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GELECEKTE TARİH  
ÖĞRETMENLERİNİN DİJİTAL  
TEKNOLOJİLERE DAYALI  
ARAŞTIRMA YETERLİLİKLERİNİN  
OLUŞUMU

FORMATION OF RESEARCH  
COMPETENCE OF FUTURE  
TEACHERS OF HISTORIANS BASED  
ON DIGITAL TECHNOLOGIES

**Yazar**

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### Öz

Makalenin konusu, dijital dönüşüm ve tarihsel kaynakların kitlesel sayısallaştırılması bağlamında tarih biliminin gelişimi ile ilgili modern zorluklar ve problemlerdir. Tarihsel bilişim ile dijital kamusal tarih de dahil olmak üzere "dijital tarih" arasındaki ilişki ayrıntılı olarak analiz edilir. Son yıllarda yeni bir ivme kazanan verilerin geleneksel tarihsel bilgisayar bilimi sorunlarına özel bir yer verilmektedir. "Büyükveri" nin genişletilmiş tanımı ve tarihsel araştırmalarla ilgili özellikleri, bir dizi büyük ölçekli uluslararası araştırma projesi örneğinde tartışılmaktadır. Araştırmanın metodolojisi, dijital dönüşüm bağlamında modern tarihsel bilim gelişim süreçlerinin incelenmesine yönelik sistematik, bilgilendirici ve disiplinlerarası yaklaşımlara dayanmaktadır. Makalenin bilimsel yeniliği, tarihsel bilişim ve dijital tarihin konu alanlarının korelasyonunun belirlenmesi, tarihsel yönelimli araştırma projelerinde "büyükveri" kavram ve teknolojilerinin kullanılma olanaklarının belirlenmesi, matematiksel yöntemlerin ve dijital teknolojilerin gelecek vaat eden uygulama alanlarının belirlenmesi gibi yönlerde yatmaktadır tarihsel araştırma ve eğitim programları. Modern nesil dijital dünyada doğar. Hayatta dijital teknolojilerin kullanımını hafife alıyolar. Öğrenme sürecinde, dijital yeterlilikleriyalnızca geliştirilmektedir. Ancak özel eğitim ihtiyacı olanların her zaman dijital yetkinlikleri yoktur. Sorun şu ki, dijital yetkinlikler olmadan entelektüel gelişim bozukluğu olan çocuklar dijital bir topluma entegre olamayacaktır.

**Anahtar Kelimeler:** Tarih öğretmeni, dijital teknolojiler, yeterlilik, dijitalleşme, bilgi okuryazarlığı, dijital tarih, dijital kamusal tarih.

### Abstract

The subject of the article is modern challenges and problems related to the development of historical science in the context of the digital turn and the mass digitization of historical sources. The correlation between historical informatics and "digital history", including digital public history, is analyzed in detail. A special place is given to the traditional historical computer science problems of data, which have received a new impetus in recent years. The extended definition of "big data" and its specifics in relation to historical research are discussed using the example of several large-scale international research projects. The methodology of the research is based on systematic, informational, and interdisciplinary approaches to the study of modern processes of historical science development in the context of the digital turn. The scientific novelty of the article lies in such aspects as determining the correlation of the subject fields of historical informatics and digital history, determining the possibilities of using concepts and technologies of "big data" in historically oriented research projects, identifying promising areas of application of mathematical methods and digital technologies in historical research and educational programs. The modern generation is born in the digital world. They take the use of digital technologies in their lives for granted. In the process of learning, their digital competencies are only being improved. However, those with special educational needs do not always have digital competencies. The problem is that without digital competencies, children with intellectual development disorders will not be able to integrate into a digital society. **Keywords:** Teacher historian, digital technologies, competence, digitalization, information literacy, digital history, digital public history.

