The work was performed at the Department of Education Management and Economics of the Institute of Education of the Republic of Azerbaijan

Scientific supervisors:

Full member of National Academy of the Republic of Azerbaijan, Doctor of Technical Sciences, Professor, **Rasim Mahammad Aliguliyev**

Doctor of Technical Sciences, Professor **Abdulla Oruj oglu Mehrabov**

Official opponents:

Doctor of Pedagogical Sciences, Professor **Vidadi Jamil Khalilov**

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Scientific secretary of the Dissertation council: Doctor of Philological Sciences, Associate Professor **Isakhan Abdulla Isakhanly**

Chairman of the scientific seminar: Doctor of Pedagogical Sciences, Professor **Akif Nuragha Abbasov**

REPUBLIC OF AZERBAIJAN

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ABSTRACT

of the dissertation for the degree of Doctor of Philosophy

PEDAGOGICAL-PSYCHOLOGICAL BASIS OF USING ICT IN THE TRAINING PROCESS AND ITS IMPACT ON THE QUALITY OF EDUCATION

Speciality: 5802.01 – organization and planning of education

Field of science: pedagogy

Applicant: **Ruhiyya Zahid Mehdiyeva**

Baku – 2024

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GENERAL CHARACTERISTICS OF THE RESEARCH

Relevance and development of the topic. The application of ICT (information and communication technologies) and innovative methods play a priority role in the modern stage of development of the education system of the Republic of Azerbaijan. It is obvious that in order to compete in the modern world market, knowing a foreign language is not enough, it is also important to use modern technologies in professional activities as well. Information technology is already becoming a determining factor of socio-economic progress of countries and individuals of society. At the same time, their application depends on the training of qualified personnel in this field in education, the development trends of the country's ICT infrastructure and the solution of common problems, effective management of education.

Children living in a rapidly changing information society must be able to take advantage of modern technology to become high-level professionals in the future. That is, modern technology should be an integral part of the learning process. Therefore, their effective use in the teaching process is an urgent problem of modern education. We acquire the necessary knowledge related to high-level management of education.

Information and communication technologies are used for the creation, transmission and dissemination of a wide range of digital technologies and services (computer equipment, software, mobile and satellite technologies, cable and wireless networks, electronic services, telephone lines, mobile communications, as well as the internet). These technologies have a wide range of services and huge information capabilities. Computers and telecommunications equipped with the appropriate software and the information placed on them are included in such communication technologies, with the help of which we not only learn about the problems around us, but also gain additional information, discover innovations for ourselves, and acquire the knowledge which is essential in learning a foreign language.

The teacher plays a key role in the process of informatization of the education system.

The success of educational informatization depends to a great extent on the level of the teacher's knowledge in the field of ICT and the application of his skills and habits in the field of classroom management in teaching.

Electronic-teaching and education management, research of e-textbook creation technologies, international standards in this field, preparation of proposals and recommendations on the use of electronic textbooks, their examination and evaluation, application of training information technologies in educational institutions, the solution to the problems of scientific research in this direction is very important.

If we pay attention to the world experience, we can see that one of the main factors setting new requirements and tasks for the pedagogical staff of the school is the modern model of education based on ICT. As a result, the enrichment of the knowledge of educators (teachers) in the field of modern technologies is extremely relevant. It is no longer enough for them to have fundamental knowledge in their specialty, as well as training in pedagogy and psychology. Today, the teachers of the new generation are required to select and apply modern technologies in teaching in accordance with the structural content and purpose of the subject they teach, taking into account the individual characteristics of students and allowing their harmonious development.

ICT is one of the tools that greatly simplifies the learning process, making it dynamic and flexible. The addition of modern technologies to the teaching model allows to organize the educational process on an individual program, stimulate pupils and attract their attention, to manage the class and pupils.

Lessons conducted through ICT become more interesting and unforgettable, and help to develop students' consciousness. The use multimedia tools, avtomatic teaching systems, modern application and computer programmes in teaching process will improve students' cognitive activity.

Today there is a need for modern teaching models which can simplify and accelerate the transfer of knowledge, the process of acquisition, at the same time which can increase the productivity of teaching both for students and teachers.

The actuality of the problem under study has a number of reasons. First of all, it should be noted that there are not enough researches mentioning the problem of encreasing the quality of training, the theoretical and practical issues of improving the quality of teaching using ICT in teaching of certain subjects in educational institutions.

Although ICT is developing rapidly, the current technologies, content and objectives of educational practice do not meet modern requirements. Therefore, there is a growing demand for personnel who are able to work with rapidly evolving technologies. The task of modern education is not only to equip learners with knowledge and skills, but also to form a person with a new type of intelligence (new information outlook), a different mindset, adapting to the changing economic, technological, social and information realities of the world around us.

A number of researches have been dedicated to the theoretical, practical and methodological informatization of education by numerous Russian, foreign and native pedagogical scientists.

The object of the study is the application of ICT for the purpose of increasing the efficiency of the training process of pupils during the educational process in educational institutions, and effective management of education.

The subject of the research is the organizational and pedagogical conditions for effective use of ICT in educational institutions.

The aim of the study is to determine the pedagogical and psychological basis of using ICT in the training process and to reveal its impact on the quality of training and the management of education.

Research objectives.

