

**REPUBLIC OF AZERBAIJAN**

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**A B S T R A C T**

of the dissertation for the degree of  
Doctor of Philosophy in pedagogy

**USE OF DISTANCE EDUCATION ELEMENTS IN  
COMPUTER SCIENCE TEACHING (ON THE BASIS OF  
MATERIALS OF HIGHER EDUCATIONAL INSTITUTIONS)**

Speciality: 5801.01 – Theory and methodology of  
education and training (methodology of  
teaching informatics)

Field of science: Pedagogy

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**Baku - 2023**

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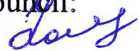
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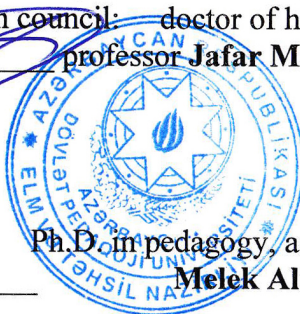
Dissertation council FD 2.15 of Supreme Attestation Commission under the President of the Republic of Azerbaijan operating at the Azerbaijan State Pedagogical University

Chairman of the Dissertation council: doctor of historical sciences,  
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## GENERAL CHARACTERISTICS OF THE RESEARCH

**Relevance and development of the topic.** Education plays an important role in the modern stage of the development of the Republic of Azerbaijan. The educational reforms implemented in the country serve its modernization, quality improvement, and human capital formation. To achieve this, it is important to ensure quality, accessibility and equal opportunities at all levels of education.

In a series of strategic roadmaps signed by the President of the Republic of Azerbaijan in 2016, it is stated: "In the education system, electronic education such as "massive open online courses" (MOOC) tools increase access to quality education at low prices for a wide population."<sup>1</sup> As it is known, MOOC as one of the modern technologies of distance education is widespread all over the world today. During the pandemic, some universities of our republic have created opportunities for their students to study remotely via MOOC. In 2023, the "Education Development Fund" supported 10,000 young citizens to improve their professionalism by studying MOOC for free. These facts show that distance education technologies are gradually being introduced in our country.

The COVID-19 pandemic has caused confusion and temporary stagnation in the education system, affecting 1.6 billion school and university students in more than 190 countries. Since March 2, 2020, due to the COVID-19 pandemic, the educational process in schools and universities in our country has been suspended. From March 11, 2020, on the Culture channel of the Azerbaijan Television and Radio Broadcasting Closed Joint Stock Company, TV lessons "Time of Lessons" has been launched. The lectures of the best school teachers began to be filmed and broadcast on television. Thus, the use of elements of distance education was started in Azerbaijan without any preparatory work, an appropriate legal framework and specialists in this field.

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<sup>1</sup> Telekommunikasiya və informasiya texnologiyalarının inkişafına dair Strateji Yol Xəritəsi. 30 dekabr 2016, Azərbaycan Respublikası Prezidentinin Fərmanı ilə təsdiq edilmişdir <https://president.az/az/articles/view/22382>

Teachers tried to organize lessons using Zoom, Whatsapp, Microsoft Teams and other programs. Nearly 2 million school and university students joined online classes using Microsoft Teams.

On June 16, 2020, at the initiative of Microsoft, a video conference was held between the President of the Republic of Azerbaijan İlham Aliyev and the company's management. At the conference, the president noted that “this situation due to the pandemic makes us take a fresh look at the issues of education, distance education...”<sup>2</sup>

In August 2020, the UN published a concept paper that analyzes education during and after the COVID-19 pandemic. During the pandemic, the article analyzed such important issues as the disruption of education around the world, the closure of schools, the disruption of the educational process, and the inequality of opportunities for gaining knowledge. The features of the steps taken towards the emergence of experimental education, the use of a wide range of distance education tools, support for inclusive education and support for teachers in the era of COVID-19 are shown, and strategic recommendations are given to achieve success in this direction.<sup>3</sup>

Today "How effective is distance learning, online education?", "Do you need distance education?" and there is an unequivocal answer to other similar questions: distance education is a universal and perfect educational technology of today and the future. Accessibility of education, quality assurance, individuality and interactivity, a wide range of teaching and information resources, and the development of students' independent work skills expand the possibilities of online education. Many countries have been able to get out of the situation by building on the experience gained in previous years.

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<sup>2</sup> İlham Əliyevlə “Microsoft” şirkətinin vitse-prezidenti və digər nümayəndələri arasında videokonfrans keçirilib: [Elektron resurs]. –İyun 16, 2020. URL: <https://president.az/articles/39176>

<sup>3</sup> Концептуальная записка: Образование в эпоху COVID-19 и в последующий период Организация Объединенных Наций: [Электронный ресурс]. -Август, 2020.URL:[https://www.un.org/sites/un2.un.org/files/policy\\_brief\\_education\\_during\\_covid-19\\_and\\_beyond\\_russian.pdf](https://www.un.org/sites/un2.un.org/files/policy_brief_education_during_covid-19_and_beyond_russian.pdf)

There is a consensus in the global educational environment today that universities that do not use distance learning technologies should not be taken seriously. Long before the pandemic, the number of universities using these technologies was in the thousands, and the number of students studying online was in the millions. The financial capacity of the distance education market is measured in trillions of dollars. In recent years, the universities of our country have been trying to apply this educational technology and are gradually increasing their attention to this area. At the same time, thousands of young Azerbaijanis are studying remotely at the world's leading universities.

However, against the background of the rapid development of telecommunications in our country, the use of distance learning has not been developed either in a technical or in a pedagogical aspect. Although many educational institutions in our country have computer classes with access to the local network and the Internet, the rich possibilities of the global network are not fully used. Due to the lack of the necessary regulatory framework, the necessary work in this area was not carried out in a timely manner. Educational institutions and teachers are not aware of the real possibilities and ways of using distance education, there is a language barrier in the use of resources, there are very few educational resources in Azerbaijani. Today distance learning technologies are rapidly developing at the world level, and a lot of experience has been accumulated in this area. In our country, the first steps are being taken in this direction.

Distance education has been used in international education for 25 years. The Law of the Republic of Azerbaijan "On Education", adopted in 2009, states that distance education is a "form of education".<sup>4</sup> However, during this period, the necessary work to establish distance learning was not carried out. The problems of using the distance education system in our country have not been studied as an object of scientific research. With these factors in mind,

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<sup>4</sup> "Təhsil haqqında" Azərbaycan Respublikası Qanunu: [Elektron resurs]. -İyun 19, 2009. URL: <http://www.e-qanun.az/framework/18343>

in 2016 we launched the study “Using the Elements of Distance Learning in Teaching Computer Science”.

