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THE ROLE OF NEW MEDIA IN MEDICAL STUDENTS' ACQUISITION OF COGNITIVE AND SOCIAL SKILLS. AN INTRODUCTION TO SOME FUNDAMENTAL CONSIDERATIONS

The subject of discussion is the evaluation process as gathering information about educational reality. In the literature on the subject, the reference is most often made to the comprehension of evaluation as "systematic study of values or merits of an object" (Nevo, 1983). In regard to education, it is the pedagogical evaluation which is being discussed. It means the process of gathering systematic information on educational reality, analyzing it, interpreting and formulating conclusions which may be used in practice, making certain decisions based on feedback.

The subject of our considerations will be the evaluation of the didactic process course. In the full emphasize that it concerns didactics as a learning process of students, as well as the teaching process. In view of the above, we may base on the following evaluation division:

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- final, summative evaluation, used after the completion of the whole process or program, providing information on its effectiveness;
- ongoing, shaping, formative evaluation, conducted during the process of education and enabling the evaluators to affect its course;
- "front-end" type evaluation, conducted before and after completion of a given process or program. It strictly determines the relation between the change that has been made and the functioning of the program.

Targeting the considerations on the evaluation on the process, great importance is attached to description, interpretation and the context of information being collected, not resigning from quantitative data at the same time. Evaluation is, therefore: a continuous process based on criteria, the team implemented, connected with the measurement of progress of students, teaching efficiency and the quality of the program (Guilbert, 1983).

DIDACTIC MEASUREMENT AS A SIGNIFICANT VARIABLE OF THE EVALUATION PROCESS

The concept of measurement investigated within social sciences is particularly assigning symbols to the objects in accordance with empirically verifiable principles. Such a concept is very broad as it includes:

- different types of symbols (numerical, letter, iconic, verbal) forming differently built systems called measurement scales;
- diverse, often multi-stage measurement procedures and various rules of using these symbols (differentiating, checking);
- flexibly treated verifiability (verification) of the implemented rules, however, the verifiability is essential, which excludes intuitive judgment of the properties of the measured objects.

Theoretical basics, checking students' knowledge originating from the psychology of individual differences. The theory of differentiating measurement defined rules, procedures and interpretation of differentiation results creating the classical theory of a test (estimation of random erroneous measurement). The next step was the emergence of probabilistic theories of IRT task results, which enabled to estimate the quality of measurement on the basis of single sentences properties. Robert Glaser is considered to be the author of a direction in didactics responsible for the theory of check measurement based on estimations of the level of program requirements achievement. He claimed that a teacher is more interested, if the students mastered specified learning content than individual differences. This theory has gained more and more supporters over time (Niemierko, 2007).

Today, didactic measurement is mainly a check measurement in regard to program requirements. Many procedures are derived from psychometrics (the system of concepts determining the measurement quality). These concepts are one more taxonomy in didactics, useful not only for the didactic measurement specialists but also for all teachers assessing students achievement.

The taxonomy of five essential features of checking (the lowest – the most essential, the highest – the most difficult to obtain) includes:

1. Objectiveness in a situation of checking – based on creating equal conditions for mastering provided activities by the students (material conditions – room, light, silence; methodological conditions – clarity of objectives, specified material, atmosphere, and work incentive).
2. Check results scoring accuracy – using auxiliary numerical characteristics of the scores. Scoring is carried out in accordance with a scoring key determining points for specific answers (suitable for closed tasks), or in accordance with a scoring scheme including the quality of answer discretionary scale. Scoring schemes do not ensure compliance between the ones awarding points (adjudicators). They differ in: the severity of assessment, the spread of assessment and the systematization of assessment.
3. The accuracy of checking – the procedure of checking is accurate when it is applied more than once, in similar conditions and brings the same results. The accuracy of students achievements checking is the consistency of results obtained by the same persons from different teachers scoring the tasks in parallel versions of the exam. The measure is the accuracy rate calculated (with the use of a computer) as a statistical rate of correlation between two applications of an exam (0.80 indicates satisfactory accuracy). Random error, connected with a strictly statistical error, is an important element determining the measure of inaccuracy of an exam repetition under particular conditions. To improve the accuracy of checking and reduce random fluctuations of its results one should: carefully define the scope of the content, improve the quality of tasks, motivate the students to make effort when working on tasks, ensure the impartiality of checking, take care of scoring precision by creating schemes or keys, and optionally increase the number of adjudicators, increase the number of tasks (extend the exam time).
4. The validity of checking – is the usability of its results. According to the taxonomy of the validity of checking (Messick's model), we encounter the concept of "progressive matrix," determining theoretical validity, which is the basis of all applications and the effects of checking. Another concept that needs to be discussed in this regard is the theoretical validity of checking. It determines compliance with relevant psychological theories and didactic decisions. Information on the student's achievements (through the validity of checking) may be used in two different ways: up-to-date (diagnostic valid-

