

## **Teachers' Views on the Use of Information and Communication Technologies (ICT) in Education Environments**

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**Abstract**—Developments in information and communication technologies enable more information services to be used in education applications. In this respect, it is important for educators to adopt technology, follow it closely and show a positive attitude towards technology in order to be able to use the developing technology in the classroom. Today, using technology is not a privilege but a necessity. Technological developments affect the structure and functions of educational institutions. For this reason, teachers are expected to integrate their lessons with technology in order to train individuals of the information society. This study aims to determine teachers' views on the use of information and communication technologies in education. Mixed research method was used in the study including experimental dimension and qualitative research. A total number of 58 teachers participated in the study. Results of the study provided useful implications for teachers in developing the ability to work in the information and educational environment.

**Keywords**—Information communication technology, information environment, teachers

### **1 Introduction**

The information and educational environment is a software-telecommunication environment based on the use of computer technology that implements high-quality information support for school children, teachers, parents, the administration of the educational institution and the public using unified technological means and interconnected content [33,23]. Such an environment should include organizational

and methodological tools, a combination of technical and software tools for storing, processing, transmitting information, providing quick access to pedagogically significant information and creating an opportunity for teachers and students to communicate.

The information and educational environment should provide opportunities for informatisation of the work of any teacher and student. Through the information and educational environment, students have controlled access to educational resources and the Internet, can interact remotely, including after school hours. Parents should see in the educational environment the qualitative learning outcomes of their children and teacher's assessment. The information and educational environment is a systematically organized set of data transmission tools, information resources, interaction protocols, hardware-software, and organizational and methodological support, focused on meeting users' needs for information services and educational resources [31]. The information and educational environment should be understood as a single information and educational space, built by integrating information on traditional and electronic media, computer and telecommunication technologies of interaction, including virtual libraries, distributed databases, educational and methodological complexes and an extended didactic apparatus.

In accordance with the definition, the educational information environment of an educational institution includes:

- A set of educational information resources, including digital educational resources
- A set of technological means of information and communication technologies: computers, other ICT equipment, communication channels
- A system of modern pedagogical technologies that provide training in modern education environment [21,28].

In its turn, the information and educational environment of the school is included in the global information educational space, which is formed by catalogues and access interfaces to collections of electronic educational resources. The purpose of creating the information and educational environment of an educational institution is to transfer into a new technological level all the information processes taking place in an educational institution, for which it is necessary to integrate ICT (Information Communication Technology) into the pedagogical activity of the school as a whole [47,36].

A properly organized information and educational environment of the school, in particular the competent use of ICT in the educational process, allows at a new level to implement:

- Differentiation of education
- Increase student motivation
- Ensure the presentation of practically any material
- Teach modern methods of independent knowledge acquisition, which, of course, will be a condition for achieving a new quality of education [21,16].

The information and educational environment is designed to cover all areas of the educational institution, create additional conditions for a comprehensive analysis of the indicators of the educational process and allows you to create a holistic view of the state of the system of general secondary education, as well as qualitative and quantitative changes in it. The information environment of an educational institution should be unified, to fulfil both educational and managerial functions. This is due to the fact that most of the information used in the management of the school is open (schedule, educational programs, etc.) [17,10]. The secondary school curriculum and administrative activities can be systematically summarized in the following five blocks of information resources of the institution.

The block of educational activities is the most representative and voluminous in content. This block stores electronic educational materials for school educational areas: primary, basic and secondary levels of continuing secondary education. Its functions include continuing education in computer science, advanced education in mathematics, subject liberal arts education, science education, social and economic education. In methodological terms, this unit is focused on the introduction of active self-learning methods based on the information model of the educational process organization. According to Talbot [39], the block of cultural and educational activities is called upon to form an intelligent person in a post-industrial society. In addition to basic knowledge of basic sciences, a graduate of a modern school must own the literary, musical, artistic and architectural heritage of world civilization. A wide selection of virtual museums, historical monuments, art galleries and other attractions should foster the culture of the student. This unit is responsible for the formation of students' information, environmental and screen culture, creative activity, high morality and tolerance. In methodological terms, this unit is based on the work of the cabinet of social informatics.