Sufficient resources are needed to create a system of distance education in our country. Conducting training in computer science in higher educational institutions using elements of distance education can be considered as the first step in the scientific support of this problem. The effective application of distance learning technology at universities opens up new opportunities for students and teachers through gradual integration into the existing education system.

Over the past 25 years, a lot of research has been devoted to the problem of distance education. In our study, we mainly examined the work of researchers from the West, the Russian Federation, the Republic of Turkey and the CIS countries, as well as our country.

Information and communication technologies (ICT) are the main technical tool for organizing modern systems of distance education. The works of G.I. Kirilova, G.M. Kokaspirov, E.S. Works by Polat, I.V. Robert, L.G. Semushina, B.E. Starichenko and other authors are devoted to the use of ICT in education.<sup>5</sup>

The theoretical foundations and methodological features of the practical application of distance learning technologies were studied by A.A. Andreev, G.L. Andrianova, N.A. Gein, Yu.P. Gospodarik, G.A. Krasnova, G.V. Mozhaeva, P.A. Nazarov, V.I. Ovsyannikov,

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<sup>5</sup> Кирилова, Г.И. Информационные технологии и компьютерные средства в образовании // -Лондон: Educational Technology & Society,- 2000. № 4(1), -с. 23-28; Коджаспирова, Г.М. Технические средства обучения и методика их использования: уч. пособие для студентов высших учебных заведений / Г.М. Коджаспирова, К.В. Петров. -Москва: Изд. центр. «Академия», -2001. -256 с.; Дистанционное обучение / Е. С. Полат, М. В. Моисеева, А. Е. Петров [и др.] - М.: ВЛАДОС, -1998.-192 с.; Роберт, И.В. О понятийном аппарате информатизации образования // -Москва: Информатика и образование, -2003. №1, – с. 3-8; Семушина, Л.Г. Содержание и технологии обучения в средних специальных учебных заведениях. Учебное пособие для преподавателей учреждений среднего профессионального образования / Л.Г. Семушина, Н.Г. Ярошенко.-М.: Просвещение, -2001.- 272 с.; Стариченко, Б.Е. Теоретические основы информатики / Б.Е. Стариченко.- М.: Горячая Линия - Телеком, -2004. - 312 с.

E.S. Polat, A.V. Khutorskoy and others.<sup>6</sup>

Authors such as Agaoglu E., G. Imer, G. Kurubachak, C. Herman, D. Butler, T. Hülsmann, E. Barbera, J. Roberts, G. Kose, B. Kantürk, S. Ulsever, M. Simonson, C. Schlosser, D. Hanson, H. Stein, T. Tavukku, I. Arapa, D. Ozcan, C. Tsolakidis in their works discuss the essence of the category of distance education, the main theories in this area, the experience of organizing distance learning, applied innovations and other topics.<sup>7</sup>

Research in the following areas is conceptually important for ongoing work:

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<sup>6</sup> Андреев, А.А. Теория и практика дистанционного обучения в России. Монография / А.А. Андреев, Ж.Н. Зайцева, С.П. Лобачев. -М:МЭСИ, -1998. - 510 с.; Андрианова, Г.А. Организация творческой деятельности учащихся в дистанционном обучении : /дис. ... канд. пед. наук / -Москва, 2010.-212 с.; Гейн, Н.А. Содержание и методы дистанционного обучения информатике на примере заочной школы программирования: /автореф. дис. канд. пед. наук / - М., 1994. - 16 с.; Господарик, Ю.П. Дистанционное обучение истории и средняя школа // -Москва: Дистанционное образование, -2000. № 5, -с. 10-17; Краснова, Г.А. Открытое образование: цивилизационные подходы и перспективы. Монография. / Г.А. Краснова -М.: Изд-во РУДН, -2002. -285 с.; Можаяева, Г.В. Учебный процесс в системе дистанционного образования / Г.В. Можаяева // -Томск: Открытое и дистанционное образование, -2000. № 1, -с.11-17; Овсянников, В.И. Дистанционное образование в России: постановка проблемы и опыт организации/ В.И. Овсянников, В.П. Кашин. – М.: РИЦ «Альфа» МГОПУ им. М.А. Шолохова, -2001. -794 с.; На пути к 12-летней школе: Сборник научных трудов / Под ред. Ю.И. Дика и А.В. Хуторского. - М.: ИОСО РАО, -2000. - 400 с.; Дистанционное обучение / Е. С. Полат, М. В. Моисеева, А. Е. Петров [и др.] - М.: ВЛАДОС, -1998.-192 с.

<sup>7</sup> Agaoglu, E.A., Imer G., Kurubacak G. Case Study of Organizing Distance Education: Anadolu University // -Eskishehir: Turkish Online Journal of Distance Education, -2002. №3:1, -p.45-51; Herman, C., Butler, D. Innovations in STEM distance education // Open Learning: The Journal of Open, Distance and e-Learning, -London: -2019. Vol. 34:1, -p.1-5; Hülsmann, Th., Barberà, E., Roberts J. Distance education and time // -London: Distance Education, -2015. № 36:2, -p. 155-160; Kose, G., Canturk, B., Ulsever, S. Distance English Language Teaching (DELTA) Programme: A New Model for Turkey // -Eskishehir: Turkish Online Journal of Distance Education, -2002. № 3:1, -p.85-88; Stein, H. A Model of Virtual University // -Eskishehir: Turkish Online Journal of Distance Education, -2000. №1:2, -p.5-8; Tavukcu, T., Arapa, İ., Özcan, D.General overview on distance education concept // - Nicosia: Procedia - Social and Behavioral Sciences, -2011. Vol. 15, -p. 3999-4004; Tsolakidis, C. Distance education: A Second Best in Learning? // -Eskishehir: Turkish Online Journal of Distance Education, -2000. Vol. 1:1, -p.12-16.

