approach in teaching English as a foreign language. Besides, the admission criteria guaranteed a similar high level of intellectual capacities. The experiment involved a special innovative teaching system including an original elearning course in legal English which was introduced in the experimental group as one of the key variables. As part of the experiment in parallel groups pretests and posttests were conducted in the scope of three language skills: listening, reading and writing. The results of the experiment indicate that the change measured in the scope of the three skills after seven months of the teaching process was relatively bigger in the experimental groups with a 15% increase in the case of writing compared with a mere 3% growth in the control groups. In the scope of two aspects of linguistic competence, the range of vocabulary and knowledge of

grammatical structure there was a considerable average increase of 13% compared with the control group (3%).

The experiment involved the development and implementation of an innovative educational system including an original elearning course used in the blended learning mode. The reception of the course was positive. 92 % of the members of the experimental group considered its usefulness and praised highly some of its elements. In accordance with the assumptions of the blended learning mode of education and in the pedagogically justified manner the components of the designed e-course and the elements of traditional classes made up whole teaching blocks. What was blended and what was used as a complement was the concrete teaching means and techniques as well as specific pedagogical aims deriving from various approaches in the area of educational theories, mainly the behavioural and constructivist ones. Figure 1 shows one block of classes as a product of blending educational means and techniques with respect to different pedagogical approaches.

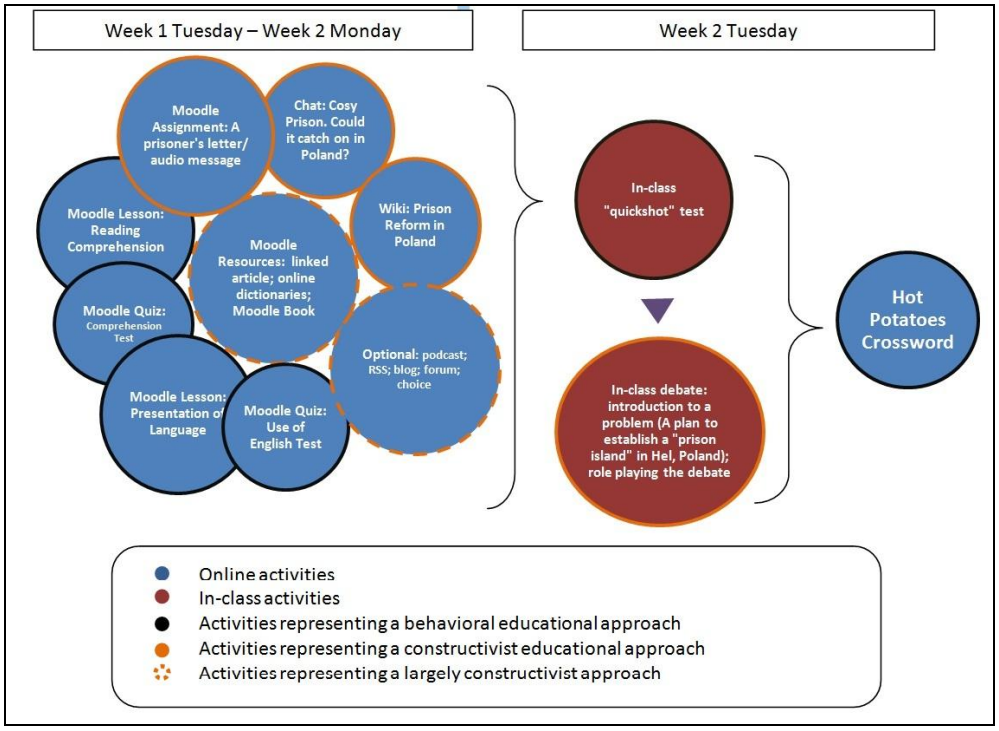


**Figure 3. An example of the construction of a block of blended learning classes**

*Source: own elaboration*

Each block of blended learning classes creates opportunity for developing particular language skills, both receptive (listening and reading comprehension) and productive (speaking and writing) as well as in the area of oral and written interaction. The balanced development of receptive and productive language skills is designed within the blended learning course for a number of reasons. Using the Internet as a medium in teaching receptive skills allows the teacher to "provide the classroom with the factors of authenticity, recency, variety, choice, novelty and interactivity, which are the important benefits of Internet-mediated instruction over coursebook-based teaching" (Krajka 2007). Productive skills are developed by computer-mediated interaction with a single person or with the whole community orally or in writing in authentic communicative exchanges. Besides, the development of speaking and writing is enhanced by the use of online materials which help to "make language production more meaningful by contextualising it properly" (Krajka, 2007). Similarly, the whole area of interaction is facilitated in the Web environment as exemplified by Figure 4.

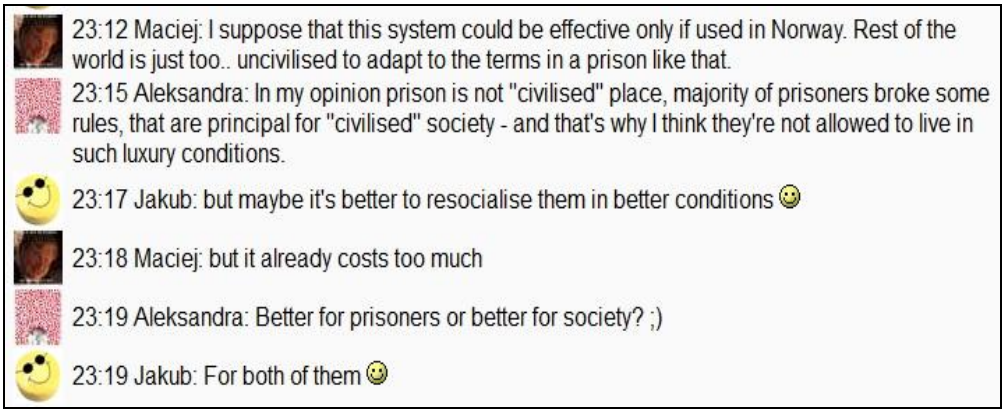


**Figure 4. The chat activity "Cosy Prison. Could it catch on in Poland?" as an example of developing language activities in the area of oral/written interaction.**

*Source: E-course "Legal English" at http://el2.us.edu.pl/mw*

There are numerous reasons for the implementation of elearning techniques in language learning-teaching. Table 1 shows some of the reasons highlighted by researchers (Krajka 2007, Sharma and Barret 2007, Smyrnova-Trybulska 2009, Kossakowska-Pisarek 2009, Kalamarz 2010 and others). Naturally, the rationale can be extended due to the rapid development of ICT and creativity of teachers.

**Table 1.**

**Summary of reasons for the implementation of e-learning in foreign language classes in terms of developing language skills (activities)**

| | **Language skills** | **Some reasons for the implementation of e-learning in foreign language classes** |
|---|---|---|
| Reception | Listening | Available real listening material provides authentic input;<br>The recording can be supported with the visual context;<br>Immediate, task-specific feedback motivates and reinforces the student;<br>Audioscript or text can be used simultaneously;<br>It is possible to listen to or to watch the text or message;<br>It is possible to listen to or to watch the whole or part of the text as many times as necessary;<br>No stress or other external factors impeding comprehension. |
| | Reading | Authentic, recent, interactive motivating reading material is available;<br>It is possible to build pre-, while- and post-reading stages;<br>Reading can be accompanied by different resources (hyperlinking, glossing, using online dictionaries) for the purpose of active learning and contextual guessing;<br>Reading can be supported with graphics, illustrations or pictures;<br>It is easy to construct varied tasks involving different types of reading;<br>Effective reading with no time pressure, stress and other constraints. |
| Production/Interaction | Writing / Speaking | It is more convenient in terms of time and space;<br>Topics can be expanded beyond those discussed in class;<br>Equal opportunity participation is possible;<br>Introverted personalities benefit;<br>Language learning process can be more student-centred;<br>Advantages of individualised feedback;<br>The real e-community provides authentic audience, offers a real purpose and motivation for writing and speaking (emailing, posting, responding, sharing, arguing, etc) both in terms of production and interaction; |

*Source: own elaboration*

In the scope of other key competences developed concurrently during the same teaching process, it is worth comparing the responses given by the students from both groups of the experiment. The respondents reflected on the particular aspects of such key competences as the ability of learning to learn, digital competence or social competence throughout the first year of university studies.

The reflections of the students in both groups are largely analogous. The respondents tend to discern some progress in various aspects of learning to learn, such as being an independent learner (being able to manage time and be self disciplined), being aware of the acquired knowledge and acquired abilities (understanding the content and purpose of learning). Using elearning platforms involves using the Internet which is a universal tool nowadays and must be treated as one of numerous applications of the Internet. However, they were not sure if there has or has not been any progress in the case of using hardware, software, and internet services while studying or communicating. In fact, students do not find using elearning platforms particularly difficult. Moodle was meant to be a simple and intuitive tool and this appears to be its strong advantage.

## CONCLUSION

The currently raised postulate of including the development of key competences within curricula deserves positive response prompted by many examples of successful use of various methods and techniques of distance learning. In the area of foreign language teaching the effectiveness of these undertakings can be measured by means of such indicators as the growth of the level of mastery of language skills which make up the ability of communicating in a foreign language as the Council of Europe's second key competence, in particular listening, reading and writing. The effectiveness in this respect is enhanced by appropriately selected, methodologically justified methods and techniques of education including the application of elearning platforms, the use of which is received by students positively within the practice of academic foreign language teaching. Bearing in mind that developing one key competence goes together with developing others, using one comprehensive tool appears to be an additional advantage which should not be underestimated or ignored.

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# COLLABORATIVE PROCESS IN SCIENCE EDUCATION

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***Abstract:*** *Today's distance education is often based on old behavioural methods of knowledge transfer. It does not allow for an effective implementation of experiments, which are the foundation of science education. Yet the experimental behaviour perfectly fits in the concept of constructivist learning. This paper proposes a cooperative learning process for natural sciences education in the specific environment of distance learning. For this purpose, the Computer Supported Collaborative Learning (CSCL) is used.*

**Keywords:** e-learning, collaborative learning, CSCL, collaborative process, science education.

## INTRODUCTION

Learning is a constructive and cooperative activity by which people build their knowledge based on their physical experiences in the surrounding world (Kritzenberger, Winkler & Herczeg 2002). Contrary to earlier behaviourist views, passive information does not play a significant role in learning. Yet a large proportion of educational software and e-learning courses rely on the programmed learning approach and fail to venture beyond mere presentation and repetition of the material. This is why new technologies based on modern psychological and pedagogical concepts should be given more focus.

One of the most promising distance learning technologies, which employs the constructivist cognitive process, is CSCL or Computer Supported Collaborative Learning. Collaborative science education seems to be a particularly interesting area, which has nevertheless been little investigated so far.

## 1. FUNDAMENTALS OF COOPERATIVE LEARNING

Fundamentals of Computer Supported Collaborative Learning (CSCL), like fundamentals of education at large, should be sought in the core biological foundations which enable cognitive processes. Studies in this field have helped determine how the nervous system processes information, how the cerebral hemispheres and cortex are designed, what are the functions of specific brain parts and how the human network system, including receptors receiving information from the external environment, operate (Szczesny 1994). Based on these findings, important conclusions have been drawn with regard to distance learning.

The core biological problems are related to the fundamentals of educational psychology (Friedrich 2005). Neurodidactics, which combines these two areas of study, explains the mechanism of reaction to various stimuli received from the environment and provides a valuable knowledge which can be applied for instance when presenting educational materials on the computer screen. The most notable studies in this area are those on the representation of knowledge, image and judgments (Sternberg 2001: 132), as well as those concerning information processing in humans, which could be perceived as the basis of the modern discourse on teaching. Based on these investigations, a number of models have been developed which draw on biological and psychological principles and are intended to find application in computer supported education (Merz 2001: 129).

One of the first educational models to be developed based on behaviourist concepts was programmed learning. It continues to be the basic principle behind many educational curricula and courses using e-learning platforms (Meger 2008), occasionally adopting the neo-behaviourist approach (Schmidt 2004: 61). The dialog-based education model, which was first employed in this context, is particularly important from the perspective of science education. Rules of positive dialog reinforcement were also formulated (Stock & Stock, 2003: 42). The significance of experiments and models, which are essential for science education, was also acknowledged. The development of programmed learning made it possible to implement branched programming, which in turn led to the emergence of the so-called adaptive systems (Strzebkowski 2002: 8).

Further studies showed that adaptive systems are not only able to analyse the learner's simple and objective answers, but also his processed knowledge. This has to do with linking the learner's old and new knowledge, which accurately illustrates the Aha! effect (Röder 2003). Anyone who experiences the Aha! moment, has comprehended the connection between a newly

learned notion or principle and previously known notions; in other words, the connection has been fixed in the neural network of the brain (Bielikova & Nagy 2006). Striving after the Aha! effect may be the foundation for developing adaptive distance learning modules (De Bra, Smits, & Stash 2006).

The adaptive approach derives from cognitive psychology, and when developing adaptive learning models, the learners' knowledge, experiences, abilities and preferences should be taken into account (Inhelder & Piaget 1958). Based on this approach, ontological models are created which can be used as a foundation for a system which not only facilitates the educational process, but also enables its complex management (Różewski, Kusztina & Zaikin 2008). This moves us closer to employing computer neural networks (Friedrich 2005: 119), which are the basis for developing connectionist models (Baumgartner & Payr, 1999: 104). Connectionism and other cybernetics-related theories arising from cognitivism may play a significant role in future knowledge modelling (Friedrich 2005: 120), which could have a particular impact on science education.

Behaviourism and, in some cases, cognitivism, only allows for the existence of a single, objectively recognized reality. It also assumes that knowledge exists independently of consciousness (Nandorf 2004: 66). However, each person constructs knowledge differently, and the human mind has an unique and subjective image of it (Overmann 2002: 38). The learning process involves an independent building of new knowledge in an individual mind. This subjective approach has provided the basis for the emergence of constructivism, whose sources can be traced to literature and art (Bołtuć 2011). It invokes a number of historical concepts, from Freinet's (1927) school of work , through Bruner's (1961) exploratory learning and the project method articulated by Dewey (1964), to Wagenschein's (1970) main lessons blocks. Some of the techniques, such as the project method or the apprenticeship method, had been known before, but were appreciated only recently, thanks to the achievements of constructivist theories.

According to the **cognitive apprenticeship** (CA) method (Brown, Collins, & Duguid, 1989), subsequent stages of a project should be realized as practical activities. The teacher's (master's) supervision ensures that the acquired knowledge is applied correctly (Niegemann 2001: 52). The CA theory is associated with cognitive modelling, which assumes the participation of experts in the educational process (Weber 1998: 65). The expert observes the learners and only offers help where it is needed. This strategy is known as **coaching** and can be applied in collaborative work as

well, where it is understood as a closed cycle from the initialisation to the realisation of a task (Busch & Mayer, 2002: 116). Coaching can be also performed by computers, which can oversee virtually the whole educational process (Winn 2003).

Constructivist techniques provide for the creation of goal-based-scenarios, which specify the tasks to be performed based on a pre-defined problem. For this purpose, certain structures can be provided in order to facilitate the learning process. This method is called *scaffolding* and provides special cognitive tools which eliminate the need to carry out surplus activities, which will often have been already learned before. In an experimental task scenario, such activities might include preparing blank tables for data, making calculations and transforming data into charts. Such tools are temporary and, much like a scaffolding, can be removed afterwards (Dernowska 2007).

Similar support can be provided by anchors, which focus attention on explaining a particular case (Bransford, Sherwood, Hasselbring, Kinzer, & Williams, 1990). Features typical for anchored instruction are mainly found in the project method (Kerres 1998). Although projects have been known for a long time (Meger 1997), it was only after explaining their constructivist mechanism of cognition that they gained a new impetus. Such a strategy is useful for distance collaborative learning, where anchors are used to mark the important points of a project, while the group of learners cooperate and communicate with each other in order to realise common goals (Albrecht 2003: 50). In fact, an adequately designed project method reflects a number of methods employed in constructivist learning (Figure 1).

It turns out that the constructivist process presented in this way can be integrated into collaborative learning. Influences between participants of a collaborative group may induce the process of social knowledge construction (Pena-Shaff & Nicholls 2004). While such a social context was already present in cognitive psychology (Vygotsky 1978), constructivism makes a further assumption that the whole group can represent a certain state of common knowledge. Furthermore, collaborative learning process may take place outside of the group, through an external contact between its participants (Sandholtz 1997). In a yet more far-reaching sense, knowledge can be divided into different internal forms of representation, such as data bases and text or image collections. Studies developed in the area of divided knowledge and knowledge management (Willke 2004) can also be employed in collaborative learning (Bauer 2004).

