Computer science higher education in Poland. Quality & quantity analysis.

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Keywords

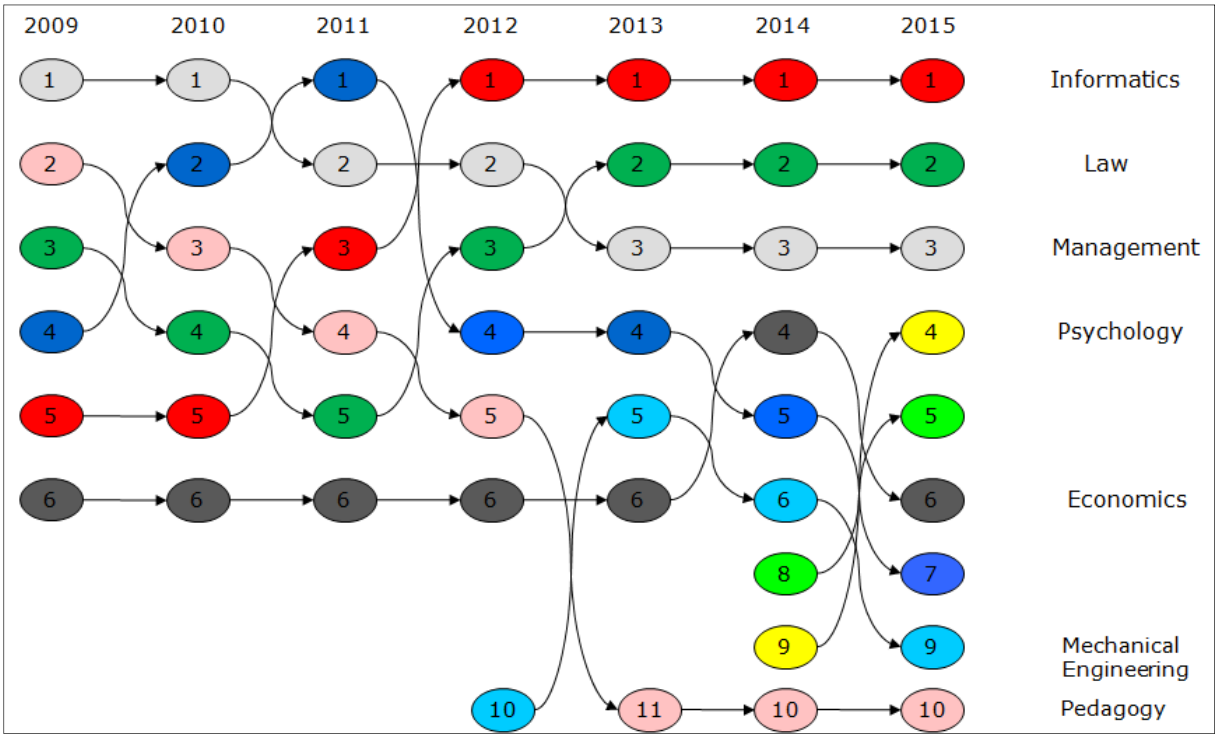
computer science, higher education in Poland, assessment of quality, PAC's assessment

ABSTRACT

The ubiquitous digitization creates demand for IT specialists not only in IT industry but also in other areas of national economy. Digital competences have become major advantage in obtaining an interesting and well-paid job. Employability of computer science graduates reaching 100 % is one of the highest among university leavers. So both interests in ICT technologies and pragmatic approach to future job perspective is the reason that for the last several years we have seen in Poland growing interest of candidates choosing informatics as a field of studies. Computer science from 2012 holds firmly the undisputed leader position among high school graduates who plan further education on university level [see: figure 1].

Figure 1

The most popular fields of university studies in Poland 2009-2015 among secondary school graduates



Comparing the computer science studies enrolment statistics in Europe with Polish ones we can see stabilized trend in most of the European countries and dynamic growth in Poland of 46% in the years 2009-2015. We can expect the same trend to be observed in computer science graduates figures in

the next years. This makes the Polish situation very untypical in comparison to other European countries. Poland may become the main European exporter of IT workforce.