- Theory and methods of teaching computer science (A.M. Mamedov, T.M. Alieva, I.B. Akhmedov, A.G. Palangov, Kh.Tagiev, S.S. Gamidov, S.A. Beshenkov, L.L. Bosova, S. K. Grigoriev, V. V. Grinshkun, I. V. Robert, T.B. Zakharova, K. K. Kolin, V. S. A. L. Semenov, E. K. Henner and others);<sup>8</sup>

- Theoretical and practical studies of distance education problems (I.B. Akhmedov, Kh.Kh. Akhmedov, A.A. Andreev, A.M.Bershadsy, Yu.N. Zaitseva, Yu.I. Kapustin, A.O. I. G. Kraevsky, E. S. Polat, V. I. Soldatkin, V. P. Tikhomirov, I. V. Kholodkova, B. Anderson, D. Kig, MC Moore and others);<sup>9</sup>

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<sup>8</sup> Orta məktəbdə informatikanın tədrisi metodikası: ümumi metodika /Ə. Pələngov, M. Abdullayeva ; elmi red. Ə. M. Məmmədov. -Bakı: Elm və təhsil, -2015. -188 s.; İnformatika: Basic və Pascal proqramları üzrə praktik və nəzəri kurs /Ə. Q. Pələngov, M. Ə. Alışov, Q. İ. Əliyev. -Bakı: [s.n.], -2005. -194 s.; Əhmədov, İ. B. Ali təhsildə kompüter texnologiyaları / İ. B. Əhmədov, Ç İsmayılova, G. Muradova // -Bakı: Təhsildə İKT, -2016. №3, -s.235; Tağıyeva Z.Ə. Kompüter şəbəkələri. İnternet. Multimedia texnologiyaları: informatika və riyaziyyat-informatika ixtisası üzrə bakalavr pilləsinin tələbələri üçün dərs vəsaiti /Z. Ə. Tağıyeva, S. C.-C. Səbrayızadə -Bakı: ADPU nəşr., -2017. -192 s.;Босова, Л.Л. Развитие методической системы обучения информатике и информационным технологиям младших школьников : /автореф. дис... д-рапед. Наук/ -М., 2010. -26 с.; Каймин, В.А. Информатика / В.А. Каймин. - М.: Инфра, -2000. - 320 с.; Лапчик, М.П. Методика преподавания информатики: Методические рекомендации для кафедр информатики педагогических институтов /М.П. Лапчик. - Омск: РЦ НИТО, -2014. - 52 с.; Леднев, В.С. Содержание образования: сущность, структура, перспективы / В.С. Леднев - М.: Высшая школа, -1991. -224 с. və s.

<sup>9</sup> Əhmədov, İ. B. Ali təhsildə kompüter texnologiyaları / İ. B. Əhmədov, Ç İsmayılova, G. Muradova // -Bakı: Təhsildə İKT, -2016. №3, -s.235; Əhmədov, İ. B. Təhsilin informatizasiyası şəraitində müasir təlim texnologiyaları və nəzarət / İ.B. Əhmədov, K. Ələsgərova // -Bakı: Təhsildə İKT, -2014. №3, -s.196; Əhmədov İ.B. İnnovativ Universitetdə Distant Təhsil // -Bakı: Təhsil, -2012. №5-6. -s.42-57; Əhmədov, H.H. Azərbaycanda distant təhsilin perspektivləri // Respublika.-2013, 26 dekabr.- s.6.; Андреев, А.А. Введение в дистанционное обучение / А.А. Андреев. - М.: МЭСИ, 1997.-50 с.; Андреев, А.А. Теория и практика дистанционного обучения в России. Монография / А.А. Андреев, Ж.Н. Зайцева, С.П. Лобачев. -М:МЭСИ, -1998. -510 с.; Андреев, А.А. Дидактические основы дистанционного обучения в высших учебных заведениях: /дис. ...д-ра. пед. наук/ -Москва, 1999. -306 с.; Дистанционное обучение / Е. С. Полат, М. В. Моисеева, А. Е. Петров [и др.] - М.: ВЛАДОС, -1998.-192 с.; Колбин, Р. В. Дистанционные образовательные технологии как средство обучения информатике в условиях профильной школы: /дисс. на соискание уч. ст. канд. пед. наук/ -Челябинск, 2007. -181 с.; Тихомиров, В.П. Солдаткин, В.И., Семенова, А.С. Принципы образовательного франчайзинга



- creation and development of an information and educational environment, theory and practice of using telecommunications in education (I.B. Akhmedov, Kh.Kh. Akhmedov, A.G. Palangov, R. Shukurov, S.K. Grigoriev, V.V. Grinshkun, S.A. Zhdanov, A.B. Zenkina, A.A. Kuznetsov, A.S. Lesnevsky, M.P. Lapchik, I.V. Surkhaev M.A., Uvarov A.Y. and others).<sup>10</sup>

However, in these studies, the scientific basis for the creation and development of distance education, systematically implemented in any country, is studied in the context of the state policy of distance education, resource support (action plan, regulatory framework, staffing, and logistics). But in the absence of any resource base for distance education and the lack of relevant pedagogical experience in the country, scientific research has not yet been carried out on the application and research of elements of distance education, ways to use the capabilities of social networks for this purpose. We are conducting research in this area for the first time.

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// Материалы Шестой между-народной конференции по ДО, -Москва: -25-27 ноября -1998, - с.472-486; Тихомиров, В.П. Дистанционное образование: история, экономика, тенденции // Труды II международной конференции «Стандарты в образовании: проблемы и перспективы» - Москва: -Апрель, -1997. - с.201-205; Moore, M. Distance education: A systems view (2nd ed.) / M. Moore, G. Kearsley. -Belmont, CA: Wadsworth, -2005. -362 p.

<sup>10</sup> Əhmədov, İ. B Milli təhsilin inkişafında mühüm mərhələ // -Bakı: Təhsildə İKT, -2015. №1, -s.184; Əhmədov, İ. B. Azərbaycan Respublikasında informasiya cəmiyyətinin inkişafı və təhsilin informatlaşması məsələləri / İ. B., Əhmədov, M. A, Nəcəfov, N. Məmmədova // -Bakı: Təhsildə İKT, -2017. №1, -s.224; Əhmədov, İ. B. Təhsilin informatizasiyası şəraitində müasir təlim texnologiyaları və nəzarət / İ.B. Əhmədov, K. Ələsgərova // -Bakı: Təhsildə İKT, -2014. №3, -s.196; Əhmədov, H.H. Ali təhsilin modernləşdirilməsi / H.H.Əhmədov. -Bakı: Maarif, -2008. -190 s.; Əhmədov, H.H. Qloballaşma şəraitində Azərbaycan Respublikasında ali təhsilin modernləşdirilməsi: /pedaqogika üzrə fəlsəfə doktoru dissertasiyası / -Bakı, 2011. -243 s.; Əhmədov, H.H. Azərbaycan təhsilinin inkişaf strategiyası / H.H.Əhmədov. -Bakı, «Elm» nəşriyyatı, 2010. -800 s.; Qasımov V. Elm və təhsilin informasiya təminatı sistemləri: Monoqrafiya / V. Qasımov. -Bakı: Elm, 2005. -116 s.; Кирилова, Г.И. Информационные технологии и компьютерные средства в образовании // -Лондон: Educational Technology & Society, - 2000. № 4(1), -с. 23-28; Роберт, И. В. Современные информационные и коммуникационные технологии в образовании // -Москва: Информатика и образование, -2012. №8.-С.77-80; Новые педагогические и информационные технологии в системе образования / Под ред. Е.С. Полат . - М.: АCADEMA, -2000. - 271 с.; Martin, A. Digital Literacies for Learning / A. Martin. -London: Facet, -2006. -228 p.

