



## Identifying the Core Professional and Interpersonal Competencies: Findings from Competency-Based Approach

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### Abstract

The issues of improving the university and postgraduate training of specialists in the Republic of Kazakhstan based on a competence approach have become an obvious factor of globalization on education system and development. According to the evolution of the competence education development, there are three basic approaches in assessing the quality of learning outcomes based on the concept of competencies: the behavioral approach (that is used in the US); functional approach (considered in the UK); multidimensional and holistic approaches (taken in France and Germany). This research is carried out within the framework of the Ministry of Education and Science of Republic of Kazakhstan grant project “Developing and implementing the innovative competency-based model of multilingual IT specialist in the course of national education system modernization”. The main objective of this study is to determine the competencies that are necessary for a modern IT specialist. The authors provide an analysis of core professional and interpersonal competencies. The results of this research will give effective opportunities for the meaningful conceptualization of educational programs and curricula for training modern IT specialists who will be in demand at the labour market.

## INTRODUCTION

The modern studies of foreign authors have disclosed in sufficient details the conceptual key points of the three main approaches to determine the competency-based interpretation of the learning outcomes quality. These approaches have been appeared independently from each other: first in the USA, then in the UK and, last but not least, in France and Germany. Thus, we can distinguish three main approaches to the competency-based interpretation of learning outcomes: the behavioural approach (USA), the functional approach (UK) and the multidimensional and holistic approach (France and Germany).

The study aims to consider issues and problems of developing a competency-based approach in IT specialist educational program, as well as a survey analysis of professional and interpersonal competencies of IT specialist. The competency analysis is based on the survey of IT employers and IT alumni engaged in professional activity in Kazakhstan. We have involved the foreign IT companies like EPAM SYSTEMS, IBM, GFI Software on the level of top-managers and executive managers of the companies.

The term “behavioural approach” can often be found in the literature related to the American approach of the competency-based interpretation on the learning outcomes quality. This approach implies the abilities to apply learning outcomes in practice after graduation [1, 13]. In this regard, we can emphasize on the taxonomy of the American scientist B.S. Bloom that is related to the educational goals [2]. This taxonomy was developed more than 60 years ago, but it is still the most comprehensive one and covers various areas of educational activities in terms of domains: cognitive, affective, and psychomotor. Furthermore, the term “competency” was firstly used by R.W. White to describe abilities and readiness for professional activity and high motivation for its implementation developed in the learning process [12]. According to White, “competency-based motivation” should be formed among the

personality characteristics of the graduate based on the relationship between cognitive competencies and motivational trends. This theoretical approach was used in the United States as the basis for assessing general competencies in the developing the competence tests to predict work performance with high predictive validity after graduation the university. In addition to that, other approaches focused on the measurement of various other types of competencies have also been developed in the USA. The American Management Association (AMA) for measuring resourcing, interpersonal, informational, systemic and technological competencies suggest the using of their structural models, which are based on the behavioral indicators of personality. According to the developers of this approach, the relationship between the various structural elements of competencies and its differentiation should be based on the modelling and assessing the formation of key success factors. It should also be noted that in 1993 McClland’s competency assessment methodology used the analysis of 650 jobs. This methodology is based on the I-Concept, cognitive and behavioural skills, which made it possible to differentiate effective and ineffective, “excellent” and average performers [9].

The European model of the university and postgraduate education system, which currently exists in all European countries, is mainly based on the higher education system of Germany and France. The implementation of the competency-based approach into the European undergraduate and graduate education system is characterized by a broader understanding of the competency concept comparing with the American or Canadian model of the higher education system. For example, the so-called functional approach, originally founded in the UK, was characterized by an understanding of competencies as the ability to perform functional duties and meet professional competency standards [6]. In this regard, it should be noted that the educational standards indicated mainly professional competencies which described the skills in the workplace. However, such

functional competency-based models did not fully comply with the requirements and standards of the educational process. These models were determined from the standpoint of skills in the workplace, i.e. mainly related to practical activities, while theoretical knowledge was often not taken into consideration. Further in the UK, as in some countries of Europe, they adapted the American competency-based education model, which now includes functional competencies in addition to behavioural skills.

In France and Germany, a multidimensional holistic competency approach began to take shape while searching for a more optimal and effective competency-based model which involved the compilation of complex professional competency-based models. This model includes the following types of competencies: a) cognitive competencies, b) functional competencies, c) personal competencies, and d) meta competencies [4, 14]. In this model the cognitive competencies are knowledge that acquired in the learning process; functional competencies are defined as skills and abilities to solve professional problems; personal competencies correspond to the ethical aspects of the subject's behavior; meta competencies are associated with the ability to learn, reflect and solve problems under uncertainty [4, 14]. However, the competency-based model structure was supplemented by new competencies, which greatly complicated the understanding of the competency-based approach by using the terminology of the competencies concept.

