



The Formation of Digital Competence by Means of Open Educational Resources

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Abstract: *The article deals with the problem of the formation of person's digital competence. The analysis of the European frame of digital competence allowed specifying the main tasks for the educational system: acceptance of those competences that are relevant for modern digital community and are basic in educational process during the whole life; formation of teacher's digital competence; creation of open educational systems. The analysis of the level of formation of digital competence among primary school teachers and university lecturers shows the gap between the achieved results and challenges of the modern society. One of the ways in solving of the given problem is the creation and testing of open educational resources, as well as unified means for monitoring of digital quotient.*

Keywords: *digital competence, teacher's digital competence, open education, digital quotient*

I. INTRODUCTION

Digital competence is a person's competence in the sphere of a wide use of digital technologies. The term 'digital competence' has been used since 21 century, broadening the lines of the terms 'computer literacy', 'information literacy', 'information and communicative competence'. The process of globalization, scientific and technological progress, information revolution caused the development of a new tendency in education aiming at the formation of person's digital competence. 'Digital competence can be broadly defined as the confident, critical and creative use of ICT to achieve goals related to work, employability, learning, leisure, inclusion and/or participation in society' [1]. The frame of digital competence DigComp 2.1 was established in 2017 within the European Union and regulates the list of those competences that are relevant for people of digital epoch and are basic in educational process during the whole life. Thus, defined 5 spheres of competences – information and ability to work with data, communication and collaboration, creation of digital content, safety, solving of problems – are represented in this document by means of description of the corresponding keywords [2].

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The system DigComp was fundamental for the formation of initiatives in Europe connected with the prediction of the level of population's digital competence, and the development of the appropriate educational programmes. In Ukraine the process of education digitization has a non-systemic character and actualizes the researches that, in our point of view, should be focused on the teachers' training as knowledge transmitters for all categories of students.

II. LITERATURE REVIEW

The analysis of the perspectives of society digitization in Ukraine in 2019 showed that there are serious gaps in the country: penetration – 50%; absorption – 10%; IT expense per GDP per head per year – 53%; basic level of digital skills of citizens – 35% [3]. And if the first three are regulated by the state, the formation of citizens' digital competence is mostly the responsibility of the system of education. The adoption of the following important normative documents "Digital agenda of Ukraine - 2020" [3], "The conception of digital Ukrainian economy and society development for 2018-2020" [4], which indicate not only the importance of economic changes, but the necessity to increase the level of digitization of all subjects of educational processes, helps to solve these problems.

Among the main educational tasks, solving of which will help to overcome the gaps between a real level of citizens' digital competence and a desirable one, we can distinguish: development of appropriate qualitative educational content with its possible testing in free-for-all online and offline courses; creation of means for monitoring and certification of digital skills. The realization of the first task is connected with modernization of education, formation of teachers' digital competence (DigCompEdu), creation and promotion of open educational systems. Teacher's digital competence was investigated by V. Bykov, N. Morze, O. Ovcharuk, O. Sagan, E. Smyrnova-Trybulska, O. Spirin, Yu. Trius and others [5,6,7,8]. The ways of realization of teachers' professional training programmes involving ICT were discussed in Qingdao Declaration (2015) [9]. The problem of organization of distant or blended education while teachers' training was reflected in the works of V. Bykov, V. Lapinsky, V. Kukharenko, R. Walker, C. Skvortsova, M. Haran [10,11,12]. H. Kashyna, A. Prokopenko, T. Oliinik, V. Moskalenko proved the effectiveness of such a training by means of creating and using of open educational resources (educational programmes, guidebooks, didactic materials created specifically for teaching), that are provided in free access without any license fee [13].

III. PROPOSED METHODOLOGY

In the process of investigation a set of theoretical (analysis and synthesis of the Ukrainian and European scientific, pedagogical sources; normative documents of Ukraine and EU) and empirical (questionnaire of schoolteachers and teachers in higher educational establishments) methods were used together with the analysis of acquired results. The methodological basis of this investigation is presented by UNESCO recommendations in which there are defined 6 components fundamental for teacher’s digital competence: Professional Engagement, Digital Resources, Teaching and Learning, Assessment, Empowering Learners, Facilitating Learners’ Digital Competence[14]. Each component DigCompEdu reveals 22 basic tendencies of pedagogical activity, which are universal for teachers working with different categories of students: from preschool age till postgraduate education.

IV. RESULT ANALYSIS

As the object of our research is focused on primary school teacher’s digital competence, we have analyzed the level of formation of this phenomenon among primary school teachers and university lecturers who provide their professional training. In general 446 respondents took part in the questionnaire. The results of our research showed that there is a gap between a fast-moving development of a digital society and the level of use of digital means by teachers (Fig.1). One of the reasons of the low level of development of digital tendencies in Ukraine is an old-fashioned system of education, that is not oriented on the priorities of STEM-education, modern models of technologies’ transfer, soft skills and business skills priorities.