Thus, the task of the dissertation is defined as the development of a primary scientific and methodological basis for teaching computer science based on these technologies using the Internet (elements of distance learning and social networks) to ensure accessibility, quality, individuality in teaching computer science at universities.

**The object and subject of the research.** It is the process of using distance education in the process of teaching informatics in higher education institutions. The subject of the research is the features of using distance education elements in informatics training in higher education institutions.

**Research goals and objectives.** The purpose of the study is to develop a model of teaching computer science in higher schools with the application of distance education elements.

The following **tasks** were defined for the realization of the goal set in the study:

- Studying the theoretical basis of using distance education elements in informatics training;
- Determining the possibilities of applying distance education in the conditions of modern educational standards;
- Determining the place and role of distance education elements and social networks in the teaching of informatics;
- Determining the forms of organization of informatics teaching in the conditions of using distance education elements, as well as the possibilities of using social networks;
- Experimental verification of the efficiency of using distance education elements in informatics training.

**Research methods.** The following research methods were used in the dissertation: analysis of literature and official documents on the problem, system-structural approach, cognitive methods such as analysis, synthesis, modeling, forecasting, observation, study of performance results.

**The main provisions of the defence are** as follows:

- Application of distance education technology through social networks in universities;
- Organization of distance learning in informatics using the

capabilities of social networks in education;

- Lectures on computer science on the social network Facebook;

- Testing knowledge of computer science using the social network Facebook;

- Interaction with students in teaching computer science using the social network Facebook and systematization of students' knowledge.

**Scientific novelty of the research.** Ways of organizing distance education using the possibilities of the Facebook social network have been determined in order to improve the quality of teaching of informatics in higher schools.

**Theoretical and practical significance of research.** Ways of efficient organization of teaching by using social networks in distance learning of informatics in higher schools have been studied theoretically and practically.

**Approbation and application of research.** According to the results of the study, 14 articles were published (3 articles abroad). In addition, the author reported on this at 2 international and 3 republican scientific and practical conferences. Experimental studies were carried out at ADPU and BSU in the 2019-2020 and 2020-2021 academic years.

**The name of the organization in which the dissertation work is carried out.** The dissertation work was defended at the Institute of Education of the Azerbaijan Republic.

**Dissertation work volume.** The thesis consists of an introduction, 2 chapters with 7 subsections, results and a list of used literature.

Introduction – 7 pages, 11546 characters, first chapter – 56 pages, 106255 characters (1.1-21 pages, 39458 characters; 1.2.-16 pages, 29938 characters; 1.3.-20 pages, 36859 characters), second chapter – 72 pages, 108284 characters (2.1-12 pages, 22775 characters; 2.2.-16 pages, 31054 characters; 2.3.-18 pages, 26391 characters; 2.4.-26 pages, 27064 characters), result - 3 pages, 4313 characters, bibliography - 17 pages, additional 6 pages. The total volume of the research work is 163 pages, 231569 characters.

## MAIN CONTENT OF THE DISSERTATION

In the "Introduction" part of the research, the relevance of the topic is justified, the degree of development of the problem is investigated, the goals and objectives of the research, methods, the main provisions defended, scientific innovation, theoretical and practical importance are determined, approval and application are reviewed.

Chapter I of the dissertation work, called "**Theoretical foundations of using distance education elements in informatics training**" consists of 3 paragraphs. Paragraph I is called "Essence and scientific-theoretical basis of distance education". In this paragraph, the stages of the emergence and development of distance education have been reviewed, different definitions given to distance education by various researchers have been shown, the main features of this educational technology, its advantages and principles have been explained, and the main types of distance education have been analyzed by dividing them into synchronous or asynchronous categories. He determined the reasons for the growing popularity of distance education and the main problems of organizing distance education.

A review of the essence, characteristics and principles of distance education shows that the role of distance learning technologies in the higher education system is great. Distance learning technology should provide solutions to tasks such as conveying the main content of the studied material to students, providing interactive interaction between students and teachers, creating favorable conditions for independent assimilation of educational material, and evaluation. The design and application of distance learning technologies aimed at students in the teaching process increases enthusiasm and interest in teaching. Distance education will help to make the training of wide-profile specialists effective in higher schools, to train specialists with broader knowledge, outlook, professional competence, highly creative thinking, and the ability to solve complex problems.

Paragraph II of Chapter I is dedicated to "**The placement and development level of distance education in scientific, pedagogical,**

**psychological and methodical literature"**. In this paragraph, a number of research works conducted in the world and in Azerbaijan on the subject of the dissertation have been analyzed.

As noted by a number of researchers, distance education is the most important change in the educational and teaching process in the 21st century. Qualitative research studies have been written dedicated to various aspects of distance education, including the use of distance education elements in the teaching of Informatics, and the use of social networks in distance education.

In the paragraph, the nature of the research conducted in such directions as defining the concept of distance education, the points to be emphasized in the study of distance education, the investigation of obstacles in distance education, and the investigation of the best practices in distance education are shown<sup>11</sup>.

Based on the high didactic and technical potential of distance education, the following possibilities of this educational technology can be noted: the possibility of conducting joint research - the possibility of organizing various types of joint research with students; the ability to advise - the ability to provide prompt advice and instructions to numerous students; possibility of promptness - quick exchange of information and ideas on any topic; the possibility of communication - the possibility of forming virtual communication

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<sup>11</sup> Berge, Z., Muilenburg, L. Barriers to distance education as perceived by managers and administrators: Results of a survey // -Baltimore, MD: Distance learning administration annual, -2000. -p.348-377; Foley, M. The global development learning network: A World Bank initiative in distance learning for development / M. Foley. -Mahwah, NJ: Erlbaum, -2003. -266 p.; Holmberg, B. The development of distance education research // -New York: The American Journal of Distance Education, -1987. №1(3), -p.16–23; Moore, M. Distance education: A systems view (2nd ed.) / M. Moore, G.Kearsley. -Belmont, CA: Wadsworth, -2005. -362 p.; Peters, O. Distance education in transition: New trends and challenges / O.Peters. – Oldenburg: Bibliotheks- und Informations system der Universitat Oldenburg, -2002. -300 p.; Schlosser, L. A., Simonson, M. Distance education: Definition and glossary of terms (3rd ed.). Charlotte, NC: Information Age, -2009. -346 p.; Simonson, M. Distance learning. In The 2009 book of the year / M. Simonson. -Chicago: Encyclopaedia Britannica, -2009. -231 p.; Zawacki-Richter, O. Research areas in distance education: A Delphi study // - Athabasca: International Review of Research in Open and Distance Learning, -2009. №10(3), -p.138-154.

between students and teachers; access to information - formation of the ability to freely access information from various sources using modern ICT tools; development opportunity - the opportunity to freely obtain and independently assimilate information for scientific, cultural and humanitarian development.