## **Introduction**

Currently, one of the urgent tasks of the development of the economy of Kazakhstan is connected with the transition to digital technologies that ensure the creation of the digital economy of the future. This transition determines the transformation of society and production, which can be provided with a qualitatively new level of research activity, both in education and production (On the approval of the State Program "Digital Kazakhstan". Resolution of the Government of the Republic of Kazakhstan, 2017). The digitalization of the economy imposes specific requirements on the content of the educational program for training specialists through the development of research skills and abilities. Digital technologies are becoming the reason for the reorganization of the educational process, in particular, the future history teacher.

When forming the professional competence of a future teacher at a university, an important place is occupied by the development of research competence throughout the entire learning process. As a result, a student – a future history teacher should become competent in the field of research and organization of scientific activity, in the ability to apply the acquired knowledge for the original development and formation of ideas, both in the context of scientific research and in professional pedagogical activity. In the context of a competence-based approach, the quality of training of future teachers can be ensured by the close relationship of the educational process with research works, where there are fundamental scientific achievements, the latest pedagogical technologies and developments. Obviously, the educational process in the conditions of digitalization of education outside of scientific knowledge and their methods cannot develop, because it will lead to a radical change in the labor market, the emergence of new competencies.

Consequently, the development of research competence involves the inclusion of the methodology of scientific research in the educational process in order to form a creative approach to solving future pedagogical tasks by the teacher. So, the teacher should develop a new digital culture among students, the ability to solve complex functional tasks. In turn, the future teacher develops the ability to independently analyze emerging problems, constant self-development and self-improvement.

The training of teachers at the university in accordance with the State Educational Standard of the Republic of Kazakhstan and the State Program "Digital Kazakhstan" (State Mandatory Standard of Higher Education. Approved by the Resolution of the Government of the Republic of Kazakhstan, 2012) should contribute to the formation of the following competencies, which can be considered as:

- the ability to use digital technologies in teaching and designing the educational process in an educational institution;
- facilitating the integration of information and educational resources that allow students to access a set of digital tools;
- knowledge of the theory and system of methods of teaching history, the ability to effectively use modern digital learning technologies to achieve their goals and organize the educational activities of students;
- understanding of new conceptual ideas and directions of development of pedagogical science in connection with the modern paradigm of digitalization of

education; - possession of skills of technical design, creation of laboratory and demonstration installations using electronic computing equipment;

- promoting the development of new digital competencies among students and using them to analyze and summarize data for exchange between the structural components of the pedagogical process.

These competencies are formed in educational and research activities, and contribute to the development of effective solutions to the tasks necessary for the implementation of research activities.

The purpose of the article is to draw the attention of specialists to this problem and determine which digital competencies can be mastered with intellectual development disorders. Digitalization of the education system is a natural and purposeful process supported by the state. Different researchers use the following terms as synonyms: "digital competence", "digital competence" and "digital literacy". The differences between these terms are minimal, so many modern researchers prefer to use them as equivalent, which leads to semantic distortions when describing the processes of digitalization in education. Digital competence includes digital competencies, both of which are manifested in activities and are a prerequisite for effective educational and professional activities in the context of digitalization.

This article offers the author's vision of digital competencies that teachers and historians will be able to master. Digital competencies include information literacy in the digital environment, communication and collaboration, digital content creation, digital security, the ability to identify a simple technical problem and seek help to solve it.

It should be noted that in the process of research activity, the formation and development of personal properties and qualities of the researcher takes place: as cognition, independence, the ability to creatively solve practical problems in personal professional activity, efficiency. Thus, the research activity of students at a pedagogical university of any level (bachelor's degree, master's degree) is considered by us as an important component in the system of teacher training, which should provide for the possession of skills, research search skills and readiness for research activities, and the quality of this activity can be analyzed through the developing research competence of the future teacher in the learning process.

The development of research activities in the training of teachers makes it possible to justify the need and study of professional 171 competence using a system-activity approach. In particular, the educational and research competence of university students acts as one of the conditions for academic success and the development of professional competencies (Lukashenko, 2012; Fedina, 2010). It manifests itself in various elements as a skill, the ability of personal self-realization, in the form of a mechanism of self-development. Research competence is a product of learning due to self-development, personal growth, holistic synthesis of one's activity and personal experience. These authors use the concept of "research competence" as a characteristic reflecting the willingness and ability of the subject to apply theoretical knowledge and practical experience in solving communicative and research and other tasks in teaching.