- to identify the role of information-communication technology in modern society;

- to study and analyze the native and foreign literature on information-communication technologies in education;

- to study and analyze the work experience of using ICT in teaching process;

- to identify pedagogical-psychological basis of the use of information-communication technologies;

- to focus on the national policy on ICT in managing and improving the quality of education and managing;

- to conduct a comparative analysis of the structure of traditional and interactive lessons;

- to show the specific features of ICT in teaching process;

- to identify the ways of using ICT and new pedagogical technologies in teaching different subjects;

- to form essential imagination about the organization, implementation and results of pedagogical experiment;

- to make recommendations for the efficiency of using ICT in improving the quality of education and management.

The following research methods are used in the study; theoretical analysis and composition; pedagogical observation; pedagogical interview; study of documents; mathematical-statistical methods; pedagogical experiment.

The research was conducted in 42 schools in Baku and different regions of the republic (north, south, lowland). The teachers were given the questionnaire which had different kinds of methods and activity to identify the level of their proficiency in using ICT and modern technologies in teaching process. The results of questionnaire are analyzed and shown in the dissertation.

The following provisions are included in the defense:

1. The use of ICT in teaching process serves to develop students' consciousness and their ability of working free.

2. The following factors allow the efficient application of ICT: taking into account the pupils' ability and knowledge, their psychological-pedagogical and age features, the methodology of teaching different subjects at school, especially the use of specific technical tools in teaching process, in managing the class and students, the relevance of slides and presentations to the topic,

content, and objectives of lesson, demonstration of presentation and determination of place and time, taking into account professional training of subject teachers.

Innovation:

1. The pedagogical-psychological basis of the use of information-communication technologies in teaching process is identified, students' opportunity of using presentations and other tools and their theoretical and practical efficiency is proved. The impact of using ICT on the quality of teaching and learning management has been determined.

2. The preparation of methodological recomendations taking into account the cognitive activity of students, the content of modern curriculum on subject courses in teaching process, the creation and use of educational presentations are substantiated.

Theoretical importance of research. Scientific ideas given in the research paper will enrich the pedagogical theory with new ideas and help pedagogical collective to organize the use of information-communication technologies on scientific grounds, help the pedagogical teams in the efficient management of education.

Practical importance of research. Methodological recomendations prepared about the use of ICT can be useful for students and teachers in their practical activity. The results of the research paper can be useful in educational institutions, professional development courses, and lectures as well. İt is possible to benefit during the effective management of education. The materials of research can be basis for preparation of computer programs on all lessons. The accuracy and validity of research results are due to the application of theoretical, empirical, analytical and statistical methods.

Approbation and application of the research: The results and materials of research are reflected in international conferences, seminars and works published by the author. The main scientific ideas and research results have been used to improve the learning process and the quality of lessons.

Name of the organization where the dissertation work was performed: Department of Economics and Management of Education of the Institute of Education of the Republic of Azerbaijan.

Structure and scope of the dissertation. The dissertation consists of an introduction, 2 chapters including 10 paragraphs, a conclusion and a list of used literature.

Introduction – 10 pages of 18829 marks, Chapter I – 51 pages of 91168 marks, II chapter – 69 pages of 106862 marks, conclusion – 2 pages of 3216 marks, used literature list – 17 pages, the dissertation consists of a total of 22075 marks.

THE MAIN CONTENT OF THE RESEARCH

The introduction substantiates the relevance of research, explains the goals and objectives, as well as gives brief information about the following issues: research methods, scientific novelty, theoretical and practical significance, provisions to be defended and the results of the study.

The first chapter of the dissertation, entitled **"The problem of using ICT in the learning process"** consists of 4 paragraphs. In these paragraphs the role of ICT in modern society was investigated; existing work experience on the use of ICT in the teaching process was studied and analyzed; the scientific and pedagogical literature was analyzed in terms of the problem, the pedagogical-psychological concept of the use of ICT was defined.

The first paragraph of the chapter ("***The role of ICT in modern society***") discusses the role of information and communication technologies in a globalizing society. ICTs is one of the main tools which has a positive impact on the development of modern society. Thus, modern technologies have an impact not only on various areas of society, but also on education. This paragraph also shows the creation of information infrastructure in our country, the penetration of the global information space and internet into the educational space, the implementation of the task set for secondary schools in the development of ICT and ways to eliminate the problems in solving these problems. Some ideas were shown about the proper management of students in secondary schools provided with the internet, and recomendations were made to overcome the difficulties that arose.

In modern times, the main tasks of education are changing and expanding. This includes: formation of basic knowledge; formation of the ability to study independently and increase professionalism; formation of motivation with a tendency to a productive and compensatory training process.

Observations show that the perspectives of education are updated and expanded day by day. This is related to the renewal and increase of capabilities of technologies not only from year to year, but even from day to day.

The second paragraph of Chapter I is entitled ***"Analysis of the existing literature in terms of the problem***". This chapter analyzes the existing literature in the field of ICT and pedagogical technologies.

The theory of learning of the twentieth century (I.P Pavlov, E. Thorndike, K. Holun, etc.) was deterministic in nature, which led to the use of methods of cybernetics. The victory of the supporters of comprehensive training was associated with the development of behaviorism in the 50s of last century (B.F Skinner's "Operant (instrumental) training concept"). Man influences the world around him with his behavior, as a result of this certain skills and patterns of behavior become to develop.

