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ANALYSIS OF EDUCATION PROBLEMS AT HIGHER EDUCATION INSTITUTIONS

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Abstract. The Bologna declaration stresses the importance of education and educational co-operation in the development and strengthening of stable, peaceful and democratic societies. Additionally the declaration highlights the need to promote European co-operation in quality assurance with a view to develop comparable criteria and methodologies. The cooperative activity of universities created preconditions for students' mobility under the Leonardo da Vinci and Socrates programmes. Hence, a comparison of efficiency of engineering education studies at partner institutions has become a topical issue. The paper presents the problems related to engineering education quality at different universities and suggests a system of indicators that are applicable for education quality estimation. The main idea is to compare the distinguished aspects of the education process and to evaluate quality of teaching. The efficiency of different subjects (social and engineering) is estimated by applying sets of criteria, to be implemented by incorporating a proposed system of criteria into questionnaires for students at Vilnius Gediminas Technical University (VGTU), who participate in student mobility programmes. Processing of the received responses let the author achieve the ultimate aim, i.e. to trace differences in the quality of teaching. Policy implications in the field of engineering education quality management are seen as main outcome of presented research.

Keywords: active learning techniques, problem based learning, constructivist classroom dialog.

1. Introduction

The importance of education and educational cooperation in the development of a stable, peaceful and democratic society is recognised by the European Union (EU). Hence, Lithuanian higher education institutions, which strive to adapt to the changing needs of society and advances in scientific knowledge, are aiming to reach the goals set by the Bologna declaration. On the other hand, after entering the EU, the competitiveness of Lithuanian higher institutions has become of higher importance.

Lithuanian higher institutions have adopted a system that is based on two main cycles – undergraduate and graduate - and established a system of credits. Lithuania has joined the following international conventions covering academic qualifications' recognition:

- The UNESCO Convention on the Recognition of Studies Diplomas and Degrees Concerning Higher Education to the European Region;
- The European Council Convention on the Equivalence of Diplomas Leading to Admission to Universities and Council of Europe;
- The UNESCO Convention on the Recognition of Qualification Concerning Higher Education in the European Region.

Notably, the Bologna declaration established the goals to promote cooperation in quality improvements and to increase the level of student and staff mobility. Hence, the number of mobile students from Lithuania through the Leonardo da Vinci and Socrates programmes has grown over the past years.

A comparison of the efficiency of engineering education studies at partner institutions has become a topical issue. The aim of this paper is to deal with the problems of engineering education quality at different universities. Hence, a system of criteria that is applicable for education quality estimation is suggested here. The main idea is to compare distinguished aspects of education process and to evaluate the quality of teaching.

The efficiency of education in different subjects (social and engineering) is estimated by an application of sets of criteria. That is to be implemented by incorporating proposed system of criteria into questionnaires for those students, who study at Vilnius Gediminas Technical University (VGTU), and participate in student mobility programmes.

The processing of the received responses permitted the ultimate aim to be achieved, i.e. to trace differences in the quality of teaching. Policy implications in the field of engineering education quality management are seen as the main outcome of the presented research.

2. Factors that determine the efficiency of education

According to the scholars the most typical teaching in higher education involves no faculty collaboration but rather engages one faculty member teaching students in his or her course alone [1]. However it is important to point out that the value of traditional lecturing has been decreasing, while other teaching approaches have become of greater importance. The traditional lecturing presents an efficient way for teachers to talk in a large auditorium. However, there are doubts as to how much students actually learn in such environments. According to some authors, traditional approaches to lecturing encourage students to concentrate on superficial indicators, rather than a deeper understanding of fundamental principles [2].

Active learning techniques range from long-term to five-minute problem solving simulations. The methods seek to encourage students to think about subject matters during interactions with teachers and each other. For instance, in the field of higher education, learning through discussions is to be seen as a characteristic of good teaching [3]. Hence, according to some authors, this method is a fundamental and key aspect of the higher education experience [4].

