

The Main Aspects of Digitalization in the System of Professional Development of Teachers

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Abstract—In the article, the process of digitalization in the system of professional development of teachers is discussed. Based on a thematic analysis, such approaches as modeling, authentic learning, metacognition and collaboration were identified. The approaches offer ways to provide teachers with digital competence and educate them in ICT application as new opportunities and prospects for continuing education. Positive changes in the system of professional development of teachers in Kazakhstan based on the use of various sources of information have significant outcomes in terms of computer skill development, and in influencing teachers' attitude to their learning behavior.

Keywords—*internet, smart appliances, digitalization, professional development, smart education, electronic resources, information and communication technologies*

I. INTRODUCTION

Today, the Internet economy is growing at a rate of up to 25% per year in developing countries, and no single sector of the economy could achieve such a pace. 90% of all global data have been created for only 2 years. Already 35 billion devices are connected to the Internet and share data. This figure is five times higher than the total population of the world [1].

The digital revolution as the transition from analog to digital devices and signal transmission technologies, has reached a new, higher level covering more areas of education. The digital revolution, understood in its narrow sense, as the transition from analogue to digital devices and signal transmission technologies, at the beginning of the 21st century has reached a new, higher level and is covering more fields, including education. Digitalization efforts have led to the creation of a new society, where human capital is actively developing. The efficiency of business is increasing due to automation and other new technologies. Along with this, the dialogue between citizens and their governments is becoming simple and

open.

The process of digitalization affects almost all countries of the world. Each country itself determines the priorities of digital development. More than 15 countries around the world are currently implementing national programmes of digitalization. The foremost countries to digitize national economies are China, Singapore, New Zealand, South Korea and Denmark. So, China, in its program "Internet plus" is integrating digital and traditional industries.

In the speech to the people of Kazakhstan "New opportunities in the development under the conditions of the Fourth Industrial Revolution" [2], the First President of the Republic of Kazakhstan N. Nazarbayev outlined that the world faces technological, economic and social changes in the era of the Fourth Industrial Revolution. In this regard, the country needs a new quality of development. As human capital is the basis of modernization, it is necessary to accelerate the creation of Kazakhstan advanced education system. Therefore, for the development of human capital, the following objectives have to be carried out:

- Developing of digital educational resources.
- Updating of training programs in technical and vocational education, with the involvement of employers' organizations, taking into account the international requirements on digitalization [3].
- In higher education, increasing the amount of future computer science specialists, capable to work with artificial intelligence and "big data".
- Developing university science with a priority on research in metallurgy, petrochemical analyses and agro-industrial complex, bio- and information technologies.

Thus, digital transformation, representing the introduction and use of modern digital technologies in the sphere of tangible and intangible production is highly significant. However, digital transformation leads to professional transformation. The success of the digital

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transformation policy is determined primarily by availability of professional staff, interest and opportunities of the business community, material and financial resources and the political will of the leadership of the country.

II. INFORMATION TECHNOLOGY AND PROFESSIONAL DEVELOPMENT OF TEACHERS

Current trends of globalization, transformation and modernization affect all levels of education system from pre-school to additional education. Nowadays, in Kazakhstan the latest information technologies are being actively implemented. This contributes to the emergence of new educational technologies and forms of education, based on electronic means of processing and transmitting information. One of the forms of application of information technologies in the educational process is learning tools. All the trends in the development of the global information infrastructure, as well as human integration in the information space are prerequisites for the digitalization of all spheres of human activity. At the same time, the problematic aspects are still the passivity of society in introducing automation and the lack of digital literacy and skills.

The most promising challenge of all universities is to improve the skills of digital literacy of teachers. Paul Gilster regards digital literacy as “the ability to understand and use information in multiple formats from a wide variety of sources when it is presented via computers”. Digital literacy of how to assimilate the information, evaluate it, and then reintegrate needs to be taught [4]. The content of digital literacy comes down to the understanding that if there is clarity in the structure and content of digital reality, then there will be clarity in control and interaction with digital technologies. Thus, the digital environment requires from teachers a different mentality, completely different ways and forms of organizing teaching process.

However, recent studies emphasize that teacher education programs must properly educate teachers in the use of ICT in order to develop their digital competence [5]. Kay showed that the overwhelming majority of studies suffered from methodological flaws, and concluded that more rigorous and comprehensive research was necessary in order to fully understand and evaluate the impact of key technology strategies in pedagogical education [6]. Digitalization management needs common database, performance criteria for the training, in other words, an integrated approach to determine the objectives, structure and content of the educational process.