ity of checking) and to predict future achievements in teaching: school and professional (predictive validity of checking). Another element in this regard is consequential validity of checking based on predicting events being under the influence of the current exam or even caused by it.

5. The objectivity of checking – scrupulousness, with which the results of checking are determined by program requirements. This property consists of impartiality, scoring, accuracy, validity, proper requirements representation. Checking is to be strictly connected with the education program, understood as the identity of the field of cognitive learning content which is checked with the content which was planned (content meaning).

Another important element at the property of students' achievements checking is the analysis of tasks. It involves the evaluation of tasks due to their suitability for a specific test. It is an essential stage of test standardization as a process of attempts, improvements and tool standardization, yet not only useful in a standardized test but also in a teacher's test (colloquiums/exams) which will be used by one author only. The most important elements of analysis of colloquium/exam tasks are:

a. Checking substantive correctness of a task, that is, its compliance with the state of scientific knowledge in a given field; task reviewer, its author or colleague – the lecturer must balance the relationship between scientific precision of a task and its availability for the students.

b. Checking the compliance of the task content with the colloquium/exam plan – comparing these two texts; it is best to be done by another teacher, not the one who prepared the colloquium/exam.

c. Checking the linguistic correctness of a task, its compliance with linguistic standards relevant to a given education level (most common editorial defects are circumlocution, unnecessary terminology complications, ambiguities).

d. Estimating the frequency of a task commitment described by a number (or percentage) of students which did not answer questions; it is not only the lack of skills and knowledge that may be the reason but also difficulties with understanding the text or lack of time for solving the task.

e. Estimating the simplicity of a task, which when it comes to holistic tests means the ratio of the points scored to the maximum number of points, in analytical tests 0 – bad answer/ no answer, 1 – correct answer.

f. Estimating differentiating capacity of a task, that is its ability to differentiate the achievements presented by a test; high differentiating capacity means strong relations of the task results with the results of other colloquium/exam tasks, and so its great consistency with the colloquium/exam; low differentiating capacity means loose connection; the simplest measure of differentiating capacity is the difference between the rate of a task easiness calculated (separately) for the students of the top half of overall colloquium/exam re-

sults and the rate of a task easiness calculated for students of a bottom half of overall colloquium/exam results; capacity close to zero – and especially negative, signalizes that that kind of a task may be affected by construction error – it must be improved or removed.

g. Removing the task profile, determining the simplicity rates in groups of students of different subject grade or in consecutive classes; both versions show the dynamics of achievements improvement at the example of activities performed to solve different tasks; apart from necessary features of measurement tools which are accuracy, scrupulousness, and objectivity, the attention shall also be paid to another feature which is significant at medical education, that is practicality; practicality depends on the time necessary to prepare and conduct an exam, to interpret its results and also to the simplicity of its application, practicality shall never dominate the validity of a test; other features of measurement tools include among others: balance – achieving correct proportions between the questions intended for every education purpose, fairness – the scope in which the questions in the exam correspond to the teaching content, specificity – the feature of a measurement tool indicating in what extent the student who did not participate in the classes is the basis of preparing the measurement tool may obtain equal result with the one which would have been obtained on the basis of strict coincidence, discrimination – the feature of every element of measuring tool, enabling to make a distinction between a learning student and non-learning student in regard to a given variable, efficiency – the feature of a measurement tool which provides greatest possible number of independent answers per unit of time, time – measurement tool will be less accurate if it causes the implementation of adventitious agents (guessing, taking risk, randomness) because the time for the answer is too short, extension – the reliability of a measurement tool may be almost indefinitely increased (Spearman – Brown model) by adding new questions, parallel to those of which the primary tool consists.

