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(editors)

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It is represented that book articles will be interesting for experts in the field of information technologies as well as for practical users.

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BUSINESS INFORMATICS STUDY IN CEE COUNTIES

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***Abstract**: The conditions of the IT-industry, opportunities and problems of preparation of IT-specialists in CEE-countries has been described. The ways of improvement of cooperation between IT-companies and universities for increases of IT-education quality and its level have been offered.*

***Keywords**: business informatics, bologna study architecture, IT, IT-specialist, CEE-countries.*

Introduction

Nowadays when Information and Communication Technologies (ICT) play an important strategic role for business success, enterprises are challenged to efficiently leverage their most valuable and underleveraged resource: the intellectual capital of their highly educated, skilled and experienced employees. This challenges academia to provide students with excellent education comprised of interdisciplinary Business Informatics competences and up-to-date research results.

The Bologna Study Architecture challenges universities and other higher-education institutions to change the structures of educational programs, to provide new academic degrees, to establish, adapt and enhance new quality frameworks and criteria and to increase the level of international cooperation both in research and in academic programs. The provision of new modular curricula in Business Informatics needs to tackle, especially at a Masters' Degree level, the topics of knowledge communication and evaluation, methods and content delivery in the context of technology-based knowledge transfer, quality criteria and performance indicators for education.

A raising number of cooperation between academia and industry on a research level provides both sides with beneficial, application-driven research results. The selection of appropriate research methods and tools is of utmost importance in this context especially in the view of industry-driven research initiatives as well as in empirical research. One aim of such concepts is to investigate approaches and offer for the storage and delivery of knowledge in enterprises that become essential pillars in the context of worldwide competition. Tightly linked to it is also the question of distribution and communication of research results as well as general legal conditions of intellectual property and interdependencies of law and technology.

Considering the impact on industrial projects, staffing requires fitting skill profiles and clear qualification requirements for enterprises. Therefore the business strategies in CEE countries and the alignment to the corresponding HR and IS strategies must be clearly defined. Nevertheless, cultural, social, economical and educational differences can be an additional hurdle for enterprises when they consider concepts like outsourcing and offshoring. From this point of view it is seen as especially interesting to also have Best Practices and Case Studies for ICT-applications in CEE countries.

Business Informatics in Romania

Education in the field of informatics in Romania has a pyramidal structure, with specialized informatics and general education high schools at the base, BA and MA studies at the middle level and PhD studies at the top.

Historically, the first ones were the BA studies within the Departments of Computer Machinery a the University of Bucharest and BBU, at the Faculty of Mathematics in 1959. The computer science studies started in 1964 at the Faculty of Automation and Computers within the UPT and in 1967 a the PUB. Today, many state and private universities have Informatics and/or Computer Science Faculties.

Representatives of the openness in 1965, Grigore Moisil and some other intellectuals explained to Ceausescu that the economy could not work without informatics. In this respect, in 1967 CEPECA (the Centre for the improvement of the staff) was founded, financed by the UN that had the mission to prepare top managers in

Romania. The lectures were held by UN experts. These delivered lectures to the top managers to make them sensitive to computers, information systems and economic informatics (EI).

Some presentations were delivered concerning informatics and its usages between 1965 and 1969 at the Cybernetic Committee of the Romanian Academy, led by Grigore Moisil. The participants analyzed the curricula of the new Informatics Departments. The conclusion was that the curricula contained much more unusable mathematical theories and lacked in economic disciplines. For this 1967.

To illustrate the difference between informatics and EI they explain this to their students: "An e-shop can be made by students from computer science, informatics, you or even pupils from high school You have to assure the knowledge about management, marketing, finance, accounting, simulation and forecasting, business plan etc. You need to be able to make an e-business by this."

The curriculum is conceived by respecting some basic principles as the following:

1. The preparation needs to be interdisciplinary, it covers 4 areas: economic sciences and business, computer science, intermediary disciplines, and complementary disciplines. 30-40 percent of our graduates are working in informatics, 20-30 percent are working as employees in different economic fields, and the rest have their own business in different fields.

2. The preparation needs to be differentiated for each level of study.

3. The preparation needs to assure a balance between theory and practice.

The BA prepares operational personnel and first-level managers. In Romania, the economic and business software companies are well developed and need specialized testers, programmers, technical assistants, data base and data warehouse administrators. Some of them have their own SMEs.

The MA prepares people for EI analysts, middle or top managers in the same or different economic and business fields. One of the alumni, who is an economic top manager of a German-Romanian company said: "I have to admit that since my graduation I have never written a program line, but EI has taught me to analyze differently the problems, data and knowledge in the company."

The PhD level usually prepares top managers, personnel for higher education, top analysts and EI developers, as ERPs, core banking systems, e-Business systems, economic and informatics advisor etc.

Some of our alumni are working abroad, from Australia to Canada. There are 30-40 of our alumni working only in Paris alone.