III. DIGITALIZATION IN THE SYSTEM OF PROFESSIONAL DEVELOPMENT OF TEACHERS IN KAZAKHSTAN

At present time, it is important to use educational organizational forms and methods, based on didactic possibilities of ICT. Effective realization of the evolving ICT potential in professional development system implies the existence of certain continuously updated teachers’

knowledge and skills in the field of information and communication technologies. In Kazakhstan, the efficient use of ICT and web technology in the system of professional development is especially urgent, since the approaches to application of didactic potential of ICT and web technologies are rather outdated. In fact, the only use of technical capabilities of ICT and web technologies (search, processing, storage and transmission of information in order to obtain new knowledge about the object or the process) is not sufficient to change qualitatively the system of professional development of teachers.

Based on a thematic analysis of studies, we identified the following approaches to be applicable to teacher professional development education:

- modeling;
- authentic learning;
- metacognition;
- collaboration.

Modeling approach implies revision of traditional methods of training activities, the development and use of new teaching technologies and methodologies (Web services, networking community, Wiki technology, etc.). Authentic learning is orientated on the use of didactic opportunities of ICT and web technologies for continuous professional development, updating of knowledge (telecommunications, distance education, network universities). Metacognitive approach strives to develop lifelong computer learning strategies. It defines a new way of studying behavior, which should be independent, self-organizing, legal and ergonomic. Participants are encouraged to identify and pursue personally relevant goals. Collaboration proposes creation of network pedagogical communities aiming at consulting, exchange of pedagogical experience, approbation of new pedagogical technologies and knowledge sharing at professional development institutions.

In the system of professional development of teachers, these new approaches are being actively implemented as new opportunities and prospects for continuing education. The work of the National Center of Professional Development of Teachers “Orleu” (Centre) shows a successful adaptation of the system of professional development of teachers to a new socio-economic environment based on centralized corporate governance, updated methodology and advanced international and domestic experience. Positive changes have resulted in the following projects of the Centre:

- Implementation of ICT policy through automation of the work sites of the affiliates of the Centre to the rapid exchange of information, operational and quality engagement in professional activities.

- Establishment of National Training Portal. It is the first educational project for teachers, practicing training in

the format of "Blended learning", involving "Distance learning", "Face-to-face learning", "Online learning".

- Organization of coursework and intercourse activities with the use of ICT technologies through smart technology and the Internet to conduct educational activities based on cloud services and innovative solutions.

- Creation feedback with refresher teachers for the purpose of post-course support through the creation of Professional Network to solve professional problems, exchange experiences and make productive cooperation and online consultation. Networking also provides organization and holding of conferences, seminars and master classes, with proper methodological assistance.

National Center of Professional Development of Teachers "Orleu" is working over a scientific and methodological project "Pedagogical and technological principles for the further training of teachers under the conditions of SMART Education". In this regard, scientific and practical conferences are annually held to promote the formation of smart society in Kazakhstan based on using the potential of the system of professional development of teachers. Within the framework of the conferences, the exchange of domestic and foreign experience in smart education occurs and teachers boost their own literacy on the use of smart technology in education. Professional communication is organized through the content and community network. Smart technologies provide significant assistance when conducting events. For example, interactive compilations of conferences allow you to read and comment on articles from paper edition by means of smart devices through QR-code. An interactive program of the conference enables participants to identify speakers of sections and make online voting through a smart device. According to the refresher course program, all categories of teachers are delivered lectures on the themes: "Development of ICT competence of teachers in the context of updating educational content", "Teaching by using digital resources and equipment of BilimLand, PASCO and others", "Digitization of educational organizations: working with e-government portal EGov".

Thus, we can observe a number of positive results in carrying out activities using smart technology in professional development of teachers:

- Compliance of the content, methodology and format of the events with the scientific and methodological theme

of the Centre.

- Creation of the products of digital educational content by the Centre staff and their use at a refresher course and post-refresher course activities.

- The efficiency of the transfer, access and exchange of event materials and work experience of domestic and foreign teachers.

- Improvement of teachers' smart technology skills and literacy on the use of smart technology in teaching.

IV. CONCLUSION

To improve a professional development for teachers in information and communication technology, quick and systematic access to various scientific, educational, methodical and organizational sources is necessary. National Center of Professional Development of Teachers "Orleu" offers refresher teachers modern information and communication technologies, providing them with new opportunities based on the use of various sources of information. Thus, they increase the effectiveness of independent work and get many opportunities for creativity. Improvement of professional skills allows teachers to implement into teaching process fundamentally new forms and teaching methods.

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