

The Problem of Methodological Training of Future Teachers in the Digital Environment

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Abstract

Changes in modern socio-economic conditions and modernization of the global and Ukrainian education system impose new requirements for education policy, which should meet the progressive needs of the state and society. Given the changing paradigm of education, society and the state urgently need to prepare applicants for higher education - future teaching specialists for professional activities in the educational digital environment. The study aims to identify the factors affecting the quality of methodological training of future elementary school teachers in the modern educational environment. Methodology. To identify the factors influencing the effectiveness of methodological training of future elementary school teachers in the digital environment, the method of theoretical analysis was applied. To determine the advantages and disadvantages of distance learning, the method of comparative analysis of the elements of classroom and distance learning was used. Results. The theoretical and methodological analysis of the problems of teacher training in the conditions of digitalization allowed to identify the factors and obstacles affecting the effectiveness of methodological training of future elementary school teachers. Conclusions. The study of the problem of methodological training of future teachers in the conditions of digitalization in Ukraine and abroad allowed to identify gaps in the professional training of elementary school teachers today. The results of this theoretical study can serve as the basis for further research (theoretical and empirical) in the field of professional training of future teachers.

Keywords: teachers, teacher education, elementary education, digitalization

1. Introduction

Changes in contemporary socio-economic conditions and modernization of the global and Ukrainian education systems have new requirements for education policy, which must meet the requirements of modern socio-cultural development. Given the changing paradigm of education, society and the state urgently need to prepare students - future teachers for professional activities in the educational digital environment.

While state educational standards reflect the requirements to educational outcomes, educational technologies, structure, content of education, and conditions of educational process organization, the digital generation, modern digital technologies and rapidly developing digital economy dictate their own conditions for teacher training.

Despite the evolution of higher education, they are forced to state the lack of connection between the new trajectory of teacher training, the new structure of education, and forms and methods of teaching students of pedagogical profile.

The analysis of modern educational and methodological and scientific arsenal has revealed a contradiction in the higher education preparation of the future teacher today. Under the conditions of technologization and digitalization of education, there are contradictions between:

- the accelerated introduction of digital technologies into the educational process raises the problem of a shortage of specialists engaged in the training of future teachers with appropriate digital competencies;

- the focus of today's education system on the preparation of future teachers and the challenges that arise here and now, and that cannot be postponed;
- growing personal requirements of future teachers and their psychological unpreparedness for professional activities due to the need to integrate into the digital environment, which requires a high level of digital competence;
- the growing need to improve practical approaches to training future teachers and the desire to move individual disciplines or entire courses to distance learning (Van den Beemt et al., 2019).

The study of the issues of educational and methodological training of future specialists of pedagogical profile in the conditions of digitalization in Ukraine and abroad will identify gaps in this cluster of higher education. The results of this theoretical study can be used for further theoretical and empirical research in the professional training of future elementary school teachers.

To identify the factors influencing the effectiveness of methodological training of future elementary school teachers in the digital environment, the method of theoretical analysis was applied. To determine the advantages and disadvantages of distance learning a comparative analysis of the elements of classroom and distance learning was applied.

Theoretical and methodological components of the study formed the actual educational and methodological and scientific-practical achievements in the field of professional training of the future teacher and the digital transformation of the state, society, economy, and education.

Analysis of the scientific literature indicates the presence in the modern scientific space of a sufficient number of studies devoted to the current problem of teacher training in the transformation of modern education.

Among them, there are works on informatization and transformation of education through the prism of digitalization processes (Berry, 2019; Cladis, 2018; Gupta & Irwin, 2016; Kumar et al., 2019), general problems of professional preparation of elementary school teachers (Lacka & Wong, 2019; McGovern et al., 2019; Paul & Lal, 2018; Song, 2018), methodological problems of preparation of elementary school teachers (Walker, Livadas, & Miles, 2020).