L.S. Vigotsky preferred social development. F. Barlet introduced science the concept of "scheme" (structure), which is the basis of the cognitive process. J. Piaje and D.J. Bruner believed that the learning process itself was more important than the information we received. According to Bruner, knowledge is not a ready-made result, but a process of development. S. Papert agrees with this opinion and shows that knowledge appears as a result of the activities of students. He created a new teaching method with the help of LOGO programming language.

S.D. Gray, Gary Dokan, Gleck Jacques, Warner Harsh Rui, S.R. Weiler, K. Viliqi, Davis Iver, James Ostavar, L.İ. Folixer, Laden Conet, Lyon Larry, Sterkak Men, R. Gabriel, Rose David, T. Anderson, G. Woodill have made a great contribution to the formation and development of this branch of science. Their researchers led to the formation of the theoretical and methodological classification of the use of technical devices.

There are also researches by Russian scientists (A.A Andreyev, M.N Bashmakov, S.N. Pozdnyakov, N.A Reznik, K.K Kolin, P.K Petrov, O.A Lavrov, V.P Tikhomirov, V.A Goncharov and others) in the field of study and application of ICTs in the educational system.

The issues of development and formation of pedagogical technologies are multifaceted. Well-known pedagogues and psychologists K.B. Shoshnikov, Sh.A. Amonashvili, Q.K. Selevko, M.V. Clarin, L.İ.Lurye, K.Q.Kreçetnikov, V.S.Bibler, M.B. Volovich, B.T. Lixachev, V.V. Firsov, N.P.Quzik, A.S. Qranitskaya, S.N. Lisenkova, V.K. Dyachenko, V.V. Rubtsov, E.Y. Vygotsky, I.Y. Lerner, P.P. Blonski, V.M. Monaxov, V.T. Sholokhovich, N.F. Talizina and others substantiated the opportunity of using technological tools in their researches.

American scientist Vaniver Bush proposed the idea of creating multimedia technology in 1945 (MEMEX is considered a concept of memory organization). However, in the late 1980s, interest in the use of multimedia technologies in the humanitarian, especially historical, and cultural spheres was associated with the name of Bill Gates, the founder of Microsoft.

It is possible to show different views of many scientists (V.P. Bespalko, B.T. Likhachev, M.V. Clarin, G.K. Selevko, etc.) on the concept and use of pedagogical technology.

There are a number of technological groups in the direction of modernization of the traditional system: Sh.A. Amonashvili's individual-humanistic technology and pedagogical cooperation, E.N. Ilyina's formation of a person in the system of teaching literature as a subject, etc.; Pedagogical technology based on the management and effective organization of the learning process (V.V Firsov, N.P Guzik, A.S. Granitskaya, S.N .Lisenkova, etc.); Pedagogical technology based on the management and effective organization of the learning process (V.V. Firsov, N.P. Guzik, A.S. Granitskaya, etc.); Nature-based processes in children's development (L.N. Tolstoy's teaching, M. Montessori's technology, etc.); Alternative pedagogical technology (R. Steiner's Waldorf school, etc.); Technology that reflects the problem-based learning process. To ensure development, it is necessary to include the "near development zone" of the learning process (L.S.

Vygotsky, L.V. Zankov). Q.K. Selevko distinguishes the technology of formation of information culture from the educational information technologies, K.Q. Krechetnikov approaches the classification of educational information technologies in pedagogical projects as a technological method of the learning process. According to V.V. Guzeyev, Internet-oriented technologies are educational technologies in the global information society.

In recent years, there is enough scientific literature on media education (O.A. Baranov, I.V Weissfeld, I.S Levshin, R.M Alguliyev, N.V. Zmanovskaya, etc.). The main duty of media education is to prepare a new generation for life in modern information conditions with the help of modern technology and technical tools, to help them to imagine and understand various information, to understand the impact on the psyche, to master communicative methods based on non-verbal forms of communication.

Currently, digital society such as e-commerce, e-army, e-culture, e-government and etc. has been formed. The development of information technology tools gave impetus to the emergence of e-learning technology. Many researchers use e-learning as a synonym of distance learning. However, e-learning differs from distance learning for its usage (animations, virtual simulators, three-dimensional scenes, graphics, etc.), and from computer learning for its network capabilities (G. Woodill, O.A. Lavrov, V.P Tikhomirov, etc.).

According to the American scientist Howard Gardner's "The theory of multifaceted mental abilities", the main purpose of education is to properly form and develop the thinking, character and morality of students.

The "Fuzzy logic theory" by prominent scientist Lotfi Zadeh (Lutfali Rahim oglu Alasgarzadeh), is the most acceptable theory which led to changes in world science, among his other theories such as "Theory of impressions", "Theory of systems", "Word computer theory", "Optimal filter theory" and "Soft computing".

Academician R.M. Alguliyev has a lot of researches and scientific works in the field of information and communication technologies (emergence and development of internet media, information culture,

information security, the transformation of a market economy in the information society, the formation of electronic libraries, etc.).