The common understanding of qualification requirements in terms of competencies and learning outcomes is formed to create a holistic concept of competencies and forming a common European educational area, as a part of the implementation of the Bologna reforms [6, 11]. It should be emphasized that the algorithm for the formation of training competency programs in European practice includes the following stages:

- determining the needs of the labour market;
- description of professional profiles (qualification requirements);

- identification of learning outcomes, disclosure of general and professional competencies;
- development of modules, organizational forms, evaluation criteria, development of ways to ensure quality;
- designing a modular curriculum.

As a rule the international companies regularly conduct research that identifies the necessary competencies composition for successful professional activities of a specialist. Due to the results of these studies, the general or basic competencies (generic/key/ core competencies) play a key role in the training of specialists. For example, among general competencies, British employers define the following skills: teamwork, ability to demonstrate entrepreneurial qualities, ability to make decisions in any situations of professional activity. Employers in Germany define such skills (core competencies) as analytical thinking, organization and management skills, entrepreneurial skills, effective communication skills, including the use of modern technologies, communication skills in foreign languages, as well as communication skills with representatives of other cultures, self-control skills.

Nowadays, the United States occupies a leading place in the training of highly qualified specialists in the field of Information Technology, as evidenced by the technologies of Microsoft, Apple, Google, Facebook and etc. However, European universities have also achieved quite good results in this field. For example, five German universities training in Computer Science are included in the international ratings of QS and Times Higher Education. The one of the universities is the Munich Technical University (TU Mu'nchen), where training and research are carried out in almost all areas of modern Computer Science, including Economic Computer Science, Bioinformatics, Game Development, and Software Engineering. The students are offered six bachelor's and seven master's programs, including English-medium ones. The skills and abilities in Theoretical and Applied Computer

Science, as well as in such modern and relevant areas as Robotics, Anthropomatics, Telematics can be acquired at the Karlsruhe Institute of Technology (KIT), as one of the leading European university in the field of natural and engineering sciences.

The University of Bordeaux in France can be distinguished as one of the major higher education institutions in training of Information Technology specialists. It includes four institutes and three technical schools. The same good reputation of the specialists training has the Sorbonne University of Paris with four autonomous higher educational institutions. In the United Kingdom we can mention such universities as Cambridge University, University of London and University of Lancaster which are very popular in terms of the quality and effective training of IT specialists.

In 2005, the European Competency Forum initiated the development of a common European model of IT competencies to determine the necessary competencies that an IT specialist should possess. Currently, we can see the officially valid version of these requirements – European e-Competence Framework 3.0. [5]. According to these requirements, IT specialist should have 32 core competencies. Moreover, each competency has five levels of proficiency, and each level is endowed with a certain set of knowledge and skills. In European countries, certification of a specialist at certain levels is provided. Currently, the European classification of IT specialists' specializations is divided into six main specifications: "Technical Management", "Business Management", "Development", "Design", "Service and Operation", "Support". Each of these specifications is distinguished by three to five categories. In total, these categories form 23 European ICT profiles, which specify the competencies that a specialist should possess. There are five competence areas: plan, build, run, enable, manage. Each area is characterized by a specific set of competencies. For instance, the planning competencies are Application Design and Technology Trend Monitoring competencies. The competencies in the building

area are characterized by Testing and Solution Deployment. The competencies of the running area are represented by Change Support skills as well as Problem Management skills. Among enablement competencies, the skills of Information Security Strategy Development are distinguished, while management competencies are characterized by, for example, Information Security Management skills. The presented European classification of IT specialists' specializations is very easy to use and appropriate for both employers in determining the rating of specialists, and potential employees in determining the necessary competencies.

Considering the previous research experience and the recommendations of the developers of the competency-based approach, we can note that the necessary skills to ensure the ability of graduates, including IT specialists, are interpersonal, communicative and professional competencies. They help to work successfully in the professional and social spheres.

