Polskie Forum Psychologiczne, 2014, tom 19, numer 1, s. 7-16

ARTYKUŁY
[*Articles*]

FORMATIVE FUNCTION OF ASSESSMENT IN A PSYCHO-DIDACTICAL CONTEXT

Věra Kosíková[1], Hanna Liberska[2], Marzanna Farnicka[3]

[1]University of West Bohemia, Pilzen, Czech Republic
[2] Kazimierz Wielki University, Bydgoszcz, Poland
[3]University of Zielona Góra, Poland

Summary. This contribution focuses on the formative function of assessment. The assessment of a student continuously informs about his or her performance, whereby it improves upon his or her learning processes. The formative function of assessment is mainly achieved by feedback resulting from the student's performance. This contribution focuses on selected aspects of the formative function of assessment, on the concordance of teaching and assessment goals (and processes) from the perspective of their formulation and the assessment criteria, on the examination of the understanding of the taught subject from the perspective of adopting concepts and their correctness during evaluation, on the didactic approach when working with errors while analyzing the student's performance.
Key words: formative function of assessment, psycho-didactical understanding, meta-reflection, work with errors, teaching and assessment goals, assessment criteria, revised Bloom taxonomy, adopting of concepts, analysis of student performance

Introduction

The problem of assessment is being tackled by many domestic as well as foreign authors, yet there are still quite a few interesting fields left that can be researched or targeted theoretically.
How is assessment viewed by domestic and foreign authors?
Petty (2004, p. 243, 344) states this definition of assessment:
Assessment measures the depth and width of knowledge and skil Petty stresses that assessment, if carried out correctly, inspires, motivates and provides feedback during the learning process.

Adres do korespondencji: Věra Kosíková, e-mail, kosikov@kps.zcu.cz

Petty, just as many others, differentiates between formative and continuous assessment, which evaluates the amount of subject matter absorbed by a student and allows for correction. The summarizing, final, assessment classifies the students' performance and sums up what had been achieved by a student.
Pasch defines assessment as a systematic process that leads to determining the qualities and performances shown by the student.
Fontana (1997, p. 165, 166) stresses the link between specific teaching goals and assessment processes. *The choice of different teaching goals is made important by the fact that it helps structure the teaching experience and assess its success.* The most important about assessment, according to Fontana, is its diagnostic function, where the teacher not only determines the knowledge and understanding of the student, but also the causes, thus "not only what the children do not know, but also why".
Pike and Selby express their apprehension of too much stress on assessment of knowledge as the main assessment criterion for understanding and the ability to express oneself – *we should assess important characteristics! They emphasize new assessment criteria, which will stress continuous assessment, based on dialogue between the teacher and the student, which will always lead the students to reflect on themselves and to self-evaluate* (1994, p. 101-103).
Kovaliková (1992, p. 101) warns about the dangerous tradition of assessment based on the Gauss curve of nominal distribution – i.e. the assessment on a scale from the best to the worst. She stresses that students should be assessed according to the criterion of actual competence, i.e. approaching each student according to his or her individual potential. The teacher's task is to make sure there is concordance between the curriculum and the assessment methods and procedures.
Rogers (1998, p. 248) sees assessment in the sense of self-evaluation. He states that: *Assessment the extent and significance of learning of each student is primarily done by the student him/herself..., but feedback from other students as well as the facilitator* (i.e. the teacher) *is important as well*.
As follows from the above stated, the emphasis in assessment is mainly set on its formative function. Assessment influences the improvement of a student's learning, it advances his or her ability to reflect upon his or her learning processes, whereby it advances his or her meta-cognitive and self-regulating abilities.
The psychological emphasis of the formative function of assessment lies in focusing on the student's psyche, which is advanced and qualitatively changed by the assessment processes. In the process of learning and assessment, a student is coping with success and failure, assessment influences his or her self-evaluation, touches the personality of the student in the context of his life, in his social relations. Assessment therefore can not be understood as an exclusively pedagogic process, taking place in pedagogic situations, without taking into account the psychological aspect of assessment. Then assessment can not be seen as merely the means to determine the student's performance by comparing his or her performance to the targeted standard, since it is also a process of advancing his or her psychological characteristics that influences the course of his or her psychological behavior and the meeting of his or her needs, it brings forth positive as well as negative emotional responses

and experiences. From a pedagogic-psychological perspective, school assessment is a process of continuous learning and evaluating of the level of knowledge, skill and competence of students, their personal characteristics, as well as the determining of the current state of these skills and of the knowledge; it thus includes the process-oriented as well as the final aspect of assessment.
The psycho-didactic approach to assessment is based on informing about the achieved results, while at the same time it functions as a formative element in the learning processes of students. However, this formative function of assessment, to be efficiently used in the teaching process, implies that the teachers harmonize the teaching and assessment goals and set performance requirements and assessment criteria for the student's performance in such a way that it will allow for a comprehensive analysis of the student's performance and for furthering this ability in students.