The unit of information and methodological activities of school teachers is focused on the development of creative pedagogy at school, since the introduction of an information model of education requires the creation and constant updating of program-methodological complexes of various forms of training (design, individual, distance, etc.). Its functions include the creation of electronic textbooks, the development of computer programs, providing teachers with home computers, conducting teleconferences, and forming a program-methodological fund. The unit of scientific and productive activity is based on the work of the school scientific society and is responsible for the acquisition by students of the professional skills necessary for life and work in the information society. This goal is achieved by combining education with useful work based on the use of new information technologies. Its work should include the provision of an electronic library, the formation of a media library, publishing, the maintenance of the administrative system, and work on the Internet [34]. The block of administrative and economic activity provides the formation and duplication of various policy documents, automated planning of the educational process, work with classrooms, analysis and ensuring the health of students, psychological and pedagogical diagnostics, etc. [24].

The information and educational environment is no longer just a collection of information in electronic form, even if structured according to the example of

electronic libraries, it is a communication system, professional and design activities in this environment, and a system of access to various repositories of a wide variety of information. The hardware basis of the information educational environment is a local area network, which provides remote access to both computers and peripheral devices [26]. The presence of a network will make it possible to organize data storage on one medium and use them simultaneously from various workstations. The use of more advanced software will allow teachers to create and replicate didactic tools that are quite suitable for use in lessons. It is also possible to conduct testing of children both in order to test knowledge, and for the purpose of psychological and pedagogical diagnosis. It is at the stage of formation of the school network that the following facts come to light [14].

Computer is a didactic tool with very broad capabilities, as well as a means of increasing the effectiveness of teachers. Limiting the use of computers only to teaching computer science is a conscious rejection of a qualitatively higher level of organization of children's mental work, and, as a result, exacerbating the divergence of vectors of pedagogically directed and spontaneous processes of development of a child's personality. The computer should not be primarily a subject of study, and not a means of teaching computer science, but a universal means of applying information technology for the education and upbringing of children [31,35,1].

In order to implement all of the mentioned aspects above, it is necessary to change approaches to teaching children and teacher training, focusing on the formation of information culture - an integral component of the general spiritual culture of the individual. The head of the school must understand the significance of such an environment and want it to function. At the initial stage, when no one has yet felt the advantages of such a system, when the volume of work increases, but not decreases (you need to put the material in the library, which means typing or scanning it, you need to learn how to work with a computer and software applications, you need to start your day by reading emails, etc., etc.) the manager's organizing will is important (to explain, changing the prevailing worldview of teachers, encourage enthusiasts, issue orders, control). Without the desire of the leader to organize such a system of educational process management, it is doomed to failure - enthusiasts will try to do something, but without finding support and understanding, they will either go to other structures or be disappointed [48,2].

Computers, there must be other technical devices for the most efficient use of computer and information technologies in the educational process - printers, scanners, projectors, etc. The information and educational environment as a pedagogical system determines the new role of the teacher, who has the following functions:

- Coordination of the cognitive process
- Adjustment of the taught discipline
- Counselling in the preparation of an individual curriculum
- Management of curricula, educational projects

Primary school students not only know the ways to use computers, the Internet, other types of information technology, but also have a flexible systematic approach to achieve qualitative results by performing research activities in the forefront of

working with them, with the possibility of continually updating the task patterns, theoretical and practical aspects of developing students' motivation to carry out research activities independently [37,6].

Furthermore, the role of teacher in ICT environment is a key issue and these roles are as follows:

1. Scientific and methodological support of the educational process (development, storage and use of training programs, methodological recommendations for conducting lessons, scripts of lessons and extracurricular activities, didactic materials, etc.)
2. Creation of databases of the educational institution, including the results of monitoring the quality of the educational process, electronic diaries of students, electronic journals. This is necessary for external and internal evaluation of the school, informed decision-making.
3. Pedagogical support of the student learning process. Organization of distance learning for children who are unable to attend school due to health reasons.
4. Organization of virtual communication of participants in the educational process (in forums with parents of students, teachers with each other, with students, students with each other). The possibilities of the information and educational environment are aimed at attracting parents to the educational process of the school, increasing their culture in the field of education, discussion and solving important problems in the life of the school.
5. The accumulation and dissemination of pedagogical experience.
6. Communication with the public, the formation of a positive image [38] [15] [4]

The teacher-consultant (or tutor) need to demonstrate his/her ability to see the technological, organizational, socio-economic and socio-psychological possibilities of obtaining the maximum pedagogical result. In addition, the teacher should become a natural intelligence that activates ICT, and with it, all its potential participants in a productive interaction with it. It is the teacher who puts the "mechanism" of the ICT into action, involving its students and the information objects necessary for this action — the resources and technologies of the IOS. The teacher combines his personal knowledge and skills (personal potential), his existing and available intellectual resources with the constant knowledge and resources of the IOS of the school, expanding the potential of the ICT. He provides this potential to his students, organizes them accordingly (in a variety of interpersonal relationships based on the principles of direct and feedback) and helps them in his perception [11].