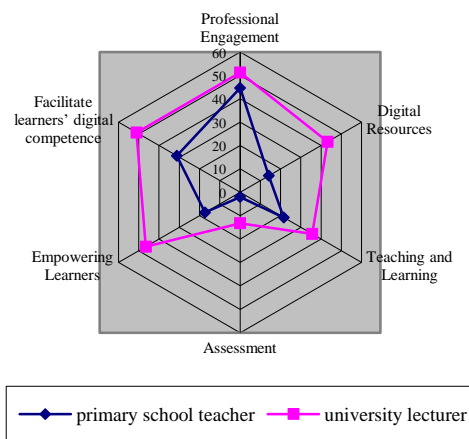


Figure1. Formation of primary school teachers’ and university lecturers’ digital competence Moreover, our results showed insufficient readiness of university lecturers to use possibilities of digital technologies for improving of their skills. One of the ways of solving of this problem is using, testing and development of open educational resources. Their number increases annually, and the quality is getting better that leads to the formation of open education system. Its aim is to expand the access to educational resources, eliminate all kinds of obstacles and create conditions for achieving of new knowledge by everyone without exception. It provides several ways of

teaching and schooling, knowledge composition and share. In 2016 there was created repository OER Commonson web-site of The Institute for the Study of Knowledge Management in Education (ISKME) that includes a search system which gives opportunity to find resources for realization of educational tasks by teachers [15]. The creation of such a system allows unifying the approaches to open education not only within one educational establishment, but in a professional network in general. Open access to educational materials gives opportunity to world’s scientists to correlate their achievements with colleagues’ researches, share experiences that, in its turn, improve the quality of educational courses. Students get the advantage of choice, possibility to study in a convenient place, in any language, in the most favourable mode. Open resources are of great importance for people with special needs and insufficient material capacities. Having analyzed web-sites of educational establishments that train primary school teachers, we defined that e-courses are available in free access, but only 7 % of the general amount of courses proposed for students. This indicates a traditional educational mode that is not oriented on blended or distant forms. In terms of our research based on principles of OpenEdu Framework: access, content, pedagogy, recognition, collaboration, research, strategy, technology, quality, leadership[16], university lecturers has detected a low level of readiness to develop, test and use available open educational systems (Fig.2).

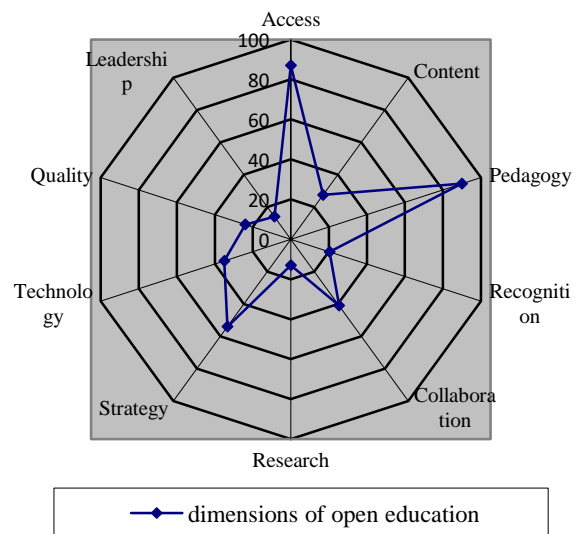


Figure 2. The results of using 10 aspects of open education by university lecturers Questionnaire of school teachers has shown greater awareness and frequency of using of open educational resources that indicates increased level of motivation for professional growth. That creates a special challenge to scientists who must produce programmes and means for additional education, retraining of pedagogical staff and the system of education in general that should provide desires and needs of the community. To define qualitative evaluation of the level of digital competence formation appropriate means are needed.

The review of Internet sources shows that there is a demand to measure DQ (Digital Quotient) as a universal indicator of the level of digitization of society. Digital Quotient (DQ) is a set of technical, cognitive, metacognitive, social and emotional competences based on universal moral values, which help people to face the problems of digital life and adopt to its requirements [17]. Digital Quotient is represented by three levels: digital citizenship (the use of digital technologies to communicate with other people in everyday life); digital creativity that includes the creation of media products and apps; digital enterprise that is oriented on the use of digital technologies in a professional activity. The structure of DQ was created by professor Yuhyun Park, in 2019 it was updated in cooperation with Educational Framework Programme OECD up to 2030 and was top-ranked as the standard of digital competence (Fig.3). The goal of our further perspective is the creation of a universal test based on the structure of DQ that allows objective monitoring of the phenomenon under investigation with further possibility of content adjustment according to new digital tendencies.



Figure 3. 2019 Digital Intelligence (DQ) Framework[17]

V. CONCLUSION

The above mentioned problem is not solved only by the state. University lecturers who aim at future teachers' training, retraining or further training of school teachers, should be aware of their role in satisfaction of educational demands of the society. It requires the fulfillment of some tasks:

1. To digitize the content of our own educational course and make it available for any person who has Internet access.
2. To popularize the availability of education not only among students of one university, but among all people who want to study.
3. To consider the availability of educational resources for people with special needs (for example, representation of texts by means of sound recording).

Thus, the formation of teachers' digital competence helps to realize more open and flexible forms of education that, in its turn, causes the increase of digital quotient of all members of the society.

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