The formative function of assessment

Formative assessment strengthens the personal responsibility for the assessment process and results of the student, it influences his or her views and the development of his or her own creative approach in the process of learning and assessment. Assessment, in order to fulfill the formative function, **must provide sufficient information about the student's performance, must be a strong feedback mechanism that is a part of the student's learning process. This is also related to the question of working with an error and adequate assessment criteria**, which are used to evaluate the error. Formative assessment focuses on the feedback function of assessment, on the formative and autonomous assessment when working with an error. A basic prerequisite is that the purpose of assessment is the feedback directed at the activity of the student, the purposeful assessment processes therefore transitioning from heteronomous assessment (*which serves the teacher as a tool for motivating and directing a student's learning process*, Slavík, 2003) to a formative assessment (*the student gains the skill to assess*). This process is capped off by the development of autonomous assessment, which Slavík (2003) describes as a "way towards the student's autonomy", when the student learns to take partial responsibility for his or her own performance.
If heteronomous assessment is applied in a higher degree, the student's autonomy in the learning process is not further developed, then the student does not perceive assessment as a process that he or she could somehow influence and use to his or her advantage during the learning process.
Restricting the assessment activities to just interventions from without, to the outside control by a teacher, slows down the student's self-regulating abilities, his or her reflective and critical thinking, while at the same time increasing his or her dependence on external guidance. The student then perceives assessment (working with an error) as some "impersonal" process, a signal of failure.
The given problem is well illustrated by an empiric study (Kosíková, Černá, 2013, p. 372, 393), some partial conclusions of which are a part of this text. It builds on the

basic assumption about the interconnectedness of teaching and assessment goals. The assessment is tightly linked to the understanding of goals, it reflects the teaching goal even in cases where the goal is not explicitly defined but rather "hidden" in the assessment. Assessment includes criteria according to witch the performance of the student is assessed, as determined by the teaching goal. It is due to this that the research of goals (and of the deviations from the desired performance, the definitions of requested performance, the concept of erroneous performance), in terms of Bloom taxonomy, is on the forefront of the field of formative assessment.
The following chapters deal with selected aspects of formative assessment, the fulfillment of which positively contributes to the formation of the learning process of a student:

– testing the understanding of the subject matter from the perspective of adopting concepts and correctness during evaluation,
– dialogic approach when working with an error in a performance analysis of a student,
– the link between specific teaching goals and the assessment processes using the Bloom taxonomy.

Testing the understanding of the subject matter from the perspective of adopting concepts and correctness during evaluation

The formative function of assessment influences the student's learning processes, such assessment provides the student with complex information about the quality of his or her performance. However, the basis for this is the performance task to be comprehensible to the student, it should contain clearly formulated performance requirements (in the form of questions, tasks, test items, including assessment criteria), so that the demands on the requested performance are adequate to the demands and means of delivery (the work with concepts), the adoption of the subject matter and its subsequent testing. If this is not the case, then it is not possible to objectively analyze the performance of a student, to provide quality information about his or her performance and thus to fulfill the formative function of assessment.
One part of the research conducted (Kosíková, Černá, 2013) was the focus on mistakes made by teachers when developing assessment for didactic tests, more specifically, the test tasks and their subsequent evaluation. It turned out that teachers incorrectly tasked the students – ambiguously formulated questions during classes – in over 20% of cases.
The problem at hand is related to the way concepts are presented to students during the exposition and fixation of the subject matter and to the way how the adoption process reflects the subsequent testing and assessment, whether the means of testing the level of acquired concepts in the form of didactic tests corresponds to the process of their adoption.
In general communication a higher or lower level of communication context is taken into account, however, the specificity of technical language lies in the definition of a concept that, if possible, unambiguously leads to fundamental and defining features, or to an account of all items enveloped by the given concept. Students