Checking students achievements is one of the essential and most important functions in teachers' work. It does not only enable to determine the level of mastered skills but also presents the picture of a teacher himself/herself, his/her efficiency and his/her teaching effectiveness. Checking the achievements is making sure that the students obtained expected results, and therefore if they mastered the activities provided by the curriculum (education standards/syllabuses).

If the procedure of checking is properly clarified, we talk about didactic measurement, that is the assignment of grades to people being taught in accordance with empirically checked rules. If the results of other students are the frame of reference, we make differentiating measurement. If program requirements are the frame of reference, we make checking measurement. The first one is typical for psychology, the second one is typical for pedagogics (didactic as applied sub-discipline) (Kaczmarek, 2018).

MEDICAL SIMULATIONS EVALUATION

From the moment when almost 50 years ago written clinical simulations were used to assess students' progress for the first time, they have become common in medical education. They are defined as people, equipment or a collection of conditions aimed at presenting the evaluation task in an authentic way. These may be standardized patients, partial tasks training, virtual reality systems, computer simulations, as well as games, mannequins or even multiple choice questions concerning a clinical case being assessed. Simulations may be used to teach or to assess students' progress. At the moment, they are used by many medical schools during exams finishing medical studies as part of obtaining professional qualifications procedure and part of the exam leading to obtaining a medical license. Training based on simulations have become popular due to their lower cost and the fact that they enable students to gain professional experience without posing risk for the patients. Apart from the advantages connected with savings and risk elimination, simulations also bring educational benefits. Training may be targeted at specific knowledge and skills, in particular, cognitive procedures and processes of a higher level, and some simulations may discretely gather data providing information on the assessment, which may be automatically used when assessing the results and diagnosing problems connected with learning. Simulations may also be used to obtain experiments which are not possible in a real environment, for example, repeated activities of specific parts of a task which may not be isolated in a real world (e.g. intubation, venipuncture, making surgical knots or incision and drainage of abscesses). It does not mean that training based on simulation may replace training with the participation of real patients supervised by doctors – nobody would want to be cured by a surgeon trained solely on simulations – yet that kind of training enables the achievement of useful knowledge and skills level in a safe and cost-effective way and that is a preparation for training in a real environment.

Medical simulations are promising for sure, yet not all of them are effective. Unfortunately, the overview of medical education research based on simulations shows that most assessments of medical simulations effectiveness in terms of methodology are not conducted well enough to allow to obtain reliable results.

THE MEASURE OF RESULTS ASSESSMENT OBTAINED BY STUDENTS DURING SIMULATIONS (PROCESS AND RESULT)

A measure is a number indicating the presence and amount of something, e.g. errors, time or the assessment of a given aspect of simulation implementation by a student on a five-point scale. McNulty et al. (2004) present a detailed overview of computer tests in medical teaching program. We shall focus on computer simulations. One of

the great advantages of simulations is the possibility of measuring the knowledge and skills in terms of performing cognitive procedures and processes of a higher level. This measurement is based on the examined person's actions as he/she progresses with the task performance. It also provides the measure of overall process success assessment, such as the measurement of the value of physiological indicator (blood glucose level, albumin level or blood pressure). As noted earlier, a key requirement of achieving validity is using proper means compliant with intentional aims of simulation, usually connected with the knowledge and skills necessary to perform simulated task. It seems obvious, yet there are many examples of discrepancies between the means and the aims. The assessment which measures learning through reactions forms or opinion research asking students how much they have learned is an extreme example. It only provides information on their self-assessment and thinking of how much and what they have learned, and not how much they have actually learned.

These measures must include the whole range of knowledge and skills at the same level of complexity which the simulation concerns and must be verified to be used for purposes and situations in which they are applied.

Level 1: Reaction – reaction cards, focus groups, informal comments: interesting, motivating, precise, good teaching method, easy to apply.

