

Self-evaluation as an Attribute of Formative Assessment of Students' Achievements in Maritime Studies

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ABSTRACT: Assessment of students' achievements in higher education didactics and in maritime studies is considered as a problematic part of study process. Especially it is difficult to use assessment practically in order to improve students' learning, for formative purposes. The role of formative assessment in the learning educational paradigm is essential. One of main attributes of formative assessment - self-evaluation of students - has been chosen as the object of the research. For the empirical research, a case of full-time studies of Marine Engineering was decided upon. An originally created questionnaire was used for the research. The characteristics of self-evaluation, such as its frequency, forms, and content were analysed with the aim of finding out their influence on the improvement of students' learning and effectiveness of maritime studies.

1 INTRODUCTION

The process of studies consists of different elements, such as teaching, learning, assessment, etc. there are no doubts that assessment process goes along with learning process and influences it. Assessment of students' achievements in higher education didactics is considered as a problematic part of study process, in maritime studies this problem exists as well. Therefore, the actual difficulties arise on a practical level when the assessment of students' achievements are organized in formative way - in order to improve students' learning and positively influence the effectiveness of studies. Assessment may take place periodically: in the beginning, during and at the end of studies for the diagnostic, summative and formative purposes. Analysis of scientific literature and previous research revealed the main components of periodic assessment positively influencing effectiveness of studies: frequency of assessment, feedback and self-evaluation (Bartusevičiene & Rupsiene 2011).

The shift of educational paradigms from teaching to learning influences understanding of studies and changes the roles of study process participants. New learning paradigm highlights active student's role in the educational process. The paradigms shift makes changes in understanding of assessment process as well: summative assessment based on behaviourism theories mainly used previously has been transformed to the formative assessment grounded by constructivism (e.g. Piaget 1929, Ausubel et al. 1968, Lefrancois 1997), involving teachers and students participatory activities which are explained by sociocultural theories (see Vygotsky 1978, 2001; Engestrom et al. 1999, Wenger 1998, etc.). Assessment nowadays from formative point of view is understood as continuous, systematic, and multilevel process aiming to collect the information about student's learning and achievements in order to improve her/his learning.

The essence of formative assessment can be understood by using three approaches of the interpretation of assessment (Earl 2003):

- 1 assessment of learning;
- 2 assessment for learning;
- 3 assessment as learning.

In the first case (*assessment of learning*) assessment is understood as summative. It is applied at the end of any process (e.g. end of study course, study programmes, etc.). The aim of such an assessment is to evaluate students' achievements (knowledge and skills) by appointing appropriate mark and to compare students according to their achievements and to rank them in line with their results. The main assessment method in this case is test, feedback is provided mostly in the mark form. This approach is based on behaviourism theories. This type of the assessment is used for a long time, it is convenient, however the scientists doubt to relate the given marks to the real achievements of the students, because it is difficult to evaluate by a single mark the variety of students' knowledge, abilities and skills. Sometimes this type of assessment demotivates students learning (Gronlund & Linn 1990, Gronlund 2002, McMillan 2000).

Using *assessment for learning* approach the priority is given not to compare students achievements as in the first case, but to identify every student's strengths and weaknesses, help teachers to adjust teaching techniques accordingly, provide feedback to the students which helps them to improve individual learning. The constructivism is used as a theoretical basis for understanding this approach of assessment. This type of assessment is usually used during the process of studies, on a continuous basis. It can be called as diagnostic; the *portfolio*, as continuous collection of evidences about student's achievements, can illustrate the example of this type of assessment.

In the third case (*assessment as learning*) assessment becomes more integrated to the study process. The formative role of assessment is extended by highlighting student's role as critical evaluator of individual learning. This type of assessment appears when student monitors, assesses and evaluates his/her own achievements individually according to personal needs in order to improve learning. The student's learning improves by continuous self-evaluation of personal achievement, constructing new learning aims and adopting study process according to the personal needs and abilities. The teachers and learners act in collaboration using participatory activities. This approach is grounded by sociocultural theories.

The *assessment as learning* approach is the most appropriate having in mind changes of educational paradigms from teaching to learning when the student assigns an active role in the study process, when the students is not considered just a recipient of teacher's knowledge, but rather an active learner who develops their own individual knowledge by means of interaction with the environment and on the basis of their previous experience (Lefrancois 1997). That's why in the new learning paradigm the most emphasis has to be stressed on the concept of *assessment as learning*, using the ideas of both concepts (*assessment for learning* and *assessment of learning*) and aiming to

improve students' learning. Therefore, the role of the self-evaluation as a n attribute of formative assessment is extremely important in the latter case.