Problem-Based Learning (PBL) can be seen as another student-centred method that aims at helping students gain particular experience through a series of solved problems. Problem-Based Learning (PBL) is frequently advanced as a powerful engaging learning strategy that leads to sustained and transferable learning [5]. T. Fenwick states the following:

Problem-Based Learning typically organizes curriculum around a series of cases profiling dilemmas of practice which student professionals read, 'diagnose' and discuss, exploring strategies for solving these problems [6].

According to D. Margetson, Problem-Based Learning (PBL) encourages the cooperative, critical and informed engagement of students [7]. Consequently, this method has been adopted in various disciplines and has enjoyed increasing popularity. Furthermore, as well as the development of self-directed learning skills, the Problem-Based method is also valuable in fostering personnel and communicative development [8].

Constructivist classroom dialogue has become a widely recognized method that targets students' involvement with a staff facilitator in the investigation of particular issues. The main purpose of teaching is to help students actively construct knowledge by assigning them tasks that foster this process [9]. N. S. Edward states the following:

Constructivism has different meaning to different people but few would disagree that it implies that learning is constructed from experience when the learner, in collaboration with others engages in activities which are realistically situated and incorporate the opportunity to test the new-found knowledge [10].

Hence, the application of this method helps students to see and resolve the discrepancies that may exist between their perceptions and scientific concepts.

Some scholars point out that institution of higher education should seek to ensure the synergy between research active staff and teaching [11]. Additionally, the research carried out by S. Rowland demonstrates the strong belief of teaching staff that teaching and research activities interpenetrate [12]. Hence, the research activities of staff are to be seen as a strong precondition of teaching efficiency.

3. Empirical research of education efficiency

The following section presents empirical research carried out in 2005. The data was collected by questioning students from Vilnius Gediminas Technical University who had studied at foreign higher education institutions for one semester according to Socrates/Erasmus mobility programmes. For this purpose, a standard questionnaire was prepared using graded answers scale (where 1 – strongly disagree and 5 – strongly agree).

During the research, 123 students from the Faculties of Environmental Engineering, Architecture, Electronics, Fundamental Sciences, Mechanics, Civil Engineering, Transport Engineering and Business Management were questioned. The breakdown of the questionnaires was as follows:

- 21 were completed by students from the Faculty of Architecture;
- 20 were completed by students from the Faculty of Environmental Engineering;
- 14 were completed by students from the Faculty of Electronics;
- 25 were completed by students from the Faculty of Business Management;
- 13 were completed by students from the Faculty of Civil Engineering;
- 17 were completed by students from the Faculty of Fundamental Sciences;
- 8 were completed by students from the Faculty of Mechanics;
- 5 were completed by students from the Faculty of Transport Engineering.

The questionnaire included questions that related to the teaching methods and research works of teaching staff.

An evaluation of the application of learning through discussions was attempted in order to assess the application of this technique. Thus, it was important to determine the following:

- If professors apply face-to-face discussions in the particular subject;

- If face-to-face discussions help students to understand the main ideas of a particular subject;
- If face-to-face discussions help students solve problems that are related to the tasks of a particular subject;
- If face-to-face discussions foster the development of skills applicable in the future career of students.

From an evaluation of application of PBL methods, an attempt was made to assess the application of this technique. Thus, it was important to find out the following:

- If professors apply problem cases in a particular subject;
- If problem cases help students to develop critical thinking;
- If problem cases help in the application of theoretical knowledge;
- If problem cases help to develop the communication skills required in the future career of students.

An evaluation of constructivist classroom dialog was attempted so as to assess the application of this technique. Thus, it was important to ascertain the following:

- If professors stimulate comparisons of previous knowledge with the knowledge presented in textbooks;
- If professors stimulate comparisons of different theories or approaches;
- If professors stimulate the criticising of theories;
- If professors stimulate applying theoretical concepts to real-life situations;
- If students are stimulated to develop critical perspectives.

Concerning an evaluation of the research activities of professors, the questionnaire also investigated students' knowledge of their professor's research works. Thus, it was important to find out the following:

- If professor's research is relevant to students' learning;
- If students have studied their professor's research works;
- If the professor has involved students in his/her research work;
- If the professor has used his/her research during practical classes or lectures;
- If these research works are applicable in the future career of students.