## METHODOLOGY

The results analysis is conducted in two stages. The first stage is a determination of relevant and less relevant professional and interpersonal competencies by survey of participants; the second one is determination of relevant and less relevant professional and interpersonal competencies by survey of participants, depending on their position. The second stage is based on some key points of Henry Mintzberg's concept. H. Mintzberg is a professor of Management Studies at McGill University in Montreal. Following his concept, employees, top managers, as well as heads of organizations and companies can be divided by certain professional profiles, depending on their qualifications and duty performance. In his concept, as in other modern scientific works on the competency-based approach, the key and professional competencies allowing a specialist to perform work efficiently and effectively have been quite clearly described [7].

The significance of certain professional and interpersonal competencies is determined according to a 100-point system. The competencies exceeding 50% are classified as significant or relevant competencies of an IT specialist, while competencies that showed a value less than 50% are marked as less significant or relevant competencies. We have studied the qualification requirements of IT specialist, as well as special scientific literature on the competency-based approach that help to determine the necessary professionally significant competencies for a specialist to complete professional activities [3, 8, 10].

## RESULTS AND DISCUSSION

The following competencies can be identified among the main professional competencies that are included to the questionnaire:

*Ability to apply knowledge in practice*  
*Data analysis and data modelling,*  
*Data placement and collection,*  
*Database administration,*  
*Design engineering,*  
*Designing enterprise architecture,*  
*Digital skills,*  
*Equipment and program knowledge,*  
*Information management,*  
*Network analysis,*  
*Operational maintenance,*  
*Possession of basic knowledge in the professional field of activity,*  
*Problem analysis,*  
*Strategic planning,*  
*System administration,*  
*Technology and production.*

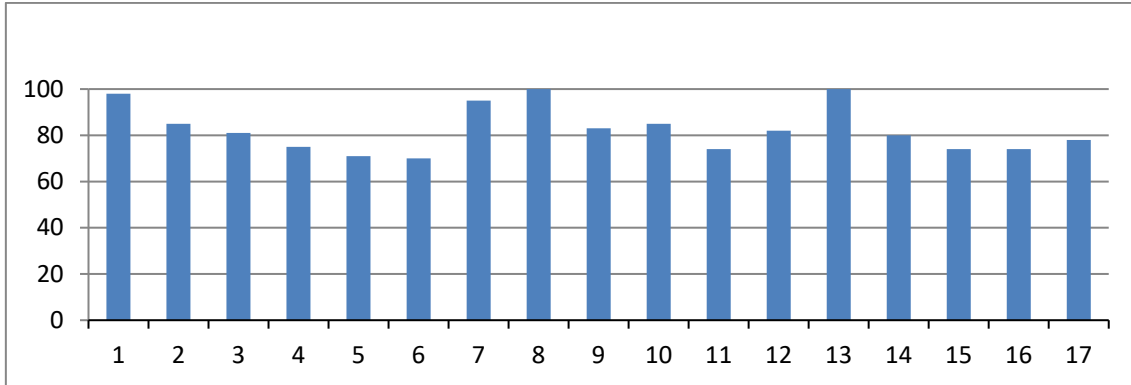
The range of abilities and skills necessary for IT specialist professional activity, which included to the questionnaire, can be represented

by the following set of interpersonal competencies:

*Change Management,*  
*Creativity,*  
*Client service,*  
*Criticism and self-criticism,*  
*Emotional Intelligence,*  
*Initiative,*  
*Interaction with experts in other subject areas,*  
 Knowledge of the main categories and concepts of conflict resolution, possession of its categorical apparatus in the analysis of professional situations,  
*Leadership,*  
*Motivation,*  
*Negotiation skills,*  
*Perception of diversity and intercultural differences,*  
*Positive thinking,*  
*Problem-solving skills,*  
*Self-management and time management,*  
*Sociability,*  
*Interdisciplinary teamwork.*

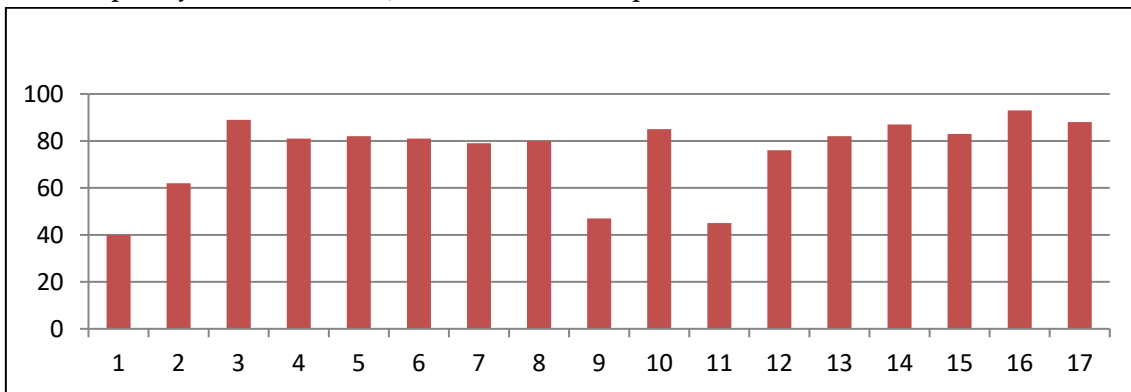
Before proceeding the analysis of questionnaire results, we can consider the diagrams, professional and interpersonal competencies that correspond to the competencies numbering presented above.