The educational model of the 21st century imposes different requirements and obligations on the personnel who perform pedagogical activities in the institution. Thus, educators should have knowledge and skills in the field of modern technology in addition to having a perfect knowledge of the subjects they teach. Modern teachers are required to correctly select technologies that have a positive effect on the cognitive activity of students and apply them precisely in teaching, in accordance with the structural content and purpose of the subject they teach. Therefore, the issue of enriching the knowledge and skills of educators in this field has become extremely urgent.

Special attention is paid to specialists working in various fields of our country who have ability to work with information and communication technologies and use them properly in their activities. Of course, the best way to acquire this technology is general education institutions.

As a result of researches and observations, it can be concluded that the role of technology in increasing the efficiency of the educational process in educational institutions is important. However, there are many scientific works in this field. But the application of technology in various subjects has not been properly studied yet.

The third paragraph of Chapter I, entitled "***Study and analysis of existing experience in the use of ICT in the training process"*** analyzes the work carried out in this field both in our country and many others (Brazil, South Korea, USA, Japan, Latvia, Finland, Russia, Lithuania, Pakistan, etc.). The paragraph also highlights the role of ICT as one of the key factors in improving the quality of the learning process. The impact of information and communication technologies and new pedagogical technologies on the quality of education has been studied and summarized. The survey was conducted in 42 secondary schools in 7 regions of the country. Schools, school principals, teachers and students were selected as objects of research. The results were systematized and justified by percentage and figures in 10 tables.

Questionnaires prepared for school principals and teachers were used as assessment tools. Open-ended questions were also used to determine the ICT knowledge of teachers and students. At the same time, the ability of principals, teachers and students involved in the study to use technical equipment was practically tested.

63 school principals and 562 teachers involved in the survey participated in the questionnaires. Of these, 150 were in urban areas, 256 in the district center and 156 in rural school.

The 42 schools surveyed were equipped with 50 computer rooms, 655 computer sets, 82 lessons on various subjects (52 of the lessons were taught using new pedagogical technologies, 30 were taught by traditional methods) were listened to, 66 open lesson reviews and 24 video reviews were analyzed.

The study revealed that in the first half of the year, the quality of 18 schools is less than 50%, and the quality of 24 schools is more than 50%.

Thus, success was below 70% in 2 schools, between 70-90% in 6 schools, and over 90% in 34 schools.

The main directions of the use of new pedagogical technologies and ICT are related to the correct acquisition of knowledge and relevant concepts related to innovations, modern teaching principles and effective use of teaching methods.

As a result of the analysis of the section “Quality of teaching”, it was possible to determine the teachers' level of using new pedagogical technologies and ICT in the learning process.

The percentage of the answer “often” to the first question (at what level do you use the “General Discussion” method?) is 76% in urban schools, 73% in schools operating in the district center, 74% in rural schools; the percentage of the answer “seldom” is 15% in urban areas, 20% in districts, 13% in rural schools; the percentage of the answer “never” is 2% in urban areas, 2% in districts, 4% in rural; the percentage of the answer “often” to the second question (“How often do you use small group research?”) is 58% in urban schools, 63% in districts, 59% in rural schools; the percentage of the answer “seldom” is 21% in urban areas, 17% in the district, 16% in the

village; the percentage of the answer "never" is 6% in urban areas, 2% in the district and 8% in the village.

At the same time, the percentage of those who often use the computer and internet is 39% in urban areas, 20% in the district, 15% in the village; the percentage of those who seldom use is 23% in the city, 25% in the district, 25% in rural areas; the percentage of those who never use the computer and internet is 17% in urban areas, 14% in districts, 28% in rural areas.

The results show that, the number of teachers using modern technological methods and tools is higher compared to the rural and district schools. Thus, for "frequent use of movie, tv and video" it was 12% higher than districts, while it was 15% for villages; for "frequent use of electronic lessons" it was 6% higher than districts, 10% than villages; for "frequent use of debates and disputes" 6% higher than districts, 8% than villages; for "frequent use of work with pairs" it was 6% for districts and 13% than villages.

However, the performance of district and rural teachers exceeded the performance of urban teachers in terms of the use of "small group research" and "role-playing games" in the teaching process.

Teachers who said "I can apply different methods and tools, but there are no opportunities and conditions for this" are in the range of 1-12% in urban areas, 1-20% in districts and villages. Of the 33 methods and techniques, 13 in the city, 1-3% for each in the districts, and 17 in the villages, teachers said that they are not familiar with the listed methods and techniques".

The level of tasks and exercises used in teaching process such as "Individual work", "Working in pairs", "Working in small groups", "Working with the whole class" and "Problem solving" by the teachers of urban, district and rural schools participating in the study is the same in all lessons. However, urban teachers use more activities (such as research work, practical exercises) in all classes than district and rural teachers.

As a result of the analysis, it became clear that the female teachers working in primary schools mainly use innovative methods. They are teachers aged 26-55 with 5-25 years of pedagogical experience.

