



## EDUCATION STRATEGY AS ONE OF THE MACROECONOMIC INDICATORS OF THE STRATEGY LEVEL OF THE DEVELOPMENT OF A STATE

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### Annotation

The main goal of bachelor study is provide quality of education to its student during three years. The better the studies, the better employment chances of the graduates. The competitive ability of today's youth is a very important social and economic factor in every developed state. Since its foundation, the European Union went from its initial documents founding European Coal and Steel Community, to the Lisbon Treaty founding the European Union, through changes in priorities and goals to a very ambitious strategy that is supposed to bring the EU to a leading place in the world market. The EU is supposed to gain a position as the most competitive economy based on a knowledge and skills-oriented economy.

The paper aims at analysing and assessing of educational programme of applied informatics. It describes the assessment quality of bachelor curriculum in half of the academic year (after one semester) by third year students (last year of the bachelor study) of the Department of Applied Informatics and Math at University of Ss. Cyril and Methodius, Slovak Republic. Data was obtained by electronic questionnaire and anonymously from students. The results are presented by graphical output and describes it.

KEY WORDS: social policy; competitiveness; employment; quality of education; data analysing; curriculum, assessment of quality; students; online survey.

### Introduction

What does quality mean in the context of education? Many definitions of quality in education exist, testifying to the complexity and multifaceted nature of the concept. The terms efficiency, effectiveness, equity and quality have often been used synonymously (Adams, 1993). Definitions of quality must be open to change and evolution based on information, changing contexts, and new understandings of the nature of education's challenges. New research - ranging from multinational research to action research at the classroom level - contributes to this redefinition.

The goal of the contribution is to show how a quality study program is capable of positively influencing the overall increase of education of the population on both a national and regional level. Education is one of the long-term economic indicators of each state and the states should therefore approach the increase of quality of study programs in a precise and highly specific manner. The key role in the system remains on the part of the state. Given that this is a classic case of non-market goods, the features and benefits of which (known as positive externalities) are crucial for the society, financing of education is predetermined to be primarily from public funding. The EU finances only specific selected programs through subsidy titles for schools, as well as scientific and research facilities.

The world transformative processes influence seriously education systems in all countries and at all levels. First of all, it appears in transformation of the main educational model specifically from the model of knowledge to the model of competency which we can

over watch in the most of countries (Gerkushenko et al., 2014). This transform for model of competency is very useful for young generation. That is the reason why education is one of the most important part of national economy for every society, every region and country. Quality of education should be supported by every government in country. If the persons responsible for education realized important of education, try to improve it by variety ways. One of the way, how can we improve or increase quality of education system in every elementary or secondary school, college or university is to provide the opportunity to students comment the content of the educational curriculum (or study program), (Ölvecký - Gabriška, 2014; Toman - Michalík, 2013; Mišútová, 2009, Mišútová - Mišút, 2012; Mišút - Pribilová, 2013)

Education invariably aims at developing competencies, technical as well as non-technical ones. As a consequence, there is also a need for methods that can be used to assess the quality of education faithfully. One possible approach is an assessment of whether intended learning outcomes are achieved, i.e. an investigation if the target audience possesses the desired competencies. Assessment of competencies, however, is tricky since competencies are often only vaguely defined. An approach to assess competencies, and particularly those needed for proper software engineering. To that end, SECAT builds on Rauner's approach for competency assessment in vocational education. Rauner's approach uses nine competency criteria, which are further refined by suitable issues that indicate to which extent a competency is, or should be, present. The main contribution of this paper lies in the adaptation and

enhancement of this framework in order to make it useable in software engineering education. Adaptation and enhancements encompass issues such as team and individual assessments, integration of multiple perspectives from various groups of stakeholders, and product- and process-orientation. The paper also presents first insights from using SECAT in a pilot university course in software engineering (Sedelmaier - Landes, 2015).