For this "mechanism" to work successfully, it is necessary to design, create, shape, develop a direct and feedback system - a virtual representation of the teacher (media environment). The teacher provides each student with the opportunity to:

- Access to the electronic library, where educational and methodological support is concentrated
- Communication with the teacher by e-mail
- Teleconferences for each course studied;
- Communication with students of their virtual study group
- Consultations with the teacher on-line and a number of other features [19,25].

The informational and educational environment of a teacher is a set of objects that support the educational process and develop a child's personality: a personal computer, a teacher's electronic library, a distance learning method, a teacher's website, electronic classrooms and forums, and an educational media environment. The effects of information technologies in the field of education are that it is used as a supportive tool in education and causes revolutionary changes in education. For this reason, it is necessary to use information technologies as a supportive tool in education and to examine their effects on the ability to create revolutionary changes in education. The widespread use and interest of educators in information technologies has increased the quality of the education and training they offer in the school environment, and it has become more remarkable for students. Therefore, this study aims to determine teachers' views on the use of information and communication technologies in education.

## **2 Method**

### **2.1 Research model**

The mixed research method, which is expressed as the combination of quantitative and qualitative methods, approaches and concepts, was used in this study [8]. In mixed method research, it is aimed to complement the weaknesses of one method with the strengths of the other by using quantitative and qualitative methods together. Thus, the validity and reliability of the data obtained by both methods are increased [9].

### **2.2 Participants**

A total number of 58 primary school teachers from different regions of Kazakhstan participated in this study during 2020-2021 academic year. When the demographic characteristics of the teachers were examined, it was seen that 61.6% of them are male and 38.4% of them are female. Considering the age of the participants, it was found that the maximum age range was 33-43 (41.6%).

### **2.3 Data collection tool**

During the experiment, an interview was carried out with primary school teachers. The interview form included the following questions:

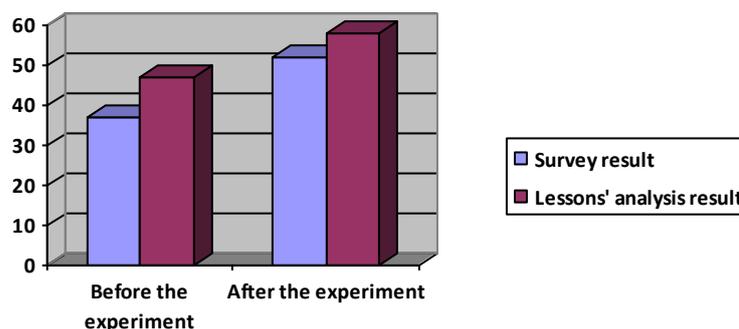
1. How do you understand the meaning of the term "*educational information environment*"?
2. In your opinion, what is included in the information and educational environment of a teacher?
3. Do you use a computer to prepare homework?
4. How often do you use the interactive whiteboard in the classroom?

5. How do you rate your computer literacy (from 1 to 10 points)?
6. Do you have an electronic library?
7. What are the sites for teachers that you use?
8. What electronic forums have you visited?
9. How do you understand the essence of the “*educational media environment*”?
10. How can information tools be used in the educational process?

## 2.4 Data analysis

In the quantitative dimension of the study, statistical methods were used in the analysis of the data in the light of the data obtained. In the qualitative aspect of the research, interpreting the phenomenon in content analysis aiming to reach the concepts and relationships that can explain the data process, the qualities were brought together, arranged and interpreted in a way that the reader can understand through similar codes, categories and themes [45].

## 3 Results



**Fig. 1.** Comparative data on the development of the skills to work in the information and educational environment among primary school teachers.

Results on the experimental data were shown in Figure 1. Results showed that 82% of teachers stated that although they understood new concepts related to the information and educational environment, they did not often use them. The meaning of the terms “*educational information environment*” and “*educational media environment*” was understood by only 28%. The electronic library, electronic textbooks were known by many teachers, but only 47% of them fully understood their value.