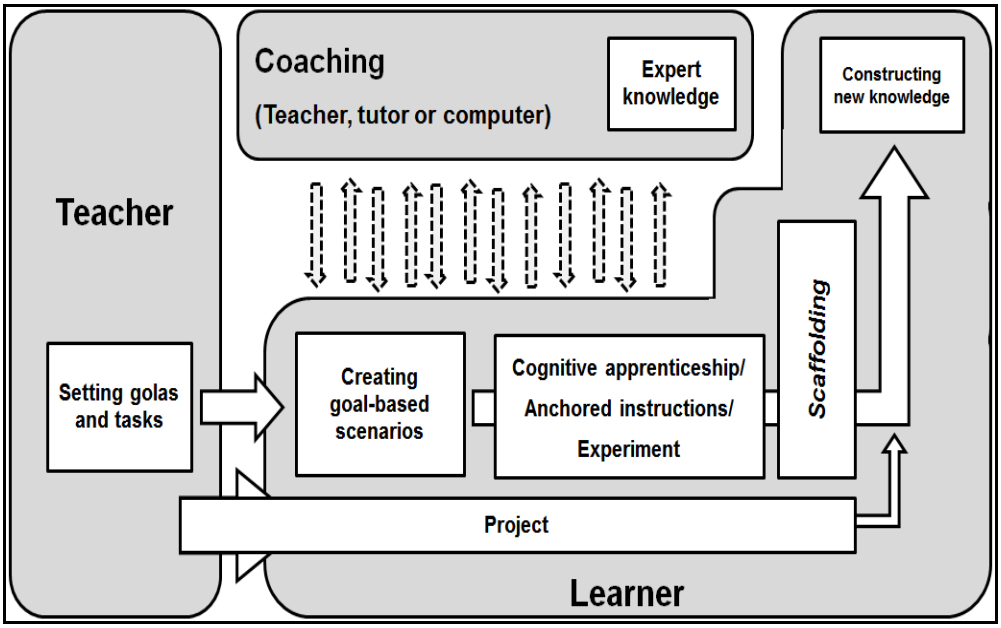


**Figure 1. Relative position of different methods emerging from constructivist concepts.**

*Source: own elaboration*

There has always been interest in exploring sciences with regard to the implementation of constructivist methods (Winn 2003). As a matter of fact, the constructivist model of knowledge is itself rooted in the area of biological and physical sciences and expressed through internal subjective constructions in the minds of learners. If these expressions are to be accurate and useful for active application of knowledge, it is necessary to employ methods of scientific experiment or experiment simulation, which is in close accordance with the situated understanding of knowledge and skill acquisition proposed by constructionism.

## 2. IMPLICATIONS FOR SCIENCE EDUCATION

Neurodidactics and the biological foundation of learning indicate a presentational model for how to prepare didactic materials (for instance, what colours should be used when presenting experiments) in order to communicate the message in a maximally effective manner. Behaviourism provides foundations of the dialog-based model, which are mostly present in programmed learning. Cognitivism, in turn, proposes a model assuming that cognition is enabled by internal mental activities. This implies that the

cognitive process may employ various cognitive tools, experimental behaviours and various models.

Different tools and models can be used for the initiation of collaborative work, as well as at its subsequent stages. For instance, the introductory material can be prepared with the use of programmed learning or an adaptive system. Cognitive concepts recommend that the material employ various representations. For instance, an experiment could be presented using knowledge representations and channels of communication such as (Redish 2003: 46): (1) words, (2) equations, (3) graphics, (4) data tables and (5) specialist diagrams. This way, an experiment could be designed to whose educational content is encoded in diverse representations. Normally, it should commence with (1) a verbal presentation of the problem, introduce relevant (2) equations, outline the experiment in (3) a graphical form, put the data into a (4) table, and finally present the date as (5) a diagram (Figure 2). Conveying the same knowledge via multiple channels is extremely effective, and today's multimedia software offer many opportunities in this respect (Redish 2003: 51).

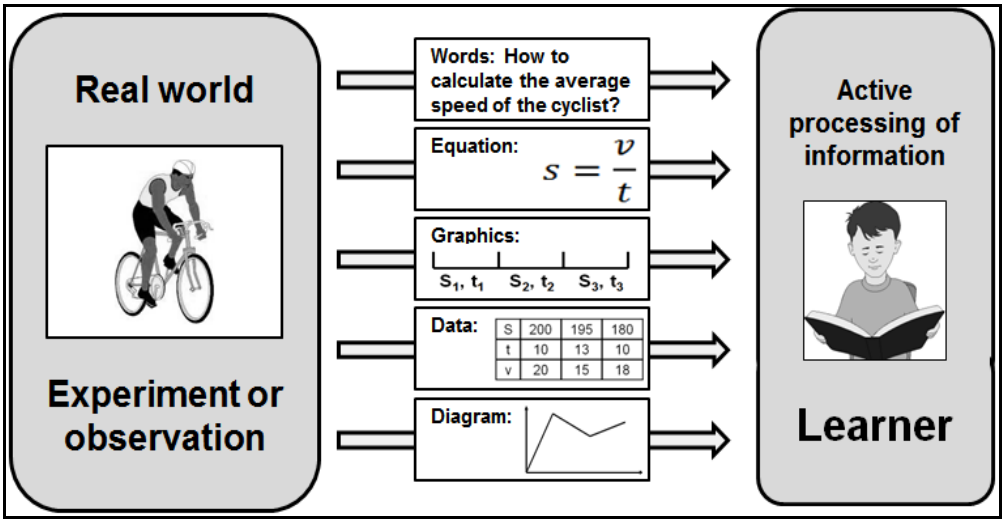


**Figure 2. Physics, chemistry and other natural sciences can be taught with the use of multiple channels encoding the same information. While employing parallel information channels is an effective solution, it may lead to communication overload.**

*Source: own elaboration*

It must be noted at this point that channels of knowledge transfer have limited bandwidth, both in terms of the amount of knowledge which can be

transmitted through a channel and, even to a larger extent, with regard to the learner's reception capability. Modern multimedia can transfer an extremely large amount of information, which often results in learners negating and rejecting such presentations (Keller 2005). The overload of communication channels, studied within the framework of cognitive load theory (CLT), is an important problem in cognitive psychology (Kirschner 2002).

In science education, multichannel communication may relatively easily result in mental weariness. In order to alleviate it and to optimise the learning process, it is recommended to ensure appropriate proportions in the channels of information. This recommendation has even become a component of the cognitive theory of multimedia learning (Mayer & Moreno, 2002). In this context, the design of the material presentation process is also analysed (Sweller 1994), as well as the ergonomics of using individual multimedia components, such as colour, volume, image and sound expression, etc. Detailed conclusions have been drawn regarding the development of multimedia materials and distance learning communication (Kirschner 2002).

The cognitive load theory suggests that distance learning systems, including those specifically designed for science learning, have limitations with regard to the utilisation of cognitive models. The overcomplexity of learning modules and systems is a severe problem and has become subject to open criticism (Blumstengel 1998: 113ff). The mathematical and computer models which are hoped to clarify the operation of the mind and build a model of the human brain have their limitations as well (Duch 2000). Cognitive studies have demonstrated difficulties in developing a general model of knowledge acquisition. A major obstacle to creating a referential model is the influence of affective factors, which can be very helpful in education on the one hand, but can also inhibit learning processes (Partala & Surakka 2004). Furthermore, the shape of the cognitive model can be distorted by the disparate personalities, which are also encountered in the process of media-supported learning (Tadeusiewicz 2005). For this reason, alternative learning models should be considered. Perhaps distance learning could be based on different concepts?

## 3. IMPLICATIONS FOR COLLABORATIVE LEARNING

The theory of constructivism proposes a number of techniques which can replace current methods of distance learning. These include goal-based-scenarios, cognitive apprenticeship, cognitive modelling, coaching, goal-

based-scenarios, scaffolding and anchored instruction. It turns out that these techniques can be successfully employed in education using the project method. The project method, however, may prove not attractive enough for a single learner. Moreover, it does not provide adequate support for the learner and may instigate a sense of isolation from others, which in turn decreases motivation and inhibits project development.

As a matter of fact, collaboration between participants of the education process is a fundamental asset of network learning. Computer Supported Collaborative Learning (CSCL) employs computer network communication based on dedicated software providing didactic and methodological support for the processes of collaborative learning (Lehmann & Bloh, 2002: 146). The basic mechanism of education in this context is the knowledge exchange process (Meger 2006), which causes individual knowledge to become group knowledge. At the same time, negative consequences of cognitive overload are avoided.

The Cognitive Load Theory (CLT), which results from experiences with multimedia education, suggests efficient solutions with regard to multichannel information transfer (e.g. via image and sound), but at the same time it cautions against the possible overload of information communicated in this way. This might occur when the experiment is reinforced with various channels and methods and all the channels originate from a single source. However, different communication channels can be distributed among different participants of a given group, which adds more variety to the education process and enhances curiosity. This helps decrease the level of cognitive weariness in CSCL and facilitates a free flow of knowledge (Figure 3).

Computer-supported collaborative learning, which has been developed based on constructivist theories, is both a subject of scientific research and an area of practical didactic implementations whose importance has substantially increased in recent years (Lehmann & Bloh 2002: 146). Some perceive such solutions as a chance for education at large (Byland & Gloor, 2002: 56). Broad perspectives for CSCL application are expected and detailed research is being conducted in this direction (Lakkala, Rahikainen & Hakkarainen 2001; Schröder & Wankelmann 2002; Veermans & Cesareni 2005; Arnold 2003: 47). However, most studies tend to neglect the aspect of science education, although international projects in this area have been developed (Milrad, Bjorn & Jackson, 2005). The growing significance of CSCL and its special assets suggest that collaborative science learning should be given more focus.

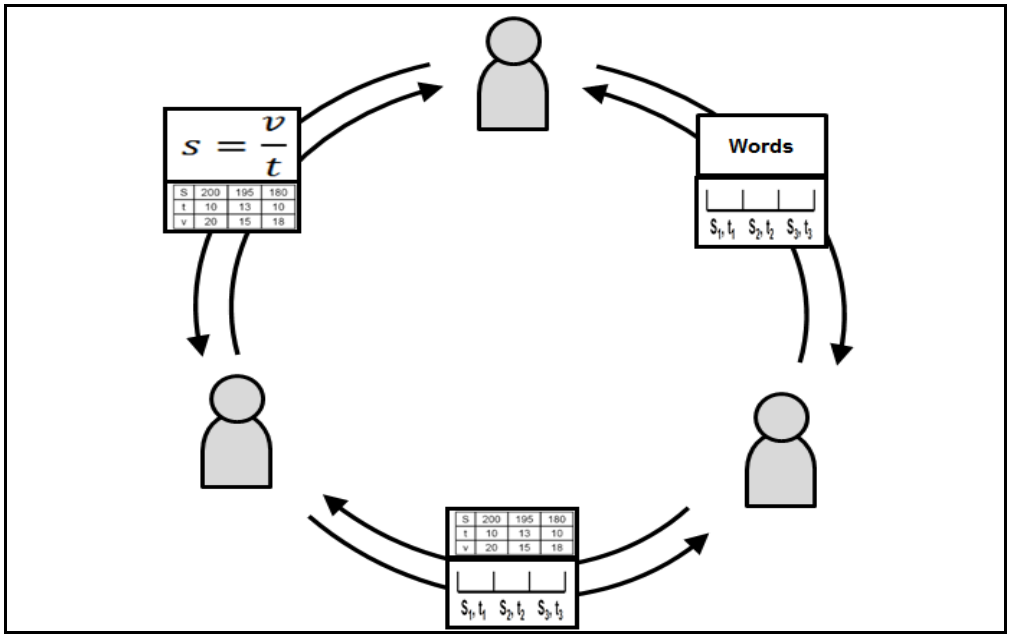


**Figure 3. Realising an experiment in a collaborative group. Multidirectional communication through various representations helps reduce the level of cognitive overload.**

*Source: own elaboration*

## 4. COLLABORATIVE PROCESS IN SCIENCE EDUCATION

Developing a constructivist educational process in science education does not involve the creation of a well-designed curriculum to support cognitive processes so much as the preparation of such an environment that would enable self-learning (Heyder 2000: 121). For this purpose, knowledge is assumed not to be self-contained, but to depend on the individual and social learning process. Learning occurs continuously and at many levels in the form of active and constructive activities on the side of learners.

In the constructivist education process, the external control over learners should be limited to a minimum. The teacher, if at all present, should act as an adviser rather than participant of the learning process. In most cases, there are no specifically defined forms or methods of learning: they depend on the individual capabilities or needs of learners. Education goals are not formulated in terms of descriptive directives (e.g. what curriculum content must be learned), but rather aim at acquiring the experts' way of thinking and

conduct. For this reason, it is postulated to use goal-based scenarios and formulate authentic tasks and goals to be achieved.

From the constructivist perspective, it is necessary to develop a work environment where tasks and problems will be prioritised in the teaching process. For this purpose, an inductive reasoning pathway can be employed, which works well with experimental activities, although deductive reasoning cannot be excluded when devising experimental tasks. Problem-solving tasks can be realised through cognitive apprenticeship, where knowledge and skills are learned from masters or experts. It is also recommended to use various cognitive tools, such as hypertext and expert systems, microworlds and semantic networks (Heyder 2000: 121). The key role, however, is that of the experiment.

It can be assumed that in a majority of cases the experiment is the most important component of the science education process and therefore it is around the experiment that the whole (usually inductive) process should be constructed. For a number of reasons, this suggests the use of problem-based learning, where the problem is posed at the beginning, the solution is established by inductive reasoning, and then verified by conducting an experiment. Naturally, the experiment must be summarised and conclusions made. The process is illustrated in Figure 4.

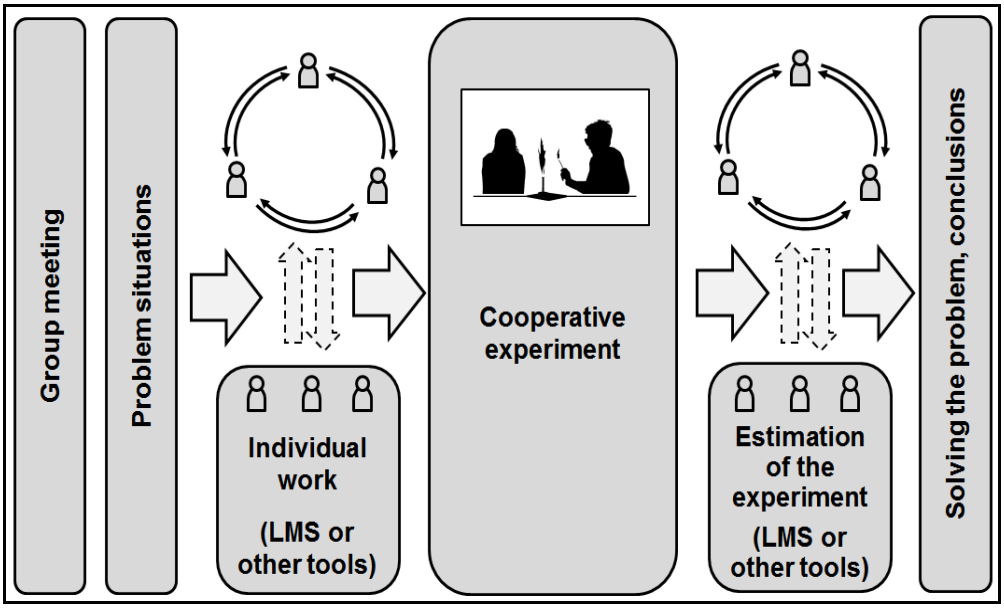


**Figure 4. Cooperative process of science education**

*Source: own elaboration*

The process is initiated by a group meeting, either face-to-face or in the virtual space. This can be achieved by synchronous or asynchronous tools, such as e-mail or message boards. Synchronous means of communication, such as chatrooms and audio/video conferences, are particularly effective at ensuring quick response, which makes it possible to define the problem and partial tasks in a precise manner.

The initiation phase, which defines the main problem (or several problems), should be attended by a teacher, although the problem might as well be included in the course or the module of a learning platform. The problem situation should be discussed by a group of collaborating learners and then divided into partial problems to be addressed by the whole group or individual participants. The same applies to the experimental behaviour. In general, the whole initial process prior to the experiment should lead to the development of an experimental behaviour scenario (or scenarios). The goal-based scenario method could be employed. Scenario development should be observed by the expert – ideally, a teacher, and only in rare cases by a computer. The learners can be assisted by anchored instruction in the form of adequately prepared materials available on the learning platform.

## 5. COALLABORATIVE EXPERIMENT

There are no simple, uniform solutions for realising the science experiment. However, a number of software products support individual or, increasingly often, collaborative accomplishment of the experiment's goals. This can be achieved by conducting actual or virtual science experiments. It is also possible to carry out remote experiments or experiment simulations. Other interesting techniques include interactive screen experiments and 3D experiments. Given the large number of solutions, it best to learn their advantages first before developing the scenario.

The most popular tools used in computer supported education are applications written in the Java programming language, which is compatible with various web agents across multiple operating systems. According to Oracle, the number of Java implementations in 2012 exceeded 3 billion, which makes Java Runtime Environment even more popular than Windows systems. This provides great possibilities for educational purposes (Fritsch, Syed, Saidkasimov, & Kreft 2004). In multimedia computer networks, Java offers broad opportunities with respect to visual presentation and computer interface support (Hall & Brown 2001: 760). The latter enables the widely understood device control and downloading experimental data.

Features of the Java environment have been effectively utilised in mechanics, where real-life experiments are proposed alongside process simulations (Heermann & Fuhrmann 2000). Animations and 3D simulations, which are the basis of any modern virtual-reality environment, are also employed (Ong & Mannan 2004).

More advanced implementations attempt to use the Java environment for collaborative work support systems (Udel 1999: 250). They have not resulted, however, in the development of a universal system that would support both collaborative work and experiments at the same time. Greater achievements have been delivered in the area of developing a uniform environment for science experiment support. One example is the INGMEDIA system, which was developed with a view to creating a complex educational environment for experimental purposes (Hagemann 2004). Other projects, such as VLIB – Virtual Laboratory for Image Processing (Schulmeister 2006: 226), Virtual Physiology (Schlattmann 2004: 78) or Interactive Screen Experiments (Schlattmann 2004: 80), also attempted to provide a universal experiment environment. Most of them, however, are only distributed through CD-ROM packages, and the lack of web support significantly limits their applicability.