Taking into account the known functions of traditional and distance education, we can conclude as a result of the research that it is appropriate to organize mixed learning on Facebook. This method creates an opportunity to organically combine traditional education with distance education technologies. At this time, the positive aspects of traditional education are integrated with the positive aspects of distance education. This model reflects the structure of the training process and consists of such didactic elements: determination of training goals; determination of content and means to achieve these goals, work planning; planned organization of teaching activities of teachers and students; organization of feedback, control and correction of educational activity; analysis and self-analysis, evaluation of training results.

In recent years, in the scientific literature, the problems of using the opportunities of various social networks, especially the use of Facebook, in the organization of distance education have been widely investigated. S.Q.Mazman and Y.K.Usluel, among the researchers investigating the use of social networks for educational purposes, considered the problem of modeling the use of Facebook for educational purposes and showed that Facebook is useful for formal education, university and school teaching.<sup>12</sup>

The problem of distance education is one of the scientific problems that are causing more and more interest in our country in modern times. In recent years, several magazine and newspaper articles have been devoted to the essence and characteristics of distance education, as well as to a number of aspects of the use of distance education elements in the teaching of Informatics. Among such authors are Ahmadov I.B., Ahmadov H.H., etc. names can be

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<sup>12</sup> Mazman, S.G., Usluel, Y.K. Modeling educational usage of Feysbuk // -Amsterdam: Computers & Education, -2010. №55(2), -p.444-453

mentioned in particular.<sup>13</sup>

Docent İlham Ahmadov was the first Azerbaijani researcher who chose the problem of distance education as one of his research directions. Since 2002, İlham Ahmadov regularly gives reports on various aspects of the distance education problem at international and national level scientific conferences, publishes articles in magazines and newspapers, and makes speeches on television programs. In his articles, Ahmadov I. constantly summarizes the essence and importance of distance education and notes that "a national education-information space should be formed over the Internet and integrated into the global information education space. Distance education is the most efficient way to do this."<sup>14</sup>

As it can be seen, various aspects of distance education are involved in scientific research in our country. However, specifically, the issue of using distance education elements in the teaching of Informatics in higher schools is not only a pedagogical problem that has not been worked out in Azerbaijan, but it has also not been worked out enough in world science.

The last paragraph of chapter I is called "**The experience of using distance education in the teaching of informatics**". In the semi-chapter, the necessity of the ability of graduates of higher

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<sup>13</sup> Əhmədov, H.H. Ali təhsilin modernləşdirilməsi / H.H.Əhmədov. -Bakı: Maarif,-2008. -190 s.; Əhmədov, H.H. Qloballaşma şəraitində Azərbaycan Respublikasında ali təhsilin modernləşdirilməsi: /pedaqogika üzrə fəlsəfə doktoru dissertasiyası / -Bakı, 2011. -243 s.Əhmədov, H.H. Azərbaycan təhsilinin inkişaf strategiyası / H.H.Əhmədov. -Bakı, «Elm» nəşriyyatı, 2010. -800 s.; Tağıyeva Z.Ə. Kompüter şəbəkələri. İnternet. Multimedia texnologiyaları: informatika və riyaziyyat-informatika ixtisası üzrə bakalavr pilləsinin tələbələri üçün dərs vəsaiti /Z. Ə. Tağıyeva, S. C.-C. Cəbrayılzadə -Bakı: ADPU nəşr., -2017. -192 s

<sup>14</sup> Əhmədov, İ.B. İnnovativ Universitetdə Distant Təhsil // -Bakı: Təhsil, -2012. №5-6. -s. 42-57; Əhmədov, İ. B Milli təhsilin inkişafında mühüm mərhələ // -Bakı: Təhsildə İKT, -2015. №1, -s. 184-198; Əhmədov, İ.B.Pedaqoji təhsilin modernləşdirilməsi və innovation texnologiyalar // -Bakı: Təhsildə İKT, -2013. №2, -s. 178-185; Əhmədov, İ.B. Təhsil innovasiyalarının idarə edilməsi // -Bakı: Təhsildə İKT, -2013.№3, -s. 158-171; Əhmədov, İ.B., Ələsgərova K. Təhsilin informatizasiyası şəraitində müasir təlim texnologiyaları və nəzarət / İ.B.Əhmədov, // -Bakı: Təhsildə İKT, -2014. №3, -s. 196-207; Ahmedov, H.H. The Strategy of Education Development in Azerbaijan / H.H.Ahmedov. -Saarbrücken: LAP LAMBERT Academic Publishing, -2014. -245 p.

educational institutions to use information and information technologies rationally was emphasized, the goals, main components, and principles of information training of students were indicated, the importance, goals and tasks of teaching informatics in higher educational institutions, and the place of using distance education elements in its education were analyzed.

The following features can be distinguished in the teaching of informatics: the importance of interdisciplinary relations determined by the metasubject of the relevant science, the orientation of the application of informatics courses; using the computer as both a tool and a research object; the presence of a theoretical component in computer science education that requires different methodological approaches depending on the level of intellectual development of learners.

On the basis of the research conducted in higher schools, it became clear that some teachers have little pedagogical experience in terms of using distance education, which creates great difficulties in the teaching process.

One of the priority directions of the informatization process in modern society is the informatization of education, which is inextricably linked to changes in the content and methods of information training of students, and their ability to work successfully in the chosen field of activity. From this point of view, the main goals of students' information preparation have been determined.

Information training should provide the necessary skills and habits to work with a personal computer. It contributes to the development of active, independent forms of acquiring knowledge, increases learning motivation, allows choosing an independent work mode, ensures orientation to the personal needs of students, multi-level education and profiling.

Studies show that distance learning is impossible if a student does not have the necessary informational preparation, which is the most important component of the fundamental training of a future specialist. The need to continuously work with ICT makes distance education itself a form of information training. Its conceptual basis is



the value-based selection of the content of education and the preparation of requirements for the level of preparation of students. Information training should also help changes in the working methods and style of the future specialist.