## Strategic goals for education

What does quality mean in the context of education? Many definitions of quality in education exist, testifying to the complexity and multifaceted nature of the concept. The terms efficiency, effectiveness, equity and quality have often been used synonymously (Adams, 1993)

Upon reaching the basic goals of the EU (becoming most competitive and most productive knowledge-based economy in the world), four new strategic goals were established in the ET 2020 program for education:

- *To put into action a life-long education and mobility in learning program.* Advanced changes in technology and increases in information transfer speeds pose ever increasing demands on life-long education. Important factors influencing employment and other social issues are both the ability and the necessity of life-long education and thus better employability in the job market. The European population is aging and it will become necessary to maintain qualified workers to a later age. The introduction of new methods of education are necessary within the globalized market and an ever increasing overlap of the individual fields, including e-learning courses, webinars and other forms of education using information and communication technologies. The internal market, understood as a whole within the entire EU, requires workforce mobility. Workforce mobility is an essential element for employment in the job market. Preparation for travel to follow jobs should therefore become an integral part of education, both for students and for teachers and training educators. Support of exchange study programs also became a partial priority within the first of the four strategic educational goals.
- *To increase the quality and effectiveness of education and professional training.* Quality systems of education and professional training are essential for Europe's success. The education system is moving away from the classic understanding of mechanical learning - memorization. Through the use of repeated word-to-word definitions, memorizing leads to learning without understanding the content, without logical systemization. The new direction is toward a systematic ability of cross-profession overlap of processing of information and knowledge. The most important goal will be to ensure that everyone gains key competencies. To have a competency means that we are capable of performing suitable activities and get appropriately oriented in a certain natural situation in a manner bringing a beneficial approach.

- *To support justice, social cohesion and active citizenship.* This goal is also accentuated by the international character of the European Union. Emphasis on fair education for all EU citizens is necessary in order to sustain economic growth and social systems. The key interest groups in this case are pupils and students from disadvantaged environments, students with special needs, migrants, etc. The goal is to ensure that they do not end their schooling prematurely, regarding all students between 18-24 years of age in Europe. Their education should also promote multicultural competencies and democratic values without discrimination. Also important are communication skills among peers from different environments.
- *To improve creativity and innovation, including entrepreneurial skills, on all levels of education and professional training.* This part of the strategy is divided into two main goals. The first is the support of key competencies in the area of digital technologies. The second is to endure a fully functional knowledge triangle: education – research – innovation. It is necessary to ensure a collaboration of all stakeholders that influence the future success of graduates in the job market. Collaboration between schools, scientific and research institutions and companies is a key factor for aligning professional and social needs with the personal satisfaction of individuals. Through quality education individuals gain a chance to succeed in the job market and obtain sufficient financial means to satisfy their needs without burdening the social-care system and thus improve the position of the European Union in the worldwide market.

Universities as the centres of knowledge play an important role in education and application of the concept of corporate social responsibility (CSR). They are not just institutions of higher education and research granting titles but they together educate responsible people with excellent knowledge able to solve questions and problems globally and share their knowledge that the wider community can benefit from. The aim is to show which teaching methods could be used to educate students of the study program Informatics (Tokarčíková - Kucharčíková - Ďurišová, 2015). The assessment of academic advising practices is far from satisfactory. Major academic advising approaches and key characteristics of quality assessment practices. We propose the consideration of integrating both the logic model and mixed methods design in academic advising assessment framework. Adapting the Appreciative Education (AE) framework to guide the assessment process, we specify a 6-step model to assess the initiation, interaction, and impact of academic advising practices (He - Hutson, 2016).

When assessing the quality of education should be considered an area involved in the assessment, which takes place. There is a difference, and we will assess the quality of the education system, the quality of schools and the quality of teaching, although all three levels of the pyramid are interrelated and interdependent (Nucem.).

The ability to predict what university course a student may select has important quality assurance and economic imperatives. The capacity to determine future course load and student interests provides for increased accuracy in the allocation of resources including curriculum and learning support and career counselling services. Prior research in data mining has identified several models that can be applied to predict course selection based on the data residing in institutional information systems. However, these models only aim to predict the total number of students that may potentially enrol in a course.. This association with student identity is not always feasible due to government regulations (e.g.; student evaluations of teaching and courses. The results demonstrate that the accuracy of the student course predictions was high and equivalent to that of previous data mining approaches using fully identifiable data. The findings suggest that a students' grade point average relative to the grades of the courses they are considering for enrolment was the most important factor in determining future course selections. This finding is consistent with theories of modern counselling psychology that acknowledges self-efficacy as a critical factor in career planning (Ognjanovic at al., 2016).

