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DEVELOPMENT OF PROFESSIONAL COMPETENCIES OF INFORMATION TECHNOLOGY UNIVERSITY TEACHERS

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ABSTRACT

The article sets out to analyze the professional competencies on the standard European e-Competence Framework. The survey of information technology teachers of Ukrainian universities concerning the necessity of forming and development of European e-Competence Framework competencies allowed defining the priority areas for training and forming the content component of a model of professional competencies development of information technology university teachers. The proposed model distinguishes stages, factors, and resources for training teachers. Teachers' attitude to motivation, time and money allocation for professional development was researched. The content component of the development of professional competences of teachers of information technologies is offered. Recommendations for training and advanced training of teachers of information technologies, assessment of the level of development of professional competence, were proposed.

KEYWORDS: *European E-Competence Framework, Professional Competencies Of Information Technology University Teachers, Development Of Professional Competencies.*

INTRODUCTION

The issue of transformation of education according to key challenges is being actively studied and discussed. Microsoft Corporation suggested a framework of higher education transformation comprising the following range of transformation processes: managing the life cycle of a student from admission to employment and maintaining contact after finishing the IT-oriented study; teaching, learning, and research based on the systems of educational content management, new

teaching technologies, hybrid cloud-oriented educational environment and services for scientific research and communication; combined campus that unites automatized management of administrative activity, the access policies on resources and services, educational laboratories, network communications and their management, automation of engineering systems etc [1,2].

The world is becoming increasingly technological. All the spheres of human activity are automatized, modern technologies are widely used even in professional activities pertaining to liberal arts. Ubiquitous technologization sets new challenges for higher education, being connected with such global issues as financing and state policy in the field of education, as well as with technological issues, namely use of ByoD/ByoIT/Cloud&Hibrid IT [3]. The approach to work in classroom using personal devices and IT requires a properly organized structure at the university, both network and server ones, while use of cloud and hybrid IT technologies – organization of access and administration of these technologies according to the concept of smart university [4].The current state of the world IT industry, development of smart education technologies, and constant change of employers' requirements to training of IT specialists at universities force all the participant of educational process to search new models of development of professional competencies of university teachers who provide training of future IT specialists. In higher education, new technologies, based on principles of open education, are also used for organization of academic activities, in particular, for organization of educational process. Teachers should not only master the technologies of e-Educational content, but also the methodology of their use in teaching disciplines according to the technology of blended, adaptive, and project-based learning [5,6]. The constant change of the curriculum of computer science in secondary school, which is becoming more oriented at STEM Education, results in brand new competence in IT of the students entering the higher educational establishments. Data show that the set of core cognitive knowledge, skills, and abilities that are associated with a STEM education are in demand in nearly all job sectors [7,8]. It should also be considered in teaching professionally-oriented disciplines of IT majors. Undergraduate students should obtain basic knowledge in IT, which will be necessary during studying specialized professionally-oriented disciplines in the last years of education to the extent meeting the current requirements of employers. Thus, cooperation with IT business is a real objective for an IT teacher, and its achievement will solve a range of issues connected with the quality of practical training of students. An IT teacher should clearly understand what professional competencies are to be formed by a future IT specialist, as well as realize the importance of forming soft skills, self-education, research, and other competencies crucial for successful career in IT field. Problem statement: to study the components of professional competence of IT teachers and develop a model of professional competencies development (lifelong learning) of IT teachers at higher educational establishments. 2 Analysis of Publications Research by Ukrainian and foreign scientists indicate the significant attention to the issues of development of methods, forms, and means for forming and developing professional competencies of university teachers. Computer science is an educational field that will continue to need qualified teachers and professors to accommodate increased student populations and interest across the nation. Government initiatives, changing school policies, financial incentives to major in computer science, and an increased need to hire more computer science professionals (including educators) adds to the appeal of pursuing a teaching career in computer science [9]. Namely, Ji Hyun Yu, Yi Luo, Yan Sun, Johannes Strobel [10] studied a model of competencies for teachers of engineering