For this reason, there have been more and more attempts at establishing web laboratories, such as the remote laboratory controlling physical devices (Thomsen & Jeschke 2008). This allows a number of science experiments to be conducted without the need to attend the laboratory in person. An increasing number of such laboratories is accessible on the web, and there has even been a proposal of connecting the existing laboratories within a single system. One of the European projects aims to create a library linking laboratories (Richter, Böhringer, & Jeschke 2009). Library of Labs (LiLa) employs a Java-based interface to provide access to experiments via the Internet. There have also been attempts at developing an experiment platform using open source software solutions (De Vora, Auer, & Grout 2007), which may open a way to creating a universal system providing management and access to a laboratory network. Such solutions would be particularly useful in the context of distance learning.

The accessibility of an experiment is not only determined by its physical availability, but also by its attractiveness and clarity, which may be enhanced by providing experiment description and manuals. This can be done with the use of an educational platform, which is normally independent of the experiment itself. There have also been attempts at integrating the experiment and simulation environment with the educational platform (Kühn 2006).

However, these are early attempts and many problems must yet be solved: for instance, how to provide collaborative execution of experiments, what type of experiments should be provided or what form of presentation (words, multimedia, 3D space) should be employed.

The unsolved problems also make it impossible to develop a detailed model of experiment course. Most experiments are realised on the basis of a single system providing access to multiple experimental modules. It is recommended that these modules be executed, where possible, with the participation of many group participants. The experiment always leads to certain results, usually in the form of data that must yet be analysed.

## 6. ESTIMATION OF THE EXPERIMENT AND PROBLEM SOLVING

The realization of the experiment does not conclude the educational process. As shown in Figure 4, the final stage should include experiment estimation and problem solving. Estimating the experiment and presenting the results in a tabular or visual form helps solve the original problem and make conclusions. At this point, it is recommended to use the scaffolding method or cognitive tools. Work can be divided among individual group members. Conclusions can also be made by the whole group or individually. However, the summarisation of detailed conclusions, as well as the formulation of conclusions solving the main problem, should be done in a group. Anchored instruction or cognitive load theory could be employed here. The teacher or an expert in the area should ensure that the conclusions are correct.

This stage can be supported by objects available on the educational platform or in the Internet. These might include expert knowledge (on how to solve a given problem) or describe the standard conduct with regard to a given problem. Tables for data input which provide automatic computation or diagram creation could be used at this stage as well. Such objects are not supposed to transfer knowledge directly or to give detailed problem solutions. They should rather suggest the general rules or patterns of action, also in collaborative groups.

The experimental behaviour, including problem posing and solution, has been studied at various levels of education. In secondary education, science experiments were situated within a web learning system (Meger 1995). As it turned out, each group worked at a different pace, and the results of group work were better than those achieved by individual learners. An extended study on the same subject involved a science experiment situated in a PE class (Meger 2004). In a study conducted in a middle school (Eberswalde),

computer methods could only be partly applied and face-to-face communication prevailed. In this case, the teacher's support for collaborative work was evidently more extensive compared to secondary education.

Other tests with regard to experiment implementation in collaborative learning involved interactive screen experiments (ISE), which allow a pre-designed, actual experiment to be reconstructed with custom parameters. They have been proven to be applicable in a collaborative learning environment (Meger 2005). Similar studies involved experiments in 3D (Meger 2008). This technology seems to be promising, but for the time being is still in a testing phase. A series of detailed of studies on the experimental behaviour in science education (Meger 1994) indicate that collaborative work technologies have a great potential and may play a significant role in future education.

## CONCLUSION

The learning process in science education is mainly based on the experimental behaviour. The experiment should also play a key role in collaborative learning. Therefore, the experiment plays an essential role in the proposed educational process, while the other components of the process, including problem-based learning, have been subordinated to it.

Various applications and environments can be employed so as to realise the experiment. The Java environment is often applied for this purpose. It can be used for developing both simple simulation programs and complex educational frameworks supporting the experiment. Despite the lack of uniform solutions, there have been attempts at consolidating various experimental frameworks and implementing experiments in the collaborative process.

The process of collaborative learning encompasses the problem analysis phase (prior to the experiment) and the phase of experiment estimation and conclusion making. The whole process should be designed in such a way so as to provide opportunities to shape the individual and group representation of knowledge. The process effectively utilises cognitive tools and methods based on constructivist principles of cognition. Modern solutions, especially in the area of technology, should contribute to this process, and its results may lead to a change in the perception of today's science education.

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# WEB-BASED TRAINING ONE WITH METHODS OF DISTANCE LEARNING

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***Summary**: The paper presents a method for distance learning using proprietary web application (e-learning.wshe.pl), which allows for the presentation of educational materials on the web. The educational platform was created to support the teaching at college level, in selected fields conducted by the university. The distance learning application was used throughout the academic year 20011/2012, during the winter and summer terms. The obtained results provided valuable information regarding functionality and usefulness of the system in the educational process. The system turned out to be very useful in complementing traditional teaching mode.*

*Multifunctional applications (panel presentations, internal messaging system between users of the system, the panel supporting the exchange of learning materials and books, calendar of events) allows to replace the traditional blackboard and overhead projector for optical media or exposure to lecture material in printed form (PDF, DOCX). Standard users (students) were divided into groups (corresponding with courses of study), making it easier for their review and access to material published only for the specific group. Teachers have ability to publish previews and manage only their own lecture and multimedia presentations. The system also provides opportunity for students to exchange books and learning materials among themselves and share their opinions. The system reports useful information, such as the number of hits per each lecture, the distribution of visitors per week, term-time use of resources, a visit by nationalities.*

**Keywords**: models of distance education, web education systems, e-learning and content management

## INTRODUCTION

The educational system presented in the paper, "e-learning-AHE" (http://e-learning.wshe.pl) is an interactive website that supports the teaching process at the College of Humanities and Economics in Włocławek. The design was based on an open source modules. It has created a friendly environment for students, students and faculty of AHE to support the teaching process. The website also enables communication between the student and teacher, as well as among students. It was assumed that its functionality will be addressed to four different groups of users.

The first group is administrators with full control over the system, who will manage the system, control the flow of information, update on an ongoing basis the static pages, ensuring information security while storing and archiving databases and materials. The second part is the authors (teachers) who are able to enter and remove contents, in the form of pre-prepared lesson plans. The third group consists of users registered, students and students with limited rights of access to materials and systems. Another group of users who are not registered, who can see the static part of the parties and all its content, without the ability to open, copy and reproduce the teaching materials. From the programming point of view this is a network operating system in a dispersed environment, which consists of elements:

1. The application of the user (student, teacher, editor of the content), which is usually typical Internet web browser, through which a user communicates with the system.
2. The application server remote education, serving standard HTML, XML, Java Script, PHP.
3. Content servers that support access to the files of teaching materials. Content can be created by teachers and content providers (distributors).
4. The database server. These data include user names, themes, permissions, user management, information on educational content, metadata associated with content lectures and scenarios in different forms.

Summarising, the distance learning system is based on a thorough analysis of users' needs. Significant attention has been paid to promote activities related

to the content. There are multiple ways to promote content relevant to education: a review of publications, conference proceedings articles, discussion groups, surveys and statistics.

The first section discusses an asynchronous learning model which is based on the distance education system. The second section provides a description of the services of the system. The author focuses on the mechanisms of content management, communications management and the basic form of the system. In the third section the author describes how to access the resources and the structure of users and their access rights.

## 1. ASYNCHRONOUS LEARNING MODEL

The asynchronous model is a one-way approach to distance learning. Widely used in education and business, large and medium-sized enterprises, government organisations, educational centers, universities and schools at all levels. It allows application of the teaching process through the Internet (Figure 1), in particular through the WBT website (called Web-Based Training). Unlike other forms of electronic education WBT systems are characterised by delivery of materials in several forms: video, multimedia presentation formats (PPT, PPS, OPD), the materials in the files in DOC, PDF, ODT, XLS.

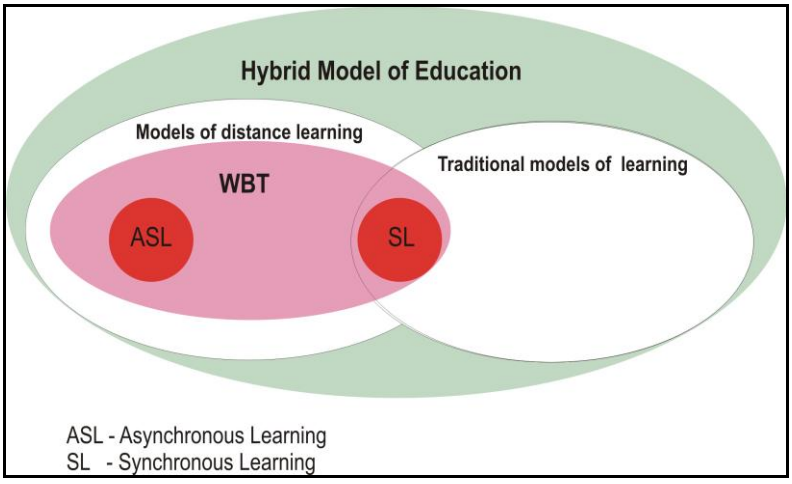


**Figure 1. Models of distance learning.**
*Source: own elaboration*

In contrast to the synchronous model of teaching (called Synchronous Learning), which is characterised by classes being held in a virtual space in real time, the asynchronous learning model allows the student to participate

in any place and at any time using the universal network to access materials that were prepared in advance.

Both synchronous and asynchronous models can be combined with the traditional model of teaching (called Instructor-Led Training), resulting in the formation of hybrid models (called Blended Learning), which combines a range of computer and network technologies with traditional means of teaching.

This publication presents the e-learning ASL in the model that was developed and implemented in higher education (AHE Włocławek) during the academic year 2011/2012. Although at present there are many ready-made systems and e-learning applications, the presented system is based on a proprietary solution, developed using free tools under the GPL (GNU General Public License).

## 2. EXISTING MARKET OF DISTANCE LEARNING (http://e-*learning.wshe.pl*)

The presented system of e-learning is an educational media database service, which allows the mass of materials and presentation effective and safe contact with the tutor system users and contact users with each other.

The system is simple to use, stable in operation at the heavily loaded, secure authentication mechanism and full control over published content (Figure 2).

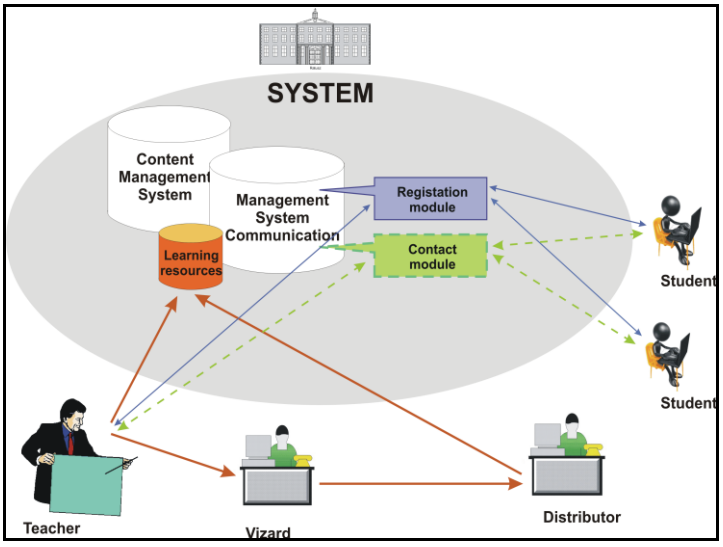


**Figure 2. Model of the Market of Services and System Management.**
*Source: own elaboration*

Full control over the content has been achieved by creating an account "wizard" and the distributor, "which exercises a sovereign role of an account" Author (teacher). Each new teaching material first passes through the position of the wizard that checks for style and spelling, omitting any merit-related assessment, followed by the position of the distributor, which determines the lifetime of the material on the web.

In addition to these features the system interacts with various interpreters of the code (Opera, Internet Explorer, Mozilla, Chrome) and has the ability to multivariate data analysis (OLAP OnLine Analitical called Processing). The OLAP system is treated as a separate class of systems to facilitate the analysis of data collected from databases and data warehouses.

The key modules of the presented e-learning platform are: Content management system, Management system communication, contact module and the auction system aids.

The content management system allows you to publish learning materials divided into fields of study, concluding in its distribution plans for classes, study programmes at various fields and specialisations, and information related to the organisation and direction of the academic year (Figure 3).

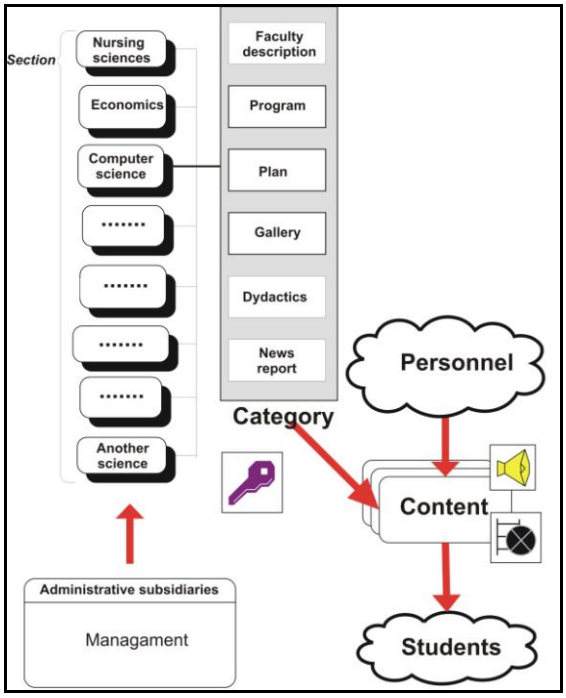


**Figure 3. Main Menu of Learning Contents.**
*Source: own elaboration*

All sections except "Teaching materials" are created based on static items. "Teaching materials" becoming backbone of the system in which scenarios are exposed to lectures. In order to improve transparency and the functionality, the contents was divided into sections. Section is a list of items in a given field of study (Figure 4).

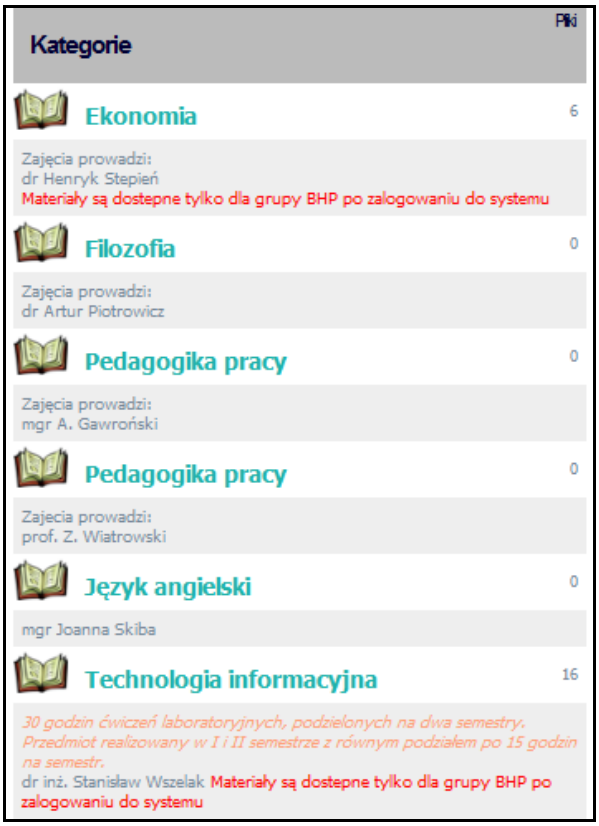


**Figure 4. List of Courses Available On-line.**

*Source: http://e-learning.wshe.pl*

The presentation of teaching materials in specific formats is possible through selected objects. To illustrate the content management mechanism the subject "Information" was chosen from the list of objects on the field of study “Occupational Health and Safety”. Lectures presented in the form of a multimedia presentation or video (video tutorials) are treated as articles in the category and stored in a database. The appearance of a component from the user with the contents of Figure 5 shows the content available in an individual course.

Lack of information on a defined subject means that at the time the item is inactive or the teacher has not prepared any teaching materials.


**Figure 5. Presentation of Contents Available for Individual Course.**

*Source: http://e-learning.wshe.pl*

Communication system is the internal mail system users. It has the necessary tools to exchange information (Figure 6), including the ability to exchange files as attachments.