The most valuable results for our research were the works on:

- the use of web-educational technologies in teacher training (Timmis & Munoz-Chereau, 2019; Moore & Kearsley, 2020);
- use of educational platforms (Mueller-Oppliger, 2020);
- advantages and disadvantages of distance learning (Martin et al., 2019);
- peculiarities of preparing future elementary school teachers to design web lessons (Hawkins et al., 2019);
- the advantages of using mobile technology in school lessons (Fenwick & Edwards, 2016);
- designing different types of electronic educational resources (Takacs et al., 2015; McLay & Renshaw, 2019);
- the experience of using e-learning resources (Burnett et al., 2019; Andersson & Mattsson, 2018);
- the use of e-assessment in higher education (Ma et al., 2019; Craciun & Bunoiu, 2019).

The purpose of the study is to identify the factors affecting the quality of methodological training of future teachers of primary classes in the modern educational environment.

The main objectives were defined: to reveal the features of the methodological training of future teachers of primary classes, the study of Ukrainian and world experience in the use of digital educational tools, and analysis of aspects of the development of the digital educational environment in Ukraine and abroad, the identification of factors affecting the effectiveness of methodological training of future elementary school teachers in the digital educational environment.

The choice of research methods was dictated by the specific goals and key objectives of the study.

2. Methodology

Today, the training of future professionals in the teaching profession is under the scrutiny of the state and society. And, the problem of the methodical preparation of a future teacher has always been one of the leading ones for teacher education.

Methodological training of a teacher of primary educational level is the mastery of methods and technologies of

teaching special subjects in courses. The result of methodical training is a specialist who knows the methods and technologies of teaching. Ilina, Oseev, Vinichenko, Kirillov, Kaurova, & Nakhratova (2018) imply the mastery of methods and technologies of teaching subjects in the study of special courses.

In the methodological training of teachers, let us note the theoretical and methodological, and practice-oriented parts. The theoretical part of teacher training includes mastering the theoretical courses that form the basis of school and interdisciplinary subjects.

The most important part of the methodology is the practical training of the general education teacher. Practical training of the future novice teacher is an integral part of teaching. Practical training provides practical knowledge of the components of the pedagogical activity, and readiness to solve pedagogical problems in the real conditions of the educational process. Obtaining quality practical training during the educational program is the most important motivating factor for successful employment in the profession (Junco, 2015).

The main goal of training is to teach the specifics of working with children in the study of a particular subject, the formation of subject-specific and methodological knowledge and skills, and practical skills in school. It should be noted that methodical training is based on the student's readiness, ability, and willingness to accept the acquired knowledge. Thus, professional aptitude, intrinsic motivation, and psychological readiness are the basis of methodical training.

Today the Ukrainian system of teacher education is on the way to find the optimal model of universal teacher training. Therefore, the priority task of Ukrainian education is to provide quality training of a specialist who is ready to work with a digital child, a representative of the generation of so-called "digital natives".

Representatives of modern generation Z are children of multimedia technologies. These are people who were born in the information society and from an early age got access to the Internet, YouTube, and various gadgets. Otherwise, representatives of generation Z are called "digital natives", and representatives of the previous generation are called "digital immigrants" because in their childhood there was no free access to the Internet and no digital technology. This "digital generational divide has been the subject of research by a number of scholars" (Mattsson & Andersson, 2019; Menashy & Zakharia, 2019). However, psychological research into this phenomenon has been quite limited to date. According to Nguyen T.-L. (2019), the construction of the "digital abyss" is a kind of "black box", which creates the illusion of explanation, but currently has no psychological content. Optimal ways to bridge this gap in the digital generation have not yet been developed.

To work effectively with today's generation of "digital natives," the teacher must have not only "digital literacy" but also digital competencies. The principle of "digital literacy" was first introduced in 1997 by Paul Gilster. He expanded the concept of digital literacy, giving it the characteristics of an instructional principle with characteristics such as the ability to critically understand and use computer information in a variety of formats from a wide range of sources. Slama & Choukir (2019) elaborated on this definition. Digital literacy is not limited to a set of ICT skills but includes the ability of individuals to use digital tools appropriately. Such an approach will allow the educator to operate with information and build effective learning content and a digital resource base. Moreover, digitalization is an important factor in the construction of social interaction.