Referring to the curriculum, we can mention that:

The BA has 220 ETCS, 20 for the Diploma. 3 semesters assure the general preparation and the other 3, the specialization. The first 3 semesters represent 30% of the courses mainly in economic and business subjects (economics, management, marketing, accounting, and finances, international and European business etc.). Other 40% include informatics (algorithms and data structures, programming languages and environments, design of IS, 2 Data Bases courses, introduction to Artificial Intelligence, ERP/EAS, web design and Internet programming), intermediates 20 % (e-Business, testing of the programs and systems, 2 practical stages), 10% complementary (modern languages: main language English and secondary languages that can be German, French, Spanish, or Italian, business ethics, philosophy and sociology, history of economy etc.). 80% of the courses are core, 20% being optional. The BA exam consists in a Diploma Paper.

At the graduate level there are two kinds of curricula.

The one-year graduate Economic Informatics and Information Society has 70 ETCS, 10 for dissertation. This program is 50% informatics (C Sharp, CORBA and Java, Programming on components, Special chapters in Data Bases), 50% intermediates (special problems of e-Business, Decision Support Systems, Banking and finance information systems and EI systems engineering and reengineering).

A two-year master program totals 130 ECTSes, of which 10s are for the dissertation. The curricula contains: the first semester - economic core 20% (collaborative management, strategic marketing, finance administration), 10% - informatics; the second semester - 30% core informatics and intermediates (Knowledge Management,

Advanced programming environment, EI project management and design, Advanced Data Bases, Programming engineering and Artificial intelligence). The third semester is dedicated to the specialization and represents 30% of the curricula. The e-Business program includes e-Business design and development, m-Business, Grids and distributed systems, Virtual enterprises and business; the Decision Systems Program includes DSS design and development, Special issues in ERP/EAI, Simulation, Component programming and development. The last semester represents 20% and contains the Praxis and two specific optional courses. The graduate level is concluded by a dissertation. An interesting study was made in [1]. The author made a survey modeling the EI students profile based on questionnaires and data-mining.

The PhD School contains 5 courses. Two of them are from the EI: DSS and collaborative systems and Techniques to design and security of the EI systems; the other two contain economic or business subjects chosen by the students and their advisors. A general subject that is included in all the doctoral programs is Research Methodologies.

Implementing Bologna Architecture – The Case of Business Informatics Curricula in Poland

In a Polish tertiary education system, study majors are a subject of standardization by the Ministry of Science and Higher Education. Universities have limited freedom of creating their own fields of study and their proposals have to be acknowledged by the Ministry.

The field of Business Informatics was never granted an independent formal recognition in the Polish tertiary education. It was always combined with another field of studies. Until nineteen nineties, the field of study concerning the topics related to Business Informatics was called Data Processing and Accounting. After the fall of communism and political and economic changes, also the educational system was also reorganized. New majors were developed including Informatics and Econometrics. This major is offered by faculties of economy or management in general universities, four specialized universities of economics, and various other higher education institutions.

The major Informatics and Econometrics covers wide range of topics related to the fields of Econometrics, Statistics and Informatics, from Mathematical Economics to E-Business and Computer Programming. Various efforts were undertaken in order to establish Business Informatics [as] an independent major field of study. So far they are unsuccessful. Linking up these fields of study is often blamed for an unsatisfactory number of students enrolling in this major. Some students' comments suggest that they are concerned about difficult courses in the wide range of topics. Particularly, students interested in a career in software development or IT consulting question the necessity to take courses on advanced mathematical methods. On the other hand, it is Questionable that a future financial analyst has to study Software Engineering.

The form of unified first and second degree studies lasting 5-6 years was dominant in Polish tertiary education. Separate undergraduate and postgraduate studies were popular only in private education sector and in the form of extramural studies in state owned universities. However, these kind of studies were never considered prestigious in comparison with unified first and second degree studies.

In 2007, in Polish tertiary education, the system of unified first and second degree studies was abandoned following the adoption of the Bologna declaration. New teaching standards for separate undergraduate and postgraduate studies were published by the Ministry of Science and Higher Education, and tertiary education institutions were obliged to adjust their curricula to ministerial standards.

The implementation of the new standards led to the disintegration of well established curricula for unified studies. This process is widely discussed in Poland. Some academics claim that it will lead the deterioration of quality of the studies particularly in the field of hard science. In this case gaps in knowledge and skills from earlier stages of education will be very difficult to catch up. The consequence of this may be a reduction in the quality of education, especially at the master degree studies, due to the enrolment of students previously awarded a bachelor degree

in another unrelated field of study. However, the purpose of this article is not the criticism of the two level studies, but the discussion of its implications for teaching Business Informatics.