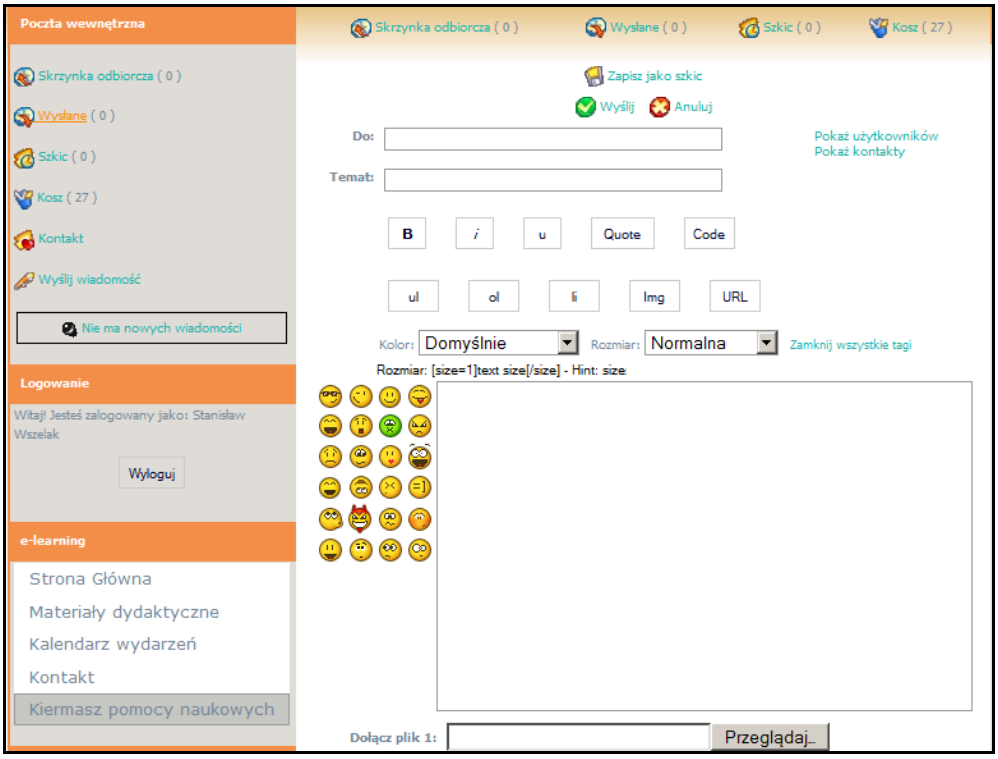


**Figure 6. Communication Management Panel.**

*Source: http://e-learning.wshe.pl*

The auction system of teaching acts as a store with educational materials. It is divided into thematic categories (Science, Education, Economics, etc.). In each category, there is a distinguished type of transaction: Buy, Buy, Swap, Rent.

Students may participate in the auction, after being authorised and registered in the system. The information is entered via a form, which overwrites the data fields of the database. The size of the input image file can be limited by its size (Width x Height). The option “Contact the Author” provides contact information such as telephone and email. Sample two auctions promote books shown in Figure 7.

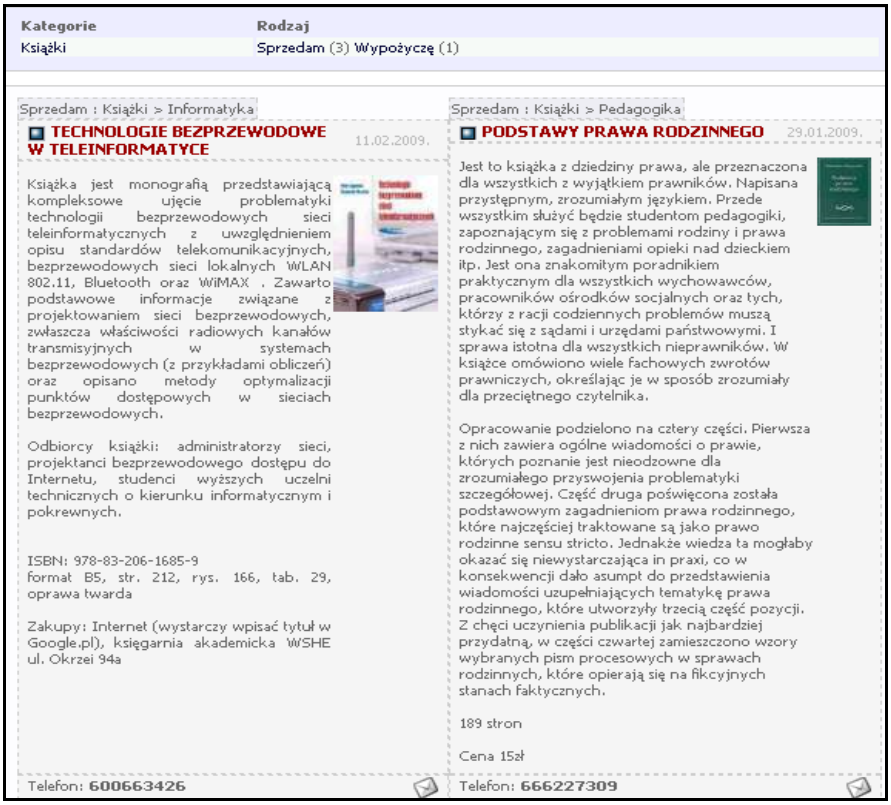


**Figure 7. Auction of Learning Materials.**

*Source: http://e-learning.wshe.pl*

## 3. ORGANISATION OF ACCESS TO SYSTEM AND LEARNING CONTENTS

The system identifies five types of permissions: Super Administrator, Administrator, Manager, Author and Registered. The passwords are encoded in binary, a 128 x 64 bits. The login process is preceded by a registration of the user. The activation of user is managed by a person with the authority to activate accounts, which also verifies the authenticity of the user and assigns the appropriate group. Belonging to groups is one way of filtering access of users to educational resources. For large databases, with lots of student registration and login process can be automated by importing records from the database fields, students from a particular university management system (USOS). User accounts are created after the easiest album number of the student. The system was created based on several groups of users with appropriate permissions (Figure 8).

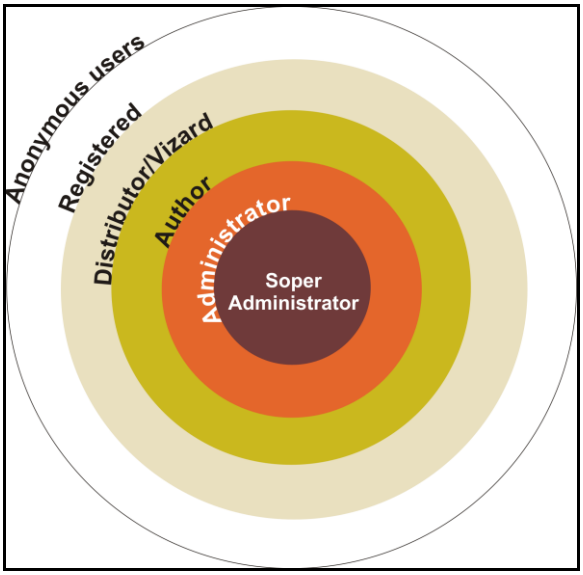


**Figure 8. Structure of System Users.**

*Source: own elaboration*

The first group is anonymous users. These are people outside of the university, with the right of access to static information site or news, communication, thematic summaries, sample multimedia presentations. The second group consists of users logged into the system, such as students of courses with specific access rights. The terms of reference include:

- the right of access to the front side,
- the right to browse resources,
- the right to transfer information and materials (internal mail),
- the right to access your account and changes in the profile,
- the right to download shared documents.

A separate group consists of content creators (teachers), which have the rights of the Author, Editor and Publisher. Authors have the right to send materials directly to the system resources in the relevant section or to a distribution of knowledge (Figure 1). Distribution point is a buffer separating the author from information resources. When you are choosing "live" materials in the network Editors (editors) have access to all the rights to edit them and add them to the selected sections, watch over the correct spelling, and correct file format. Compresses (video files) and the treatment proposed for the presentation of teaching materials. This allows the inclusion of all

teachers in the system, even those who have made limited use of information technology and media in teaching. Materials are subjected to treatment that is too extensive and provides too large burden on the links for a tele-transmission.

## CONCLUSION

Education via the Internet using e-learning applications is an effective way of knowledge transfer as it guarantees to reach a large group of students anywhere, anytime. Classroom scenarios can be played several times, and in some cases, copied and stored. Teaching in the network and the Internet certainly has its advantages, increases the quality of teaching, increases the discipline of teaching, enhances knowledge and improves self-control, it also allows for self-esteem. The biggest problem encountered, was to convince teachers of high scientific and educational experience to use this form of teaching.

The correct operation of the system affects the web server configuration, eliminating the unnecessary processes during data transmission, and helps protect the system against overloads and attacks from the hackers. Knowledge of network traffic allows for planning session on-line and off-line. The performance of the network effects are also customer terminal equipment. The most effective and popular reference materials made in the video formats, (Figure 9), the tutorial: Explosive materials, lecture videos, with Id 119, viewed 1624 times between September 2011 - July 2012.

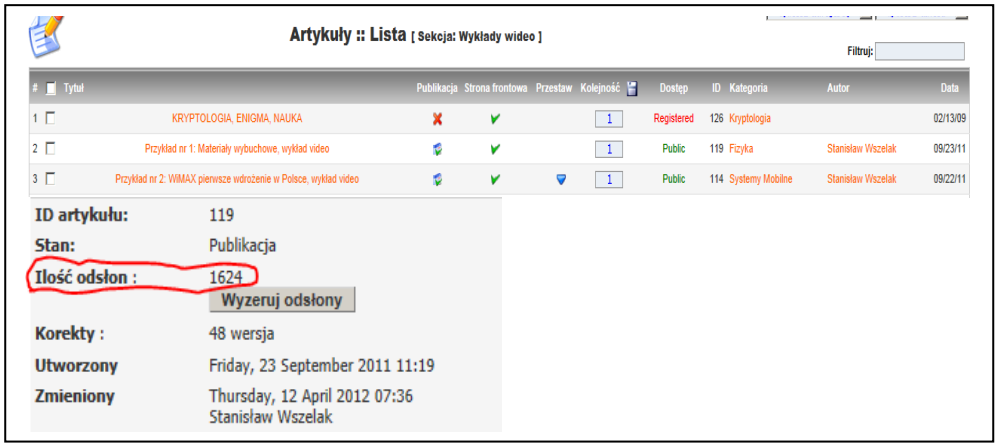


**Figure 9. View of the OLAP System Analyzing the Functionality of the Learning Contents.**

*Source: http://e-learning.wshe.pl*

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# SOME PROBLEMS WITH THE USE OF THE MGL METHODS IN SCHOOLS

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***Abstract:*** *The article presented here reveals an important part of the use of the computer and electronic toys in the moral growth of a child. They develop little children's imagination, make them concentrate their attention on various problems and help them make decisions. They also help children in shaping their ways of thinking, solving problems or tasks, finding out what to do in case of making errors, showing clear ways out of certain situations, and finally offering perspicuous solutions and effects. The article discussed here also presents the description of the child's moral development which can be found in the works of Piaget and Bandura.*

*The method MGL is based on a model of education as a multiagent simulation of pupils' social milieu*

**Keywords:** education, MGL method, children.

## INTRODUCTION

Fundamentally, the computer games that children play nowadays have three functions which are educationally significant for advancement and improvement. Firstly they are all fitted with attractive story context to draw young children's attention and develop their imagination. These settings may be familiar and domestic as well as fantastic and magical. Certain programmes reveal children's favourite stories, others concentrate their attention on rhymes that seize the love of the silly and the weird , while still other ones are presenting familiar domestic situations and extremaly interesting fictional worlds.

Secondly, their probably most important feature is creating opportunity for children to choose and make decisions. Practically, they are amusing and the child controls them. They make children think, carry on discussions and learn by way of trial and error. The games' third function is presenting children in a clear way, the essence of cause and effect children's choices as well as decisions lead to certain results. At the beginning it is very simple but with time it becomes more thoughtful. Obviously, this is the essence of problem solving. Allowing children to have more control and choices and making them gradually more thoughtful enables moving towards progress in the field of the games that children perform. Whatever such games are it is important that children find them really interesting (Siraj-Blatchford, Whitebread 2003).

'The importance of adventure games in the process of learning'

Numerous computer games for children create:

1. An amusing accessibility to learning.
2. Putting problems in significant context (background).
3. The state of being suitable for collaborative problem solving.
4. Skills and processes necessary for solving problems.

ad.1 – Teachers and developmental psychologists are fully convinced nowadays that play is a powerful means for children's learning. Up to now it has been proved that playing helps young people to be flexible and inventive in their thinking and in solving their problems successfully. Computer games give an access to playful opportunities for increasing creative thinking.

ad.2 – When children receive a task, they start to rely on its context. The difficulty appears when a task they receive is not based on their actual knowledge. Noticing of these barriers has led to new procedures in some curriculum fields. Children learn much better when they receive tasks that are meaningful from their points of view. When children are presented with stories of adventure, they themselves can help their heroes to final the right ways of solving some problems. Children understand the essence and meaning of such problems, they use their reasoning powers, and they benefit of learn from their experience in the most effective way. Needless to say, the become highly motivated by meaningful contexts of their computer games. In their fairy tales the problem – solving becomes the aspect which fascinates them.

ad.3 – Proper positive results of children's learning in groups rely on the nature of the talk and the appearance of mutual actions among them. The

increase of proper problem – solving conduct is intensified by working in groups on computer – based tasks. Working in collaborative groups on many games enables to create an effective setting in order to generate children's problem – solving skills. Children's groupwork and ways of communication prove to be very efficient in this respect.

ad.4 – Problem solving – skills and processes relate to

- understanding the problem and introducing information that is necessary to its solution,
- collecting and arranging proper information,
- creating and conducting proper plans of actions,
- applying varieties of problem – solving means,
- polemics, putting theory in practice and deciding about solutions to problems.

The truth is that simple games do not increase the above-mentioned elements very fast, but they help to do it.

Children and adults (grown – ups) spend quite a lot of time before they reach a solution. Children learn how to transform what they know in a little different way (Siraj-Blatchford, Whitebread 2003).

## 1. EDUTAINMENT IN VIEW OF CHILD'S MORAL DEVELOPMENT

Scientific researchers dealing with cognitive development of children and social learning agree with the idea that social factors create a very important role in children's morality development. Piaget describes the final stages of moral development as the time when children acquire the ability to create new ideas and principles. Formal operational abilities allow 1) to imagine hypothetical situations which may appear in a game and 2) to invent the laws of directing them. Children's moral reasoning gets widened beyond personal level and in the direction of more serious social matters. Adolescent children may start being interested in more general moral issues, eg. protection of environment. According to Piaget moral reasoning is steered by the inherited and environmental factors. The advancement of children's cognitive abilities, depending on nature, e.g. abandoning egocentric thinking, allows them for considering a greater amount of information and accepting several points of view while communicating with their peers during backyard games, learn

that there are many views on a given subject and the rules are often the result of compromise, negotiation, accepting other people's points of view (Vasta, Haith, Miller 1992).

The theory of social learning states that social forms of behaviour, introduced in categories of moral development, are acquired via the same processes and ruled by the same general principles pertaining to the majority of other behaviours. Although theoreticians of social learning agree about the issue of the influence of developmental cognitive abilities achievements on the above mentioned processes, they put emphasis on the meaning of punishment means, reinforcement, learning through observation, modelling and imitating. Such arrangement of emphases instead of interpretation of moral development through a stage model, where moral behaviours appear and are universal for all children in accordance with 'time table', anticipates a possibility of development that is more individualized and largely depends on the social milieu and personal experiences acquired by every child.

The principal spokesman for the use of social learning theory to describe moral development was Albert Bandura who assumed that punishment and reinforcement are processes owing to which children develop their moral behaviour. There is an increase of frequent occurrence and possibility of anti – and pro – social behaviours, both praised and rewarded. It is observed, too, that frequent occurrence and possibility of ignored or punished behaviours becomes reduced. Children learn likewise how to distinguish and differentiate possibilities of acquiring cases of reinforcement which are available in various situations such as parent's approval on receiving good marks, or schoolmates pressure to play truant (Vasta, Haith, Miller 1992).

Bandura puts emphasis on the process of learning by means of observation: children learn the rules of conduct and behaviour in society while observing other people. Many researches confirm the fact that parents, schoolmates, people coming into interaction and those who are models can influence moral behaviour of children due to modelling and imitating (Brody, Shaffer 1982, Mills, Grusec 1988).

Also, one should pay attention to functioning of mass media, namely how is children's behaviour affected by contents transferred via television, e.g. in fairy tales, various programmes films, or read in magazines and books (Eron, Huesmann 1986).

## 2. DESCRIPTION OF CHILDREN'S BEHAVIOUR(S) BY MEANS OF THE MGL METHOD

This type of relation among children can be described by the MGL method (Meta Game of Learning problems). The method is based on an educating model as a multiagent simulation of pupils' social milieu. This kind of simulation can be used in our case because the educating system is complex. It possesses qualities of both dynamic and independent system. It includes the subjects which perform special functions in this hierarchy and these subjects are characterised by their individual behaviour, sometimes contradictory. "The general formalism underlying simEd language is based on an electronic or e-institution, a multiagent framework that consists of:

– roles that characterise different types of agents (i.e. who the agents are);

– norms that define allowable behaviours for each type of agent (i.e. what the agents can do);

– a dialogic framework that describes the ways in which agents can interact (i.e. what the agent can say); and

– a performative structure that depicts scenes of interactions between agents and transitions for linking one scene to the next (i.e. when the agents can do and/or say what).

simEd is constructed as a set of hierarchical 'sub-institutions': classrooms, schoolhouses and school districts. Each of these sub-institutions exhibit the characteristics of an e-institution.

The underlying goal within each sub-institution, and across the system as a whole, is student learning, which is measured in the classroom" (Sklar, Davies 2005).

In this system, the teacher and the pupil is compared to players in a game. Each of them can perform one of two movements in each interaction. The teacher starts as the first and asks the pupil and easy or difficult question. The pupil gives a correct or incorrect answer. Each time a movement is observed in the direction of a question and the state of the proper answer. In such a case the agent is 'cooperating', otherwise he is 'defecting'. This model is shown in Table 1. It is assumed that the aim of educating system is reaching intellectual progress.

