

Soft Skills in Enhancing the Quality of Information Systems Master Education Programme

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Abstract. *Appropriate soft skills combination viewed as the capabilities of graduates in the field of oral and written communication, leadership, teamwork, time management, the ability to systematically think in analysing different situations, solving problems and tasks, etc., have been identified as a major competency in nearly all the professions and the main employers' demands. With completion of the studies in the field of Information Systems (IS), graduates gain knowledge and experience that only partial correspond to the needs of business employers. There is an evidence of an awareness gap resulting in deficiency of soft skills among IS graduates entering the work force that implies the need for better alignment of academic study programs with extremely rapid evolution of business needs. The main purpose of this paper was to present new master's program of information systems as a result of the MASTIS project as a basis for further discussion and researches. The new studying program has been compared with ACS/AIS 2016 recommendations in order to evaluate the enhancement of education quality with introducing soft skills in IS master's curriculum.*

Keywords. Soft skills, higher education, information systems, competences, MASTIS, ACS/AIS, employers

1 Introduction

Technological development has a major impact on our lives and directly affects the characteristics of man and his behaviour (Werber, 2018). The field of computer and information systems science is particularly affected by technological innovations, since employees are exposed to their influence both at work and at home. The tribe of IT programmers` are always recognized as specialists who use a specific expert-slang language which is understood only by their colleagues. As a consequence of work conditions, especially virtualization of software solutions, where different IT specialists work by themselves and with only a few contacts with other people, it can lead to

their asocial behaviour with poor communication skills for team working. Employers identified soft skills of employees as the major competency in nearly all the professions, even in the technical ones. Without them they cannot successfully communicate with clients and coworkers from other professional fields, and thus often result in misunderstanding, unnecessary errors and loss of time in the development of information solutions. It can therefore be concluded that there is the gap resulting in deficiency of soft skills among IS graduates entering the work force that implies need for better alignment of academic study programs with extremely rapid evolution of business needs. Consequently, enormous pressure can be observed on the academic institutions to improve soft skills of their students. As a part of enhancing quality of study programs that should be regularly reviewed and updated in order to reflect changes in IT and its implementation strategy, the academic community recorded that with well-planned studying programs and embedded soft skills in the curriculum, it is possible to shape and develop soft skills among students.

The paper analyses the new master's program of information systems as a result of the MASTIS project as a basis for discussion and further researches. The MASTIS project aims to introduce soft skills into a modern master's study program in the field of information systems at technical faculties in Ukraine and Montenegro. The basic elements of the new MASTIS Master's Program of Information Systems were compared with the ACM / AIS recommendations (ACM, 2019; AIS, 2019) MSIS 2016 (Topi et al., 2017) in order to identified possible differences.

Limitations of this paper concern the presentation of only few results of the MASTIS project. Statistical analysis and their results for each of the project that partners can find on project's web pages.

The remaining of the paper is organized as follows. The next section shows the background and related work of the integration of soft skills in different IT/IS study programs. The third section highlights the important dimension of education quality in order to find appropriate approach for evaluation of new

Master's Program of IS. The fourth part describes specific elements of new IS Master's Program through three quality dimensions: presage, processes and product. The fifth part concludes the paper.

2 Background and Related Work

In higher education one of the main factors of success is the employability of their graduates. In order to increase employability, education institutions and researchers were studying the requirements of employers and industry for individual fields of study. In 2013, an online survey was conducted in the USA (Hart, 2013) among 318 leading companies with at least 25 employees. Almost all surveyed employers (95%) responded that they give priority to employing graduates with the skills that will enable them to contribute to innovation in the workplace. Considering this study, an important result is that almost all respondents (93%) agree that "The proven ability of a candidate for critical thinking, clear communication and solving complex problems is more important than their undergraduate studies". More than three out of four employers replay that they want more emphasis on helping students develop five keys of learning outcomes; critical thinking, complex problem solving, written and oral communication, and the use of knowledge in real environments.