A lecture on the topic “*Components of the information and educational environment*” for primary school teachers was organized. The seminar gave full information on the topic, clarified key concepts, organized practical classes in the

form of a dispute, mini-games, individual and group work using various means of information technology. It was especially important that the teachers were given a huge amount of new knowledge about the information and educational environment, about the electronic sites of teachers, which made it possible to exchange new materials using the computer at any convenient time, about distance learning methods that could be used in the course of their work. At the end of the lectures, the above terms were understandable to all teachers and they had a great desire to use them in the lesson and after-hours.

In addition to the questionnaire, we attended the lessons of primary school teachers in order to determine, through analysis, their level of development, skills to work in an information-educational environment. Analysing their lessons, we concluded that teachers in the lessons mainly used only an interactive whiteboard. Other components of the educational information environment were not observed. To improve the results of the analysis, we conducted a master class on the creation of electronic resources and the organization of the development of educational and methodological support (electronic courses, control and test tasks, interactive laboratory workshops, etc.)

#### **4 Discussion and Conclusion**

In accordance with the aim of the present study, the meanings of such concepts as “*information-educational environment*”, “*media environment*” are determined. The use of ICTs in a primary school is an inevitable phenomenon caused by objectively occurring global processes of innovation of society. A change in the paradigm of education, consisting in the transition from instrumental to communicative rationality, meets the needs of the new society as a society of information, communication and systems. As a result of this, it becomes necessary to form an education system as a means of communication based on understanding [44]. It was revealed that should be placed at the centre of the pedagogical process. The teacher's task is not to present the material, but to determine the right direction in the work. The development of means of informatisation, information and especially telecommunication technologies lead to the creation of an information and educational environment for any subject activity, which requires a radical rethinking of the goals, contents, forms and methods of teacher training at a new modern level and should be reflected both in general education and in training teachers [32,5,12,42,3].

In accordance with the changes in the paradigm of education, the information and educational environment is based on the application of the latest ideas, functioning at the forefront of pedagogical science, and reveals: the main trends in the development of secondary pedagogical education in the context of active information interaction, information space, information and educational environment.

The main ideas for developing the educational information environment of an educational institution are: the formation in the consciousness of trainees of an informational and pedagogical picture of the world through its educational model - the informational and educational environment of an educational institution equipped with modern informatics and implementing an informational ideology in the

educational process an active member of the information society, for which purposeful development of new methods, search and testing in tech boiling the new organizational forms, the development of a number of innovative teaching and learning techniques [27,18,41,46].

In line with the results of the present study, the information and educational environment provides the general educational institution with the necessary regulatory, organizational, scientific, methodological and educational resources and implements:

1. Interconnection and interdependence of goals, means and the result of the process of complex informatisation in a general educational institution;
2. The creation of information flows for all participants in the pedagogical process, which provide an effective solution to educational, scientific, economic and administrative tasks aimed at improving the efficiency of the educational process [13,49,29,40].

The information and educational environment affects the development and improvement of the educational process of a general educational institution:

1. Development of "network" learning environments that are built on the system of "student-intermediary-teacher", where modern means of information technology act as an intermediary;
2. Presentation of the modern educational content in two components: updated educational content and updated practice of educational content;
3. Emergence and development of new forms of organization of educational information, which are primarily characterized by non-linear structuring of educational material, which, in turn, allows the student to choose an "individual learning path";
4. Creation of a computer training methodology;
5. Development of educational institutions of the open type, including various forms of distance learning, which significantly increases the motivation of students to study subject disciplines [22,7,43].

Therefore, the development of teachers' skills to work in an information-educational environment creates the conditions for the focused development and use of new methods, helps to find and test new organizational forms in the current work, and to master a number of innovative teaching and learning technologies. The use of technology in an integrated manner in the course of the school is very important for developing countries. Following recommendations are provided based on the results of the study:

- Decisions to be made on this subject should be based on the results of research conducted in a way that can clarify the questions and problems identified on the subject.
- Schools should be supported by experts in educational technologies.
- Curriculums should be reorganized to provide enough flexibility in using technology in classrooms.

- In addition to supporting teachers with in-service training on computers, the Internet should be used to ensure continuous training of teachers. For this purpose, virtual communities can be created by using the technologies in the market to ensure continuous communication of teachers. In this way, teachers can share their practices and experiences with other colleagues without leaving their school.

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