**Table 1.**

**The behavioural model for a student.**

| sample questions in a single interaction | | | |
|---|---|---|---|
| STUDENT: | | right | wrong |
| TEACHER: | hard | learning | frustraction |
| | easy | verification | boredom |

*Source: own elaboration based on Sklar, Davies 2005*

In the currently discussed system it seems to be convenient using just such formalities though the selection of words is rather arbitrary and it should not be used to depict all 'malintent' when the agent chooses 'defect'. With the above approach we have got the labels simEd of class Q characterized as follows:

Q = ({C}, {T}, {S}),

where:

C – represents the domain knowledge, T means teaching factor describing the teacher's behaviour comprising teaching methodology and training model, S matters to a group of pupils' means including both ways of behaviour and models of knowledge (e.g. how a student acts how much he/she knows, and how he/she performs).

The model of pupils' behaviour within the framework of all the MGL structure is presented in Figure 1.

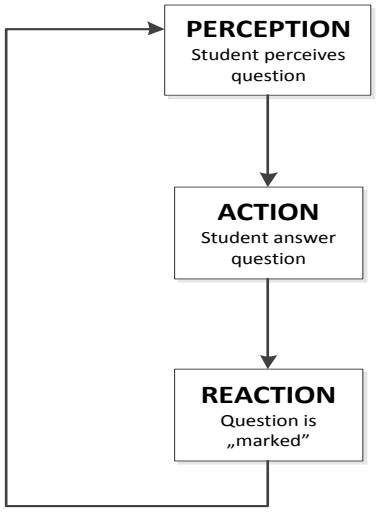


**Figure 1. The behavioural model for a student.**

*Source: own elaboration based on Sklar, Davies 2005*

Incidentally, the pupil's abilities are the real index from between 0 and 1, proportionally to difficulties connected with the concept. The Student Sj considers the concept Ck as 'hard' difficult, if Sj.aptitude <Ck. Difficulties, and 'easy' otherwise. The level of student's motivation is adjusted by the teacher in a view of the former questions. If the pupil sees that the question is 'hard'difficult we can say that he/she feels the challenge and he/she has motivation to try and answer the question correctly; otherwise he is less motivated. If he answers the question correctly, he will be happy (his emotional level will increase); if not, his emotional level will be reduced.

We set a real value learning-rate to indicate how much of a concept a student can learn, based on his aptitude:

sj.learning-rate.....( sj.aptitude/Cq.difficulty )

Thus, if a student finds a concept 'easy', then the learning-rate >=1. Presently, the learning-rate shows 1 which means that the pupil cannot progress faster than the teacher (Sklar, Davies 2005).

## CONCLUSION

The article presented here reveals an important part of the use of the computer and electronic toys in the moral growth of a child. They develop little children's imagination, make them concentrate their attention on various problems and help them make decisions. They also help children in shaping their ways of thinking, solving problems or tasks, finding out what to do in case of making errors, showing clear ways out of certain situations, and finally offering perspicuous solutions and effects. The article discussed here also presents the description of the child's moral development which can be found in the works of Piaget and Bandura.

The method MGL is based on an educating model as a multiagent simulation of pupils' social milieu.

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# THE USE OF EDUCATIONAL PLATFORM IN THE PROCESS OF TEACHING ENGLISH AS ONE OF THE FACTORS INFLUENCING MOTIVATION TO LEARN A FOREIGN LANGUAGE

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***Abstract**: The article will focus on factors influencing motivation to learn English. On the basis of questionnaire results the author will describe factors influencing motivation and specify whether and to what extent the use of an educational platform influences motivation to learn English among full time and part time students.*

**Key words**: educational platform, teaching English, motivation.

## INTRODUCTION

One of the consequences of Poland joining the European Union is the fulfilment of plans and assumptions concerning teaching foreign languages. Opening European job markets for Poland determines apart from having job qualifications the working knowledge of foreign languages. It can be easily stated that knowledge of a foreign language is one of the conditions of making a career both in Poland and abroad, good knowledge of a foreign language is becoming essential right now. On 27 July 2003 after a long preparation and consultation time the European Commission accepted an action plan: 'Promoting Language Learning and Linguistic Diversity 2004-2006' (European Commision 2010). This plan involved 45 action plans which were to be completed until 2006 within the initiatives undertaken by local, regional and national authorities. The actions included enabling all citizens the access to foreign language learning within the lifelong learning scheme, improvement of the quality of teaching at all levels and a creation of a favourable climate for learning languages and promotion of multilingualism in Europe. In the plan it can be read: 'nowadays gaining skills necessary to

communicate with our neighbours is more important than ever before' (Komisja Europejska 2010).

The European Union works towards raising the quality of education by: promoting mobility, working on shared syllabi, enabling the exchange of information and promoting lifelong learning. Teaching foreign languages is one of the basic components of these activities. People who use foreign languages are prepared to use educational opportunities better and have better chances connected with finding employment offered by the United Europe.

The aim of European policy concerning the knowledge of foreign languages is that each citizen can communicate in at least two foreign languages. This aim was expressed after the European Council summit in Barcelona in March 2002. During that meeting the leaders of European countries agreed that it is important for each European child being a citizen of United Europe to be multilingual. Multilingualism enables communication and understanding which inspire different European cultures to undertake shared activities. By learning languages young European citizens have the chance to become more open towards other cultures, may broaden their mobility and chances for finding their place on the foreign or national job market. According to European Commission's White Book concerning education and training 'Teaching and learning towards the learning society' (1995), teaching and training may offer solutions for the needs resulting from the three main 'factors of change' which are: information society, internationalization and development of the field of technical and educational research (European Commision 2010).

European priorities follow the needs of both young and adult learners. The possibility of finding a work place is a real chance for those who know foreign languages. It is essential not only to know general language but languages for specific purposes as well. Moreover, keeping language skills at a level enabling communication requires learning languages throughout life. The need to combine family life with professional life and with constant learning and deepening the understanding of other cultures makes e-learning a very effective way of learning available to adult learners. Older people very often start learning a foreign language to keep their mind active and to fulfil their dreams. They will learn more eagerly without leaving home. It is not really true that older learners have difficulties in learning how to operate a computer, e-learning is also attractive for them (Gajek 2004). Teaching languages online is essential and has a great future. It results from the needs of both educational institutions and learners as well. All the parties involved in the process of education have the need to change the way learning and

teaching foreign languages was and is still treated. The quality of teaching guarantees wise use of the development of traditional methodology of teaching foreign languages and traditional methodology of distant learning combined with the use of the latest technologies.

## 1. MOTIVATION

For most fields of education motivation is an inevitable element to succeed: we have to want something to achieve a success. Without such motivation it is almost sure that we will not manage to even try. Since motivation is so important we should be able to understand it and answer questions such as: are all the learners motivated in the same way? what is the role of a teacher in motivating the learners? how to maintain motivation? (Harmer 2001)

At the basic level motivation is a kind of an intrinsic drive which pushes people to do something to achieve the goal. Motivation involves such factors as: the need of exploration, action, stimulation, new knowledge and improving one's ego (Brown 2000).

Marion Williams and Richard Burden suggest that motivation is 'a state of cognitive arousal' which results in 'a decision to take action' in result of which 'intellectual or physical effort is maintained' so that the person may achieve a previously set goal (Wiliams, Burden 1997). They also point out that the strength of motivation will also depend on how important the result of the taken action will be.

In psychology a drive towards something, wanting something is also called motivation. People act by following some motives which in some cases may appear together in groups and such groups of motives to take some kind of action are called motivation. Very often one of the motives comes as the first one and decides about the character of the whole motivation. Motivation is not something easily described because human beings are very complicated and their inside can not be easily entered, so researchers can only try to discover it. We can ask why people learn? Some of them because they simply want to know more - this type of motivation is called cognitive motivation – the reason for action is the need to get to know something, gaining knowledge, learning to perform some activities. According to psychologists it is one of 'the best motives of undertaking actions.' Apart from cognitive motivation learners follow some other motives. On the other pole of the subject there is so called fear motivation. We can talk about it when someone learns to avoid some unpleasant consequences (Ledzińska, Czerniawska 2011).

### 1.1. Types of motivation

Motivation can be referred to as a continuum from extrinsic to intrinsic motivation (Oleś 2011). If we talk about learning we should refer to extrinsic motivation the source of which is outside the learner and intrinsic one the source of which is inside the learner (Ledzińska, Czerniawska 2011). Extrinsic motivation focuses on the fulfilment of achieving the aims set by the environment, results from the need to get rewards and avoid punishments. The example can be the need to pass an exam, waiting for a financial reward or the chance for travelling. (Harmer 2001). Intrinsic motivation focuses on choosing aims and fulfiling set goals that result from internal needs and are undertaken for pure pleasure, are not of an instrumental character (Oleś 2011: 298-299). A good example of an intrinsic motivation is a stimulation by parents, teachers or peers. Learning motives do not belong to the learner but to another person or people - such motivation can easily vanish when the learner is not stimulated (Ledzińska, Czerniawska 2011). One of the most important issues resulting from Piaget's Theory is the need for intrinsic motivation of which the powerful source is curiosity, natural for children and among other age groups – the loss of cognitive balance or cognitive conflict (Ledzińska, Czerniawska 2011). Cognitive motivation is intrinsic motivation, its source is inside a person, it is most favourable because we work towards it by ourselves, and we keep it: we act because we want to. Learning and teaching as intended activities depend on motivation which should be accompanied by precise actions. The most favourable is intrinsic motivation, but fear motivation should be avoided (Ledzińska, Czerniawska 2011).

Between those two types of motivation there are two other ones: introjected motivation – when someone forces himself to achieve a goal, treats it is as something necessary and at the same time in conflict with his needs, and identifying motivation – when someone gets involved in achieving an aim which is not necessarily a source of pleasure, but does it with the feeling of autonomy of his/her choice and intrinsic agreement for this type of activity. This way we form a continuum of motivation: extrinsic motivation, introjected, identifying and intrinsic one. With age adults are less forced to complete goals that are in conflict with their character, they have, on the other hand, more possibilities to fulfil aims chosen by them. What is observed is the change from extrinsic towards intrinsic motivation while getting older (Oleś 2011).

Motivation is a theoretical construct which is used to explain certain behaviours, its action and length of duration – especially the behaviour set to

achieve a specific aim. In case of school education the definition of students' motivation is used to explain to what extent students focus their attention and effort to do some tasks desired or not by their teachers. The aims of motivation should concentrate on encouraging the students to get involved in the lesson taking the motive of learning into consideration that is in order to get some knowledge or skill. (Brophy 2002). Apart from the above defined intrinsic and extrinsic motivation there is also a motivation to learn understood as students' tendency to treat school education as reasonable and crucial for finding benefits in it. Motivation to learn is a cognitive reaction which aims to make some activities reasonable, to acquire knowledge that the action brings with and to acquire the skills that the action prepares for (Brophy 2002).

Motivation understood as a pursue to achieve a certain goal in a foreign language teaching may be connected with different stimuli, i.e. motives. In the case of school education a motive of safety is very important especially with students with low self-esteem and high level of fear. The motive of getting approval – both parents' and school mates is crucial, motive of achievement for proving acquired skills and success is crucial as well. In the process of learning there is also a cognitive motive when the student gets pleasure from learning a language or getting to know the culture of other countries. Students very often have integrative motives when they learn the language because of being fascinated by another country and its culture, they sometimes have instrumental motives when they learn in order to earn more or get a better job. Sometimes students have no motivation which is often connected with having a different strong type of motivation with which the motivation to learn the language is in conflict, i.e.: motivation to spend time on a chosen hobby. In such a case the teacher sometimes introduces some extrinsic motives – a motive of compulsion. However, motivation is connected with the learner's general attitude to all the issues connected with learning the language. It is thus connected with the attitude towards the language, as well as society and the culture of the language area. Positive attitudes may bring integrative motivation of a cognitive force and this is the way to succeed. Motivation and attitudes are not given the only once so they can be shaped. In different age groups motivation is different, in the case of adults both motivation and attitudes were shaped earlier so the teacher's influence is very weak. These are usually positive, because adults learn the language because they want to, so the teacher's role is just to keep the motivation the learners came with to the language course (Komorowska 2009).

### 1.1. Factors influencing motivation

Motivation is what drives the learners to achieve the goal and it is the key factor in determining success or failure in language learning. The learner may set long or short term goals. In case of long term goals instrumental and integrative motives should be separated. Instrumental motivation exists when the learner sets a functional goal such as passing an exam or getting a job. Integrative motivation exists when the learner wants to be identified with the environment of a chosen foreign language. Intrinsic and extrinsic motivation follows these two mentioned types. Most theories connected with motivation distinguish some factors that influence the whole motivation, these are:

- attitude: to the language and its native speakers,
- goals: both short and long term ones,
- value: the value that learners attribute to achieving a goal, especially compared with the need to succeed,
- self-esteem: the need to have it and keep it,
- intrinsic interest and pleasure in the set goal,
- group dynamics: is there the atmosphere of competition or cooperation?
- teacher's attitude: teacher's attitude towards learners and their chances to succeed.

As the last mentioned factor points out the teacher can play a key role in motivating the learners by his/her own attitude and choosing appropriate tasks that will help to keep the intrinsic motivation (Thornbury 2006).

Motivation which makes people learn English may be influenced by the environment and the attitude of different people. It is thus important to see what the influences are and who are the people who influence someone's motivation to learn.

– *Society we live in:* outside the classroom environment there are some attitudes to learning foreign languages, especially English. How important is it to learn English in the society? Is teaching a foreign language a part of a school curriculum, how important is it? If the learners could choose the language, what language they would choose and why? These factors influence the attitude of the learner towards learning the language. The nature and force of this attitude will definitely influence: the level of motivation the learner comes with to the language classes, and whether the motivation will

be kept or not. Even if adults start learning English because they want to, they start learning with positive or negative attitudes they bring from the environment they live in.

– *People living next to us:* apart from the culture the learner functions within, there are people around whose attitude towards learning the language will influence the attitude of the learner. Do these people (parents, siblings) approve learning the language? Do they think that maths and reading skills are more important? Friends' attitude is also crucial; especially if they are critical they will have a strong influence on the learner's motivation.

– *Teacher:* plays a key role in learning. His/her attitude to the language and teaching is crucial. Enthusiasm in teaching English and the area of English speaking countries will be the most important factor in creating a positive learning atmosphere.

– *Method:* both the teacher and learners should be sure as to the way the process of learning-teaching is conducted. If any of the sides loses the feeling of being sure about it, that will influence the motivation. However, if both sides feel confident with the chosen method the more probable is the success (Harmer 2001).

At the beginning of the process of learning, independently of the age and the level of language skills, the teacher observes different levels of motivation among the learners. Some have clearly set goals, are enthusiastic and have a strong intrinsic motivation, others are weakly motivated. Motivation with which the learners come to the classes does not have to remain at the same level all the time. Increasing the level of motivation is one of the teacher's tasks however; the teacher cannot be responsible for the motivation of all the learners in the group. There are three areas in which the teacher's behaviour may directly influence learners' involvement in the classes:

– *Goals and their setting:* Since motivation is connected with people's desire to achieve some goals, short- and long-term ones should be distinguished. A long-term goal can be learning English in order to pass an exam or get a better job. A short-term goal can be mastering one of the language skills, ability to write something in a foreign language or passing the final test. The teacher has to be aware that long-term goals are important, but may seem too distant for the learner. When learning English is more difficult than expected than long-term goals may be treated as too difficult to achieve, that is why it is more important to concentrate on short-term goals first as their fulfilment will increase the level of motivation.

– *Learning environment:* the teacher does not always have an influence on the classroom where he/she works, however even less attractive rooms may be changed by using visual materials and become more attractive. Both the way the room looks and the atmosphere are important to arouse and maintain motivation. The teacher's behaviour especially the way the feedback is given and the language errors are corrected influence learners' emotions and motivation.

– *Interesting classes:* if the intrinsic motivation is to be kept the learners must be interested in the subject, exercises and the topic of each lesson, thus a teacher needs to provide a variety of activities and topics.

All teacher's efforts to keep and stir up motivation are necessary to succeed in learning-teaching a foreign language (Harmer 2001). Alan Rogers said 'motivation… is equally important for the teacher and for the learner, it depends on the teacher's and students' attitude' (Rogers 1996).

## 2. ADULT LEARNERS

The research that this article is based on was conducted on a group of adult learners aged 19-30. Adulthood is the longest period in the development of human beings that lasts a few decades. The length of the period of becoming adult depends on many factors such as biology, demography, socio-cultural factors that decide about the length and pace of life. In our culture adulthood lasts between 20/25th and 65/85th year and is divided into three periods: early, middle and late adulthood. There are usually two classifications of adulthood: according to the first one early adulthood is a period between 20 and 40 years, according to the second one early adulthood is between 18-20 years and 30-35 years. Early adulthood is a period when people take life roles characteristic of adults. The borders of adulthood specified in years are important however, as observation shows a 30 year old elderly person can be met or a 50 year old young person. What decides about the length of periods in a person's life is not a biological age but the type of interaction between the person and the environment. (Turner, Helms 2011).

What decides about a person being an adult is also the type of life roles he/she takes and completes responsibility for himself/herself and other people, emotional independence. Another feature of adults is the freedom of choice and the strength to fulfil desires and aspirations (Oleś 2011).