According to the Terminology of European education and training policy of The European Centre for the Development of Vocational Training (CEDEFOP), the competences are abilities to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development. They define skill as ability to apply knowledge and use know-how to complete tasks and solve problems (CEDEFOP, 2014). Soft skills can be seen as a personal and interpersonal skills such as communications skills, team work, time management, problem solving, self-motivation and decision making. From the IT engineering perspective, the term "soft skill" includes also the managerial and entrepreneurial skills, understanding of business processes, finance, economy etc.

In literature there are examples of inclusion of writing in multiple places in the Computer Information Systems (CIS) curriculum to meet the expectations of industry for entry level employees. Writing as a soft skill was introduced in form of Writing to Learn (WTL) and Writing in the Disciplines (WID). It has been concluded that the use of both WTL and WID techniques in the CIS curriculum has improved student engagement both in and out of the classroom and improve student writing and learning (B. Saulnier, 2015). The same author, (B. M. Saulnier, 2016), stated that employers require an employee with soft skills along with hard skills specific to their field and he introduced a system of High Impact Practices and The

Essential Learning Outcomes (Knowledge of Human Cultures, Intellectual and Practical Skills, Personal and Social Responsibility, Integrative and Applied Learning).

Jerod-Wilkerson (Jerod- Wilkerson, 2012) studied the soft skills significance in the perception of alumni of the Managing Information System (MIS) higher education study program. The author found that the skills in the non-technical categories, soft skills, are more important to succeed in Management IS career than knowledge, skills and abilities from technical categories.

Saulnier reported (B. M. Saulnier, 2017) about adaptation of the Computer Information Systems undergraduate study programs in order to introduce soft skills learning in study programs curricula. Based on that, the students had to have opportunities to develop/improve their personal and interpersonal skills that employer place at the top of their wish-lists for new employees. As a result, they engaged in individual and collective problem solving, they developed ability to effectively work in team environments, to comfort working in a world of changes and adapt to new/changing technologies. Student reaction to the adoption of these changes throughout the curriculum was recorded as very positive.

Woodward et. al. (Woodward, Sendall, & Ceccucci, 2010) studied the integration of soft skills and competences through project learning at three universities. They suggested that IT students should use a combination of experiential learning, planning process, collaboration and learning strategies with a case study. The results showed that the usage of these teaching methods directly influence the usage of students' soft skills.

Two professional associations can serve as referential points for providing the guidelines in research, teaching, practice and study of information systems around the world: ACM and AIS. Association for Computing Machinery (ACM) represents the world's largest educational and scientific computer association, provides resources that promote computing as a science and profession (ACM, 2019). AIS as "Association for information systems" (AIS, 2019) serving society with the advancement of knowledge and the promotion of excellence in practice and the study of information systems.

Burns et al. examined whether the knowledge and skills required by employers from the new graduates of information systems programs are consistent with current ACM / AIS guidelines for study programs in information systems. The authors examined the requirements of job vacancies in the field of information systems within four months. They showed that potential employers are interested in a "soft skills", such as written/ oral communication, teamwork, problem-solving skills, and general technical skills (Timothy Burns, Yuan Gao, Cherie Sherman, 2018).

In 2010. a comparison of these findings with ACM /AIS recommendations pointed to the obvious gap

(Topi et al., 2010). In that time, ACM/AIS's guidelines contained only knowledge, skills and abilities from the field of management and communication, the ability to work individually and to work in the organization. According to these findings at 2016., ACM/AIS's recommendations were updated.

The comparison result of 18 universities and 108 study programs made by Powell et al. ((Powell, Krause, & Jones, 2018) were more business oriented modified study program that enabled IT students to obtain knowledge and skills of leadership, team building, problem solving, searching novelties and making decisions with a social sense, considering legal and ethical norms.