Many scholars study digital competence and try to create its optimal model. Selwyn, Pangrazio, Nemorin, & Perrotta (2019) offer their concept of digital competence, which is part of social competence and includes four components (knowledge, skills, motivation, and responsibility) implemented in different areas - working with content, communication, technosphere, and consumer sphere.

Of course, the technical potential of the university plays a fundamental role in the organization of the educational process. Song (2018), speaking of digital transformation, draws attention not only to the technical re-equipment of resources but also to the rebooting of human potential and optimization of all internal processes of an educational institution. He considers it extremely important to provide training, retraining, and education of specialists, including heads of organizations, behind the key competencies in the field of digitalization.

The current state of distance education in Ukraine requires special attention. The share of online education in the Ukrainian educational market is small: 1.8% for the higher education cluster and 6.7% for additional vocational education. The largest percentage of students (82%) studying exclusively by distance education is at commercial universities.

The analysis of Table 1 will provide a manifestation of positive and negative aspects arising in the organization of distance learning in the training of elementary school teachers. Table 1 presents a comparative analysis of the elements of classroom-based and distance learning formats (for full-time, part-time, and blended learning).

Table 1. Comparative Analysis of Elements of Classroom and Distance Learning

Indicator	Full-time (part-time, full-time / part-time)	Distance learning
Conceptual framework	Teacher-student interaction, live communication. The dialogue between the teacher and the student is carried out by e-mail (asynchronous interaction) and in chat on the forums of distance learning sites.	Chat classes (synchronous interaction in forums). Web classes (interactive video conference, online lecture, or webinar).
Purpose	Training highly qualified specialists with universal cultural, professional, and vocational competencies.	1. Professional development. 2. Training and retraining of personnel. 3. In-depth study of topics and sections on the studied disciplines. 4. Additional education. Basic training course for students who for various reasons cannot attend full-time training sessions.
Scope of training material	The amount of study material is limited. It depends on the number of hours allocated for lectures and practical classes, as well as for independent work.	The large volume of learning material. Free choice of information sources to be studied.
Methods and forms of students' activity	Listening, comprehension, exercises, the study of textbooks and primary sources, modeling, including hands-on work, and educational research. Individually, in pairs, in small groups, frontally	Independent work of the student on the study material.
Methods and forms of learning	Traditional (lectures, proseminars, seminars, special seminars, colloquia, laboratory work, master classes, and special practices, etc.) and non-traditional forms of classes. Active interactive teaching methods.	Online lectures (webinars).
The teacher's role in the learning management process	Providing continuous cognitive activity of students, their independent work, and scientific creativity.	Student Coordination
Control and diagnostics of the educational process	Oral, written, practical control. Possibility of personal control. Systematic regular monitoring at all stages of the learning process. Control is comprehensive, and allows you to check the theoretical knowledge, intellectual and practical skills.	Regulated written and machine control, self-monitoring.

Source: compiled by the author

Undoubtedly, nothing can replace live teacher-student interaction, which is a huge advantage of a classroom. In addition, these classes have several important features that cannot be implemented remotely:

- 1) current control of the results of students' independent work;
- 2) students' skills in independent oral reports, justifying and defending their own point of view;

- 3) teaching students, the rules of discussion and listening to a partner;
- 4) identification of individual learning difficulties of individual students, possible deficiencies in their thinking or some thinking operations (analysis, synthesis, generalization, abstraction, etc.)
- 5) identification of personal features of students, which may positively or negatively affect the whole learning process and therefore require registration or even correction.

The positive aspects of distance learning are:

1. A lot of training material.

Through distance learning, students can gain knowledge from the latest sources through their own research and study.