learn to understand the relation between the word (a lingual term) and its meaning, whereby adopting the desired complex idea.
In this context, Peregrin (1999), Slavík (2001) and others speak about a structuralist approach, about an interconnection of vertical relations (linking a term with its meaning) and horizontal relations (linking meaningful terms with each other).
The meaning of every term follows only from the connection to other terms, in parallel with the bond of the terminology system to physical reality.
... the meaning is not just some completed thing that would be simply differentiated by a term (Peregrin, 1999, p. 51).
"An important condition for understanding is the judging, incorporation into a logical structure of reciprocal reasoning and deduction..." (Slavík, 2001, p. 138-139).
The way towards understanding a concept is demanding, a concept can not be easily adopted as "unique", it always depends on how the whole explanation system is handled, meaning, within the context of the relevant field and/or a specific communication framework (Kosíková, 2011, p. 143). Testing the understanding of a concept is equally demanding.
The testing of understanding of a subject matter (adoption, understanding of concepts) should provide a meaningful feedback within the teaching process Yet, as Linhart (1967, p. 92) states:
An Exam is usually one-sidedly understood as a means, how a teacher acquires information about what a student has learned, and not as an actual check of the learning process.
To acquire objective information on what a student has learned, however, assumes a correct setup of didactic tests, which correspond to the formulation of questions and tasks.
Testing students by means of didactic tests is demanding in terms of preparation, it is unconditionally required for the questions and tasks to adequately reflect, in terms of their content as well as extent, the teaching goals. The above mentioned research has revealed deficiencies here as well.
The didactic approach that is based on formulated goals incorporates requirements imposed on the student's performance. These requirements are linked to the assessment criteria.
Test items should therefore be formulated clearly and comprehensibly, explicitly expressing their content and extent, without allowing for discrepant interpretations based on deduction from context. **An incorrectly formulated question then lacks a logical link between the performance request** (ambiguously following from an incorrectly formulated question) **and the assessment criterion of that performance**.
Let us remember the words of Socrates (Chlup, 1955, s. 13-14): *Let us thus go back to what I said a moment ago, that it is my fault that you answered wrongfully, since it was me, who wrongfully asked...*
No less grave is the fact that was revealed by the research (Kosíková, Černá, 2013), namely that test questions did not cover the whole subject matter that was presented to the students within a coherent teaching topic. The tests were missing questions and tasks that would test meta-cognitive knowledge of the students that would be based on developing new solutions of a heuristic-divergent type.

Dialogic approach when working with an error in a performance analysis of a student

A correct approach to an error is to see the error as a natural part of the learning process (especially in the beginning of learning). The point is, to teach the student to work with an error and use this phenomenon to his or her advantage.
"Piaget proved that if a child makes a mistake, it is not usually due to its incompetence, the child simply reacts on the basis of its currently achieved level of thinking. It is possible to progress to a higher level, if we provide the children with a relevant knowledge basis and if we pay attention to the processes using which they will be able to adequately structure and utilize this knowledge base" (Fontana, 1997, p. 76).
An important author, who deals with the subject of errors in students' learning processes, is Kulič (1971, p. 100-135). Kulič analyzes 3 processes of working with errors, 4 processes respectively:
1. identification, 2. interpretation, 3. correction:
1. In the process of **identification** of an error, two phases are distinguished:
– **Error Detection** – revealing the incorrectness of an answer, finding out that a performance is erroneous,
– **Error Identification** in a more literal sense of the word – i.e. finding out what the error is, "how" does it make the performance erroneous.

The identification process of an erroneous performance provides the learning individual with information about the reached state of knowledge, not only in the sense that the result is erroneous, that the goal has not been reached, but also **how** erroneous it is, what is the difference and gap between what should be and what is.
A phase, often omitted by teachers, follows, namely:
2. **Interpretation of an Erroneous Performance** – the analysis of the cognitive structure of the erroneous performance.
Reflecting about One's Own Performance – determining conditions, causes of the erroneous performance, the result being the locating of the source of the misunderstanding.
This phase is extremely important with regards to the learning process of the student, it teaches the student to understand why he or she made an error, what was not understood, what necessary knowledge and skill has yet to be acquired, for what reason he or she made the wrong judgment etc.
3. **Error Correction** – depends **on the level of processing of the feedback information**; correction gains meaning only when it is **justified**, not just a mechanical statement of the correct answer. The basis for the interpretation of an erroneous performance is a detailed analysis based on the reflection and meta-reflection of the teacher and the student. A prerequisite for an efficient reflection to take place, is knowing the assessment criteria.
For the student, working with an error means not only knowledge, but also the acceptance of the assessment criteria. The process of accepting the assessment criteria, which "objectively" mark a student's performance as erroneous, also represents a process of understanding – **why** has the student made the error, and **how** is the error to be corrected. At the same time, it allows for the student's meta-reflection