Although self-evaluation is defined in rather different ways, it can be mentioned that all definitions of self-evaluation characterize it as learner's activity during which decisions are taken about their own progress and the degree of achievement of the set standard (criterion) in order to improve the process of learning (Stellwagen 1997, Garcia & Roblin 2008, Brew 1999). Self-evaluation can be understood as feedback provided by the student to him/herself in order to make a decision about his/her performance and effectiveness of studies. It may involve different processes, such as self-evaluation, self-testing, reflection, etc. in order to make sound decision.

The researches revealed different aspects of influence of self-evaluation to student's learning: some of them prove that self-evaluation enhances academic results (e.g., McDonald & Boud 2003, Irving et al. 2003, Cambra-Fierro & Cambra-Berdun 2007, etc.), help to develop personal competencies: readiness to help colleagues (Ross 1998, 2006), orientation ability (Henry 1994), cultivation of self-control (Nelson et al. 1995); training of independence (Cassidy 2006); education of active citizen and long-life learner (Malone & Pederson 2008); foster intrinsic motivation to study (Ross & Starling 2008). The scientists analyse self-evaluation forms and methods, frequency, difficulties of its organisation.

The concept of the *effectiveness of maritime studies*, in relation to quality assurance in maritime studies, was defined as an attribute of learning at maritime education and training institution which indicates the achievement of the intended learning outcomes (Rupsiene & Bartuseviciene 2010, 2011). The assessment of students' achievements is one of the factors that influence students' learning and effectiveness of maritime studies. As witnessed by previous research, the components of the assessment of students' achievements, such as assessment frequency, assessment methods, feedback characteristics, and student involvement in the assessment process positively influence the effectiveness of maritime studies whenever properly used. As witnessed in previous research the marine engineering students mentioned advantages of their involvement into assessment process in the form of self-evaluation (Bartuseviciene & Rupsiene 2011). However, the self-evaluation and its characteristics influencing the effectiveness of maritime studies needed deeper investigation. The aim of the research was to determine how the frequency of student' self-evaluation, its form, and the content influenced effectiveness of maritime studies, and which of the above mentioned elements was more important for the improvement of students' learning and for the effectiveness of maritime studies. The research methods included a questionnaire survey and statistical analysis of quantitative data.

2 RESEARCH METHODOLOGY

2.1 Research sample

For the empirical research, a case study of the programme of maritime specialty was chosen. The research population consisted of Marine Engineering students of the Lithuanian Maritime Academy. 132 full-time students of Marine Engineering (95 % of all population) in all the study years of the said study programme were surveyed. The research sample included merely male students.

The questionnaires were handed to each student personally. To ensure the ethical character of the research, an official permission for its conducting was obtained from the Head of the Academy. Moreover, all the participants of the research were introduced to the research objective and the specific requirements for the completing of the questionnaire. The questionnaires were compiled in such a way as to maximally ensure the participant anonymity; it was impossible to identify the respondent by means of the questionnaire data. Therefore, the essential principles of the social science research were observed, viz., voluntariness and anonymity that accounted for the situation in which the respondents were able to fully express their views of the phenomenon or the event of the research.

2.2 Research instrument

The research instrument was developed by the authors, given the aim of the research. The questionnaire entailed an open question about the study subject to which, in the respondents' opinion, student self-evaluation was applied the most effectively. The question was necessary to establish the limitations of the application of the research findings. 38% of the respondents pointed out such subjects: the figure proved that student self-evaluation was insufficiently practiced in the *Marine Engineering* study programme, probably the teachers do not have enough knowledge and experience in including self-evaluation into the assessment process, but this topic needs deeper investigation. However, the analysis of the named academic subjects revealed that student self-evaluation was effective both in the subjects of professional qualification and professional specialization.

The most frequently named subjects of professional qualification included *Chemistry, Physics, Information Technologies, and Physical Training*. It turned out that the majority of the teachers of the subjects of professional specialization, such as *Electrical Engineering or Theory of Internal Combustion Engines*, also applied student self-evaluation. Therefore, the findings of the research provided in the article are limited to one study programme (viz. *Marine Engineering*) and the subjects of the study field (subjects of professional qualification and specialization). The relevance of the research findings for other study programmes could be established after additional research.

The items of the questionnaire contributed to the identification of the forms, the frequency, and the content of student self-evaluation and students' views

of the influence of self-evaluation on the effectiveness of the mastering of academic subjects. All the questions were formulated in such a way as to enable students who provided answers to them to refer to their own experience in the studies of the subject where the application of student self-evaluation was the most successful. The frequency of self-evaluation was measured on the basis of the number of times that student self-evaluation was applied in the course of the studies of the subject.