One of the important issues during distance learning of informatics is the problem of methodical provision of the higher education institution. Higher education institutions providing distance education in informatics must additionally have the following methodological support for the educational process:

- semester teaching plans and programs;
- teaching-methodical materials: a set of traditional and electronic textbooks, modeling, training and monitoring programs;
- questions for active control of knowledge, test database.

The specified features of informatics as a subject must be taken into account in the didactic model of distance education in informatics. The didactic model of distance education of informatics includes the following components of the educational process that interact with each other:

- construction of the target model of the course at the conceptual level;
- selection of content and tools for achieving educational goals;
- remote interaction of teacher and student;
- control and self-control;
- analysis of the results of the study period.

**"Possibilities and ways of using distance education elements in informatics education"** is chapter II of the research work. The first paragraph of this chapter, consisting of three paragraphs, is called **"Platforms in the organization of distance education"** and it addresses issues such as the benefits and advantages of various platforms, especially social networks, that can be used in the organization and implementation of distance education.

The development of web technologies and their impact on modern society has led to changes in traditional areas of communication, and changes in means and forms of communication on the Internet. The Internet has become a platform for unhindered

transmission and exchange of information, knowledge and communication between people of different cities and countries.

In the last 5 years, the world pedagogical community has been discussing the use of social networks in education. Social networks are a popular and interesting technology among all age groups as well as schoolchildren. We believe that it is still underutilized for educational purposes. Is it possible to use social networks today as a means to achieve educational goals? Many Methodists are skeptical of the use of networks as a pedagogical educational tool. Traditionally, social networks are considered a medium for leisure and entertainment. Undoubtedly, social networks are not the only tool in education, but their educational potential is currently underappreciated.

There are many platforms for organizing distance learning. Some of them are free and some are paid. These platforms differ in their features: Moodle, Facebook, Google Classroom, Udemy, Classmill, Edmodo, Cloudschool, Learnme, Open Edx, Microsoft Teams, Skype, Zoom, etc. an example can be given. The main features of these platforms are analyzed in detail in the subsection.

It is possible to use different education management systems in higher schools. With their help, higher education institutions will attract students who will increase their competitiveness to an interactive, dynamic and attractive educational environment. Development directions of social networks create such a situation that the full coverage of the audience and the use of the possibilities of modern Internet technologies lead to a significantly higher level of educational activity. Social networks are not only a means of communication, but also an important educational tool for schools and universities.

Paragraph II of Chapter II is entitled "**Possibilities of using distance education in the process of teaching informatics**". In the paragraph, the traditional and modern forms of computer science education with the application of distance education elements are analyzed, their advantages and disadvantages are determined, various methods of using social networks in distance education are shown.

In the conditions of using distance education elements in the

teaching of informatics, the effectiveness of teaching depends on the correct selection of its organizational forms. Organizational forms in the methodical system of education mean the activities of teachers and students in a certain order and regime. Organizational forms of education are classified according to various criteria: number of students, place of study, duration of training sessions, etc.

The use of distance education elements in the teaching of informatics creates new organizational problems for the teacher. This also applies to the organization of students' work with distance learning materials. Such works will be carried out individually, in groups or collectively for the entire audience. Along with traditional organizational forms, non-traditional forms are also used in distance education. Among them are: e-mail, newsgroups, forums, thematic conversations.

Social network systems also play an important role among the organizational forms of computer science education in the conditions of using distance education elements. Social networking systems are not designed specifically to create and manage learning experiences. However, they can greatly support the new social orientation of educational processes, as they allow people to make communication more personal and motivating than on other platforms.

The conditions for the use of distance learning elements in the classroom teaching system will allow this educational model to be implemented in the most efficient way.

The third paragraph of Chapter II is called "**Methods of distance learning of Informatics through the Facebook social network**". Here, in the educational process of the University, the expansion of work with young people through the creation of certain groups and communities that unite caring, creative young people who aspire to the knowledge of social networks, as well as the process of applying this knowledge in practice; use of the Facebook social network, a popular means of education and development, training courses for university teachers for students, organization of a closed corporate network on its platform; effective collective work distributed by the educational group, long-term activity, international exchanges, scientific-educational, mobile, continuous education and

self-education, organization of network work of people living in different countries and different continents on different continents of the world; variety of forms of communication: wiki-pages, forums, polls, votes, comments, subscriptions, sending private messages and many other opportunities for joint cooperation; making it easier to share interesting and useful links to other resources on the social network; The main application possibilities, such as the participation of teachers in the implementation of communication, which is the biggest positive aspect of the application of social networks in the educational process of the university, were investigated. In addition, in the sub-chapter, the goals and tasks, benefits and advantages of using the Facebook social network for educational purposes, obstacles and problems are reviewed and interpreted.

Facebook is a universal, multidirectional social network. Students can discover other more useful and effective Facebook services. Using Facebook effectively in education is not easy. A system must be established to facilitate the use of technology for social and educational purposes and to use it effectively in education.<sup>15</sup> Facebook has created an environment that promotes learning, develops teacher-student relationships and interactions. It is an innovative way to develop social and cultural awareness. In general, social networking sites like Facebook are worth exploring as educational tools.

In addition, some negative aspects of using Facebook are also shown. The presence of side effects that may be distracting for some students, such as the presence of certain advertisements or notifications that may interfere with the student's learning process.<sup>16</sup> The possibility that during dialogue it may be difficult to reliably identify the true identity of students may lead to an inaccurate assessment of

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<sup>15</sup> Bicen, H., Uzunboylu, H. The Use of Social Networking Sites in Education: A Case Study of Feysbuk // -Graz: Journal of universal computer science, -2013. №19(5), -p.658-671, s.661

<sup>16</sup> Terrana, D., Augello, A., Pilato, G. Feysbuk Users Relationships Analysis Based on Sentiment Classification. Proceedings // IEEE International Conference on Semantic Computing, San Diego, CA, USA, -2014, -p.290-296, s.291

student learning outcomes.<sup>17</sup>

Every social media platform, including Facebook, offers a wide variety of ways to use it in education, from publishing ads to live lectures. First of all, Facebook offers more convenient and direct means of communication between students and teachers. In addition, Facebook is opening up more opportunities for e-learning. As distance learning and distance learning have become more prevalent in recent years, the use of social media as well as Facebook in education can help students in their future careers.