The results of the answers to the open-ended questions addressed to the teachers were as follows:

“How does the use of new pedagogical technologies and ICT affect teacher-student relations?” Regarding the question, we can say that 96% of educators in urban areas, 74% in districts and villages showed that the application of pedagogical technologies and ICT in the learning process has a positive impact on teacher-student relations. It expands relations between teacher and students, and allow them to be active in the teaching process;

"What are the problems in teacher-student relations when using new pedagogical technologies and ICT?" 22.5% of educators in the city, 31% in the district and village noted the low level of ICT skills of teachers and students, 13.3% in the city, 44% in the district and village noted the lack of technical resources as a problem;

How does the use of ICT affect the quality of education?" 96.5% of educators in urban areas and 74% in districts and villages answered “positively affects the quality of education”. Thus, they noted that it creates opportunities and conditions to bring clarity to the explanation of the topic, to form students' worldview, to make the lesson more interesting;

“Does the use of ICT save time?” 77.6% of teachers in the city and 78% in the districts and villages said that it allows them to save time.

Thus, the analysis of the research conducted in 7 regions of the country (northern, lowland, 2 southern cities – Sumgayit and Mingachevir, 5 districts – Guba, Gusar, Khachmaz, Ujar, Jalilabad) and in 42 secondary schools (11 in cities, 16 in district centers and 15 in rural areas) show that all of these schools use new pedagogical and information communication technologies at different levels. However, this level of use is not satisfactory.

The ***fourth paragraph*** of the first chapter studies the pedagogical-psychological concept of the use of ICT, emphasizing the importance of detailed knowledge of the pedagogical-psychological basis of the use of ICT to achieve quality in training, teacher-student relations which are key components of teaching as well. In order to overcome the problems between the teacher and learner,

recomendations were made to provide training for learners and to meet the minimum requirements for this activity, and the importance of integrative teaching in ICT teaching was considered more expedient. It has been suggested that four main competencies be taken into account when designing a teacher training curriculum using ICT:

- competences related to the content and methodology of the teaching process;
- competencies related to cooperation and network use group;
- competences related to the group of social and sanitary hygienic aspects;
- competences related to the group of mastering information and communication technologies.

Chapter II is entitled **"The role of the use of ICT in improving and managing the quality of education"** which includes 6 paragraphs. The paragraphs in the chapter focus on national ICT policy in improving and managing the quality of education. The following issues are mentioned in Chapter II:

- a comparative analysis of the structure of traditional and interactive lessons are expressed;
- specific features of the use of ICT in the learning process; ways of using ICT and new pedagogical technologies in teaching subjects are determined;
- the organization, conduct and results of pedagogical experiment are shown;
- recommendations for the effectiveness of the use of ICT in improving the quality of education are made as well.

The first paragraph of the chapter entiteled ***"National policy on ICT in improving and managing the quality of education"*** gives a chronological sequence of the formation of ICTs in our country, the expansion and development of its application: 1) the period of our USSR, 2) the period of independence. It is noted that the development of ICT in both periods is associated with the name of national leader Heydar Aliyev. It also reflects the current successful policy pursued by President Ilham Aliyev.

The second paragraph of the chapter, entitled "***Comparative analysis of the structure of traditional and interactive lessons***" gives

a comparative analysis of the structure of traditional and interactive lessons and their features, and determines the ways of discovering the quality of creative work of teacher. In modern times, education requires continuity, distance and mobility, technology and design, interactivity and dialogue in learning. All this can be done with the help of Internet technologies. In this sub-chapter, the sources for the formation of complex of modern text-books are shown. Finally, teachers are recommended to use web tools that have been tested in foreign countries, depending on the purpose of the teaching.

The third paragraph of Chapter II, entitled ***"Specific features of the use of ICT in the learning process"***, gives some suggestions to determine the goals and objectives of ICT, grouping some cases used in modern lessons today. It provides information about networks, explores the pedagogical potential of social networks, analyzes their positive and negative effects, provides recommendations for more efficient use of social networks, problem solving and perspective, studies knowledge and skills acquired during the effective use of ICT in the learning process, and propose several models for their realization.

The active use of Internet technologies and telecommunication tools in the educational process in schools gives grounds for a positive opinion about the application of innovation processes and requires conducting new searches that make it necessary to investigate some of the issues. Because the application of Internet technologies in the educational process causes changes in the school in various ways, the goals and contents of the curricula, educational forms and methods change.

The fourth paragraph of the chapter is called "***The ways of using ICT and new pedagogical technologies in teaching subjects"***. Here, the ways of using new pedagogical technologies and ICT in teaching different subjects are shown and the attitude to it is expressed. It is also noted that the modern teacher should be proficient in ICT and modern applications and use these programs in teaching process. Some of these types of applications are described in detail such as "Crocodile Physics", "Edison5" produced by Designsoft, "Crocodile chemistry", "GeoGebra" and others.

The fifth paragraph, entiteled ***"Pedagogical experiment and its results***", reflects the experiment conducted to determine the impact of the use of ICT on the quality of teaching. The experiment was organized in different schools, and at the beginning of the school year, control and experimental groups, criteria and indicators for improving the effectiveness of ICT-based education in the teaching process were identified. The ICT tools used in the experiment are shown in the table.

During the study, the following worker hypotheses were put forward and tested:

Research hypothesis. The use of ICT in teaching individual subjects has a positive effect on the quality of teaching under the following conditions:

- if the pedagogical and psychological bases of the use of ICT are correctly defined;

- if there is a wide use of modern technologies along with traditional means of training;

- if the features of the content of the subject are taken into account in the presentations prepared with programs for presentations;

- if the didactic opportunities, forms and methods of training adequately reflecting modern technologies are developed (e-lectures, virtual seminars, video conferences);

-if there is a management system ensuring the use of technical training aids and information and communication technologies;

- if a control system for the results of educational activities is formed by using ICTs;

- if ICT support system (electronic information resources, educational and methodical complexes of the new generation) developed;

- if information and communication competence of all representatives of the education sector is provided in accordance with modern requirements (readiness for education in a modern electronic environment, availability of methods and special skills in the preparation of e-courses, mastery of interactive methods, etc.).