In the psychology of human development the years of studying fall exactly in the period of early adulthood. Students are people who have a high level of

cognitive possibilities, high level of readiness to learn, people having a lot of energy. Early adulthood is a period of the highest brain activity, sensitivity of senses, high muscle efficiency and immunity to illnesses. Positive features of young adults include: high intellectual efficiency including memorising, fast action taking, efficiency to learn within subjects of interest, easiness to identify and solve practical problems, thus most students should memorise, store and use information effectively (Stanisławiak 2010).

A characteristic feature of adulthood is also motivation to learn understood as consciousness to fulfil a goal, which is why it plays such an important part in the process of teaching adults (Boczukowa 2010).

Teaching adults does not usually cause as many problems as teaching other age groups because adults are not forced to learn and even if it is so it rather strengthens than weakens the need to master a foreign language (i.e. because of fear of losing a job). Taking part in a language course is usually an autonomous decision and choice so this fact connected with motivation to learn makes a language teacher's job easier.

However, for the teacher it means:

- necessity to make classes attractive,
- necessity to teach what is useful in learners' professional life.

Apart from having a strong motivation to learn adults very rarely spend enough time on their self-studying and the reason is lack of time rather than lack of eagerness. Adults are in fact working people, with families, children, home and social duties. That is why it is difficult for them to have enough time for individual work between language classes. The teacher despite those difficulties should ask the learners to do some homework, however it should not be the basis for organising next class as the learners may not have time to complete the given tasks. Another difficulty is the irregular attendance to classes caused by individual private and professional situation. All these factors together with weaker abilities to memorise may require the teacher:

- to plan classes so that they are independent units, in case someone misses classes can follow the ones he/she is present at,
- to revise the material from the previous meetings at the beginning and end of each class,
- to prepare handouts including the new material presented having in mind those who are absent.

An advantage, but at the same time a problem with teaching adults, is the fact that they are already shaped personalities, so it is difficult to change, shape their habits and expectations as to the used methods. This causes problems in adjusting to the used method of teaching and the way other people in the group learn. Sometimes adults insist on using traditional methods (reading and translating) because they were taught so, sometimes it is difficult to agree on common preferences for the whole group.

For the language teacher it means:

- necessity to present during the first meeting the aims of the course and the skills that the learners should acquire at the specified language level,
- necessity to present the techniques of teaching a foreign language – their advantages and disadvantages,
- it is necessary to get information about individual learners' needs,

It is important to remember that adults, very often holding important positions, enter a learning environment with a lot of difficulty as they are afraid of being laughed at or criticised by the teacher. That is why the teacher should:

- be sensitive especially in error correction,
- use 'persona technique' in which the learner takes on different personality than in real life.

The most important is convincing adults that it is never too late to learn and that their life experience or professional one are very important in achieving success in learning (Komorowska 2009).

Adult learners have some characteristic features:

- can think in abstract terms,
- bring their life and professional experience to the class,
- have specific expectations as to the process of learning,
- are disciplined and can cope with boredom,
- understand why they learn and what they want to achieve by learning,

Adult learners however, have some features that can cause problems in the process of learning-teaching:

- may be critical as to the used methods,

- may have experienced criticism at the earlier stages of learning and that might have caused stress and feeling of insecurity,
- may be afraid about their intellectual possibilities.

Teachers working with adults should minimise the effect of previous bad experience in learning. The feeling of failure may be reduced by using such activities that the learners will be able to do, paying special attention to the level of language presented by the learners. An example of a communicative activity for learners at A1 level (level represented by the whole group) is filling the form with personal details. Learners working in pairs ask and answer questions about personal data and complete the form, this way they practice asking and answering questions. The teacher should also listen to learners suggestions and modify his actions so as to suit the needs and expectations of the learners (Harmer 2001).

## 3. RESEARCH

The research the results of which are presented in the article was conducted among first-cycle students studying both full - and part-time. The Education Standards prepared by the Ministry of Science and Higher Education state that the graduate of the first-cycle studies should know a foreign language at B2 level according the Common European Framework of Reference and should be able to use a foreign language for specific purposes connected with the chosen field of study. The Education Standards enforce the necessity to use a foreign language in the graduates' future profession. The National Framework of Qualification for Higher Education which present the requirements a graduate should fulfil after graduating from a cycle of studies state that a graduate should be able to communicate in foreign languages: after first-cycle studies in English at least at A1 level (A person using a language at A1 level can: understand and use familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type, can introduce him/herself and others and can ask and answer questions about personal details such as where he/she lives, people he/she knows and things he/she has, can interact in a simple way provided the other person talks slowly and clearly) and in one foreign language at least at B2 level (A person using a language at B2 level can: understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her field of specialisation, can interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible without strain for either party, can produce clear, detailed text on a wide

range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options). The necessity to use foreign languages is enforced by legal acts used by higher education institutions.

In order to check what factors make students learn English a research based on a questionnaire was performed in January 2012. The research involved students studying full-time and part-time. Both groups counted 50 people of both sexes aged 19-30. The results of the research are presented below. The questions that the students were asked were divided into two categories:

1. questions concerning the level of intrinsic motivation,
2. questions concerning the level of extrinsic motivation.

Additionally students were asked whether using educational platform between face-to-face classes with their teacher influences their motivation to learn English.

### 3.1. Level of intrinsic motivation

The first part of the questionnaire was to answer questions about the factors that influence the level of students' intrinsic motivation. Students were asked the following questions:

1. Do you like learning English?
2. How do you prepare for classes?
3. Do you prepare yourself for English classes regularly?
4. How much time (on average) do you spend on preparing for English classes?
5. How much time (on average) do you spend on preparing for tests at English classes?

As the result of the analysis the following answers were acquired:

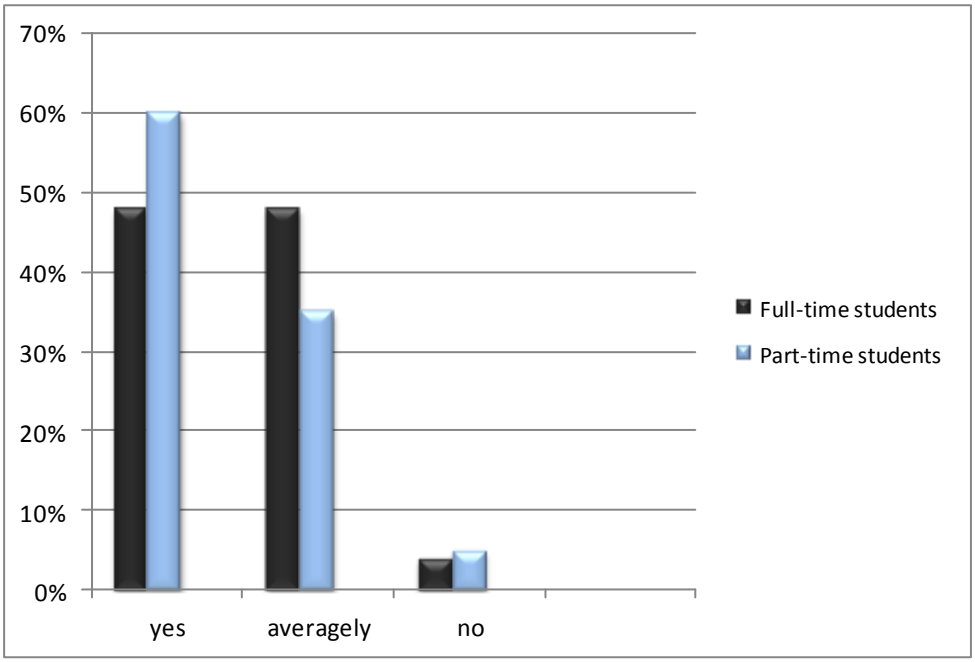


**Figure 1. Do you like learning English?**

*Source: own elaboration*

As results from the figure presented above 48% of students studying full-time stated that they like learning English, 48% said that they quite like it, the remaining percentage of the surveyed stated that they do not like learning English. Students studying part-time in 60% answered the question positively, 5% said no, and the remaining 35% said that they like learning English averagely.

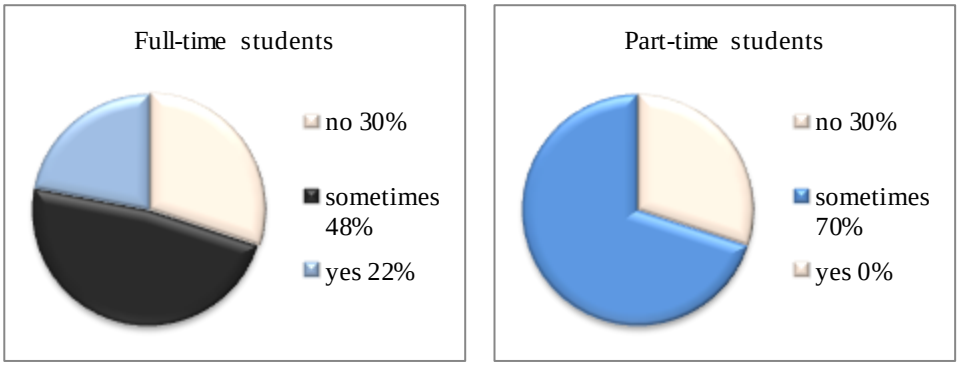


**Figure 2. Do you prepare yourself for English classes regularly?**
*Source: own elaboration*

Asked about preparation for English classes and whether they prepare regularly full- time students in a majority of 48% responded that they sometimes prepare, as much as 30% does not prepare, and regularly only 22%. In case of part-time students the differences in giving answers were bigger - 30% answered that they do not prepare, no one prepares regularly, but as much as 70% sometimes prepares for language classes.

Asked about the average time spend on regular preparation and preparation for English test full-time students gave the following answers: 51% spend on average up to half an hour on the preparation for classes and 36% spend from half an hour up to one hour on test preparation. The remaining percentage of the surveyed spend less than half an hour or more than one hour. In case of part-time students the majority of 60% devote on average up to half an hour to class preparation and as much time to test preparation spend the majority of 40%.

### 3.2. Level of extrinsic motivation

The second part of the questionnaire was to give answers to the questions about the factors that influence students' extrinsic motivation. The following questions were asked:

1. Does a negative grade have an influence on your motivation to learn?
2. Does a positive grade have an influence on your motivation to learn?
3. Does the teacher influence your preparation for classes?
4. Mark the factors that influence your motivation to learn. (the desire to get a good grade, avoiding getting a bad grade, features of character (conscientiousness, reliability), the need to acquire knowledge, the need to get a good profession, parents' requirements, other)
5. Why do you learn English?

Asked about a motivating factor in the form of grades (positive and negative) the students studying full-time responded in the following way: 51% stated that a negative grade influences their motivation to learn, and 36% said that the grade does not really matter, 66% think that positive results make them learn eagerly, for the rest of the surveyed neither good nor bad grades have an influence on their attitude towards learning. The students studying part-time answered the same questions in the following way: 45% of the questioned students said that a negative grade influences their motivation to learn and 50% said that a positive grade makes them learn eagerly.

Asked about the teacher's influence on the preparation to classes 60% of the respondents studying full-time said that the teacher has an influence on their preparation and so did 50% of those studying part-time. The remaining

percentage of the surveyed answered no or stated that the influence is only partial.

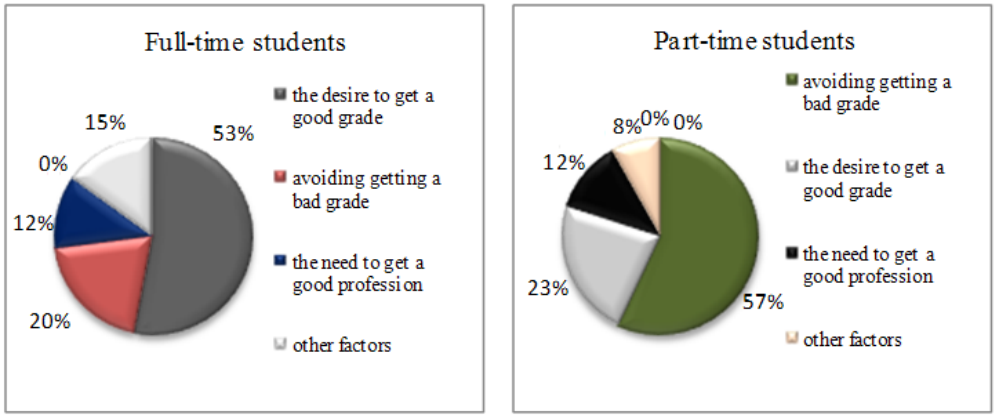


**Figure 3. Put the factors that influence your motivation to learn in order of importance.**

*Source: own elaboration*

The students were also asked to put the factors that influence their motivation to learn in order of importance**.** The factors were to be put in order of importance from the most important (marked as 1) to the least important (marked as 7). Students studying full-time as number 1, so the most important factor, marked the desire to get a good grade, avoiding getting a bad mark was marked as number 2, and the third in order of importance was the need to get a good profession. Students studying part-time as number 1, so the most important factor, marked avoiding a bad grade, the desire to get a good grade was marked as number 2, and the third in order of importance was the need to get a good profession. As results from the given answers both groups are quite similar in marking the factors.

Students were also asked to provide an answer to the question why they learn English (out of the given options they were supposed to choose minimum 1 and maximum 3):

- I have to, it is one of the obligatory subjects,
- I want to, apart from the fact that I have to,
- usefulness in life,
- it will help to find a job,
- usefulness while travelling abroad,
- it is useful because I want to go to work abroad,
- for self development,

- for raising qualifications,
- for social prestige,
- other.

In case of those studying full-time the most commonly chosen answers were: usefulness of knowing a language in life, self-development and its usefulness connected with going to work abroad. The majority of part-time students in the first place marked usefulness of knowing the language in life, usefulness of knowing the language while travelling abroad, and the third place was taken by the usefulness of knowing the language to find a good job abroad.

The surveyed students both studying full- and part-time have to work online with materials put on the educational platform which are linked to the materials in their coursebook, they were asked whether doing the tasks on the platform between face-to-face meetings with language teacher influences their motivation to learn English. In the online part of the language course students solve quizzes referring to the skills they can improve working on their own. Each module includes grammar quizzes, vocabulary quizzes, reading comprehension quizzes relating to coursebook texts. Each module should be opened for a time specified by the teacher, relevant to the time needed to work with coursebook units. The idea of setting a time limit is meant to motivate the students to work systematically between face-to-face meetings.

The platform part includes tasks related to:

a) reading

b) comprehension quizzes, grammar and vocabulary quizzes,

c) grammar theory, links to extrinsic Web pages

d) revision

e) introduction to discussion

f) writing task

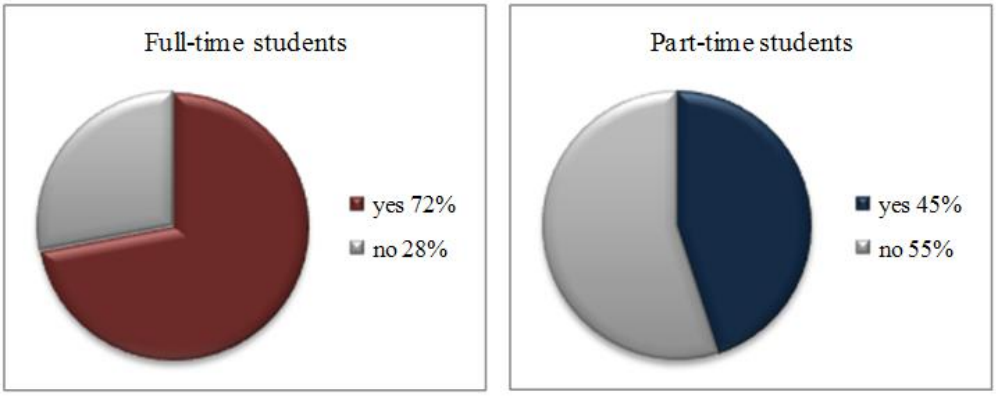


**Figure 4. Does working on the platform motivates you to learn English?**

*Source: own elaboration*

Asked about a motivating influence of quizzes solved on the platform between face-to-face meetings 72% of the full-time students answered that it motivates them to learn English. The major arguments were: the possibility to do the quizzes many times, contact with the language between face-to-face meetings.

55% of the part-time students referred to the motivating role of the platform tasks negatively. The major arguments were: preference of face-to-face meetings, being forced to do the quizzes, lack of time, and as a result solving the tasks in the last minute.

## CONCLUSION

As results from the research the factor that influences the level of intrinsic motivation the most is the positive attitude towards learning English both among full- and part-time students. Within the factors that influence extrinsic motivation the most, the dominating one is the teacher and the results. Getting a good grade and avoiding getting a bad one according to the surveyed students influence their motivation to learn English the most.

Puzzling is very high percentage of the surveyed who spend on general, weekly preparation for classes from half an hour up to one hour weekly and for test preparation half an hour up to one hour a week or during two weeks in case of part-time students. In case of both studying full- and part-time half an hour preparation seems to be enough only to get the materials from the previous class and preparing them to take to the next class, the time is not even enough to look through the notes in order to revise or memorise the

material. So little time spent on the preparation for the test may be caused in case of part-time students having not enough time for learning as these are mostly people who work, have their own families. Not enough time spent on learning English results in the grades students receive for language tests. As it results from my own experience too little time spent on preparation for an English test that influence receiving the semester grade causes the need to pass the tests again in order to get a positive grade. As results from the answers given by the surveyed students the need to get a good grade and avoiding getting a bad one are factors that motivate them to learn English which is in opposition to the time spent on learning the language. Such answers may result from the fact that students sometimes deliberately lower the level of language skills to attend language classes at a level lower than their skills and knowledge, in such a situation the time (half an hour up to one hour) spent on preparation for the classes and/or test will be enough to get a positive grade.