Additional problems were caused by the very late publication of the Decree of the Minister of Science and Higher Education including teaching standards for respective studies [2]. It was published in July 2007, whereas it was put into force already on October 2007, forcing the universities to develop their curricula without full knowledge of ministerial standards.

The Decree of the Minister of Science and Higher Education from July 12th 2007 [2] defines new learning standards for the first and second degree studies in 118 majors, including Informatics and Econometrics. The document does not include the detailed curricula but so called "learning content". However in many fields, including Informatics and Econometrics, the elements of learning content are directly reflecting the names of courses listed in the previous ministerial curricula for unified master degree studies [3]. The learning content specific for the area of Informatics and Econometrics in the undergraduate studies includes ten elements [2]: Mathematical Analysis, Linear Algebra, Descriptive and Economic Statistics, Probability Theory and Mathematical Statistics, Econometrics, Financial and Insurance Mathematics, Operational Research, *Computer Programming, Systems Design, Databases.*

Only three often topics are directly in the field of Business Informatics. Similar situation occurs in the case of postgraduate studies, only tree of nine learning contents are within field of Business Informatics: Multicriteria Analysis, Representative Sampling, Dynamic and Financial Econometrics, Mathematical Economics, Actuarial Methods, Statistical Analysis in Market Research, *Computer Networks, Software Engineering, Management Information Systems.*

A characteristic of this standard is little repetition of the learning content on both levels of education. As a result, students knowledge can be considerably different depending on which level of studies they carried out. Moreover, it is hard to find explanation why, for example, Computer Networks are taught at the second degree, whereas Computer Programming at the first degree. Such way of developing the program of study indicates incomplete understanding of the concept of separate undergraduate and postgraduate studies, allowing students to get both degrees in different fields. In fact, paragraph 12 of the very same document states as follows: 'The completion of the first degree studies enables to continue education on the second degree studies in the same or different field" [2]. It can be assumed that the core courses from the curriculum of the unified first and second degree studies were split into learning contents of separate levels, without thorough consideration. The reason for this can be lack of understanding the idea of Bologna architecture, skepticism about the quality of two level studies or, simply, attachment to the traditional curriculum and unwillingness to change.

The Conditions and Perspectives of the IT Study in Ukraine

At the moment Ukraine is facing the tasks of increasing the competitiveness of its economy, changing the structure of its gross domestic product (GDP) in favor of high-technology and science intensive sectors. It is impossible to solve these tasks without onrush of Information Technology (IT) sector due to the fact that it is basic for any economic sector. In the new economy the most valuable characteristics of workers are: informational competence: search and processing of information; creative and analytic way of thinking; ability to work with cycles and projects; ability to solve problems, personal responsibility; effective communication, team work; high efficiency.

The 1/8 of the budget of Ukraine goes to science and education. One can get higher education degree in 348 Universities, where 620 000 students study, this number also includes 30 000 students per year who graduate technical sciences.

Every year in Computer Sciences 1 000 people get a PhD or Associate Professor degree, 9 000 Master of Science, 4 000 - Bachelor of Science. Main centers of IT education in Ukraine are Kyiv (25000 students, 87 universities), Kharkiv (20000 students, 61 universities), L'viv (15000 students, 42 universities) [4].

Every sphere has the problem of training highly qualified professionals, but the IT sphere has the most significant problem [5].

This problem comprises of several factors: novelty and onrush of the sphere, variety of qualification requirements for professionals, high financial expenses on workshops equipment, difficulty organizing professional practice for students, and many others.

The IT evolution is faster than educational system can get used to the changes. New approaches and technologies arise every 10 month, fundamentally new concepts - every 3 years, change operational systems and hardware platform - every 5 years.

Universities do not have enough time to follow the development of IT sphere and, though, I professionals who graduate from the universities cannot go to work without extra skill Nevertheless, there is a lack of such professionals.

The companies are obliged to train their workers which require high financial expenses. There i high demand on financial, human resources and time which are spent on training professionals during their work. Not only IT companies suffer from the lack of qualified professionals, but also the consumers - all spheres of economy, state and population.

One of the biggest problems is also the situation with the professors' qualification degree. These problems can be solved by means of organization of mutually beneficial cooperation between universities and IT companies, as well as the development of research and educational resources.

It is essential for universities to cooperate with IT companies during the process of preparing professionals in order to define requirements that face graduates, to have an advice during drafting teaching plans, which correspond to the needs of modern IT industry, organization of students' practices etc.

Conclusion

We consider that EI is very necessary in the future because of the globalization, the Internet and the Information and Knowledge Society, respectively, where the EI systems need well interdisciplinary prepared specialists. EI education is important for CEE-countries because, in our opinion, the large number of students specializing in finance, banking and other economic departments will decrease due to the current economic crisis. We estimate that the informatics activity will also be diminished because of the increase in salaries in IT in CEE-countries. Finally, this specialization offers our EI students diverse opportunities in the areas of informatics, economics and business.

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