2. Independence, self-control, individualization of learning.

The digital age requires people to develop self-organization and self-motivation skills, and the individualization of education contributes to this. Self-education is a powerful resource that contributes to significant optimization of the educational process. Student self-organization provides a painless transition to continuous postgraduate education (primarily self-education) after graduation. Independent work allows to reduce the negative impact of certain individual characteristics of students (for example, inertia, inability to distribute attention, inability to act in a situation of time constraints, etc.) and maximize the strengths of individuality through the independent choice of time and methods of work. Access to education from anywhere in the world. Continuous education is becoming the norm, as online learning is actively developing and society's attitude to the learning process is changing.

3. Results

Significant changes in the socio-economic conditions that have recently taken place in society have a major impact on the processes of education. Educational standards are actively implemented in the system of primary education, which have made changes in the structure, content, and resource provision of educational activities, in the system of evaluation of educational results.

The theoretical and methodological analysis of the problems of teacher training in the context of digitalization allowed to identify the factors and obstacles affecting the effectiveness of methodological training of future elementary school specialists.

Factors contributing to the effective methodological training of future elementary school teachers through the prism of digitalization of education:

1. A digital learning environment for the university that contains the full range of ICT tools and effectively implements them in the context of certain public education standards.
2. Practicum bases are equipped with modern technical means of education.
3. High level of digital competence among mentors who directly train future elementary school teachers.
4. Improved practice-oriented models of training elementary education specialists using modern digital learning tools.

Obstacles to effective methodological training of future elementary teachers in the digitalization of education

1. The steady foundation of the educational culture that has been formed for decades is poorly digitized and hinders the rapid introduction of technology into the educational process.
2. Doubts about the effectiveness and feasibility of digital technology.
3. Weak technical equipment of university informatization services and practice bases.
4. Inefficient implementation of digital tools, communication channels, social networks for educational purposes.
5. Inefficient use of the potential of distance learning courses.
6. Insufficient level of digital literacy and digital competence among the staff involved in the educational process.
7. The "digital divide" of generations.

4. Discussions

Educational and methodological and scientific-practical achievements of the modern pedagogical cluster do not have the proper potential to cover the issue of training future elementary school teachers in the digitalization dimension. However, the socio-cultural realities of recent years indicate a significant increase in the share of information and digital space in the educational environment. Therefore, elementary school pedagogy is forced to adapt to the demands of the time and present new developments that will ensure the further development of this educational cluster. General difficulties of preparing future teachers have been researched and extensively presented in the results of research by philosophers, educators, and psychologists. First of all, theoretical ideas and conceptual provisions have been investigated to facilitate understanding of the problem (Fleisch et al., 2016). At the same time, there is a need for scientific research on the results of the introduction of new educational formats and a comparative analysis of the effectiveness of traditional and innovative (information and digital) dimensions of educational activity.

At the present time in the cultural and educational environment, there is a priority of the concept of quality of education. However, in the realities of modern education, we observe insufficient actualization of progressive educational trends, which hinder the formation of quality indicators. The quality of education is formed in the following moments:

- * transformation of the goals and learning outcomes in the context of socio-cultural relevance;
- * increase in the intensity of learning through information and digital learning technologies;
- * integration and differentiation of all parts of the educational space;
- * strengthening of individual creative education (Craciun & Bunoiu, 2019).

The success of specialist training largely depends on the focus on the target component and the results of the activity. Training a pedagogical specialist requires consistency, so the search for effective ways of forming a system of ideas about the object of own professional activity, skills, and abilities of its study, organization, and management is actualized (Tsekhmister et al., 2021).

The systemic nature of education is determined by causality, which produces continuity and consistency in the process of training elementary school specialists. Since elementary school is a cluster where fundamental educational elements are formed, the teacher acts not only as a translator of educational content but also as a generator of cultural and educational attitudes. Since the modern educational space is inextricably linked to the information and digital environment, the competence of the teacher should include orientation in the processes of digitalization and the use of digital potential in practical and educational activities.