The last paragraph of Chapter II of the dissertation is entitled "Organization and conduct of a pedagogical experiment on the application of distance education elements in informatics training", and here, during the experiment, the following working hypothesis was put forward in accordance with the goals and tasks of the dissertation: Methodologically and technically, the possibilities of the Facebook social network in the teaching of informatics in higher schools the organization of distance education with proper use, the optimal choice of the topics to be taught, allows to raise the quality of the teaching of the subject, to improve the free work habits of students.

In order to use distance education elements and social networks during the teaching of informatics in higher education institutions, if the information and methodical support of this process is created on the basis of the electronic management system of education for the organization of the educational process, the students will master the educational materials better, the quality of education will increase, and individuality will be ensured. they do, it will be possible for them to realize their creative potential. At the same time, the information-methodological support of the educational process based on the education management system for the organization of the information-educational environment and the educational process must meet these requirements:

1) planning of the educational process and its resource provi-

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<sup>17</sup> Lin, K.M. Understanding undergraduates' information literacy from their Feysbuk usage // Advanced Learning Technologies (ICALT), - Athabasca: -12-15 July, -2015, -p. 256-257, s.256

sion;

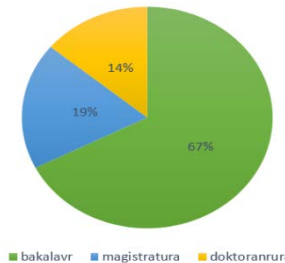
2) monitoring and registration of the progress and results of this process;

3) remote interaction of all participants of the educational process (students, teachers, parents, employees of educational management bodies, the public);

4) organically combining the form of distance education of informatics with the traditional form of education, application of "blended" education.

To confirm our hypothesis, we used a descriptive, teaching and test experiment among students studying computer science at Azerbaijan State Pedagogical University (ASPU) and Baku Slavic University (BSU). In the empirical part of the defining experiment, a survey was conducted among 250 students, undergraduates and doctoral students of these higher educational institutions. The purpose of the survey was to determine the level of existing knowledge about the use of the social network Facebook from the elements of distance learning in teaching computer science.

37.3% of respondents are men, 62.7% are women. At the same time, the total percentage of respondents aged 18-25 is 64%, the remaining 18.5% are aged 25-35, 12.7% are over 35 and 5% are under 18. In terms of education, 67.5% have a bachelor's degree, 18.5% have a master's degree and 14% have a doctorate, which is reflected in the graph below.



**Graph 1. Division of respondents by education level**

The conducted survey clarified which social networks the respondents prefer and which social networks they use more in the organization of distance education. Facebook has determined the

frequency of use of the social network and its goals. It clarified their level of awareness of the educational possibilities of Facebook, the nature of their use and analyzed their thoughts about the benefits of distance learning experience on Facebook.

At the second stage of the experiment, 60 students of ADPU and 38 students of BSU were involved in the pedagogical experiment; the students were divided into control and experimental groups in order to clearly demonstrate the influence of lessons organized using the remote social network Facebook on the quality of education. At both universities, courses of "Computer Architecture and Operating Systems" and "Application programs" were delivered face-to-face in control groups and remotely on Facebook in experimental groups.

The course of a remote lesson on Facebook is the same as the course of a face-to-face lesson: each lesson is preceded by a Q&A session of the previous lesson, then a new lesson is taught, after the lesson, questions and answers are held to consolidate the new lesson, students' knowledge is assessed and their evaluation of the lesson is carried out.

A Facebook page was created and then groups were created inside the page. These groups used presentations, videos, live broadcasts and images to make the lesson interactive.

Class times are announced and classes are held at the specified time. The lecture is posted in a group on Facebook. The lecture was prepared using Microsoft Power Point and Camtasia programs. After the lecture, questions and answers are asked to better understand the topic. Questions are posted and students write their answers and follow-up questions in the comments section.

One of the positive and different aspects of Facebook is the ability to quickly change and edit the methodology.

At the end of the lectures, the general knowledge of the students was assessed. The Online Test Pad program was used here. One of Facebook's downsides is the lack of a test service. It can also be solved with other apps and programs. The final score in this group was made by compiling the tests in the Online test pad and linking to this group. After the students follow the link and give their answers,

the teacher receives information about who solved the task, how long they solved it, the percentage of correct answers and the grade received. The teacher can then print the results as an Excel file.

The dissertation provides several examples of lessons learned from the experiment and their course, which can serve as a methodological basis for informatics teachers with distance learning technologies.

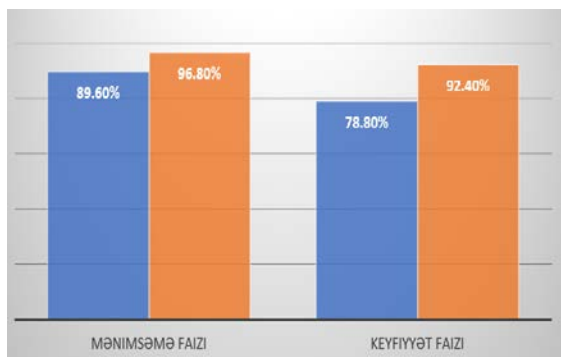
In order to experimentally test the effectiveness of computer science classes conducted through Facebook and confirm the hypotheses put forward in the course of the study, the third - testing stage of the pedagogical experiment was carried out. In the control experiment, the knowledge gained by the students of ADPU and BSU, who participated in the second stage of the experiment in full-time and distance learning, was assessed using questions on the topic, as well as the results of the control and experimental groups were compared. These results are presented in the following tables and graphs (tables 1 and 2, graphs 2 and 3).

**Table 1. DT Hardware and OS group**

№ of questions	Participants		Evaluated							
			Those who gave complete answers		Those who gave incomplete answers		Those who gave wrong answers		Those who could not answer	
	C	E	C	E	C	E	C	E	C	E
1	25	25	18	21	0	0	3	2	4	2
2	25	25	20	25	0	0	4	0	1	0
3	25	25	19	23	0	0	2	1	4	1
4	25	25	23	25	0	0	2	0	0	0
5	25	25	19	21	0	0	4	4	2	0
6	25	25	16	19	0	0	5	3	4	3
7	25	25	20	23	0	0	2	1	3	1
8	25	25	23	25	0	0	0	0	2	0
9	25	25	19	25	0	0	3	0	3	0
10	25	25	20	24	0	0	2	0	3	1
total	50		197	231	0	0	27	11	26	8



In the control group skill 89.6%, quality 78.8%, in the experimental group skill 96.8%, quality 92.4% (graph 2).