The use of ICT in the training process was conducted mainly in three areas: knowledge testing, explanation of a new topic, strengthening of the studied topic.

The integration of ICT into the teaching process increases the effectiveness of the lessons and children's motivation, facilitates interdisciplinary integration, and develops creative thinking.

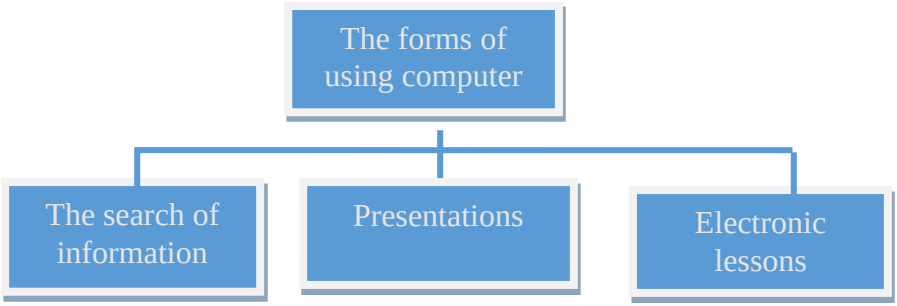


Figure 2.5.1
Forms of computer using

Table 2.5.1
Results of tasks used in control and experimental groups

Tasks	Control group	Experimental group
	60 students	60 students
- Tables, diagrams, graphs, maps	21%	26,52%
- Presentations	18,2%	35,9%
- Electronic tests and quizzes	17,3%	20,7%
- Electronic textbook	12%	27,8%
- multimedia	18,5%	29,8%
- Blog, website	8,2%	13,2%
- web resorces	15,6 %	21%
- Forum	2%	4,2%
- Online lectures	11%	20,3%

Table 2.5.2

Conscious use of ICT by students in the learning process

	Experimental group 60 students	Control group 60 students
	%	
Conscious use of computer	93	51
The role of computer in training	92	11
Opportunities to use a computer in classes	88,9	27
Possibility to use a computer only in computer science classes	2	88
Using a computer as a teaching aid	93	33

Table 2.5.3

Effective use of ICT by learners in the learning process

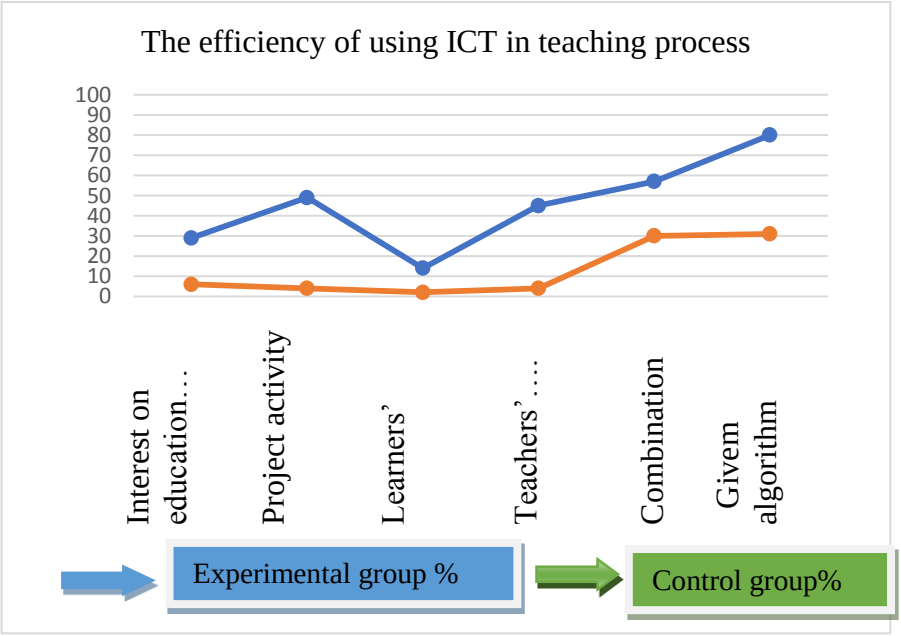
	Experimental group	Control group
	%	%
1. Increasing interest in learning, motivating learners	29	6
2. Project activities and cooperation	49	4
3. Improving students' attention, logical thinking, perception	14	2
4. Formation learners' computer skills and independent thinking	45	4
5. Formation of combination skills	57	30
6. Ability to act with a given algorithm	80	31

In learning process, indicators such as the solution for learning problems, the ability to work with different information, the ability to act with algorithms, the ability to solve learning problems, the ability of self-control were selected. Increasing students' interest and

motivation in the experimental group, is about 5 times higher than in the control group (29% and 6%, respectively). In the experimental group, project and collaboration activities are higher than in the control group (49% and 4%, respectively). Improving learners' attention, logical thinking, and perception in the experimental group is higher than in the control group (14% and 2%, respectively).

