

Evaluation of Students' Competencies from the Perspective of University Education

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Abstract

In this paper the criteria and the application procedure for evaluation of competencies by students are presented and discussed. The outgoing point for this research is the new approach presented in the paper "Approach for evaluation of professional knowledge, skill, and competence by professors, alumni/students, and industry" /6/. The application of this new approach presented below is focused on students/alumni studying or graduated certain study program at the university. Students are involved in education process of particular study program as its target group. The main aspects and crucial points for research presented are the flexibility and the objectivity of the evaluation. Decisive attributes and their application within evaluation process are explained in detail.

Key words: Evaluation of students' competencies, University education

Introduction

Scientific discussion about competency has many facets and perspectives /1, 2, 3, 4, 5/. Current research is focused on the evaluation of professional competence by individuals represent three groups involved in the educational process at the university /6/. Corresponding approach is discussed and figured out in the paper "Competency and approach for its evaluation" /7/.

Analog to the previous publications /8, 9/ students represent in this research the target group of educational process in certain study program at the university. Consequently they are directly connected with all activities of educational process. This relation might be considered from both points of view – students learn at the university and therefore are the targets of educational process. On the other side students have their own interests and hence contribute to improvement of teaching and learning. Additional to regular lectures and laboratory

tutorials students participate in research and development projects at the university. Many of them have their student jobs in the business or in administration institutions. Following the proposal presented in /7/ the decisive factor for the evaluation of students' competency is their comparability along knowledge and skill characteristics discussed in /8, 9/. Even because of the best skill and/or knowledge available in the project team special student will take e.g. the responsibility about one or another decision. According to this approach competency represents some kind of capability rating in the group in selected field. It could concern professional knowledge, intellectual capacities, and skill. To define the competency of one person isolated without comparison with capabilities of others can lead to ineffective or inefficient decisions and actions. Exact this specific leads headhunter in enterprises to consideration of several candidates for the job and to selection as a result the (most) competent one. Professional knowledge and skill of employee is no guarantee for the good project or team leader. Competency includes many other dimensions and qualities /7/. In the recent scientific discussion about competency and qualification it can be considered as "...the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development" /1/.

According to the investigation presented in /7/ it is difficult to formulate the universal definition of competency (or competence?). In present research the competency is considered as a factor and criterion of educational processes at the university /6/. This paper is focused on evaluation of students' competencies. Proposed in /7/ approach is oriented on comparability of various suitable characteristics used to describe individual capabilities including knowledge and skill. Consequently in the definition of the competency one can utilize characteristics defined in /8/ and /9/ for evaluation of students' knowledge and skill.

Characteristics of competency by students

Generally the consideration of competency can cover a long list of characteristics related to students being within their study of just after the graduation. For instance one can speak about learning competency if the selected student can learn fast and take into account more aspects of content to be understood and prepared for use than others. More detailed consideration can lead to special learning competency for instance in geometry, programming, industrial design and many other subjects relative to the study program under evaluation. In similar way one can consider the results of the learning process and related professional competency. It could be the professional competency aligned on the orientation of the educational program like computer science, mathematics, physics, philosophy, business administration etc. From more detailed view it could be oriented on single subjects like data bases in bachelor program computer science or special functions in master program mathematics. Because of diversity of the study programs at different universities and the huge amount of subjects delivered in these programs it seems to be impossible to consider in this research and to define the competency related to one or another subject. In every individual project one can follow the rules formulated and explained below.

The learning competency will be proposed to evaluate based on the duration of education and results achieved. This way one can use the quantitative characteristics allowed the comparison of selected person with others. Based on approach proposed in /7/ one can define if somebody efficient and effective used the time at the university to study in particular program. Moreover it is possible to bring the results into line with proposed three levels of competency /7/. As an example – the top competency will sign the study in the planed time (or shorter) with results among best ten percent of graduates; the medium one will be defined for graduates with up to one additional study semester to the planed and the grades in the field between the 70 and 90 % related to the best ones; the minimum competency is then defined accordingly with longer duration of the study and grades ranged between 30 and 70% related to the best achieved in semester.