Thus, in the modern development of psychological and pedagogical science, research competence is considered as the most important component of professional competence. It is formed when studying basic and profile disciplines, analyzing and

solving research problems, performing coursework and qualification work by a future teacher. This actualizes the interest in the procedural side of research competence, which is formed in the process of implementing educational activities, while the position occupied by students in this activity is important. It follows from these studies that the development of research competence is one of the important conditions for the successful professional activity of a future teacher.

The study of the professional training of students at the university in historical specialties shows the need to master a whole complex of various scientific knowledge, including those related to the features of the object of its activity of the holistic pedagogical process in which the personality of the future history teacher is formed. Based on the fact that the formation and development of research competence while studying at a university is a complex multi-level step-by-step dynamic process, it is necessary to consider its various aspects in interrelation at all levels of teacher training. Thus, research competence is considered as an integral characteristic of personal and professionally significant qualities of a teacher, assuming possession of a system of scientific knowledge and value orientations specific to this branch of science (Moldabekova and Akzholova, 2015).

The formation of a student's research competence at different levels should be organized within the framework of his research activities in the field of both physical experiment and computational and theoretical research, which are verified relative to each other. The empirical and theoretical levels of scientific research, its forms and methods should be presented in the structure of research competence with the methodology of scientific research.

Thus, the research competence of a teacher is an inextricable link between the theoretical and practical aspects of his readiness to carry out pedagogical activity. One of the main components of the professional pedagogical competence of a history teacher is knowledge of the discipline (subject) of history and the ability to use historical knowledge as a tool for solving cognitive and practical problems.

Considering the concept of "research competence" and based on the formed research competencies of graduates of different levels, it is possible to determine its component composition.

When constructing a model for the development of research competence, its component composition and conditions of implementation, we took into account the following components:

- a motivational component that depends on the personal efforts made and affects the ability and intellectual level;
- the cognitive component determines the relatively stable individual characteristics of the cognitive processes of the student, which are expressed in the implementation of educational, cognitive and research activities;
- the content-activity component includes educational and research and research competencies and the implementation of the results of scientific research into the practice of educational institutions;