The required knowledge for system analytics group of jobs were surveyed by Lang et al. (2015). They identified a lack of soft skills divided into two groups: intrapersonal and interpersonal skills. Intrapersonal group of skills were considered as the ability to break complex problems into smaller ones and ability to think things through. Among the interpersonal group, they classified: the ability to work in a team; facilitate workshops, meetings, and conference calls; conduct interviews and communicate with different audiences (Lang, Jones, & Leonard, 2015).

The soft skills based on the learning of the SCRUM methodology throughout project management in the field of engineering was introduced by Stawiski et al. (Stawiski, Germuth, Yarborough, Alford, & Parrish, 2017). The application of SCRUM methodology requires group work, the ability to manage, organize, analyze and to solve problems, report and to work under time pressure. The activities are organized through several repetitions - sprints, in the period of 2-4 weeks and they contain several sessions of team's meetings. Different software tools were used for tracking the progress of each participant and the group as a whole. During the project, students played different roles (Scrum master, Product owner or Team member). Students' responses from classical lectures and lectures which included the practical use of the SCRUM methodology were compared. The results show students' favoring renewed lectures, and they expressed the desire to elect more engineering courses if they were taught in the similar way.

3 The Dimensions of Education Quality

Quality in Higher education as a concept lacks a common definition that could be applicable in all fields, for every phenomenon or any subject (Barrett et al., 2006). With respect to the goal of this paper, the authors adopt the meta-quality concept to "Quality as transformation" (Harvey & Green, 1993). According to this transformative conception, the main customer of the higher education is a student whose understandings, attitudes and objectives change and

evolve in the course of the study process. The better the graduate can manage in the future working life with the help of the the knowledge, experience and skills acquired at the university, the more fully has the particular university fulfil its goals.

For the purpose of this study, the authors apply the commonly used "3P" model categorising dimensions of quality (Biggs, 1993), which approach education as a complex system with "Presage", "Process" and "Product" variables interacting with each other. This model is almost the same as the one used by large-scale quality measurement framework: the "Input-Process- Output" model. Presage variables are those that exist within a university context before a student started learning and before he was being taught, and include description of the important aspects as: resources, the degree of student selectivity, the quality of the students, the quality of the academic staff and the nature of their research. Process variables are those that characterise what is going on in teaching and learning and that include class size, the amount of class contact and the extent of feedback to students. Product variables concern the outcomes of the educational processes and include student performance, retention and employability. Products can also include psychometric measures of generic outcomes of higher education, such as students' ability to solve problems (Bevanda, Brenko, & Frankovic, 2014). Modified "3P" model tended as a basic framework for description of important elements of the MASTIS's collaboration experiences.

4 Education quality dimensions of Modern Master-level Studies in Information Systems - MASTIS

4.1 Description of Presage and process variables of IS education quality

As an example of the introduction of soft skills in study programmes in the field of Information Systems, some results of the MASTIS project have been used (Chauchat, 2019). The MASTIS project, funded by the Erasmus+ Programme of the European Union, aims to improve the master level studies in Information Systems (IS) according to the needs of the modern society. The outcome of the project, the new master level study programmes, have enabled the Partner Country and EU Universities to modernize education in the field of IS. The new master study programmes have to provide students a smooth transition to the global IS labour market, incorporating student-oriented principles, modern educational approaches and strong cooperation with the industry sector.

Current curricula in IS has been updated according to the Bologna requirements and new developments in information technologies and therefore had provided an innovative academic environment for IS programme

as a platform for training/retraining, PhD and long-life learning. Nine EU partners have advised seven Ukrainian and two Montenegrin partners during the process of modernization of the IS curricula. The project has begun on the 15th of October 2015 and will end at October 2019. The sustainability strategy based on the interactive links between university and industry, will ensure the continuation of the proposed study programmes.