Certainly it is possible to investigate the duration of study separated from the grades and name it the learning competency. The grades achieved can be defined as study competency related to the program orientation – e.g. computer science competency or design competency for the corresponding programs. Such specification is fuzzy because of the fact that in the competency defined related to the program the evaluators have to include (or exclude) different students' activities outside of the university but important for the profession or job after the graduation. Many examples for such activities were proposed and considered in previous papers /8, 9/. The decision about inclusion (or exclusion) of e.g. project participation or job in one or another firm during the study is the task for the evaluation team or commission. If students in such jobs worked as the team leader, one can extend their evaluation along the leader competency axis. Another source of fuzziness is related to the characteristics of jobs in the firm – whether the duration or the position in the project will be used for definition of the competency? How it can be compared to the different job in the other company? Because of this uncertainty it will be proposed to start with more or less general evaluation criteria and to specify them individually if necessary.

Table 1. Evaluation criteria for selected students' competencies

<i>Decisive Attributes</i>	<i>Specification</i>	
Learning competency	Number of Semesters	Relation to curriculum ($\leq 100\%$; $\leq 120\%$; $\leq 150\%$)
Program competency (e.g. master information systems)	Final grade	Relation to the semester, program or University (top 10%; [70%, 90%]; [30%, 70%) of the best)*

* The relation of the results achieved by selected student will be derived based on comparison with other students in semester; more generally with results in the program over the year(s) or of it possible with those of students at the University. In example described top 10% will mean the top competency, if the results are in interval between 70% and 90% the competency will be qualified as medium one, if the results are between 30% and 70% compared to the best achieved corresponding level will be defined as the minimum competency.

Presented in the Table 1 specification and its quantification can be defined based on the documents about every student available at the university. However some kind of knowledge and skill described in /8/ and /9/ is not a part of the regular documents about the students' achievements. As an example one can consider the language or leadership capabilities or skill.

The situation will change itself if for instance competencies related to soft or social skill have to be evaluated /9/. There exist no standard concept and/or rules for such evaluation. On the other side these competencies play often the decisive role within every recruitment process. They build the basis for the position in the firm, job specification, salary, responsibility, etc. The proposal for the evaluation approach of the soft and social competencies is presented in the Table 2. The list of the decisive attributes below is not exhaustive and can be extended based on the orientation of the evaluation or specific of the study program.

Table 2. Evaluation criteria for students' soft and social competency

<i>Decisive Attributes</i>	<i>Specification</i>	
Language competency	Criteria of expertise (duration, level, etc.)	Relation to the semester, program or University (top 10%; [70%, 90%]; [30%, 70%) of the best)
Leadership competency	Criteria of expertise (duration, level, etc.)	Relation to the semester, program or University (top 10%; [70%, 90%]; [30%, 70%) of the best)
Soft skill competency	Presentation experience	Relation to the semester, program or University (top 10%; [70%, 90%]; [30%, 70%) of the best)
	Communicative experience	Relation to the semester, program or University (top 10%; [70%, 90%]; [30%, 70%) of the best)
Social skill competency	Intercultural experience	Relation to the semester, program or University (top 10%; [70%, 90%]; [30%, 70%) of the best)
	Teamwork experience	Relation to the semester, program or University (top 10%; [70%, 90%]; [30%, 70%) of the best)*

* The calculation of the values in the last column will be made according to the explanation for the Table 1.

Framework and evaluation procedure for students' competencies

According to the approach presented in /6/ students' competency evaluation is based on submitted by them and other available information. The duration of the study, final grades as presented in the Table1 or grades for each subject are stored in the database at the university

and can be used for statistical evaluation toward the definition of competency. Following the approach in the completing step this information will be evaluated by representatives of both other groups industry and professors. The corresponding part of framework for evaluation of competency by students is presented in the Table 3.