The leitmotif of professional and pedagogical training should be logical and pedagogical culture as a fundamental basis because the formation of Higher Education is impossible without understanding the realities of socio-cultural space. Under such conditions, digitalization is one of the key worldview benchmarks for the future teacher. The information and digital space significantly expand the teacher's potential in the context of the translation of pedagogical ideas. It contributes to the creative self-organization of subjects of the educational space.

In pedagogical currently relevant research to deepen the level of professional training of the teacher. Innovative educational trends are found in the research of Kumar, Martin, Budhrani, & Ritzhaupt (2019). Some aspects of the formation of ICT skills are reflected in the studies of McGovern, Moreira & Luna-Nevarez (2019). The development of professional competence of educators in the current scientific paradigm is associated primarily with project skills and mentor pedagogical thinking, discussed in detail in the works of Timmis & Munoz-Chereau (2019) and Menashy & Zakharia (2019).

Awareness of the role of hands-on learning and interpersonal interaction in elementary school has actualized the problem of adequately preparing future teachers on these issues (Lacka & Wong, 2019).

Particular attention in professional education theory has focused on problems of pedagogical organization. At the forefront of scientific research are the issues of revealing the educational potential of the pedagogical cluster (Craciun & Bunoiu, 2019); the formation of axiological and gnoseological qualities of the teacher in the implementation of professional activity (Lacka & Wong, 2019).

It was found that the process of preparing future elementary school teachers in the process of digitalization will be effective if:

-describe the content line of student competence in the interrelation of its components: cognitive, educational, constructive-educational, and normative-evaluative;

-create a clear educational strategy that includes bringing theoretical and practical training to a common methodological denominator; forming constructive skills in the format of full-time and extracurricular activities with younger students; making students aware of the importance and necessity of self-improvement and promoting the principles of self-development.

Analysis of the achievements of scientific and educational practice allowed us to conclude that the training of future elementary school teachers has not been allocated in a separate educational and methodological cluster. At the same time, theoretical analysis on improving the professional training of future elementary school teachers has shown that the use of information and digital potential is the one component that allows to successfully form the readiness of future teachers to organize work in the elementary school.

5. Conclusion

This study has identified factors that contribute to effective methodological training of elementary school teachers. However, there are also obstacles to this process. And, it must be recognized that against the background of a dynamic global digital economy, the process of digitalization of education is only at the beginning of its path.

Higher education institutions that train future teachers have a lot of work to do to modernize basic practice-oriented approaches using modern digital educational tools. Undoubtedly, the modern technical equipment of educational institutions is the key to the formation of the digital competence of future specialists. This applies not only to universities but also to practice bases. We should also note the need for regular updating of technical equipment funds. However, regular professional development courses in the field of ICT for teachers and staff of educational institutions at all levels would be a huge digital leap for the informatization of Ukrainian education. In a rapidly changing digital world, it is important to constantly improve to meet the rapid changes.

Distance learning is very popular today. And this is the main disadvantage because not every profession can be mastered remotely. Given the specifics of elementary school teacher training, there is a question about the feasibility and logic of introducing distance learning into teacher training. Blended learning is the most consistent in the professional training of future elementary school specialists. The combination of classroom and e-learning can be very effective. Comparative analysis of distance learning and traditional classroom learning, and theoretical analysis of scientific literature led to the conclusion that distance learning can only complement basic education, not replace it. It is worth noting the main reason why the effectiveness of distance learning for future teachers is questioned: it is impossible to work with the student's personality.

The digital age is a new stage of human development, and it is perceived as something inevitable. The Internet today is not only a specific sphere of human activity. The digital world is changing human life and activity, and therefore there is a need to study the processes taking place in it. The political, social, ethical, and psychological processes of the digital world are inextricably linked to all spheres of life, and we unwittingly become users of all the benefits that modern technology gives us. Thanks to digital technologies, the academic world is globalizing, and academic mobility is growing.

Since theoretical analysis is most often an integral part of any scientific research and is the first stage, the findings may become the necessary basis for further empirical research in the professional training of future teachers under the innovative conditions of digital transformation of education.

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