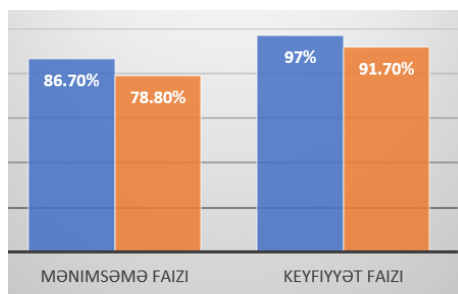


**Graph 2. Percentage of perception and quality**

**Table 2. Application programs group**

№ of questions	Participants		Evaluated							
			Those who gave complete answers		Those who gave incomplete answers		Those who gave wrong answers		Those who could not answer	
	C	E	C	E	C	E	C	E	C	E
1	24	24	17	22	0	0	3	1	4	1
2	24	24	20	23	0	0	2	0	2	1
3	24	24	18	21	0	0	2	2	4	1
4	24	24	19	24	0	0	2	0	3	0
5	24	24	19	21	0	0	3	3	2	0
6	24	24	20	22	0	0	0	2	4	0
7	24	24	18	21	0	0	3	2	3	1
8	24	24	21	24	0	0	1	0	2	0
9	24	24	19	22	0	0	1	1	4	1
10	24	24	18	20	0	0	2	2	4	2
Total	48		189	220	0	0	19	13	32	7

At the same time, the skill in the control group was 86.7%, the quality was 78.8%, the skill in the experimental group was 97%, the quality was 91.7% (Graph 3).



**Graph 3. Percentage of perception and quality**

In addition, at the test stage of the experiment, an additional small survey was conducted among 49 students of the experimental group to determine the attitude of students to the lessons conducted through Facebook, the effectiveness of Facebook as a tool in distance learning of computer science, as well as the positive and negative points identified in this process.

Thus, the pedagogical experiment conducted in the course of the study showed how distance learning computer science in higher education can create educational opportunities for students using the social network Facebook. In the experimental and control groups, the difference in academic performance was 5%, the difference in quality was 13%. It also allows future teachers of computer science and mathematics to implement distance learning through FB in their professional activities. The analysis of the conducted surveys and the results of the conducted classes shows that during distance learning of informatics with the social network Facebook, students have formed a positive motivation for distance learning of informatics. A model for effective teaching of informatics through remote informatics lessons using Facebook was developed, methodological recommendations were given for students and teachers in these classes, and the learning outcomes of the control and experimental groups were compared. As a result, the effectiveness of distance learning in informatics through Facebook has been experimentally confirmed.

In the "Results and proposals" part of the dissertation, the

research was concluded and the main conclusions obtained were summarized and presented. The work conducted on the dissertation, the results of the conducted pedagogical experiment and surveys are summarized. The following results were obtained and suggestions were made.

## **RESULTS**

1. Based on the high didactic and technical potential of distance education, the following possibilities of this educational technology can be noted: the possibility of conducting joint research - the possibility of organizing various types of joint research with students; the ability to advise - the ability to provide prompt advice and instructions to numerous students; possibility of promptness - quick exchange of information and ideas on any topic; the possibility of communication - the possibility of forming virtual communication between students and teachers; access to information - formation of the ability to freely access information from various sources using modern ICT tools; development opportunity - the opportunity to freely obtain and independently assimilate information for scientific, cultural and humanitarian development.

2. Taking into account the known functions of traditional and distance education, we can conclude as a result of the research that it is appropriate to organize mixed learning on Facebook. This method enables organic combination of traditional education with distance education technologies. At this time, the positive aspects of traditional education are integrated with the positive aspects of distance education. This model reflects the structure of the learning process and consists of such didactic elements: determination of learning goals; determination of content and means to achieve these goals, work planning; planned organization of teaching activities of teachers and students; organization of feedback, control and correction of educational activity; analysis and self-analysis, evaluation of training results.

3. Distance learning of informatics in a higher school allows to improve the quality of teaching of the subject. In this process, the

effective use of the possibilities of the Facebook social network increases the student's interest in the subject and encourages them to work independently. Distance teaching of informatics in higher schools allows to master the content of this subject in a better quality. Distance learning of informatics includes a number of components that interact with each other: modeling the course at the conceptual level; correct selection of content and tools in achieving training goals; rational organization of remote interaction between teacher and student, organization of control and self-control, correction of the process based on the analysis of training results.

4. The use of social networks in the educational process facilitates the exchange of information, increases students' enthusiasm for educational activities, and encourages the development of creative abilities and cognitive interests. These factors have a positive effect on the formation of knowledge and skills in students. Social networking platforms are used to share announcements, organize live lectures, provide feedback to students, send assignments to them, receive answers, etc. provides such opportunities. Social networks also create favorable opportunities for e-learning.

5. The distance learning of informatics in the higher school using the Facebook social network clearly showed students the didactic and methodical possibilities of social networks. If before the experiment, most of the students had limited information about the educational possibilities of FB, after the experiment, most of them clearly saw the possibilities of social networks as an educational technology. This allows future informatics and mathematics teachers to properly establish distance education through FB in their professional activities.

## **SUGGESTIONS**

1. There is a need to create a distance education system in the Republic of Azerbaijan. For this purpose, a strategic road map and its implementation plan for the creation and development of distance education in the country should be prepared. Then, the process should be implemented in stages according to the strategic road map.

2. It is necessary to create a legal and normative base for the application of distance education. If this is the case, the implementation of distance education in higher schools can be carried out on legal grounds.

3. For the development of distance education in the country, a choice should be made on any of the well-known platforms, and the process of electronic content preparation should be carried out on it.

4. In order to develop the distance education system in universities, it is necessary to start appropriate personnel training. First of all, personnel who can lead these projects should be trained. In the next stage, special trainings should be organized for teachers.

**The main provisions and content of the dissertation are reflected in the following published works:**

1. Əlizadə, T.V. Distant təhsilin metodoloji və texnoloji təminatının əsas prinsipləri // -Bakı: Təhsildə İKT, -2015. №4, -s. 110-117.

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The defense will be held on November 24, 2023 at 16<sup>00</sup> at the meeting of the Dissertation council FD 2.15 of Supreme Attestation Commission under the President of the Republic of Azerbaijan operating at the Azerbaijan State Pedagogical University

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Dissertation is available in the library of the Azerbaijan State Pedagogical University.

Electronic versions of the dissertation and abstract are available on the official website of the Azerbaijan State Pedagogical University.

Abstract was sent to the required addresses on October 24, 2023



Signed for print: 23.10.2023  
Format of the paper: 60x84 <sup>1/16</sup>  
Volume: 37749 characters  
Number of hard copies: 20