In the column *Evaluation Criteria for Industry* representatives from industry will get their grades (e.g. from 0 to 1) and score the importance of selected competency from their point of view. Based on this value the information submitted and presented in the previous column will be weighted and forwarded into the last column of the framework. This way the competency level(s) achieved by students can be estimated and used for further decisions.

Table 3. Part of extended framework for selected students' competencies

<i>Decisive Attributes</i>	<i>Specification</i>		<i>Evaluation Criteria for Industry*</i>	<i>Grades or Points</i>
Learning competency	Number of Semesters	Relation to curriculum ($\leq 100\%$; $\leq 120\%$; $\leq 150\%$)	LPR grade:	
Program competency (e.g. master information systems)	Final grade	Relation to the semester, program or University (top 10%; [70%, 90%]; [30%, 70%) of the best)	LPR grade:	

*Abbreviation used: LPR – Level of Practice Relevance

Analogous procedure will be used for the competencies presented in the Table 2. This part of the framework is presented in the Table 4. Difficulties here appear in the comparison with other students and estimation of competency level related to semester, program or University. Helpful in this situation are some opinions made by lecturers or business partners. Even for the language competency where different grades for the corresponding courses could be used it is not easy to establish the top 10% part of the group. It depends e.g. on the focus on written or spoken capabilities. In the first case the writing of reports and/or documents play the important role where in the second one the presentation of papers at the conferences, exhibitions or communication with partners or employees is essential. Very difficult is also to establish and quantify the other listed in the Table 2 competencies. If for instance some students were a team leaders in small students projects at the university and another ones worked as the project leader assistants in the big firm projects the definition of the competency level will be a difficult task. Even working in the same project at the different managerial levels will bring some definitions problems.

Table 4. Extended framework for students' soft and social competency

<i>Decisive Attributes</i>	<i>Specification</i>		<i>Evaluation Criteria for Academia*</i>	<i>Grades or Points</i>
Language competency	Criteria of expertise	Relation to the semester, program or	LRR Grade:	

	(duration, level, etc.)	University (top 10%; [70%, 90%]; [30%, 70%) of the best)		
Leadership competency	Criteria of expertise (duration, level, etc.)	Relation to the semester, program or University (top 10%; [70%, 90%]; [30%, 70%) of the best)	LRR Grade:	
Soft skill competency	Presentation experience	Relation to the semester, program or University (top 10%; [70%, 90%]; [30%, 70%) of the best)	LRR Grade:	
	Communicative experience	Relation to the semester, program or University (top 10%; [70%, 90%]; [30%, 70%) of the best)	LRR Grade:	
Social skill competency	Intercultural experience	Relation to the semester, program or University (top 10%; [70%, 90%]; [30%, 70%) of the best)	LRR Grade:	
	Teamwork experience	Relation to the semester, program or University (top 10%; [70%, 90%]; [30%, 70%) of the best)	LRR Grade:	

*Abbreviation used: LRR – Level of Research Relevance

Both last columns will be filled by professors analogous to the situation explained before. All points gathered by single student can be summarized to evaluate his or her individual competency. Based on results in the group related to semester and specialization one can calculate the competency by students in particular program at selected university. Detailed comparison of attributes discussed above allows formulation and interpretation of strengths and weaknesses of the education with respect to university, study program, specialization, teaching procedures etc. Using this knowledge university staff can improve the orientation of the particular program. On the other side the results achieved by industry evaluation can document the interest in specific competencies by university graduates in different jobs in (local) business.

Summary and outlook

In presented research the procedure for the competency evaluation by students and the rules for its application in the practice is described and discussed. Important feature of the approach used is its flexibility, scalability, and objectivity /6/. These aspects support the applicability of the approach in various environments and situations.

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