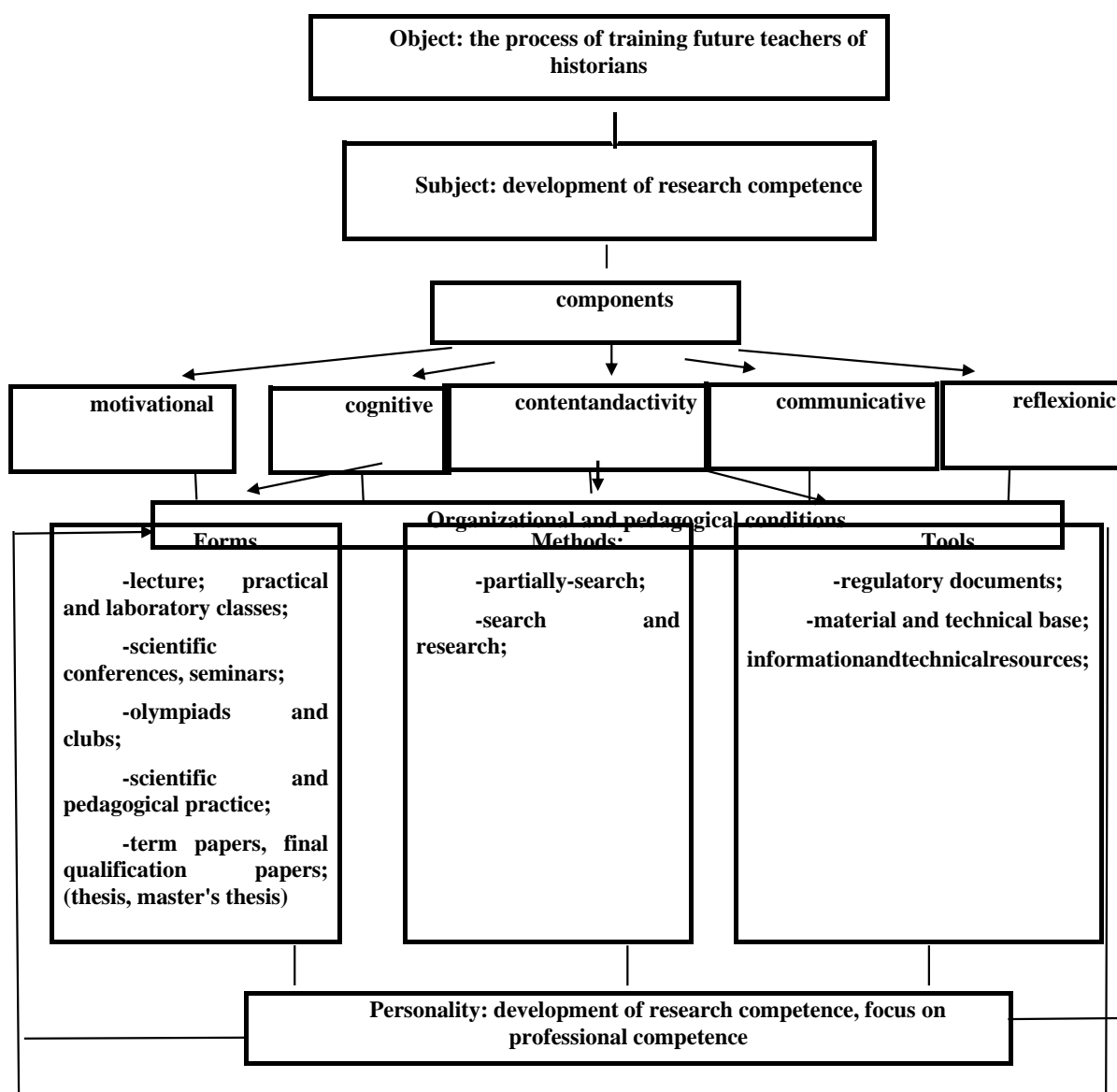
- the communicative component is a component of readiness for research competence, reflecting the degree of research competence, abilities and certain qualities that a participant in the research process should possess.

- a reflexive component that acts in the form of self-awareness by the subject in joint research activities, as well as an assessment of personal characteristics and cognitive, cognition-related representations in solving research problems. Based on the study of the educational and research activities of students, a model of the development of the research competence of future history teachers was developed.

(Figure 1), where the organization of research activities in which the development of the research competence of students appears as a product of his activities to perform various tasks in history, is a model of the development of the research competence of the future teacher.

Based on the model, the object and subject of research are presented as interrelated components of research competence (motivational, cognitive, content-activity, communicative and reflexive), which determine the organizational and pedagogical conditions for the preparation of future teachers at the university. Since the development of research competence is considered by us as a complex multilevel dynamic process with various stages that are interrelated, which should be studied at all levels of teacher training in a pedagogical university.

Figure 1 – A model for the development of research competence of future history teachers



In recent years, in the context of the development of DH technologies, the discussion of the topic of big data in the humanities has intensified. Today we can say that the problem of accumulation and analysis of big data in historical research has already arisen and may become relevant in the near future. However, the answer to the question about the availability of big data in relation to historical sources depends significantly on what definition we adhere to.

So, if we follow the authors of the book "Exploring Big Historical Data: The Historian's Macroscopic" published in 2015 in the USA, then these are the data sources that require computer processing to understand them. This definition allowed the authors to proclaim that historians have been living in the world of big data for a long time. This thesis is difficult to take seriously. In the generally accepted understanding, big data is defined as a set of approaches, methods and technologies for processing structured and unstructured data of huge volumes and various formats to obtain user-perceived results, in conditions of continuous data growth (streaming data), their distribution across nodes (clusters) of a computer network (Soldatova, 2018).