The project was divided into six work packages that described individual activities and responsibilities between partners. The tasks of Slovenian partner were:

- Examine the demands of employers to master graduates in IS;
- Education of lecturers in partner countries (Ukraine and Montenegro);
- Analysis of existing master study programs in IS;
- Development of a new master study program in IS;
- Setting up websites and laboratories at partner institutions;
- Preparation of study materials;
- Implementation of pilot exercises;
- Quality monitoring,
- Dissemination and use; and
- Project management.

Task of the EU partner was to examine the IS graduate requirements from employers/industry point of views, to help in the preparation of a new IS study programme, evaluate new IS programme and their contents, prepare study materials, evaluate study materials and the diploma theses, advocate students of pilot lectures, disseminate information about the project and to evaluate the implementation of new IS study programmes at partner institutions.

The variety of method and methodologies were used in order to create a new Master-level Studies in Information Systems area. After the literature review and their analysis, set of questions were formed and used in interviewees during the meetings and through web questionnaires to Alumni members or members of Universities/Faculties program boards.

4.2 Description of product variables of IS education quality

As a result of international collaboration of project members from 12 countries represented by 17 Universities and Ministry of Education and Science of Ukraine a new master study program was formed. It contained detail descriptions of subjects, competences, contents and teaching methods for as much as the requirements of employers.

The main elements of the proposed study program can be found in Table 1, Table 2 and Table 3.

The proposed curriculum contains the competence areas/ subjects shown in Table 1.

Table 2. shown the list of the Programme Learning Outcomes.

In Table 3. Personal and Social Learning Outcomes were representing the soft skills required by employers.

Table 1. Proposed new IS master study programme

Competences Area	Competences
Systems Development and Deployment	1. Managing plan-based, hybrid, and agile development approaches
	2. Specifying and documenting systems requirements
	3. Managing IS development projects
Data, Information and Content Management	4. Selecting appropriate data management technologies based on the needs of the domain
	5. Integrating and preparing data captured from various sources for analytical use
	6. Selecting and using appropriate analytics methods
Innovation, Organizational Change and Entrepreneurship	7. Developing a business plan
	8. Understanding how to apply creative problem solving to technology-related issues
IS Strategy and Governance	9. Engaging in IS strategic planning
	10. Planning and implementing IS governance
Enterprise Architecture	11. Understanding enterprise architecture principles and the value it provides to business
	12. Communicating and deploying an EA
Business Continuity and Information Assurance	13. Implementing and managing quality audit processes
	14. Managing Information Systems risks
IS Management and Operations	15. Managing IS/IT projects and programs
IT Infrastructure	16. Monitoring emerging technologies to understand their potential to support the domain

Table 2. Proposed new IS master study Programme Learning Outcomes

Programme Learning Outcomes	
No.	To be able to:
1.	understand essential concepts, facts, principles, and theories of information system
2.	understand the diversity and state-of-the-art in area of information system
3.	analyse, model, and evaluate organization's business processes from the perspective of information systems development
4.	apply various methods of information systems analysis
5.	understand problems of users of information systems, to be able to identify, analyse and specify user requirements
6.	manage information systems development projects and identify, analyse, evaluate, and solve the arising management problems
7.	identify, analyse and understand unorthodox problems of information systems development
8.	apply various methods of information systems design
9.	apply methods of knowledge, metadata analysis and information
10.	identify, find and evaluate information relevant to information systems by using data bases and other sources of information
11.	apply various computerized tools for model driven information systems analysis and design
12.	choose and apply various technologies of information systems' development
13.	apply various tools for management of information systems projects
14.	develop innovative decisions for IT business creation and support

Table 3. Personal and Social Learning Outcomes

Personal and Social Learning Outcomes:	
No.	To be able to:
1.	think systematically when analysing different situations, solving problems and tasks
2.	apply the acquired knowledge creatively
3.	work individually with minimum guidance, manage one's work and time
4.	work efficiently in a group, manage the team, and act collectively
5.	understand the impact of information systems solutions on the society and environment and their economic aspects

Enriched courses with adequate soft skills should equip graduates with the necessary knowledge for modern society.