Applied Informatics may have an important role in the strategies for attracting and retaining talent in Computer Science (CS) studies and careers. Contrary to the continuing growth of the informatics industry in Europe the number of CS experts (students, graduates, teachers, etc.) is declining. This decline is producing negative consequences in the technology field that affect other sectors like business and education. The purpose of this PhD study is to determine if the strategic implementation is an effective means to counteract the declining trend. The research will: Identify the negative consequences of a declining interest in CS studies in Europe; determine the factors which motivate young Europeans to pursue or reject CS studies and careers; analyse CS curricula and how technology can enhance teaching and learning of the unique skills required to become a computer scientist, thus increasing the interest in CS studies and careers amongst young Europeans (Porta, 2010). Students graduating from this programme develop the ability to work on applied problems. Graduates after finish study at the university will use their knowledges in variety areas. They can offer high theoretical, practical and analytical skills.

Accreditation can be referred to as the procedure followed for official recognition or quality assurance. It provides the opportunity of promoting excellence in the field of education. It can be stated as the process in which the quality of an educational institution or a particular educational programme is evaluated so as to formally recognize it if it meets certain standards. As per the exponential growth in the number of engineering colleges in India, the process of accreditation is becoming a necessity in order to maintain the standard of education in the engineering institutes (Kohli, 2014). According to the continuous changes in technology there is a need for continuous changes in rising area of higher education like engineering for the development and evolution of nation in world. For this, there is a need of educational accreditation. Educational accreditation is classified into

different categories like primary educational accreditation, secondary educational accreditation and higher educational accreditation. Accreditation of an educational program is a continuous process which should meet specific standard of quality required for education. There are many points has to be consider for accreditation process (Gonge - Ghatol, 2014).

Modularity is one of the most important quality attributes during system development. Its concepts are commonly used in disciplines of information technology courses, mainly in subjects as software project, software architecture, and others. However, it is notable among certain groups of students that this issue is not fully absorbed in a practical way. Although some researchers and practitioners have approach themes like this, there is still a lack of research about how modularity can be approached in IT courses. This paper presents a systematic mapping study about how the modularity is addressed in education. The main objective is to understand what the main areas in this field are and find more interesting points of research to improve the practice of modularity during IT disciplines (Lima at al., 2015).

### **Educational policy**

The University of Ss. Cyril and Methodius has developed its own basic document Quality Policy titled: *internal system of quality policy at UCM*. Policy, strategy and quality assurance procedures are official and are publicly available. The principles of quality UCM:

- The system has a complex character and is uniform for the whole university;
- The system supports the achievement of strategic objectives of the University;
- The system is elaborated in accordance to national and international Quality Assessment Framework universities;
- The system is open, flexible and focused on continuous quality improvement;
- The system is aimed at strengthening the ongoing feedback from stakeholders and visibility objectives and results of the faculty;
- The system includes the participation of students, employers and other interested parties in the evaluation of quality.

Internal directive regulates cyclic monitoring and assessment of study programs at the University of Ss. Cyril and Methodius in Trnava (further 'UCM'). It is focused on rules, organizational charts and structure evaluation of programs in accordance with internationally accepted evaluation scheme designed for higher education institutions. The cycle of evaluation of programs was processed according to standards and guidelines for quality assurance in the European Higher Education Area, processed organization European Association for Quality Assurance in Higher Education (ENQA) and the monitoring of good practice in the implementation of evaluation systems of European universities. Internal guidelines governing the procedures and framework in which the UCM committed to develop and monitor the effectiveness of the quality system. The

Directive contains binding rules of quality assurance in various fields and at various levels and to various stakeholders. Basic quality policy processed in the internal:

- Linking education and research.
- Quality assurance of teaching staff.
- Monitoring and evaluation of programs.
- Monitoring and evaluation items.
- Control and monitoring of educational process through classroom visits.
- Surveys of relevant target groups in education.
- Assessment of students.
- Evaluation of teachers.
- Monitoring and evaluation of quality in science and research.
- Monitoring and evaluation in the field of international relations and cooperation.
- Student support and involvement of students in internal quality system.
- Public information and information systems.
- Provision of material, technical and information resources to support student learning needs appropriate learning programs.