↓

Level 2: Learning – test results, the assessment of assessing person through the check list, in-built progress measures: what level of knowledge, skills, and attitudes has been established? What attitudes have been changed?

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Level 3: Behaviors – completed self-assessment questionnaire, self-reports, co-workers and supervisors reports: knowledge, skills, and attitudes.

↓

Level 4: Results – from hospital records: patient's satisfaction level, waiting time of a patient, the degree of disease history study, time needed to implement the procedure, time spent in a hospital, appropriate selection of assigned tests and prescribed prescriptions, the frequency of complications occurrence (Bewley, O'Neil, 2013).

Currently using new media in the education process, implementing the concept of multilateral education and the strategy of multimedia education, pedagogics may be built as science on upbringing, educating and self-education of a human, adopting that upbringing is:

- shaping the attitudes and systems of values;
- education includes shaping cognitive skills and developing interests;
- self-education as implementing auto-regulatory processes.

Pedagogics understood in this way should bind the approach typical for social, natural and human sciences (Palka, 2003).

THE DECISION MAKING

The decision making process is a complex act requiring high personal competences of a decision maker. Social context also has an influence on this process. Making a decision is a result of the following actions:

- assessment of a situation;
- analysis of available modes of actions and the selection of one of them;
- implementation of the decision;
- assessment of implemented action effects.

Assessment of a situation is an important element enabling to make a proper and optimum decision, whereas a necessary condition for determining the nature of a problem is collecting enough information.

Another step is the analysis of available modes of actions and the selection of one of them. Four basic models of decision making may be distinguished:

- Intuitive model, based on recognition of patterns. A decision is being made after identifying an event that we are dealing with and connecting it with a recommended action in such a case. This model is usually used by persons with big experience in a given field, well familiar with their work environment. Decisions are being made quickly.
- Model-based on previously developed procedures, rules. This model is routinely applied in aviation and is based on acting in accordance with previously developed procedures which describe the proceeding in every moment of a flight in details (checklist).

In medicine, this way of decision making is used mainly by persons with small experience, who when it comes to their decisions rely on the recommendations of experts creating the procedure. The decisions are being made a little slower.

- An analytical model based on comparing possible options of taking actions. A decision is being made as a result of a submitted procedure consisting of assessment of a situation, knowledge, and experience of team members, as well as professional knowledge derived from written and electronic sources.
- There are a few proposals of proceeding from which the best is chosen after having made an analysis. The method provides great opportunities to make a proper decision but it is time-consuming and the analysis may be complicated by time pressure, stress, and noise.
- Creative model. Used in untypical situations when there are no clearly determined operating rules. The necessity of using this method may be a result of an untypical condition of a patient, unusual place where the incident occurred or the lack of typically available resources for example. The person making a decision on the basis of the situation assessment undertakes improvised actions in order to solve the problem.

One of the means of supporting the decision-making process is creating an easy to remember acronym describing subsequent steps of a process. *DODAR* acronym used by *British Airways* pilots may be an example of that. In the context of medical teamwork it would look like this:

D (*Detect*) – Problem **detection**. E.g. blood pressure of a patient decreases. Collection of information: when was the measurement last taken? What with other parameters of vital functions? What are the reasons for this phenomenon? What had been done to avoid it? Or maybe it is an artifact (broken screen, damaged cuff)?

O (*Options*) – What are the **options** of proceeding? How to determine the cause of pressure decrease? How to treat the patient? (team search for a solution of a problem).

D (*Decision*) – **Decision making**. The person in charge of the team must decide: what to do? What is the plan? The time is running though.

A (*Actions/Assign*) – **Coming to actions**. The team is being informed: what the plan is? What needs to be done? What is the division of tasks?

R (*Review*) **– Review** of a situation after having implemented the plan: did we remember about everything? What else may be done?

THE ASSESSMENT OF NON-TECHNICAL (SOFT) SKILLS

The assessment with regard to social attitudes and skills is hard. According to the research result concerning empathy, it is necessary to make a thorough observation of a couple of dozens of meetings of a student with patients (Clinical Encounter). In this situation, the development of assessment methods of this type of competences within known forms of examining, e.g. OSCE and the development of new methods of assessment occur (Mirecka, Nowakowski, 2018).