Computer science studies are run in over 100 Polish public and non public universities. Geographical and ownership distribution of computer science studies delivery in Poland over the last years is the next interesting issue to be discussed. Political and system changes after 1989 brought a new category of non public schools which especially in the last few years tried to enter computer science higher education market. Nowadays it seems that academic computer science courses stay firmly at big public universities which are more conservative in curricula and less responsive to labor market needs.

For all Polish universities the basis for creation computer science curricula are the instructions that are included in the national educational standards for informatics, national qualification framework for higher education, accreditation standards of Polish Accreditation Committee and the model learning outcomes defined by the Minister of Science and Higher Education. Educational programs cover the following areas of interest of computer science: algorithms and data structures, programming languages, architecture, computers and computer networks, numerical and symbolic, operating systems, software engineering, database and information retrieval systems, artificial intelligence, human - computer communication, computer graphics. Curricula projects represent all of the above areas of computing interest. The specific objectives, content, learning outcomes and ways of verifying the learning outcomes at the level of subjects are presented in study programs (syllabuses) and graduates professional profiles.

Finally the Polish Accreditation Committee (PAC) is an institution that since 2003, assesses the fields of studies conducted by individual universities / faculties in Poland. One of them is computer science. PAC's assessment is the fullest and most reliable source of quality evaluation of individual universities / departments conducting studies in computer science in Poland. According PAC's information, computer science as the field of study and research has been assessed by the Committee a total of 289 times (17 times PAC abandoned the assessment and in one case, the evaluation rating has not been issued). The number of total issued final grades are as follows: outstanding - 9 positive - 199, conditional - 42, negative - 21. Since 2009, PAC next to the final rating also introduced partial ratings for evaluation purposes. Since 2011, according to the statute of PAC final rating includes 8 sub-criteria: (1) assessment of the field of study development concept, (2) assessment of the educational aims and learning outcomes and a system of their verification, (3) assessment of the curriculum, (4) assessment of quality of academic staff (5) assessment of educational facilities, (6) assessment of the quality of research, (7) assessment of the students support system in learning process , and (8) assessment of internal quality assurance system.

Table 1

PAC computer science faculties assessment results for chosen universities

	University/ Department Name	Faculty development concept	Educational Aims and results and system of verification	Curriculum	Quality of Academic Staff	Teaching/ learning facilities	Quality of scientific research	Student's support In the learning process	Internal quality assurance system	Final rating	Date of final rating
1	University of Information Technology and Management In Rzeszow, Faculty of Applied Informatics	fully	fully	fully	fully	outstanding	fully	fully	fully	Positive	2015-05-21
2	Warsaw University of Technology, Faculty of Electronics and Information Technology	outstanding	fully	fully	outstanding	outstanding	outstanding	fully	fully	Positive	2015-03-12
3	Warsaw School of Computer Science	fully	fully	fully	outstanding	fully	outstanding	fully	fully	Positive	2013-10-17
4	Warsaw School of Information Technology under the auspieces of the Polish Academy of Sciences, Faculty of Computer Science	fully	fully	fully	fully	signific	fully	fully	fully	Positive	2015-06-25

PAC's assessments criteria and results don't involve any elements of e-learning tools and new teaching methods used in computer science delivery. Although some universities use new educational technologies intensively there are no traces of this in PAC's reports.

Computer science studies is the most popular field of higher education for Polish secondary school graduates. The new socio-economic situation in Poland, also in higher education after over 25 past years made no visible changes on computers science higher educational map, although some private universities forced public universities to some extant to be more active in introducing new teaching/learning methods and adapting curricula to labor market needs. These changes are very merely reflected in PAC's assessment criteria. Its the labor market and the students themselves who finally will modernize the system to be more effective, innovative and flexible one.

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AUTHOR'S BIOGRAPHIE

Andrzej Żyławski most of his professional life has been managing educational institutions preparing computer science specialists. 1991-2000 director of Mila College, 2000-2012 rector of Warsaw School of Computer Science. Presently president of Warsaw School of Computer Science. From 2007 chairman of the audit committee of Polish Scientific Association of Internet Education. In 2009 received a New@Poland award for Polish Open Internet Informatics Academia Project from Polish Association of Private ICT Employers. In 2013 received award from Informatics Europe for Best Education Practices in recognition of the outstanding educational initiatives. Research areas involve IT usage in pre and university education, education management and university – business relationships.

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