The questionnaire also investigated students' attitude to the studies. Thus, it was important to ascertain the following:

- If the goals of studies are clear and easy to understand;
- If the professors put much effort and try to understand difficulties, which the students encounter;
- If professors tend to test what students have memorised or what they have understood;
- If students are satisfied with the studies.

The evaluation of the application of active learning techniques during lectures showed that foreign higher institutions are more advanced (average evaluation 4.09). The answers of students from different faculties allowed to conclude that professors at Vilnius Gediminas Technical University are more oriented towards traditional lecturing and only some of them apply active learning techniques (average evaluation 2.28). Furthermore, an analysis of the data obtained during research delivered the conclusion that foreign higher institutions were more advanced in their applications of learning through discussions (average evaluation 4.26). Staff at Vilnius Gediminas Technical University applied this method less than their counterparts at foreign higher institutions (average evaluation 3.08).

Research into the application of PBL methods showed that professors at foreign higher institutions applied this strategy more actively (average evaluation 4.01) than staff at Vilnius Gediminas Technical University (average evaluation 3.42). However, it is important to note that staff from Faculty of Electronics is more advanced in their application of the Problem-Based method (average evaluation 4.26) compared to their colleagues at foreign higher institutions (average evaluation 3.08).

An evaluation of the application of constructivist classroom dialog during lectures showed similar results as for evaluations of the above-mentioned methods. Foreign higher institutions are more advanced in their application of this active learning technique (average evaluation 3.67) than staff at Vilnius Gediminas Technical University (average evaluation 2.65).

The data obtained during research allowed one to conclude that students stress the link of research activity of professors and teaching competence. An analysis of the obtained results indicates that foreign higher institutions are more advanced (average evaluation 4.1) than the staff at Vilnius Gediminas Technical University (average evaluation 3.8). A closer analysis of the results shows that staff of the Faculty of Electronics are more advanced (average evaluation 4.36) than their colleagues from foreign higher institutions (average evaluation 3.79). Very similar results were obtained from the students of Faculty of Civil Engineering (average evaluation 3.69).

The evaluation of the goals of studies at Vilnius Gediminas Technical University showed that the goals are not always clear and easy to understand (average evaluation 2.89), furthermore, it is difficult to understand, what it is expected from students (average evaluation 3.45). The evaluation of foreign higher institutions indicates that the goals of studies are clear and easy to understand (average evaluation 4.25). Additionally it is easier to understand, what it is expected from students (average evaluation 3.50).

Evaluation of teaching quality showed that the majority of respondents claim that professors at Vilnius

Gediminas Technical University do not put much effort and do not try to understand difficulties, which the students encounter (average evaluation 2.53), however, they agree that professors are interested in students' opinion (average evaluation 3.20). The evaluation of foreign higher institutions indicates that professors put much effort and try to understand difficulties, which the students encounter (average evaluation 3.80) and are interested in students' opinion (average evaluation 3.30).

Evaluation of knowledge testing showed that the professors at Vilnius Gediminas Technical University tend to test what students have memorised and not what they have understood (average evaluation 3.65). The evaluation of foreign higher institutions indicates that professors tend to test what students have understood (average evaluation 3.50).

Evaluation of general satisfaction with the studies programme at Vilnius Gediminas Technical University showed that the majority of respondents were essentially satisfied with their studies (average evaluation 3.72); they assess the results of their studies as satisfactory (average evaluation 3.27). The evaluation of satisfaction at foreign higher education institutions showed that students were satisfied with their studies (average evaluation 3.80); they assess the results of their studies as satisfactory (average evaluation 3.60).

3. Implications of education efficiency

The priority of human resources, with regard to their potential and quality, should be seen to be of higher importance in the processes of globalisation and integration. This priority is closely connected with the system of higher education. Hence, the quality of studies in higher education should be perceived to be one of the key aspects for integrating the Lithuanian educational system into the educational system of the EU.