disciplines, in which they distinguished 7 components: Engineering Concept Knowledge, Engineering Skills, Knowledge about Engineering Disciplines, Engineering Pedagogical Content Knowledge, Attitudes toward Engineering, Attitudes toward Teaching Engineering, Integration of Engineering with Other Subjects. Such a model partially considers modern approaches to competencies of a university teacher in terms of their digital competence. The six areas of European Framework for the Digital Competence of Educators focus on different aspects of educators' professional activities [11]: Area 1: Professional engagement using digital technologies for communication, collaboration and professional development. Area 2: Digital resources sourcing, creating and sharing digital resources. Area 3: Teaching and learning managing and orchestrating the use of digital technologies in teaching and learning. Area 4: Assessment using digital technologies and strategies to enhance assessment. Area 5: Empowering learners using digital technologies to enhance inclusion, personalization and learners' active engagement. Area 6: Facilitating learners' digital competence enabling learners to creatively and responsibly use digital technologies for information, communication, content creation, wellbeing and problem-solving. The analysis of the level of digital competences of students and teachers of Ukraine according to Dig Comp 2.1 methodology is given in [12]. It is determined that the level is sufficient, but there is a difference between teachers and students, which is the basis for organizing cooperation within the educational process. In our opinion, ISTE Standards for Computer Science Educators [13], Comprising 4 components: Knowledge of content, Effective teaching and learning strategies, Effective professional knowledge and skills, Effective learning environments, describes the elements of the Computer Science Educators competency in the most accurate manner, in the light of the issue considered. The model of competencies of a teacher includes pedagogical competencies that consist in mastering modern technologies of teaching, methods, and tools for development of educational content, analysis and assessment of e-Educational resources, conducting scientific research and processing their results using modern tools and services, including cloud ones. Both professional and pedagogical competencies of a teacher include the set of digital competencies and specific subject competencies. Professional competences in information technology deal with the design, creation, management and maintenance of the varied components of the system, including software, hardware, networks, systems integration and multimedia. Broadly, information technology can be divided into four central pathways: network systems, information support and services, programming and software development, and Web and digital communication [14, 15].

For development of practical skills of teachers, it is necessary to constantly cooperate with IT companies and participate in development of IT solutions of various level of difficulty. Internships and involvement in project solutions at IT companies are one of the most efficient mechanisms of consistent improvement of professional competence in practical dimension. Cooperation with IT companies can be provided by means of: ─ Involvement of students and teachers in implementation of the projects ordered by IT companies. Hence, a teacher is managing a project and improving the level of practical skills of IT specialist: ─ Involvement of companies in teaching academic disciplines and practices. A teacher receives recommendations, practical cases, and assistance in their resolving; ─ Part of academic classes is transferred to a company and conducted under supervision of a company's tutor. Together with students, a teacher acts as an executive, improving the level of practical skills. Attending conferences, workshops, and seminars where teachers are able to obtain new knowledge and skills, is another

efficient mechanism for their self-development. Every member of teaching staff of university should not only conduct educational activities, but also carry out research, scientific projects, and publish the results of research. Scientific achievements form a basis for their educational activities, since they are of significant theoretic value and, thus, should be accessible for students.

Conclusions The proposed model, based on the analysis of modern standards of professional competencies of IT teachers, consists in a range of consecutive stages: defining the need for training, selection of courses for training, completing the courses, assessment of level of professional competence. The need for training is formed due to the following factors: emergence of new information technologies, new teaching technologies, requirements of IT companies to qualification of graduates majoring in IT, requests of students, and self-motivation. To define the need for professional competencies development, the existing standards (e-CF, ISTE) should be used, in accordance with the devised indicators for each set of competencies. The same indicators are to be used for assessment of professional competencies of teachers. Postgraduate courses can be used to substitute the advanced training courses. Additionally, it's possible to use training programs for teaching staffs of departments, which are based on MOOCs and form the necessary competencies.

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