Thus, according to the survey results, on the first stage, all professional competencies exceeded 50%. It indicates that they are relevant and significant for IT specialist professional activities. Moreover, the highest percentage corresponds to the following professional competencies: Critical and analytical skills - 85%; Information management - 85%; Designing enterprise architecture - 95%; Ability to apply knowledge in practice - 98%; Possession of basic knowledge in the professional field of activity - 100%; Digital skills - 100%. The data are given in the diagram 1 - The professional competencies of IT specialist.



**Figure 1.** The professional competencies of IT specialist

According to the survey results, the most interpersonal competencies are marked as relevant and significant for IT specialist professional activity. The following competencies have the highest percentage: Motivation - 85%; Problem solving skills - 87%; Interdisciplinary teamwork - 88%; Client service - 89%; Sociability - 93%. Only three competencies correspond to less relevant interpersonal competencies: Change management- 40%; Negotiation skills - 45%; Leadership - 47%. The data is presented in diagram 2 - The interpersonal competencies of IT specialist.



**Figure 2.** The interpersonal competencies of IT specialist

Due to the survey second stage, the professional and interpersonal competencies are distributed among various professional specialities that correspond to the following groups according to the Mintzberg concept: Group A (strategic apex/senior management), Group B (middle line/management of operational staff), Group C (operating core/operational staff). This system of professional profiles classification is appropriately grouped into the three categories that determine the professional activities of IT specialists. Group A includes employees performing the managerial functions, Group B includes employees obtaining functions of coordinating, Group C includes employees providing functions of basic work and services.

In this regard, we can identify the competencies for A, B, C groups with the highest percentage and relevant or less relevant for the professional activity. Due to the survey results, the analysed professional competencies are relevant and significant for all representatives of professional specialities, while the interpersonal competencies depend on the organization hierarchy.

By following the survey analysis, we determined the most and least relevant interpersonal competencies for the three groups A, B and C. The interpersonal competencies are relevant for group A, whereas the highest percentage corresponds to the following competencies: Leadership - 100%; Sociability 3-100%; Negotiation skills - 100%; Change

management - 100%. The only interpersonal competency marked as the least relevant one 3 - The interpersonal competencies for Group A.

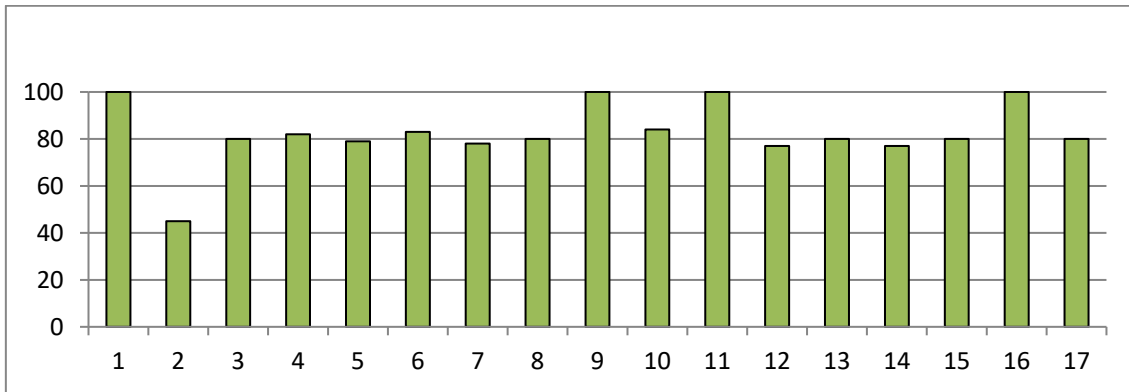


Figure 3. The interpersonal competencies for Group A

The interpersonal competencies are mainly defined as relevant competencies for group B. Thereby, the interpersonal competencies such as Client service and Sociability have the highest percentage - 100%. However, the Negotiation skills and Leadership are the least relevant for the representatives of this group and correspond to 40% and 45%. The data is shown in diagram 4 - The interpersonal competencies for Group B.