Both surveyed groups agree as to the choice of reasons for which they learn English. Major reasons are the usefulness of knowing the language at work or in life. Full-time students as one of the reasons mentioned usefulness of knowing the language in connection with plans to work abroad as these are in majority people who do not have a permanent job and their own families yet.

Using an educational platform as one of the factors influencing motivation to learn is visible among the surveyed part-time students, as far as full-time students are concerned using a platform does not influence their motivation to learn apart from the fact that it is learning by doing which in case of adult learners is one of the key learning forms influencing learning efficiency. Maybe the fact of using time restrictions and the obligation to work with platform tasks lowers adult learners' motivation as it is a kind of a constraint. Additionally, low percentage of the surveyed for whom the use of the platform is motivating results from the fact that the learners represent different learning strategies. Some people remember better written information, some heard information, and others prefer to learn by being involved in the task. What can be useful is the verification of the platform tasks to adjust them to learners' different sensory preferences. Placing various activities matched to sensory types: auditory, kinaesthetic, and visual may influence motivation to learn. Working with adult learners the teacher has to adjust learning strategies different than those used with the remaining age groups of learners. While arranging the process of education one should be aware of the constraints and problems that adult learners may face, such as:

- lack of time – adults cannot spend as much time learning as children and teenagers do,
- a longer break in learning – is especially import and in case of those who start learning a after a long break,
- lack of interest in learning or the subject – when learners see some issues as unimportant, the teacher should show possibilities to use them in practice
- bad attitude to learning – the result of previous bad experiences and failures,

Working with adults demands adapting content in various ways to give the participants of the process of education the chance to use their own skills and preferred ways of learning (Matlakiewicz, Solarczyk-Szwec 2009).

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# TRAINING AND DEVELOPING STUDENTS' KEY COMPETENCES USING E-LEARNING ON THE EXAMPLE OF THE E-LEARNING COURSE "THE SOURCES OF INFORMATION FOR THE REGION"

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***Abstract:*** *The aim of the paper is to present opportunities for training of selected key competences of students using e-learning. The work consists of both a theoretical and practical part and can be used by teachers and other professionals in teaching using the Moodle platform. The theoretical part presents the assumptions of the "construction" of the course: logical structure, level of interactivity and learning methods in the training of key competences of course participants. The practical part concerns the development of the e-learning course "The sources of information for the region". The course will be developed and posted on The Distance Learning Platform of The Institute of Library and Information Science (University of Silesia in Katowice). I am trying to determine the distribution of teaching methods in the training of key competences of students using e-learning in the final part of the paper.*

**Keywords:** key competences, e-learning, information for the region

## INTRODUCTION

The concept of competence is ambiguous. The Latin verb *competere* means the following: to be appropriate, to compete, to take a given position. Thus, "the etymology sets a perspective of understanding competence in which its essential meaning is associated with the potential of the subject which marks its capability of performing particular types of activities" (Encyklopedia 2003). Competences could be understood as "a collection of learning effects, in other words, what a given person knows, understands and is able to do" or

"a proved ability to apply knowledge, skills and personal competence, social or methodological, demonstrated in work or study or professional career and private life" (Hendryk 2010). Competences are defined in the *Recommendation of The European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning* (2006/962/EC) as "a combination of knowledge, skills and attitudes appropriate to the situation. These are skills which all individuals need for personal fulfilment and development, active citizenship, social inclusion and employment" (Recommendation 2006). The *Recommendation* sets out eight key competences: communication in the mother tongue, communication in foreign languages, mathematical competence and basic competences in science and technology, digital competence, learning to learn, social and civic competences, sense of initiative and entrepreneurship and cultural awareness and expression. The order of listing does not create a hierarchy. All key competences are considered to be equally important, and the ranges of these competences are not separable and form an associated structure. Considering the term competence it is important to distinguish between competence and skill. "Skills development in the educational process refers to the sphere of activity. Competences are the consequence – result achieved by practicing skills and gaining experience based on conviction, certainty based on reflection why to act like this in a given situation" (Okońska – Walkowicz, Plebańska, Szaleniec 2009).

The term *competence* is also used to determine the ability of *soft competence*s (behavioural competences) as well as *hard competences* (functional competences). The former determine the manner in which people are to behave to do their work. *Hard competences* inform about what people need to know to do their work (Armstrong 2005). Richard Boyatzis introduced the division of threshold competences - which are the basic skills required for the position and differentiating competences – which are capable of distinguishing people who have a better outcome from those who achieve worse results. The first group includes the competence of knowledge and skills, while the second one - attitudes, motives and values (Boyatzis 1982). An important role is granted to the appropriate competences owned by employees of companies, and the changes taking place in the environment of macro-and microeconomics cause continuous updating of the list of most desired competences. Competences used in a given organization form a structure whose elements are: analytical thinking, creative thinking, computer skills, creativity, organizational skills, personal planning and organizational skills, technical proficiency, the ability to communicate in writing and behavioural competences: flexibility, managing, ability and willingness to

learn, establishing relationships, customer orientation, focus on results, confidence, searching information, teamwork and collaboration, leadership in the group, self-control, stimulating the development of other people, concern for order, ensuring the quality and accuracy, ability to influence others, showing initiative, organizational commitment, interpersonal skills (Coll, Zegwaard 2006).

These competences can be classified into the following groups:

a) competences related to the process of thinking (reasoning) - for example, analytical thinking, creative thinking, the ability and willingness to learn;

b) competences associated with the process of perception - such as the ability to influence others, and interpersonal skills;

c) competences related to the process of action - for example, organizational skills, personal planning.

There are three groups of individuals whose activities are closely related to competence: academic teachers who are responsible for the development of competence in the educational process, students or graduates who are entering the labour market and employers who are looking for graduates with the closely defined skills needed in certain occupations (Marszałek 2011).

Competence models developed in European countries emphasize the skills acquired in the workplace. In the UK, where a system of training is focused on the adoption of a common framework for professional qualifications, competence was defined as the ability to apply knowledge and skills in the implementation of standards relevant to the workplace (Beaumont 1996). After considering appeals by employers who strongly stressed the need for recourse to the social aspects, there are references to the behavioural and functional competences (Winterton, Winterton 2002). This approach was adopted in the British Commonwealth countries (Australia, New Zealand) and in Europe, including in Ireland and Finland. In Germany in the 1990s training programs were defined referring to the areas of science (in German *Lernfelder*) (Straka 2004), which led to granting competence greater importance. Current training curricula are described by the professional or managerial competence (in German *Handlungskompetenz*), specialized technical skills (in German *Fachkompetenz*), personal competence (in German Personalkompetenz) and social skills (in German *Sozialekompetenz*). The balance between them is a prerequisite for the existence of learning competences (in German *Lernkompetenz*) and methodological competence (in German *Methodenkompetenz*) (Winterton 2009).

Acquiring competence by learning is one of the aims of modern education. Work on skills should help the pupil/student in his personal development. ”Certainty of knowledge and competences should help pupil/student in building his/her self esteem and most of all in decisiveness of action. The teacher’s work on the key competences will be the work around the objectives of education” (Krzaczkowska 2011). *Directive of the Prime Minister of 17 February 2010 on the Inter-Team for lifelong learning, including the National Qualifications Framework,* established *Interministerial Team for lifelong learning, including the National Qualifications Framework*. National Qualifications Framework is developed and implemented in European countries on the initiative of the European Union, and one of the basic documents of the underlying action is a *Recommendation of The European Parliament and of The Council of 18 December 2006 on key competences for lifelong learning* (2006/962/EC). In the Polish Qualifications Framework learning outcomes are defined as a combination of knowledge, skills and social competence. Social competence is "proven (in work, learning and personal development) ability to apply their knowledge and skills with regard to the internalized value system. Social competence is determined based on the terms of responsibility and autonomy" (Słownik 2011).

Development of the recommended competences required of such teaching to pupil/student was wagered on emerging problematic situations, which in time pupil/student will solve on his/her own. One of the key competences of the media shaping of contemporary man is the Internet. The results of the research conducted among the students of the Academy of Economics in Cracow showed that 97% of the respondents have access to the Internet and use web services. The students use the Internet to gain knowledge related to studies and information necessary for the development of their own interests. Internet resources are also used to acquire practical knowledge of the world, maintaining social contacts, and four fifth-year student it is also the means to deal with professional maters. Among the key skills that shape the Internet, students have pointed out: the use of different sources of information, combining and organizing knowledge, problem solving and working with others, independence in thinking and the acquisition of knowledge, organizing and evaluating their own work, ability to communicate. Unfortunately, only 34 out of 100 surveyed students had the opportunity to participate in online learning (online exercises, virtual seminars and consultations, distance examinations) (Krzyżak, Szczygieł 2004). The paper presents programming of an e-learning course that will enable students

to further develop these competences and will improve the unfavourable statistics.

## 1. PROGRAMMING OF "THE SOURCES OF INFORMATION FOR THE REGION" E-LEARNING COURSE

### 1.1 Principle of programming

Creating proper e-learning courses requires the use of sound methodological principles formulated among others in the work of researchers such as Michael Allen, Benjamin Bloom, Joe Harless, William Horton, Robert Magera et al. One of the theories forming the basis for the design of e-courses is ID (Instructional Design), for which Robert M. Gagne, Leslie J. Briggs and Walter W. Wager (Gagne, Briggs, Wager 1992a) published the so-called "nine principles". This theory is still the subject of research in many countries, which contributes to its improvement and modification. The most commonly used method of designing and development of distance courses is the so called ISD (Instructional Systems Design), also known as ISDD (Instructional Systems Design & Development). The most common model among is ISD ADDIE model, used in the training of both traditional and e-learning. The ADDIE model is to organize the process of developing e-learning, dividing the work on it into five steps: analyze, design, development, implementation, evaluation (ADDIE 2012).

Beginning the construction of e-learning content universal nine steps (components) instruction RM Gagne's were used. They are generally regarded as necessary in the design of e-learning courses (Gagne, Briggs, Wager 1992b). Their use also helps to solve the problems encountered while working on e-learning content. These are:

1. Motivate the Learner.
2. Explain What is to be Learned.
3. Recall Previous Knowledge.
4. Present the Material to be Learned.
5. Provide Guidance for Learning.
6. Active Involvement.
7. Provide Feedback.
8. Test Comprehension.
9. Provide Enrichment or Remediation (Orczykowska 2006).

Ten principles of training design contained in the "Guide to e-Learning" were also included:

1. Tell properly chosen, evocative stories.
2. Enable learning through play.
3. Allow experiment and learning from mistakes.
4. Properly choose images and multimedia elements.
5. Surround the learner with care.
6. Offer opportunity of learning in a group.
7. Concentrate on what is important.
8. Give time for independent/individual learning and understanding.
9. Inspire the learner with your passion.
10. Make the learner never stop learning (Hyla 2005).

### 1.2 Logical structure

Creating a logical structure we must take into account the roles, changing during the course, of the participants, both teachers and students. In the model proposed by Rita M. Conrad there are four phases of defining the logical structure of the course. These are:

I. Introduction - creating community.

II. Building cooperation.

III. Cooperation.

IV. Partnership (Conrad, Donaldson 2004).

In this concept there is no clear way to divide the content into different phases of the course. Their length is adjusted individually to each course, depending on both the taught content and the nature of the group of learners. It is important, however, to include in the course all the proposed phases and to cover the entire course. An important feature of this approach is the active inclusion of students in the process of teaching and learning online (Zając 2009).

Given the methodological requirements, determining the quality of e-learning, the course unit should include the following elements:

1. The introduction to the subject.
2. Presentation of the key messages of education.

3. Summary.

4. Testing.

5. Problems or issues for self-reflection.

6. Additional resources to enable those interested in deepening the content of the basic course to carry out during their study (Dąbrowski 2004).

The introduction to the topic should focus on the overall presentation of the objective of the performed tasks, provide a description of the factual material and determine its structure, and indicate the possibility of practical application of that knowledge. Presentation of the basic learning content should be structured, consider the division into small learning objects and include illustrated examples. Summary, usually referring to the teaching activities, should include repetition of key issues. The part devoted to testing is used to self-determine the level of knowledge acquired with the use of interactive tools for testing. Problem issues for self-reflection should allow students to move from passive learning to creative content processing. Additional resources should allow those who are interested to deepen the content and do more difficult tasks (Bednarek, Lubina 2008).

Guided by these principles, the parts of the course which is stated on The Distance Learning Platform of The Platform for Distance Education of The Institute of Library and Information Science (University of Silesia in Katowice) were developed. The course consists of five modules, which contain basic information concerning the knowledge of contemporary sources of information about the region, the regional development policy and cultural information, scientific, economic and social data concerning the region. Information was collected on the basis of the analysis of contemporary literature. The course includes the following modules:

I. Sources of information about the region and the methods of their preparation.

II. Regional Information System.

III. Contemporary local and regional bibliographies.

IV. Digital libraries as a source of regional information.

V. The Internet as the source of information about the region.

The first module contains the following topics:

I.1. Discussion of the selected concepts of the region and regionalism.

I.2. Sources of information and their classification. Meta.

I.3. Distribution of sources of information about the region.

I.4. Methods to develop sources of information.

The second module consists of the following issues:

II.1. The concept of regional information system. Examples.

II.2. Information for the region in the strategy of building information society.

II.3. State regional policy guidelines and implemented regional programs.

The third module discusses the following topics:

III.1. Bibliography local, regional, territorial - definition and examples.

III.2. The Regional Bibliography (SBR) in Poland - examples of solutions.

III.3. The importance of regional bibliography of social communication.

The module contains four issues:

IV.1. Federation of Digital Libraries in Poland.

IV.2. Regional digital libraries.

IV.3. Library Collections: regional, social documents, old books, archives, bibliographies, documents thematically related to the history of the region.

IV.4. Digital libraries in the development strategy of the region.

The module contains five questions:

V.1. Division of the sources: websites of the offices, thematic services, databases.

V.2. The role of the Internet in regional education.

V.3. Internet as a source of social change in urban and rural areas. For each module a testing part in the form of the examination quiz is included and bibliographic materials. A sample quiz below.

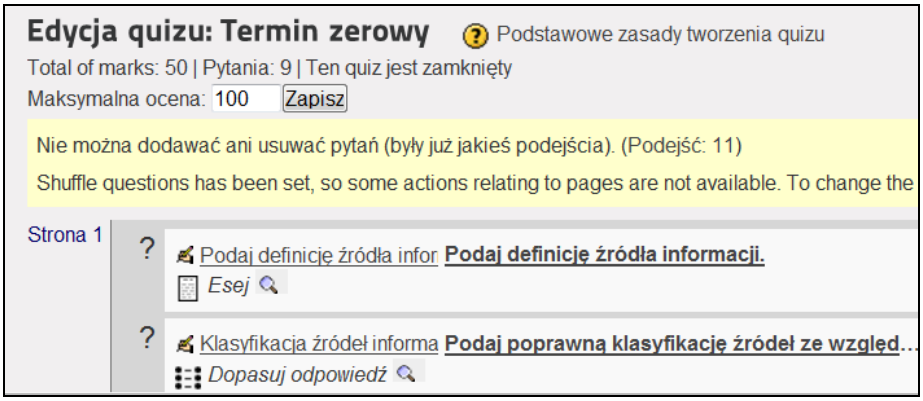


**Figure 1. Edit the quiz – a screenshot from the Moodle platform.**
*Source: own elaboration*

### 1.3 Interactivity level

Interactivity is a "kind of a user dialogue with a system run through the content on the screen and input devices (mouse and keyboard)" (Clark, 2004). Interactivity is also referred to as the interface. The interactive e-learning is implemented through a number of tools, such as chat, e-mail, electronic bulletin, etc. Interactivity can be implemented using simple tools, such as a program, for example moving the cursor causes that explanatory labels can be displayed and inform the user. Components in the system can mimic traditional learning equipment, such as computers, books, desks, tables that serve similar functions, such as real elements.

Designing an e-learning course is supported by tools to enable the preparation of the learning content and multimedia. *Hot Potatoes* allows you to create interactive exercises in the form of generated Web pages using JavaScript (access: http://hotpot.uvic.ca/). The application consists of six modules that allow you to prepare: a short answer task (*JQuiz*), a crossword puzzle (*JCross*), a gap-fill exercise (*JCloze*), a matching task (*JMatch*), a mixed-up sentence exercise (*JMix*). *The Masher* tool is used for automatically compiling batches of Hot Potatoes exercises into units (Zieliński 2012). Exercises in each module can be imported into e-learning system Moodle. Another example is a free program *EclipseCrossword* (access: http://www.eclipsecrossword.com/), which makes it possible to create crossword puzzles. *Articulate Studio* program (access: http://www.articulate.com/) enables effective and engaging e-learning with a high-speed technology. The program allows you to create advanced interactions, including quizzes with additional animations and graphics. This program is used to interact with PowerPoint and it is easy to use.

In the literature, the so-called *interactive model of the medial teaching*, proposed in 1993 by Bronisław Siemieniecki has been distinguished. This model assumes multiple interactivity in a single system: student-medium, teacher- medium and other users-medium. Depending on the source of origin of the message by the following way flow of information there could be distinguished:

a) teacher - medium - student

b) other recipients - medium - teacher,

c) student - medium - teacher,

d) other recipients - medium - teacher,

e) student - medium - teacher.