The form of self-evaluation was assessed in accordance with the way of its most frequent application (written, oral, or both written and oral). The content of self-evaluation was judged by the frequency that the students had to assess their progress, to note things they had not understood, to point out learning difficulties, and to plan the prospects of further learning on the request of their teachers.

The answers to the question *Do you feel you better mastered the academic subject in which student self-evaluation was applied in the best way?* revealed the effectiveness of the mastering of the academic subject. Even though the opinions may have been subjective, in our case, the provision was observed (see Fitz-Gibbon & Kochan 2000, Petty & Green 2007) that it was possible to refer to learners' opinion when judging the effectiveness of studies. However, the second limitation of the research findings was identified there, as the teachers' opinion or other parameters of the evaluation of study effectiveness were not taken into consideration. To eliminate the said limitations, additional research would also be necessary.

3 RESEARCH OUTCOMES

3.1 *Is self-evaluation important for marine engineering students?*

After defining the main assessment components, such as periodicity of assessment events, methods of assessment, provision of feedback after evaluation, ability of students to evaluate themselves, the respondents were asked to rank the mentioned components of assessment in relation and importance of each of them for the effectiveness of studies (which of the mentioned features give the better result of studies).

Analysing, which of the assessment components critically influences effectiveness of studies; it was revealed that 37% of respondents give the highest priority to the frequency of periodic assessment events, 23% of respondents – to assessment methods, 23% – to students' involvement into assessment process, and 18% - to feedback (Bartuseviciene & Rupsiene, 2011).

That figures prove that self-evaluation is important for the students and this issue is worth to be investigated more deeply. Moreover the value of self-evaluation enhances, because more than half of surveyed students (62 % of the respondents) pointed out that, in their opinion, they better mastered the subjects in which self-evaluation was applied the most successfully.

3.2 Frequency and forms of self-evaluation used in maritime studies

Before establishing the impact of self-evaluation components on the effectiveness of their mastering of academic subjects, we have to find out how frequently, in which form(s), and in what way in terms of the content the learners evaluate their achievements during the studies.

While answering to the question how often the students had a chance to evaluate themselves, it turned out that self-evaluation was applied from 0 to 11 times. The respondents' answers witnessed that in 25% of the cases, self-evaluation was used only once; on average, students had an opportunity to evaluate themselves 3.32 times (sd=2.83) (Fig. 1). There are not doubts that the number of self-evaluation events depends of the number of assignments given to the students during the course. However, the fact that 11 assignment events during one course were given to the students can doubtful and may be considered as overload for the learners, but this issue needs more details about the characteristics of the subject and of the assignment tasks.

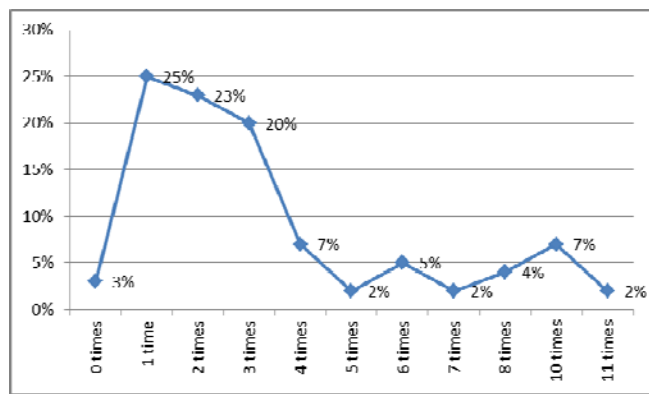


Figure 1. Frequency of self-evaluation.

The forms of self-evaluation were determined as written, oral, and both written and oral. In accordance with the respondents' answers, the students evaluated themselves in different forms: in writing - 6%; orally - 46%; and in writing and orally - 48%. Usage of the different forms of self-evaluation almost in the half of cases can be considered as positive characteristic, however not practical. In author's opinion self-evaluation can be more easily organized in written form.

On the basis of the aforementioned facts, a conclusion can be drawn that the regularity of the self-evaluation events can be improved, in ideal situation every assignment has to be self-evaluated by students. The research revealed that the students evaluated themselves in different forms (in writing, orally, in combination of both) almost in half of assignment events; the variety of forms show positive tendency, however using written form can be considered as more practical approach. Probably, the teachers themselves need more information about self-evaluation techniques, its importance and influence on the effectiveness of the maritime studies. This issue needs further investigations.