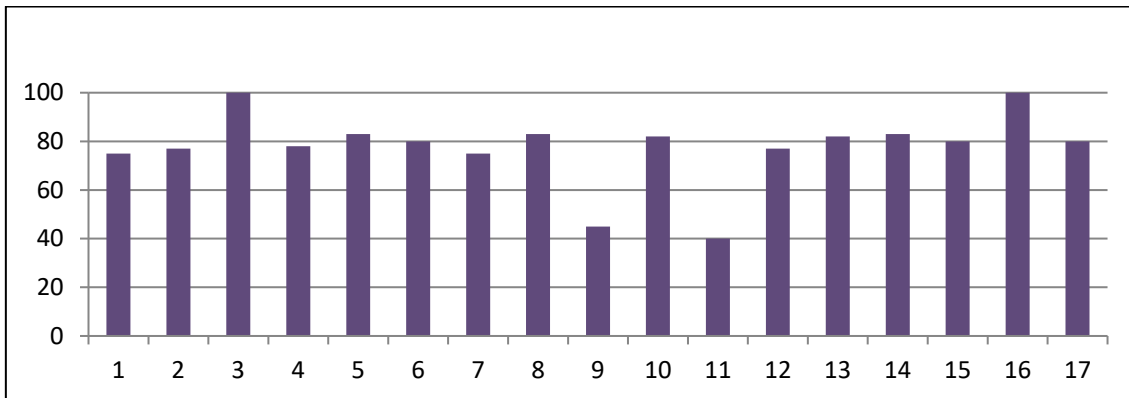


Figure 4. The interpersonal competencies for Group B

The following interpersonal competencies have the highest percentages in group C: Problem-solving skills - 100%, and Interdisciplinary teamwork - 100%. Leadership (46%), Negotiation skills (47%) and Change management (48%) are defined by them as the least relevant. The data is shown in the following diagram 5 - The interpersonal competencies for Group C.

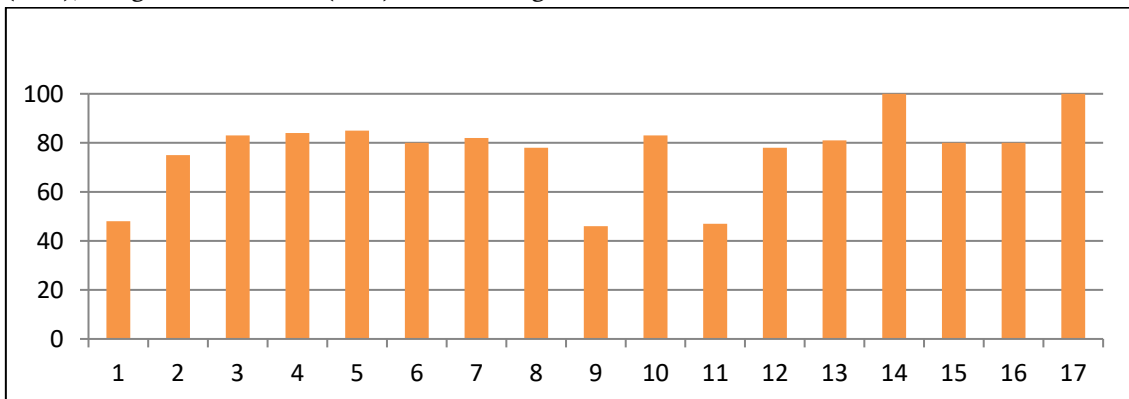


Figure 5. The interpersonal competencies for group C

Consequently, all core professional competencies are assessed by respondents as relevant and significant for each professional profile; secondly, the interpersonal competencies, on the contrary, are the most relevant and significant for a particular professional group, and less relevant and significant for another professional profile.

## CONCLUSION

Thus, the study and analysis of the conceptual key points of the competency-based approach in education lead to additional opportunities for optimizing the educational system of Kazakhstan. However, it is important to consider national traditions and use only those key points of the concept that have proved their effectiveness to reform the Kazakhstan competency-based approach in education. In the preparation of competent IT specialists, it is necessary to build a model for training specialists for the IT industry, in which they gain knowledge, form and develop the necessary competencies, performing real projects under the guidance of both the faculty and future employers. This approach is especially important and effective in the era of digitalization of the country when today the IT-technology industry is highly dependent on the influx of competent IT-specialists.

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