upon his or her performance. And that is the right way how to teach a student to work with an error.
Working with an error in the process of learning is also important with regards to the phases of the learning process. The error has to be identified at the start of teaching. If students adopt erroneous approaches, or if they get wrong the purpose, meaning, concept with witch they then carry on working, the unlearning of such a reinforced "error" is then much harder than regular checks and feedback. Psychological studies (Linhart, 1967; Kosíková, 2011) confirm the dependence of the influence of feedback on the learning phase. Monitoring information acts in a different way in the starting phase of learning than it does throughout or in the final phase, it is of greater importance, since in the first phase of learning knowledge structures and new interrelations develop, correction during the practicing phase, when acquired knowledge is already being reinforced, is less effective for the student than in the beginning. This is related to the memorizing process, since a necessary prerequisite for long-term memorization is repetition. Understandably, it is desirable for students to refresh and practice the subject matter, which they have well understood, the logical structure and interrelations of which they have grasped.
In 1977 Doležal and Mareš (1977, p. 201-207) were researching the way how teachers react to students' errors. They built on the assumption that a student's erroneous performance does not necessarily have to jeopardize the process and the results of learning, provided the conditions of its interpretation are met. The comparison of the theoretical assumptions, by Kulič, about efficient work with students' errors and the actual situation in school led the authors to a broader conclusion, namely that teachers make the work easier for themselves when working with errors, they react intuitively and unsystematically. The authors proclaim the need for a systematic training of teachers for dealing with diagnostics of student errors. Our research, as well (Kosíková, Černá, 2013), though limited by the sample and the research approach, has confirmed the stated conclusion even after 40 years had passed.

The link between specific teaching goals and the assessment processes using the bloom taxonomy

The Bloom taxonomy of cognitive goals allows to formulate requirements laid on a student on different thought levels, it formulates the expected output and learning tasks containing requirements on the performance of a student.
Psycho-didactic understanding of the skill of the teacher to work with Bloom taxonomy assumes the preparation of such tasks and activities for the students, which clearly contain performance requirements, the task difficulty, its assessment criteria, motivation aspects, how to engage the student in completing the task, means of task presentation even in the form of assessment.
The Bloom taxonomy of cognitive goals encompasses goal categories, which express requirements for a student on the level of cognitive thought processes. The taxonomy proceeds from lower cognitive goals towards higher ones, the higher ones incorporating the lower ones.

The revised taxonomy contains two dimensions – the dimension of knowledge and the dimension of cognitive processes (Byčkovský, Kotásek, 2004, p. 227, 242; Kosíková, 2011).

– Cognitive Level I – this is cognitive activity of a lower level, linked to context and the information contained in it, to their reception, processing and further handling – learning with understanding – knowledge, understanding – interpretation, application,
– Cognitive Level II – this is a higher level cognitive activity, bound to actual thought content, to their formation and handling, development of meta-cognition – creation, solving of a problem, assessment (Anderson, Krathwohl, 2001; Krykorková, 2008, p. 144, 174, 185).

The basic Cognitive Level I deals with basic knowledge and information, which the students acquire, they demonstrate their understanding by independently interpreting tasks, by restating them in their own words etc. This cognitive activity of a student is known as learning with understanding. At the same time, this level has a certain overlap, a potential for overlap with higher meta-cognitive activities, which are less bound to context, which contain basic information and knowledge and their processing, and which tend to be more oriented towards activities carried out on the basis of the actual thought activity.

Cognitive Level II develops the meta-cognition of students, requires such thought processes from students, in which they deal with abstract and general requirements in specific situations, they are able to explain relations in between elements, to understand the basic structure of a statement or a thought process.

The highest level of synthesis, the forming and assessment aside from the requirement for incorporating an unknown element, as was the case with the previous level, it encompasses requirements for students to create new structures, to propose new approaches, to evaluate the effectiveness and quality according to relevant assessment criteria.