### Education as an economic indicator

The definition of competition-ability of the European Union emphasizes the needs of citizens. Competitiveness enables a country to offer its citizens a growing quality of life and employment for all who want to work.

The EU continues to increase its emphasis on the quality of education in the individual member states, however it fully respects the sovereignty of states in the organization of their educational systems. The responsibility for content and systems of education is fully within the competencies of the governments of the EU member states. Quality school is understood to be a basic prerequisite for the quality development of education of children and students. It is understood in all its aspects, from technical equipment to professional composition of the educational staff. Preparedness and motivation of teachers is seen as a key prerequisite of education of pupils and students in the strategy. Tools and implementation methodologies are ready for school educational systems to achieve all goals of the Strategy 2020 document. All three key aspects are covered: regulative tools, economic tools and information tools. Priority subjects were also established.

Education became one of the key subjects of the Lisbon strategy, defining educational goals intended to help achieve the overall objectives of the strategy. A system of introducing new technologies into education was prepared due to the fast development of information technologies, defining the needs for life-long education. Given the globalized environment of Europe, there is an emphasis on teaching foreign languages and digital literacy.

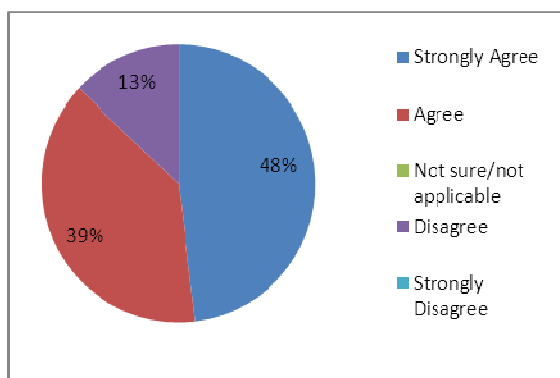
The aim of our research was to determine quality of study of bachelor programme. An anonymous questionnaire was used in the research that we carried out to determine how students evaluate the quality of this program. The questionnaire was divided into sections:

- *In the first section* a short introductory text about the intent of the questionnaire was presented followed by demographic data about a student: age, sex, student's current grade etc.
- *In the second section* was implemented database of questions about the quality of study programme (curriculum). We were examining differences in content, subjects composition, which subjects are at least beneficial and the most useful for market needs or if students consider useful theoretical knowledges obtained from lectures during their seminars. The questionnaire was anonymous and used electronically. Electronic questionnaire was created using Google Docs and distributed via an electronic link sent to students.

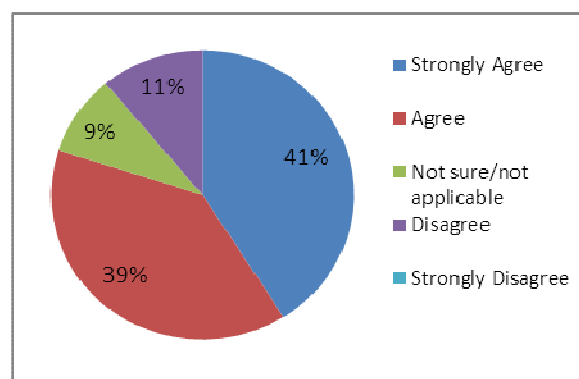
Participants were 76 bachelor students (60 males and 16 females) with the mean age of 21.6 years (range: 19 - 23 years). The research sample consisted of university students in third level of education. Students participated in the research on a voluntary basis, i.e. they could decide for themselves whether they will take part or not.