Medium is referred to as the user interface of a computer program, implemented by the input and output devices. Bi-directional flow of information will modify the sender and receiver of the message. The author of this concept presents specific benefits from the application of this model. These are, as follows: achieving objectivity and reliability of the survey design (methodology and practical benefit), better translation of schemas and models of cyber information on language pedagogy, creating conditions for a more complete discussion of phenomena and problems, good introduction to the methodology of educational technology, critique of existing theories and creating new ones (Siemieniecki 2007).

Distance education is not only an interaction between the triad: pupil/student - teacher - medium, but also between the learner, the teaching material and its context (Juszczyk 2005). An interaction of specific teaching materials with each other could be observed. An example of this could be coupled interaction (correlation) database provided by meteorological satellite, the teaching materials in the form of electronic weather maps, which are made available to students of geography (Siemieniecki 2007). Interactivity is an important feature of e-learning training. It is useful in maintaining students' motivation. The dialogue taking place on the Internet connections can be educational and cognitive. The highest interactivity features the forms of e-learning implemented in real time, and the least is found in resources for reading, listening or watching (Czarkowski 2012).

Interactive and social elements belong to the components of the course. According to William Harrison Rice social elements are *elements that not only allow, but encourage, or even force the interaction and collaboration between students* (Rice 2010: 183). One of the elements of the proposed

Moodle platform is Wiki. This tool allows pupils/students to co-operate and implement a project. It is relatively simple to use, increases motivation to work and is a factor influencing the attractiveness of the course. One of the most popular forms is a task that involves the student command. Students perform a specific work. The work is done offline (outside of Moodle), the results are sent as a file and the teacher evaluates it. The components include interactive quizzes, and available through forums and chats. Form of an exchange of ideas can also vote (Czarkowski 2012). Some of these interactive elements were used in creating the course "Information sources for the region". The following is a screenshot of the glossary which allows the user to access a chosen definition of the concept of any "place" in the course.


**Figure 2. Glossary of Terms – a screenshot from the Moodle platform.**
*Source: own elaboration*

## 2. COURSE MANAGEMENT OF THE MOODLE PLATFORM

### 2.1 Assessment of efficiency of learning

All teacher's activities aimed at comparing the student's performance with the objectives of education is defined as assessment of efficiency of learning. These activities include:

1) observation, analysis and evaluation of academic progress and behaviour;

2) observation and evaluation of self-study activities for pupils/students and entire classes/groups;

3) feedback to inform pupil/students and other persons responsible for educational attainment and development of pupils/students.

One of the elements of the educational process is to develop a plan that allows you to establish clear criteria for evaluation. Assessment should focus solely on evaluating the substantive achievements of the student. We can distinguish between emotional evaluation (moral and aesthetic) in which subjective elements play a greater role, and utilitarian evaluation (practical), with which it is possible to refer to the laws of science (Okoń 1993). The functions of assessment and evaluation are as follows: diagnostic function, educational function, control function, methodical function, motivational function, selection function, educational function. The learning platform offers a number of tools for constructing and testing tasks. These are tests containing single-task and multiple choice answers, true-false, crossword, the tasks of routing and matching sequences, quizzes. It offers conditions to create a task situation, in which the student must judge the level of their work, for example, assigned to each task a system of descriptive comments and ratings and the ability to formulate feedback. The platform allows the system to monitor the progress of education in accordance with the behavioural and constructivist concept (Bednarek, Lubina 2008).

Assessment as part of a learning process requires permanent checking achievements of pupils/students. The conditions for a good review and assessment include:

a) knowledge, understanding and acceptance of rules of conduct established in the process of evaluating both the teachers and pupils/students;

b) the formulation of assessment criteria explicitly, excluding any manipulation;

c) taking into account social aspects, such as individuality, personality, experience gained in a classroom environment and outside of it;

d) awareness that the assessment is a powerful tool that can undermine learning outcomes and motivate to work harder;

e) awareness that the received mark is also a kind of gratification student for the effort associated with acquiring new knowledge;

f) the summary function of assessment the teacher's work with the student;

g) recognition and appreciation of the progress of the learner;

h) the use of evaluation as feedback, bearing instructions for further student's work;

j) building a sense of justice and fair evaluation of the work (Bednarek, Lubina 2008).

The e-learning course "Sources of information for the region" includes the module of learning outcomes of the same name. The module is implemented in one semester and the course material helps students. The aim of the module is to make the potential employees of libraries aware of the culture influencing role, often dependent on the relevant library policy, the diversity of working with users (adults, children and young people) and regional cooperation (both at a national and international level). The course is aimed at the synthesis of issues and knowledge which is essential for regional organizer of the cultural centre in the library (Chuchro, Ochmański, Zając 2011). The expected learning outcomes relate to the learning outcomes set out in the National Qualifications Framework for Higher Education. These are as follows:

1. The student knows the principles and methods of implementation of the idea of contemporary regionalism.

2. The student knows the goals of regional education including the specific characteristics and needs of the local community.

3. The student knows the regional methods of work in the school library, public library and academic library (or its affiliates).

4. The student is able to determine the role of libraries in the local community referring not only to the Polish but also to the adequate exemplifications in Eastern and Western Europe and the United States.

5. The student has the ability to communicate in order to establish cooperation with local government units and other non-profit institutions working in the field of education and culture.

Methods for verification of learning outcomes contain all the categories of learning outcomes (knowledge, skills, competences) and include: continuous assessment, design and presentation. Continuous assessment will check the level of preparation to classes, knowledge and skills developed and completed during classes, recommended literature. Independent or group preparation of the selected project will include: selection of sources of local information, the plan of library work, an outline of regional trips, pattern of regional information in the school, public and scientific (optional) library, web design content information about the municipality. The presentation will include examples of good practice, the use of public libraries for the immediate environment, regional and local projects, local governments and community organizations, multi-cultural and multi-ethnic communities.

Tools available on the Moodle platform will enable conducting continuous assessment of students by solving quizzes or sending tasks. The *Assignment* module enables the teacher to transfer the content of the task, follow the activities of pupils/students, grade and give feedback. During the review task, teachers can add comments, opinions, and transfer files. Assignments can be evaluated using a numerical scale or a custom scale or advanced methods of classification. The final assessment is recorded in the Gradebook. An example of assignment is shown below.

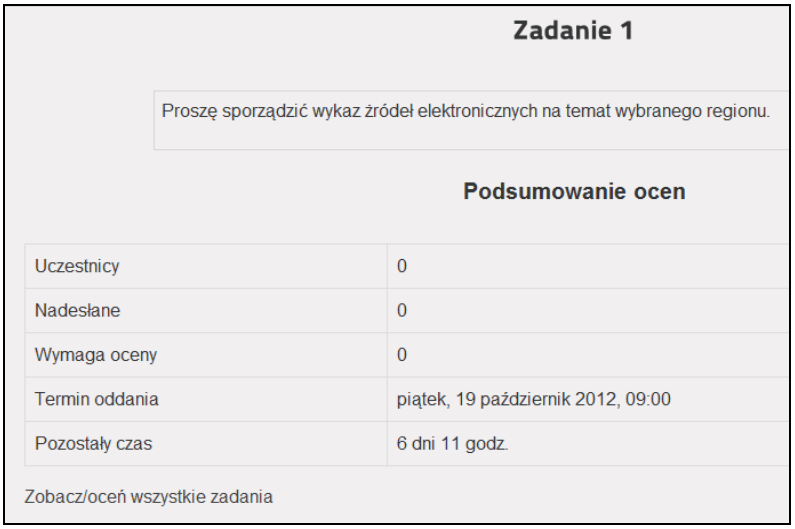


**Figure 3. An individual performance assignment – a screenshot from the Moodle platform.**
*Source: own elaboration*

## 2.2 Developing students' key competences

The concept of the core competence is the answer to the fundamental question of how to prepare pupils/students to function in a rapidly changing social and economic realities. Implementation of the key competence plays a very important role in the European Union. This process was initiated by the Lisbon European Council (23-24 March 2000). The European Council agreed that "it is necessary to formulate a European framework that should define the new basic skills to learning throughout life, which are a key measure in Europe's response to globalization and the transfer to a knowledge-based economy" (Lisbon 2000). An EU document from 2006 indicated a "frame of reference", i.e. the basic knowledge, skills and attitudes that each student before completing education and training should achieve at sufficient level to enable him/her to take an active part in the social life in the knowledge society (Recommendation 2006). The educational policy of the European

Union is of particular importance for the changes in the Polish system of education. As part of the operational program "Human Capital" tasks aimed at "Promoting public education at all educational levels should be carried out simultaneously with increasing the quality of educational services and making a stronger link with the needs of a knowledge-based economy" (Program 2007). The programme provides 10 priorities implemented at central or regional level. Three of them relate to education. These are:

Priority III "High quality of education"

Priority IV "Higher education and science"

Priority IX „Education and competence development in the regions".

Priority III focuses on increasing the quality of the functioning of the system of education, assuming the implementation of system solutions in the field of monitoring and evaluation, development of educational research and its relationship to education policy. New developments also include measures to increase the effectiveness of pedagogical supervision.

Priority IV focuses on increasing the quality of institutions of higher education. It includes the following specific objectives: to adapt higher education to the needs of the economy and the labour market, to improve the quality of learning in higher education institutions, to increase the attractiveness of education in the area of mathematics and natural sciences and engineering at a higher level and improve the quality of human resources of B+R in cooperation with economy, marketing and commercialization of research.

Priority IX is implemented at the regional level. Intermediaries are local regions. Priority objectives are:

1) to reduce inequalities in access to education, particularly between rural and urban areas;

2) to reduce disparities in the quality of educational services, particularly between rural and urban areas (for education)

3) to increase the attractiveness and quality of vocational training,

4) to strengthen professional development and qualification of teachers, especially in rural areas.

In this priority the following programmes are implemented: regional programmes to promote pre-school education, scholarship assistance, grant programmes for gifted students, levelling educational disparities in education, the implementation of programmes of efficient school management,

identifying educational needs, modernization of vocational education offer, programmes including completion of formal qualifications of teachers (Zgliczyński 2010). All the above-mentioned objectives were considered and analysed in the process of designing the module "Sources of information for the region."

Key competences "are considered equally important, because each of them can contribute to a successful life in a knowledge society" (Recommendation 2006). In all eight key competences the following issues apply:

1) critical thinking,

2) creativity,

3) initiative,

4) problem solving,

5) risk assessment,

6) decision-making,

7) constructive management of feelings.

In the module "Sources of information for the region," it was assumed that one of the effects of education and training will be to develop social competence, "the student can see the problems and needs of the local community and help to solve them " (Efekty 2012). It was also assumed that the following key competences will be developed:

a) digital competence,

b) social and civic competences,

c) sense of initiative and entrepreneurship.

The following table shows the methods of teaching the selected competencies.

**Table 1.**

**Developing of students' key competencies.**

| Name of competence | Methods of learning |
|---|---|
| digital competencies | - searching, gathering and processing of information sources for the local community;<br>- the use of information collected in a critical and systematic way, an assessment of their suitability; |

| | |
|---|---|
| social and civic competencies | - cooperation with local government units and other non-profit institutions working in the field of education and culture; |
| sense of initiative and entrepreneurship | - implementation of the objectives of the state regional policy and regional programs;<br>- active management of projects of regional information in the school library, public libraries, academic libraries. |

*Source: own elaboration*

Entrepreneurship is one of the key competencies in the labour market. The study of entrepreneurship of 221 students of two universities in Cracow showed that almost 40% of all respondents consider the establishment of a business in the future. Within this group, nearly 28% plan to do so soon after graduation, and every fourth student still at university (Marszałek 2012). The results of Fri "Transition from University to the Labour Market - The PhD's Case Study" are also interesting. The study was performed in the framework of an international research project Regions for Lifelong Learning (LLL Regio), carried out by organizations in the network FREREF - the Foundation of European Regions for Educational Research and Vocational Training. At the turn of 2009 and 2010, the authors carried out Polish part of the research project. Research in Poland was limited to universities and the labour market organizations from Małopolskie voivodship. In order to manage the transition of PhD graduates to professional life, a few important critical points were observed, such as the recruitment for studies, determining the competence gaps, developing a plan for the development of the competence and to determining the nature of the necessary training and support activities (Prawelska – Skrzypek, Baran 2010).

### 2.3 Course evaluation

The evaluation is "the systematic process of gathering information on the performance, characteristics, and outcomes of programs, personnel and products whose goal is to use the collected data to reduce the irregularities surrounding the program and improve its effectiveness by specialists, and support decision-making process that will take into account the fact what these programs, personnel or products are doing and what they relate to" (Czarkowski 2012: 203). There are democratic evaluation (democratic evaluation), formative evaluation (formative evaluation), conclusive evaluation (summative evaluation) and triangulation (triangulation) (Korpowicz 1997). The evaluation process is the most elementary form of assessment of the action taken. The evaluation process sometimes takes the

form of internal or external evaluation. There are as follows: internal evaluation of the project and external evaluation of the project (Sochocki 2006).

Evaluation independent of the kind, the type and the object with which it deals is composed of several stages. These are:

Step I. Preparation - includes planning activities (evaluation plan) and project evaluation.

Stage II. Implementation - involves the collection of data.

Stage III. Summary - provides an analysis of the data, drawing conclusions, recommendations, preparation of the report, dissemination of results. In practice this is achieved by the so-called evaluators. A project carried out by KNOW experts from four universities of northern Poland: Medical University of Gdansk, Gdynia Maritime University, Technical University of Gdansk, Gdansk University could be an example. Three evaluators participate in the project: (1) the external evaluator of the substantive content, (2) an external evaluator assessing the course of the pilot courses and (3) the internal evaluator assessing the performance of pilot courses.

Proposed pilot training evaluation stages:

a) to assess the substantive content of training (evaluator 1),

b) a quantitative and qualitative assessment of the needs of the participant of the e-course - survey (evaluator 2),

c) ongoing assessment of quality of the e-courses with the participation of the teacher and the students - discussion forums, choice, chat, skype, observation, phone calls (evaluator 2, evaluator 3),

d) final quantitative and qualitative evaluation of e-courses - surveys and interviews (evaluator 2, evaluator 3) (Grabowska 2007).

Evaluation in distance learning includes student evaluation, teacher and course evaluation (assessment of the quality of the course) (Bednarek, Lubina, 2008, s. 134). The evaluation is to verify the student's knowledge through tests and assignments. Teacher evaluation is carried out in the framework of the study of the effectiveness of education. Evaluation of the course allows to evaluate the course in terms of knowledge and skills acquired by the participants during the course. The following steps are planned to evaluate e-learning training:

a) to assess the substantive content of the training;

b) a quantitative and qualitative assessment of the needs of the participant of the e-course (survey);

c) ongoing assessment of quality of the e-course with the participation of the teacher and the students (chat, forums, choice, observation, phone calls, skype);

d) the official quantitative and qualitative assessment of the e-course (surveys and interviews).

Evaluation, understood as a process of systematic collection of information about the activities, characteristics and outcomes of programs, is an important element in the organization of an e-learning course. The use of the Computer-aided Assessment, also known as the less E-assessment, which includes a multiple-choice computer test and advanced forms of testing is anticipated. In some systems, the evaluation may refer to specific errors made by the student or the computer may ask the student a series of questions adapted to the state of his/her knowledge. The use of artificial intelligence tools enable the creation of interactive intelligent learning environments that are able to adapt to the needs of the students. The ability to adapt makes it possible to individualize the learning process through personalized e-content (in accordance with the needs of the student, student's current knowledge, style of learning, student experience, his preferences, his habits) and learn at your own pace (Biedrycki 2012).

## CONCLUSION

Improving efficiency of academic performance depends on: thorough analysis of academic methods, teachers' responsibility for students' attitude towards the studied issues and creative skills to use the acquired knowledge in practical situations. During the e-learning course "Sources of information for the region" digital competences, social and civic competences and sense of initiative and entrepreneurship are developed. Digital competences are formed during the search, collection and processing of information sources for the local community. Students try to use the collected information in a critical and systematic way and to assess their suitability. Social and civic competences are developed in cooperation with local government units and other non-profit institutions working in the field of education and culture. Initiative and entrepreneurship assists implementing the state regional policy objectives and regional programmes. In practice, students take active management of projects of regional information in the school, public or scientific library. Students prepare individually or in a group the selected

project: selection of local information sources, library work plan, an outline of regional tour, scheme of regional information in the school library, public or scientific content of the project site for community information.

In the process of life-long learning the key competences, understood as a combination of knowledge, skills and attitudes appropriate to the situation, play an important role. They are particularly necessary for personal fulfilment and development, social inclusion, active citizenship and employment. The ability to continue self-learning and demonstration of (continuous) readiness for self-improvement is closely related to the issue of lifelong learning. It is one of the priorities of the European Union in the coming decade, as emphasized among others in the document "Europe 2020", which is a continuation of the Lisbon Agenda, adopted on 3 March 2010 by the European Commission (Marszałek 2010). For self-learning motivation is very important. It can be described as goal-oriented behaviour, which consists of three components: the direction, effort, perseverance (Armstrong 2005).

The process of learning can be supported by new, intelligent assistance systems. These are the tools and methods of artificial intelligence (expert systems, fuzzy systems, genetic algorithms, intelligent agents, neural networks, etc.), new technologies (distribution, interaction, presentation) and communication tools (synchronous and asynchronous). The use of artificial intelligence tools in the future will enable the creation of interactive intelligent learning environments that are able to adapt to the needs of pupils/students.

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