These technologies are alternatives to traditional database technologies. Although the strict definition of big data implies their streaming nature (their continuous flow), such data are rare in the practice of social and humanitarian research (the exception is reduced to social network research); but there is a need to analyze a huge amount of data, work with which cannot be done using computers and standard software familiar to users. Even in the absence of streaming data, the storage and processing of an information array, the volume of which is estimated in tens and hundreds of terabytes (or even petabytes), requires special technical and software-algorithmic solutions, since standard hardware and software are useless in such situations.

To work with such data, cloud technologies and special software are used, for example, NoSQL, MapReduce, Hadoop, R, etc. At the same time, the data is distributed, as a rule, across computing nodes, clusters. Participation in a number of recent conferences on Big Data analysis allows me to conclude that today, in these situations, they talk about an acceptable extension of the definition of big data, when data may not have a streaming nature, but their volume is so large that it cannot be stored and processed by standard means (Yakovleva, 2020). A characteristic feature of such data in historical research is not only the huge volume of sources underlying large-scale comparative research projects implemented by historians as part of international collaborations, but also the variability, poly-species nature of these source complexes, which may include texts and statistics, visual and audio materials.

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In conclusion, it can be noted that the research abilities of graduates of a pedagogical university, developed in the conditions of the modern paradigm of digitalization of education, have a competitive advantage in the labor market and are in demand by employers.

The interaction of the educational process with the research work of the university can be carried out by including individual research issues in the work programs of the profile disciplines. This contributes to improving the quality of education of the future teacher through the use of digital technologies and the creation of a future creative society through the education and upbringing of the younger generation.

Thus, the development of students' research competence in the conditions of digitalization of education requires further development and improvement of educational programs for training specialists for production and teaching staff for the educational sphere.

The emergence of digitalization has brought many changes to human society. The rapid development of Science and technology and socio-economic changes require a new approach to the education of the younger generation. In the context of modernizing education today, its informatization is becoming a priority. In general, today the basis of social development of all countries of the world is education, information and information technologies. According to it, the connection of the current stage of the development of

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civilization with informatization and the formation of an information society is not a random thing.

Currently, the main goal of informatization of education in the Republic is to improve the quality of state education by creating a unified educational information environment based on the use of modern information technologies.

The use of information technologies in the training system has now become one of the main directions of improving education. That is, the use of Information Technology in the educational process:

\* opportunities provided by information and communication technologies in improving the educational process;

\* possible options for teachers to use information and communication technologies in elementary school;

\* availability of appropriate skills and knowledge for the subject teacher and student to use information and communication technologies in the classroom.

The Republic of Kazakhstan is moving towards the creation of an information society in accordance with the <<Education Development Program 2011-2020>>. Today, the ability to use information and telecommunications technologies is balanced by the skills of reading and writing necessary for each member of society.

Modern education on the way to e-learning is based on the use of Information Technologies on the ground - computers, programs, means of storing and distributing information, etc. It, in turn, allows you to promptly track changes in the knowledge of Primary School students along with graduates of educational institutions of various levels.

In fact, the school should prepare graduates for work in modern production conditions - in the process of production activities that can use information technology. This is not just the concept of pressing the mechanisms of a computer and working with various programs, it is the ability to work with information, analyze information, make a correctly differentiated decision, bring the decision made to the final result.

The process of transition to the information society it is called informatization. Schools should also move to the basis of teaching using information technology in order to fit into modern society. Therefore, the priority direction for the development of knowledge is the transition to e - learning. In this regard, the issues of informatization of educational institutions are not only the organization of teaching computer science, but also the effective use of information technologies for teaching all disciplines, the appropriate equipment of computer science offices and the readiness of teachers and students for such innovations.

The use of information and communication technologies makes a significant contribution to the assimilation of the transmitted knowledge by students, improves the presentation of the lesson material to children, increases its mood, aesthetic and scientific significance when explaining the lesson.

The use of a computer in the classroom changes the attitude of students towards the same subject, the teacher, and also improves discipline and performance.