I assume that we should go back to a well-known method from the 60s., the so-called auto-teaching, which is a popular method in improving teachers and sportspeople based on recording the classes scenarios, then analyzing and interpreting them, and as a result, correcting recorded skills. It has excellent results.

The aim of educating students of medical faculties in regard to non-technical skills is the improvement of therapeutic teams work quality, as well as improving the safety of patients. That is why the Ministry of Science and Higher Education imposes an obligation on universities in this regard. The necessity to check the results of training in this field, and in particular such skills as situational consciousness, decision making or team work makes a certain difficulty in the implementation of these objectives. Non-technical skills assessment during an exam requires proper preparation. Examiners must have appropriate training in this regard. Unsatisfactory training of examiners may cause significant discrepancies among them when it comes to the as-

sessment of students skills. That is why the examiners should understand the rules of creating systems assessing non-technical skills and be familiar with the rules of their implementation (the usage of scales). In cases when the assessments of examiners differ significantly, the cause of such a phenomenon must be sought and there should be training organized in order to eliminate them (calibration).

EXAMPLES OF SCALES USED FOR NON-TECHNICAL SKILLS ASSESSMENT

- *ANTS – The Anesthetists' Non-Technical Skills*. Very complex scale used to assess the work of anesthesiologists, yet can be used in different cases as well.
- *Ottawa Crisis Resource Management (CRM) Global Rating Scale* and *Ottawa Crisis Resource Management (CRM) Checklist*. Easy scale, used during simulation contests organized under the auspices of the Polish Society of Medical Simulation (*SimChallenge*).
- *OSCAR – Observational Skill-based Clinical Assessment Tool for Resuscitation*. The scale used for assessing soft skills of a resuscitation team.
- *OTAS – Teamwork Assessment for Surgery*. The scale used for assessing non-technical skills of teams working in operating theatres. This feature makes it especially used in specialized education (Cebula, 2018).

SUMMARY

We may consider the education process from the perspective of education technology which promotes hard tools of cognitive and practical competences measurement. The first part of the thesis is kept in the approach of positivistic research in the perspective of theoretical considerations. The achievements of researchers dealing with didactic measurement with the use of new media were used. The process of information and students' skills evaluation in the centers of medical simulation is a new cognitive problem. The process of acquiring social competences should also be subject to observation, description, and interpretation. This is undoubtedly a difficult test. The article is only a theoretical background for further works on the development of the theory, implementation of new solutions and further educational practice.

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THE ROLE OF NEW MEDIA IN MEDICAL STUDENTS' ACQUISITION OF COGNITIVE AND SOCIAL SKILLS. AN INTRODUCTION TO SOME FUNDAMENTAL CONSIDERATIONS

Keywords: education, didactic measurement, medical simulations, competences
Abstract: Education process in a college has been transforming as a result of new technologies implementation. It is the outcome of digital technologies which by impacting our everyday life, also affect the education process. The so-called centers of medical education functioning in educational systems are new research areas for pedagogues – education technologists – in the aspect of their functioning and securing the effectiveness of teaching. Didactic measurement in this regard is extremely difficult and all attempts need description and standardization.

NOWE MEDIA W PROCESIE NABYWANIA KOMPETENCJI POZNAWCZYCH I SPOŁECZNYCH STUDENTÓW MEDYCYNY – WSTĘP DO ROZWAŻAŃ ZASADNICZYCH

Słowa kluczowe: edukacja, pomiar dydaktyczny, symulacje medyczne, kompetencje
Abstract: Proces kształcenia w szkole wyższej przeobraża się na skutek wprowadzenia nowych technologii. To wynik technologii cyfrowych, które rzutując na nasze codzienne życie, wpływają także na proces edukacji. Funkcjonujące w systemach edukacyjnych tzw. centra edukacji medycznej stanowią nową przestrzeń badawczą dla pedagogów-technologów kształcenia – w aspekcie ich funkcjonowania i zabezpieczenia efektywności kształcenia. Pomiar dydaktyczny w tym obszarze jest niezmiernie trudny, a wszelkie próby wymagają opisu i standaryzacji.