In the experimental group, the ability of learners to develop computer skills, independent thinking is higher than in the control group (45% and 4%, respectively). The formation of combination skills in the experimental group is about 2 times higher than in the control group (57% and 30%, respectively). The ability to act with a given algorithm in the experimental group is about 3 times higher than in the control group (80% and 31%, respectively).

Thus, the study showed that the experimental group (perception, motivation, thinking, emotional maturity) showed higher statistics than the control group.



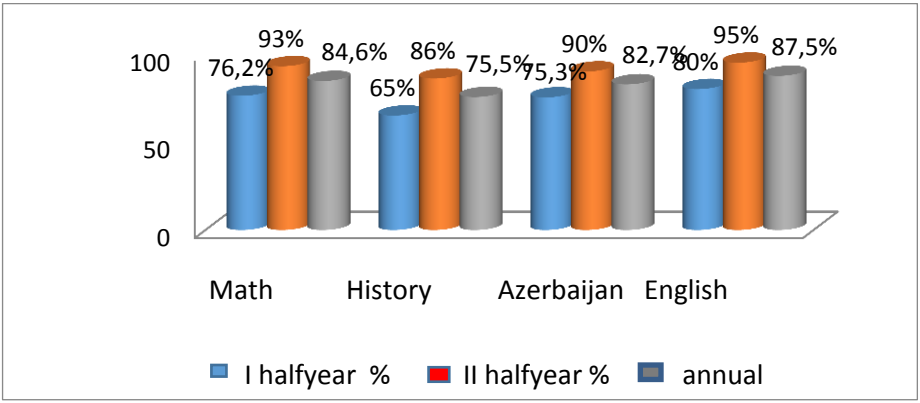
Picture 2.5.2
Effectiveness of learners'use of ICT in the learning process

Learner success monitoring

1. Experimental group (60 students)

Table 2.5.4

Subject	I halfyear %	II halfyear %	Annual %
Math	76,2	93	84,6
English	65	86	75,5
Azerbaijani language	75.3	90	82,7
History	80	95	87,5

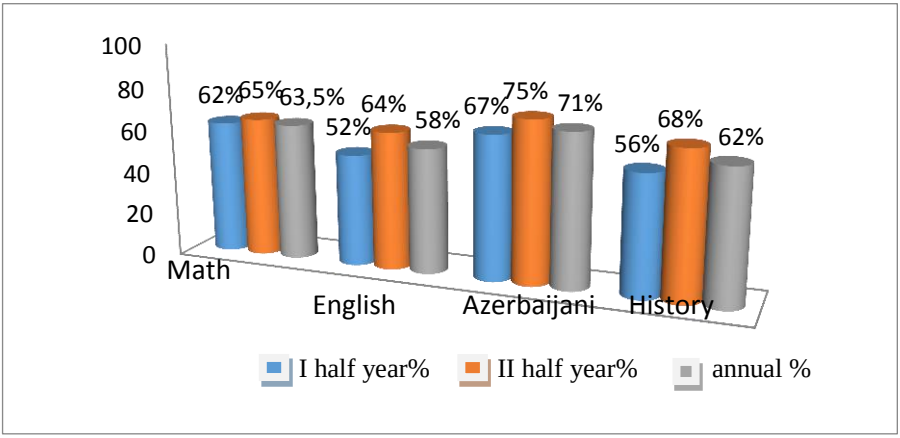


Picture 2.5.3
Achievement indicators of learners in the experimental group

2. Control group (60 students)

Table 2.5.5

Subject	I half year %	II half year %	Annual %
Mathematics	62	65	63,5
English	52	64	58
Azerbaijan	67	75	71
History	56	68	62



Picture 2.5.4
Success indicators of learnes in the control group

The results of the experiment allowed to confirm the hypothesis of the study.

The sixth paragraph of Chapter II provides recommendations for the effectiveness of the use of ICT in improving the quality of education:

1. It is not possible for educators to make a presentation through a multimedia projector only a few times during the academic year, and for students to create an interactive environment by simply listening to a lesson without being able to use the program. For this, there is a need to increase the number of computers of high quality in educational institutions, provide them with modern software, and involve teachers and laboratory assistants in high quality training courses.

2. ICT tools and modern application programs should be applied in the teaching process taking into account the individual characteristics of learners. This will have a positive effect on the quality of education, taking into account what ICT tools and modern applications will be used by teachers in their activities.

3. For the purposeful use of ICT in the learning process, not only educators but also students need to develop their knowledge and skills in this area, will have a positive effect on the quality and management of education.

4. New information technologies should play an important role in the process of training future teachers and should be implemented on the basis of new requirements.

5. Lack of theoretical and methodological, fundamental training of teachers on the use of new information and communication technologies in the teaching process has a negative impact on the quality of training. Therefore, preventive measures should be taken in the training of future teachers and students in pedagogical universities.

6. Each subject teacher should create an individual site (taking into account the design, style of the site), where they can set various electronic materials on the subject (these materials should be selected according to the content of the subject). This will both greatly improve the professionalism of the teacher, as well as ensure that students master the subject better, develop their logical and creative skills.

7. The content of ICT usage models should be determined depending on the sort of application software products and the amount of information resources.