Teaching the subject using information technology: allows students to better remember the information received during the lesson, not only listening to the teacher's

bare words, but also seeing a lot of information with their own eyes. One of the requirements of the teacher to students in the course of teaching the discipline is: the development of information culture, that is: the development of thinking, the ability to work with various sources of information and increase the student's interest in the subject by communicating it in a way that is understandable to students. If the student has a high interest in the subject, it affects the high quality of the student's knowledge of the subject.

These include obtaining additional opportunities in the implementation of the teacher's responsibilities and tasks or life plans, achieving some kind of freedom, professional growth, getting closer to students, increasing authority in front of them, creative work with children, having a reference summary on a computer screen, systematized storage of methodological material in electronic form, opportunities to use the experience of others in the lesson, etc. Well, it is known that if the teacher is not sought, there will be no move forward. Therefore, each teacher should find his own interest in this direction, put aside all the fears of suspicion and work on the same topic together with the children in depth.

Today, in conditions where information is a strategic resource, we are convinced that the development of society, modern education is a continuous trend. Therefore, it is at this time that it is appropriate to organize the educational process using modern information and communication technologies. Electronic means are widely used here as sources of information.

The main tasks of modernization are to achieve improvement of the quality of today's school education. Informing knowledge should help solve two problems. Education is a new quality of education for everyone and for everyone.

For the primary school, this is a shift in the priorities of determining the goals of education: one of the results of education and upbringing at the initial stage of school is the child's readiness to learn by mastering modern computer technology.

In order to implement this, there was a need to use information and communication technologies in educational and educational work to teach children in the practical activities of a primary school teacher. The use of information and communication technologies in the lessons of elementary grades allows you to learn methods for finding orientation in the information flow in the environment, exchange information through electronic and technical means, and be able to work with the necessary information. The use of ICT in elementary school goes from one-sided interpretation of the lesson to interpretation through two-way communication. In this case, the student has the opportunity to easily master the materials provided by active participation in the educational process. Children easily get rid of the thoughts <<that the lesson is difficult to understand>>. The use of ICT in elementary school provides the following opportunities:

- \* increase the cognitive activity of students;
- \* conduct classes with a high aesthetic degree (melody, animation);
- \* work with each of them individually, giving each student different levels of tasks.

Thus, in modern school education, the use of information and communication technologies in the educational process is an urgent problem. Today, a teacher should be

able to prepare and conduct a lesson using ICT in the subject he teaches. Classes using ICT are visual, informative, interactive in color, save time for students and teachers, allow the child to work at their own speed, it is convenient to work with each student individually, and quickly and fully evaluate the quality and results of Education. In addition, the use of modern information technologies in the educational process in primary school allows students to perceive knowledge at a qualitative and creative level, and also creates favorable conditions for them from the role of passive receivers of knowledge to becoming active subjects of this process.

The main goal of solving this problem is to improve the educational process, create a unified educational environment, and improve the quality of Education. To do this, it is necessary:

- \* integration of different subject areas;
- \* modernization of the traditional system of teaching the discipline;
- \* accumulation of educational resources;
- \* teacher's mastery of modern information technologies;
- \* Organization of personality-oriented training;
- \* creative interaction between student and teacher, teacher and teacher.

To achieve these goals, the following issues must be addressed:

- \* development of students ' skills to find directions in the space of modern information technologies;
- \* education of systematic-analytical thinking people;
- \* formation and development of conditions for creative collaboration between students and teachers;
- \* formation of students ' attitude to the computer as a cognitive tool;
- \* ability to apply ICT in all areas and forms of educational activity.

In the future, it is necessary to introduce other forms of education in domestic education. Even today, with all its relevance, the problem of distance learning on the basis of ICT is facing. If we really want to lighten the burden of our students, then we should look for solutions in the use of ICT and distance learning. It is necessary to learn how to use ICT not only in the educational process, but also in educational work and organizational and methodological work.

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#### **Publication Ethics**

The authors declares that all ethical principles and rules were followed in data collection, analysis and reporting processes.

#### **Additional Statement/Contributing Authors**

The authors contributed equally to the study.

#### **Conflict of Interest**

The authors declares no conflict of interest.