4.3 The Snapshot of Comparison Results

For comparison, the authors took the recommended MSIS 2016 global model of competences for graduate and master programmes in information systems by ACM/AIS (Topi et al., 2017), which propose nine areas for the competence of study programs:

- Business Continuity and Information Assurance;
- Data, Information, and Content Management;
- Enterprise Architecture;
- Ethics, Impacts, and Sustainability;
- Innovation, Organizational Change, and Entrepreneurship;
- IS Management and Operations;
- IS Strategy and Governance;
- IT Infrastructure;
- Systems Development and Deployment.

The competences areas of new program were the same as proposed by MSIS 2016. Ethics, Impacts, and Sustainability were missing with different order of competences areas listed.

MSIS 2016 proposes the following personal core competencies:

- Critical thinking;
- Creativity;
- Cooperation and teamwork;
- Ethical analysis;
- Intercultural competencies;
- Management;
- Mathematical and statistical competences;
- Negotiation;
- Oral communication;
- Problem solving; and
- Written communication.

Comparison of personal core competencies from MSIS 2016 with personal and social competences from the MASTIS master IS study program shows that most of the competencies are consistent. Mathematical and statistical competences with negotiation and ethical analysis were missing. Mathematical and statistical competences were indirectly included at new IS curriculum through different subjects such as Data, Information, Content Management, Data management, Data mining and Data analytics. Ability to negotiate can be practiced in team work. The ethical analysis can be seen as missing as a main difference with respect to MSIS 2016. It could be added to the content of understanding the impact of information systems solutions on the society and environment and their economic aspects.

It can be said that the vast majority of personal and social competences, in these two analysed study programs were almost the same. The differences refer to the description of competencies and the study level where they have to be adopted.

Not only personal and social competences can be considered as a soft skill. It can be found that graduates from technical background missed the business knowledge of organization, finance or enterprise

architecture. Such as situation can be noticed, for example, in case of an Enterprise resource planning (ERP) software solutions development. ERP mediated by software and technology, integrated management of the main business processes, nowadays in real-time. To overcome occurrence of the further competences gap, MSIS 2016 recommends Enterprise Architecture and Innovation, Organizational Change, and Entrepreneurship In that way, from historical points of view, once again technical students will get addition of obligatory courses from business economies area in their study curriculums. As a curiosity it can be mentioned that in the technical museum of National Technical University Kharkiv Polytechnic Institute in Ukraine, founded at 1885, you can find the diploma and curriculum of their first engineers with the business economy as obligatory courses.

4 Conclusion

“It is just as important to focus on pedagogy (how we teach) as it is to define our curricular content (what we teach) in meeting employer demands for successful 21st century CIS graduates.” Saulnier, 2016.

Almost several decades researcher and professionals from IS field urge that soft skills are needed for IS specialists. At the end of the MASTIS project, the new master IS study programme was presented and introduced to the professors at technical faculties in Ukraine and Montenegro. Not all participants agreed with the importance of soft skills for their graduates and this is one of the reasons why the changes in the field of engineering come so slowly. As a result of the pilot implementation of the MASTIS` s project results, few months ago, it was possible to attend the defense of the student final work which was held simultaneously in the French, English and Ukrainian languages.

Additional implementation problems of the project results concern the usage and exchange of modern pedagogical principles used in classroom. On the teaching staff is to accept and deliver the proposed changes in a suitable way to the students. Teaching students in new classrooms with new equipment without application of new teaching methods or without administrative support of institutions can spoil the result of this large project. As an example, one of the authors had the opportunity to teach students with the new classroom and new equipment as a result of the MASTIS project. During the lectures, he founded that the software for teaching did not have appropriate license agreement. He was forced to improvise the lectures with students` personal laptops and with limited access to professional literature sources.

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