### Research evaluation and practice recommendations

After obtaining specific data we have them evaluated and graphically illustrated. Of the more than 25 items in the test, we selected those that we think in terms of interpretation to the topic the most important.



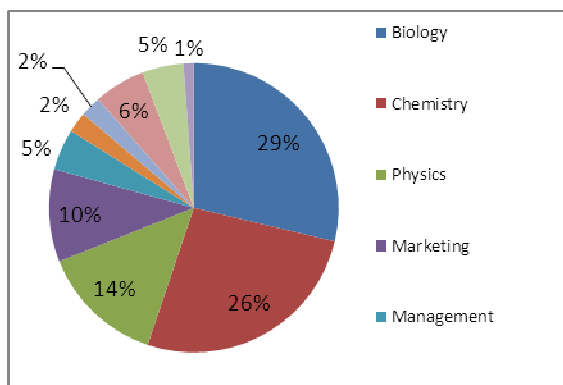
**Fig. 1.** Is evident consistency between the name of the study program and its content?



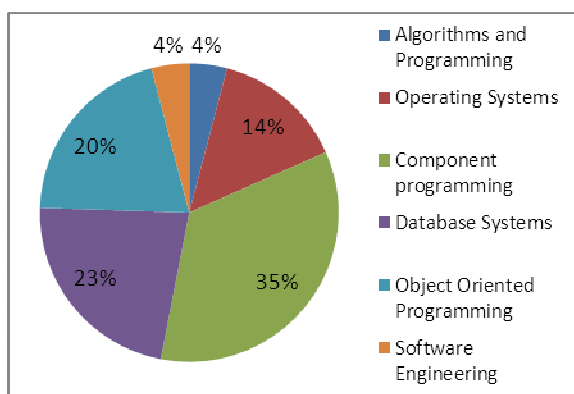
**Fig. 2.** Does agree study programme composition with the graduate profile of a student?

We have asked students of bachelor's degree, program study of Applied Informatics: "Is evident consistency between the name of the study program and its content?" (Figure 1). We have investigated this issue, or indeed the content of study during three years of their study corresponds with the name of the degree program. More than 48% of students strongly agreed, 39% agreed. Overall, therefore, it expressed, or course content corresponds to the agreed program, nearly 87% of all students. Only 13% of students did not agree with the view that the name of the study program does not match the content. The reason could be that the students probably pointed to the absence of some subjects during the study.

Based on the above, we wanted to confirm the question with the next question in the questionnaire, which was: "Does agree Study program composition with the profile of a graduate student? (Figure 2). "This question surveyed the views from students, or individual objects that have been designed in each semester during every year of study correspond to the profile of the graduate. Based on the results, we can confirm, more than 41% of students strongly agreed with the view that the composition of the study program equivalent to filling a graduate of Applied Informatics. More than 39% of respondents agreed with this view, with 80% of students agreed with this view. Only 11% of students Applied Informatics disagreed with this opinion and requested for more innovative composition of study program of Applied Informatics. Only 9% of students did not answer for the question.



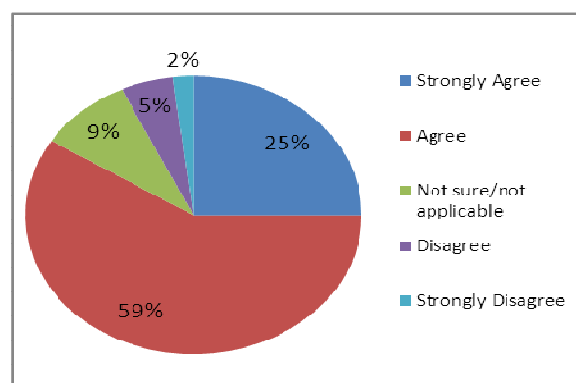
**Fig. 3.** Which subjects of the study program are at least beneficial for the market need?