Questions of higher order pose a higher demand for objectivity verification on the part of the teachers, however, from the perspective of diagnostics, these provide an overview of not only mere accomplished learning, but also of understanding reached. They can reflect the competences of students for application, analysis, for creative problem solving, the expression of assessment statements etc. and thus provide a valuable source of information for teaching and learning process optimization. When using and evaluating these, the teacher should continuously make use of feedback and work with it. The more information about a student's performance feedback provides, the more it fulfills its formative function and the more opportunity will be provided for the student to reflect on his or her learning processes.

It is fundamental to ensure the validity in the conformity of the goal orientation of student performances with the assessment criteria, according to which the performance is assessed. Deficiencies in assigning tasks revealed themselves in the form of incorrectly formulated questions and tasks, which were assessed on the basis of criteria that differed from the ones assigned (Kosíková, Černá, 2013, p. 385, 391).

Conclusion

Formative assessment, as was stressed, forms the learning processes of a student. An important aspect of this process is the formulation of requirements for the student's performance, a clear formulation of questions and tasks for students, an informationally supporting analysis of the student's performance, the assigning of assessment criteria. In case of an erroneous performance, it is important, how the teacher works with the student, to allow him or her to reflect on his or her performance, to interpret the erroneous performance and to correct the error. The utilization of students' errors to the advantage of the students' learning depends on the level of processing of feedback information.

The formative function of assessment in a broader context means that it is a part of the formation of the personality of the student, it develops social relations, it is a prerequisite to an efficient learning process of the student. For assessment seen in this way, it is important to find motivational factors for student learning, to perceive assessment as a natural and integral part of teaching.

Formative assessment encompasses several important principles and concepts (Kosíková 2011, s. 102-147):

- the way assessment is carried out, must not be humiliating to the student,
- the teacher's assessment must take into account the student's limitations,
- the teacher's assessment should provide the student with such assessment criteria, which the student can identify with,
- aside form the teacher, the student is also subject to the assessment activity,
- autonomous assessment strengthens the responsibility of students for their performance, for their learning activity,
- the necessity to differentiate between the substance of assessment and grading – leads to a natural integration of assessment into teaching and into the learning process of a student.

This approach to formative assessment is a way to the student's autonomy, a way to improve the quality of the student's learning processes, based on the development of meta-reflection and of the autonomy of the student. It allows the student to **perceive assessment as a natural part of the teaching process, to strengthen his or her responsibility for his or her learning results and to learn to perceive his or her own errors as an means for correction, learning lessons, an opportunity for improving the quality of his or her learning**.

References

Anderson, L.W., Krathwohl, D.R. (2001). *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. New York: Longman.

Byčkovský, P., Kotásek, J. (2004) Nová teorie klasifikování kognitivních cílů ve vzdělávání: Revize Bloomovy taxonomie. *Pedagogika*, 54, 3, 227-242.

Chlup, O. (1955). *Čítanka k dějinám pedagogiky*. Praha: SPN.

Doležal, J. Mareš, J. (1997). Učitel a žákův chybný výkon. *Socialistická škola*, 18, 5, 201-207.

Fontana, D. (1997). *Psychologie ve školní praxi: příručka pro učitele.* Praha: Portál.

Kosíková, V. (2001). *Psychologie ve vzdělávání a její psychodidaktické aspekty*. Praha: Grada.

Kosíková, V., Černá, K. (2013). Výzkum kvality informační funkce hodnocení ve středoškolské praxi. *Pedagogika*, LXIII 3, 372-393.

Kovaliková, S. (1992). *Integrovaná tematická výuka.* Kroměříž: Spirála.

Krykorková, H. (2008). Kognitivní svébytnost, teoretická východiska a okolnosti jejího rozvíjení. *Pedagogika*, 58, 2, 140-155.

Kulič, V. (1971). *Chyba a učení: Funkce chybného výkonu v učení a v jeho řízení*. Praha: SPN.

Linhart, J. (1967). *Psychologie učení*. Praha: SPN.

Peregrin, J. (1999). *Význam a struktura*. Praha: OIKOYMENH.

Petty, G. (2004). *Moderní vyučování*. Praha: Portál.

Pike, G., Selby, D. (1994). *Globální výchova*. Praha: Grada.

Rogers, C.R. (1998). *Způsob bytí*. Praha: Portál.

Slavík, J. (2001). *Umění zážitku, zážitek umění*. Praha: Pedagogická fakulta UK.

Slavík, J. (2003). Autonomní a heteronomní pojetí školního hodnocení – aktuální problém pedagogické teorie a praxe. *Pedagogika*, 53, 1, 5-25.