8. The effectiveness of project work should always be taken into account during the application of ICT.

The following **results** were obtained from the research:

1. Proper mastery of content related to innovations, effective use of training principles and methods that meet modern requirements are the main directions of using modern technologies. Pedagogical technologies manifest themselves not only as an element of education, but also as its purpose, content, process and result. If modern technologies are used systematically, scientifically and consistently in the teaching process, then it will contribute to the management of education.

2. In the teaching process, ICT tools and modern application programs should be applied taking into account the individual characteristics of learners. It will have a positive effect on the quality of education if it is taken into account what ICT tools and modern application programs will be used by those who teach in the courses. For purposeful use of ICT in the training process, it is necessary to

develop the knowledge and skills of not only educators, but also learners in this field.

3. Research has shown that teachers in the teaching process do not have detailed information and knowledge about what ICT tools and modern applications they will use to master the subjects they teach. Based on the analysis of the research, the didactic conditions of pedagogical potential were revealed. Thus, the use of ICT in training on the basis of both traditional and author's scientific-methodical complex ensured the effective formation of theoretical and practical knowledge in learners. Each subject should be provided by the teacher with an individual site (taking into account the design and style of the site) where various electronic materials for the subject (these materials should be selected according to the content of the subject) are placed. This will improve the teacher's professionalism to a high degree, as well as ensure better mastering of the subject by students and the development of their logical and creative skills.

4. The use of ICT in teaching subjects has a positive effect on the interaction between students and educators. It develops cooperation between students and teachers and allow students to act independently. In this case, the educational process performs both educational, developmental and pedagogical functions.

5. ICT equipment in general education institutions is placed in special computer laboratories. This equipment is used under the supervision of teachers for a certain period of time. The use of modern technologies allows to improve the quality of training. Thus, it enriches the lesson, brings clarity to the explanation of the topic, identifies and develops talented students and shapes their worldviews.

6. Modern pedagogical technologies are based on interactive learning. They play an important role in improving students' thinking and develop their cognitive activity. Research shows that women are more likely to use modern methods and tools. Most of them are primary school teachers. Special attention was paid to the general bases of professional activity, professional areas and participation of teachers in in-service training on the basis of modern requirements.

It is possible to make the following **suggestions** regarding the research:

1. It would be appropriate to continue research on the use of ICT in terms of quality management of training.

2. In order to help teachers, it is useful to prepare and publish methodical materials on the pedagogical and psychological basis of using ICT in the training process.

3. In terms of quality management of training, it is advisable to hold national and international scientific-practical conferences dedicated to the use of ICT.

The content of the research, the main scientific provisions and the results are reflected in the **following articles published by author**:

1. Mehdiyeva, R.Z. Use of Internet technologies in the development of students' motivation of learning // -Baku: Curriculum, -2013. № 2, -p. 94-97.

2. Mehdiyeva, R.Z. Heydar Aliyev and state policy in the field of ICT in Azerbaijan // -Baku: Materials of the republican scientific conference on "Actual problems of modern education". -2013. -p. 46-50.

3. Mehdiyeva, R.Z. Use of modern technologies in teacher training // -Baku: Materials of the international scientific conference on "Teacher training policy and problems", -2013. -p. 82-86.

4. Mehdiyeva, R.Z. Use of information and communication technologies in teacher training // -Baku: Materials of the XVIII Republican scientific conference of doctoral students and young researchers, -2013. Dec. 19-20, -p. 377-380.

5. Mehdiyeva, R.Z. ICT in general education: competencies, opportunities of use. Issues of application of new educational programs (curricula). -Baku, -2014. -p. 106-113.

6. Mehdiyeva, R.Z. Interactive technologies in improving the quality of education // -Baku: Curriculum, -2014. № 4, -p. 89-94.

7. Mehdiyeva, R.Z. The role of teacher-student relations in the learning process // Curriculum, -2015. № 4, -p. 52-56

8. Mehdiyeva, R.Z. Assessment of student achievements in personality-oriented training: a textbook for bachelors and masters of

higher pedagogical schools / R.Z. Mehdiyeva, N.E. Zeynalova. -Baku: Science and education, -2016. – p.119

9. Mehdiyeva, R.Z. Opportunities to use ICT in the teaching process: Methodological aids for school teachers, teachers and students of pedagogical higher education institutions / R.Z. Mehdiyeva -Baku: Science and education, -2016. – p. 106

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12. Mehdiyeva, R.Z. The impact of the use of Internet technologies in teaching subjects on the quality of teaching // -Baku: Scientific works of AREI, -2018. № 7, -p. 233-236.

13. Mehdiyeva, R.Z. Integration of ICT into the training process // -Baku: Baku Girls' University. -2018. № 4, -p. 220-224.

14. Mehdiyeva R.Z. Pedagogical opportunities of social networks in the training process // -Baku: Actual problems of studying humanitarian sciences, -2018. № 5, -p. 203-205.

15. Mehdiyeva, R.Z. Information communication technology and modern pedagogy // London: LXII Informational correspondence scientific and practical conference “Evropean research: Innovation in science, education and technology”, -2020. -p. 63-65.

16. Мехтиева, Р.З. The role of the use of information and communication technologies in the management of the educational process // -Moscow: Modern Humanities Success / Успехи гуманитарных наук. -2024. № 6, -p. 129-134.

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