**Fig. 4.** Which subjects of the study program are the most useful for market needs

Other question that we have investigated from students about the quality of the study program was the question: „Which subjects of the study program are at least beneficial for the market needs? " (Figure 3). This question is one the most important for us, because it identifies which subjects during the study were, for students at least beneficial. Based on the above we can confirm more than 29% of students answered Biology, followed the subject: Chemistry, said 26% of students, and Physics 14% of students. Up to 10% of students reported that the subject of Marketing for least important, followed by 5% subject Management, Accounting 2% of the students said. Subjects that students identified as at least will be remove from new study program at the next accreditation process. More students these subjects not offered and will be replaced by new - attractive and more important subjects from the perspective of practice.

On the other hand we wanted to know which subjects students designated as important for extra practice and their future professional activity. More than 35% of students said that the subject is most beneficial for them Component programming and 20% students Object Oriented Programming i.e., that up to 55% of students deemed most beneficial to market needs programming, ie programming skills. It followed by a further 23% of students who identified the subject Database Systems 14% and Operating System. The remaining 4% of students identified as being most beneficial articles Algorithms and Programming and Software Engineering. In terms of commercial offers that are placed on the site Job, we can confirm the dominance of IT sector offers the most bids is aimed at the programming, database systems and operating systems. These skills are also important for positions as an analyst and consultant of software development. Mentioned objects which gained most evaluation by the students will be widely teaching time from the perspective of seminars.



**Fig. 5.** Are there useful theoretical knowledges obtained from lectures during seminars?

The last graph shows the question: "Are there useful theoretical knowledges Obtained from lectures during seminars?" (Figure 5). As we can see from the responses of students, more than 25% said they strongly agree with the question that the theoretical knowledge of the use of lectures during seminars. Followed by 59% of respondents who agreed with that view. Jointly agreed with the interconnection of more than 84% of respondents. Only 9% of respondents were unable to

comment. 5% of students disagreed and 2% strongly disagreed with the statement that the knowledge gained during the lectures are applied during seminars.

Strategic projects and goals on national levels are approved by the governments of the individual states in accordance with these essential objectives of the EU. With the ongoing transformation of education on the national level of all member states of the Union, a disproportional number of plans, projects and other documents are set forth at such rates that the implementation of one is not completed before another one is issued. Educational laws alone are amended several times per year. The goals of education are established by political priorities of the individual ministers of education, rather than on the basis of professional materials, and the ministers are often changed several times during one election period.

Upon evaluating the answers, many questions and hypotheses arose, suitable for further research or verification. The key subjects of further research should focus on detailed identification of the methods of educating students in regard to their current habits from school.

Another serious matter suitable for further research is a detailed study of the motivation of students for their further application in work life. The European Union strategy is targeting knowledge-based economy. Do the students realize what is expected from them? Do they want to focus on science and research? Do they consider it prestigious? Or are they primarily motivated by financial rewards? Are the EU representatives and the individual member states able to ensure sufficient financial rewards for scientific workers?

## Conclusions and discussions

Based on these results we have obtained from students, we can confirm that in the upcoming respectively. The updated program of study for future accreditation be omitted certain subjects and did not offer further students during their studies. In addition, students will have an extension of time should be earmarked for teaching subjects have identified as being most beneficial for practice. It also plans to expand study program for other new items that could increase the attractiveness of study programs, such as. Project management for IT, game development and game programming etc.

Education policy is regarded as a coordinated policy. Each member state of the European Union individually defines its system for upbringing and education. The EU merely helps the member states establish common goals. In 2000, the document known as the Lisbon Strategy became the key strategic document that notably also touched the area of education in the EU. Given the globalized environment of Europe, the document emphasizes the teaching of foreign languages, creating a system of new educational methods using the internet and digital literacy. Further documents followed the Lisbon Strategy, with the current up-to-date program titled *Education and Professional Development 2020*. Quality education and professional training are essential for resolving the social, demographic, environmental and technological challenges of the world.

It is necessary to prepare high-quality programs focused on the basic subject of education that would solve the key areas of education regarding language training and motivation of students for self-education. The program should have clear and specific established goals that may not change 'annually' according to political decisions, but should be carefully maintained and implemented according to a stipulated schedule. It is critical that the established rules cover the majority population of children and students and not solve only the extremes on both ends - meaning only exceptionally gifted children or, on the other hand, educationally subnormal children.

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