The integration process has revealed some positive factors. For instance, integration processes have fostered international links with foreign higher institutions. Therefore, academic staff is involved in international projects and research works. Also, great emphasis is placed upon a theoretical background that helps graduates to adapt to the changing requirements of society, to manage the situations of social change and to improve reality in a creative way.

The negative factors related with the quality of studies are connected with the problems of transitions, i.e. changes in political, social and economic environment of Eastern and Central European countries in the past 15 years. Hence, such problems as students' insufficient practical knowledge and skills, as well as programmes of studies that do not meet the actual needs of a changing society, should be perceived to be of high consideration. The solution of these problems should foster the intense internationalisation of Lithuanian higher education, especially through the introduction of joint programmes of studies prepared with foreign partners.

The mission established by Vilnius Gediminas Technical University is to create, store and propagate scientific knowledge, the latest technologies, cultural values, to teach and bring up members of society, to cherish democracy and, through such efforts, foster the economic growth of the country, competitive spirit in the economy, social welfare and peace, as well as a high quality of life [13]. Hence, taking into account the mission of the University, the problems that were highlighted during research could be solved by placing greater emphasis on the teaching efficiency of the particular disciplines. The application of active learning techniques to help training specialists can help to meet the needs of Lithuanian social and economic development, as well as other EU countries; this can be seen to be a solution to certain efficiency problems. Additionally, the policy of the University, which fosters the participation of academic staff in various international projects and research work, could also play a crucial role in the internationalisation processes.

4. Conclusions

This research carried out at Vilnius Gediminas Technical University, revealed some problems related to the efficiency of engineering education. The results of empirical research allow concluding the following:

In order to evaluate the efficiency of education, it is especially important to highlight problematic areas related to teaching methods. Research works carried out by the academic staff should also be taken into consideration.

The empirical research was based on an evaluation of these factors determining the efficiency of education: learning through discussions, PBL, constructivist classroom dialog, the research activity of professors and students' attitude toward studies.

The survey permitted a comparison of the efficiency of education at Vilnius Gediminas Technical University with that of foreign higher institutions. Hence, the research has created a prerequisite to put more emphasis on the application of active learning techniques in various disciplines and to create a policy that fosters the scientific activities of the University's academic staff.

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MOKYMO PROBLEMŲ ANALIZĖ AUKŠTOJO MOKSLO INSTITUCIJOJE

R. Korsakienė

Santrauka

Bolonijos deklaracija pabrėžia mokymo ir mokymo kooperavimosi reikšmę, plėtojant ir stiprinant stabilią, taikią ir demokratišką visuomenę. Be to, deklaracija išryškina poreikį skatinti europietišką kokybės užtikrinimo kooperaciją, siekiant sukurti lygintinus kriterijus ir metodologijas. Universitetų kooperavimosi veikla sukūrė prielaidas studentų mobilumui pagal LEONARDO DA VINCI ir SOCRATES programas. Taigi inžinerinių mokymo studijų efektyvumo lyginimas partnerių institucijose tapo aktualia problema. Straipsnis pateikia problemas, susijusias su inžinerinio mokymo kokybe skirtinguose universitetuose ir siūlo rodiklių, kurie taikytini mokymo kokybei vertinti, sistemą. Pagrindinė idėja – palyginti išskirtus mokymo proceso aspektus ir įvertinti mokymo kokybę. Skirtingų disciplinų (socialinių ir inžinerinių) efektyvumas vertinamas, taikant kriterijų sistemą, kuri turi būti įdiegta įtraukiant siūlomą kriterijų sistemą į klausimynus, pateiktus Vilniaus Gedimino technikos universiteto (VGTU) studentams, dalyvaujantiems studentų mobilumo programose. Gautų atsakymų rezultatai leidžia autorei pasiekti galutinį tikslą, t. y. nustatyti mokymo kokybės skirtumus. Pagrindiniu pateikiamo tyrimo rezultatu laikoma kokybės valdymo politika inžinerinio mokymo srityje.

Reikšminiai žodžiai: aktyvūs mokymo metodai, problemų sprendimu pagrįstas mokymas, konstruktyvistinis klasės dialogas.

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