3.3 The content of the self-evaluation

The content of self-evaluation can be very helpful for teachers in getting information about students' progress, learning difficulties, organization of studies, and other. Mentioned information is important for the students as well. Analysis of obtained data revealed some of the mentioned issues. The respondents' answers about the content of self-evaluation (Fig.2) witnessed that they most often self-evaluated the things they failed to understand (64%), how to organize further learning (61%), pointed out the difficulties they encountered while studying the subject (54%), and self-evaluated the progress made (52%). So, more than in half cases of self-evaluation events, students identified independently their learning difficulties. This fact has to be taken for the consideration of teachers, because proper identification of learning difficulties by the students themselves is a good start for the individual organization of independent learning taking more responsibility for studies which is extremely important in the context of development of professional competencies in life-long learning perspective.

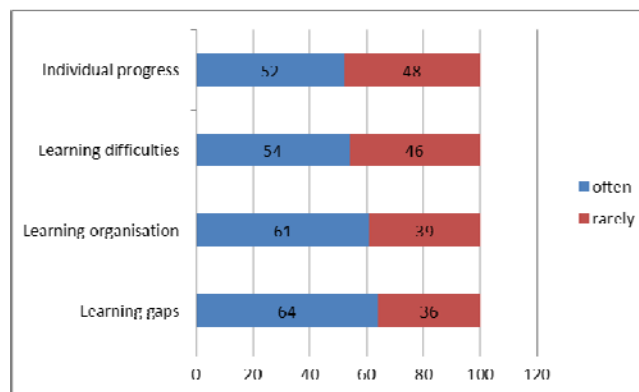


Figure2. Content of self-evaluation.

The method of regression analysis was used to explain the meanings of the variable *The effectiveness of mastering of an academic subject* in accordance with the meanings of independent variables: self-evaluation form, self-evaluation content (which was aggregated from the four self-evaluation content variables presented in Fig.2), and self-evaluation frequency. On performing the regression analysis (Table 1), the influence of three variables on the effectiveness of the mastering of the subject was established ($r=0.570$). The three variables accounted for 32.5% of dependent variable dispersion ($r^2=0.325$; $r^2_{adj}=0.271$). The regression model was appropriate ($p=0.002$), and it described a statistically significant relation ($F=5.949$) between the dependent variable and the three identified independent variables. The meanings showed that the dependent variable could be forecast by means of the three identified variables (form, frequency, and content of self-evaluation).

Table 1. Coefficients of the appropriateness of a regression model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig.
1	,570	,325	,271	,906	5,949	,002

Standardized (Beta) coefficients (Table 2) witnessed that the effectiveness of the mastering of the subject mainly depended on the content of self-evaluation.

Table 2. Coefficients of the regression model.

Model	Unstandardized Coefficients		Standardized t Coefficients Beta	t	Sig.
	B	Std. Error			
1 (Constant)	2,315	,724		3,199	,003
Self-evaluation forms	-,106	,256	-,059	-,416	,680
Self-evaluation content	,155	,037	,624	4,194	,000
Self-evaluation frequency	-,058	,051	-,169	-1,127	,267

The regression analysis method helped to explain importance of three characteristics of self-evaluation (form, frequency, and content) for the effectiveness of maritime studies, emphasizing the content of self-evaluation. That means that in order to make maritime studies more effective, the teachers have to learn how to use self-evaluation of students in the assessment process in proper way, highlighting not only form and frequency of self-evaluation event, but mostly the content of it.

3.4 Conclusions

As established by the research, self-evaluation encouraged students to improve their individual learning and to become more responsible for their study outcomes, which was important in the context of the learning paradigm. This issue is also significant for the maritime studies.

In the initial stage of the research, the importance of the frequency, the form, and the content of student self-evaluation was established. Self-evaluation was used with different regularity (from 0 to 11 times), in ideal situation it has to be used in every assignment. For better effectiveness of the maritime studies, different forms of student self-evaluation can be applied (written, oral, or combined), however for the better practicality of self-evaluation events the written form is more applicable. The content of self-evaluation is also important for the effective maritime studies, because it can help to identify the students' learning progress, their encountered difficulties, learning gaps, or planning of the learning prospects.

Although all three self-evaluation elements were significant in the context of the effectiveness of the subject mastering, self-evaluation of the content had the greatest influence on the latter. The effectiveness of studies increased when students had to self-evaluate their own individual progress in the written form and to indicate the difficulties they encountered in the studies of the subject.

The research proved that self-evaluation is important attribute of formative assessment of students' achievement in maritime studies. However some observations has led to the assumption that

probably, the teachers themselves need more information about self-evaluation techniques, its importance and influence on the effectiveness of the maritime studies.

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