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Features of Psychological Readiness of Teachers to Use Information and Communication Technologies in Pedagogical Activity

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Abstract

The objectives of the research: The article considers the problem of preparing teachers for activities in the information space, which covers both the virtual space, where electronic communications are provided via various Internet networks, and certain technical devices. Considerable attention is paid to the study of the peculiarities of the psychological readiness of teachers to use information and communication technologies.

The complex of research methods is used in the work: Psychological features and problems of the influence of information and communication technologies on the implementation of effective interaction between teachers and students are identified.

Theoretical results: Based on the analysis, the essence and structure of psychological readiness of teachers to interact with students in the digital educational environment are revealed, which contains cognitive, motivational and operational components.

Empirical results: A set of methods for studying the levels of psychological readiness of teachers to use information technology and interaction with students in the educational environment is grounded and the results of their application in a representative sample of educators are presented. It is noted that the introduction of ICT in the educational environment contributes to improving its quality, as well as improving the organization of educational institutions and their management.

Keywords: Psychological readiness, participants of the educational process, digital educational environment, distance learning, distance learning, pedagogical activity, information and communication technologies

Introduction

Information society is built today, in which there is an increasing role of information and its transformation into one of the driving forces of life. Modern information and communication technologies were not created for the educational space, but led to a revolution in education. The education system is gradually becoming part of the global information network and the teacher's personality is responsible for mastering and implementing information and communication technologies in everyday pedagogical practice.

A teacher is an entity that creates conditions for communication and self-improvement of the learner, but he is also a participant in the process of self-development, development of professional self-awareness. He is a facilitator who creates conditions for self-improvement of students and their personal growth (Flyarkovskaya, 2019; Gorbenko et al., 2020).

Information and communication technologies (ICT) have become the most important component of modern society in a short time. In many countries, understanding of these technologies and fluency in them is now considered part of basic education, along with reading or writing. The use of new advances in information technology in the

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educational process, which contribute to the entry of man into the world information space, especially in the context of distance learning is becoming increasingly important. Modern educational institutions have Internet sites that have become an effective means of communication with students and their parents.

Distance education has become a challenge for all participants in the educational process teachers, children, and parents. Everyone was morally and psychologically unprepared for a long time to work in this format. But this may be the best time for children to develop a number of life competencies, including self-organization.

In the Concept "New Ukrainian School", special attention is paid to the activities of specialists in the digital educational environment, and the question of finding the latest approaches to the organization of teacher training is increasingly emerging. Among them, as noted by Martyniuk (2014), there is the informatization of education. The Concept of the National Informatization Program (Law of Ukraine, 1998) states that the focus on the introduction of informatization of education will contribute to "the formation and development of intellectual potential of the nation, improving the forms and content of the educational process, the introduction of computer methods of teaching and testing" that will give the chance to solve problems of education at the highest level taking into account world requirements; as well as to develop individual qualities aimed at critical thinking, collaboration, creativity and communication" (Human Development Report, 2016). However, in the scientific literature (Bondarchuk, 2013; Martyniuk, 2014; Smuljson et al., 2012), it is increasingly noted that teachers do not have enough information and communication competence for subjective reasons (lack of professional knowledge, information literacy, motivation to use information and communication technologies), and objective ones (lack of technical means, computer multimedia programs, unified platforms, independent units for the organization of distance learning, the Internet, etc.).

This problem makes us think about creating a single system of digital environment that would contribute to the teaching of the necessary educational material: well-illustrated documents and presentations; modern Internet technologies, local networks, databases; interesting material on the Internet (Martyniuk, 2014). Theoretical analysis of the scientific literature (Bondarchuk, 2013; Smuljson et al., 2012) revealed psychological problems of participants in the digital educational space, including: maintaining anonymity in communication create situations of permissiveness (atypical, abnormal behavior, etc.), which violate the rules of interaction, but such resource users know that they will not be responsible and behave incorrectly; lack or absence of non-verbal signs with an excess of visual images (exchange of letters (e-mail), exchange of instant messages (chat), assessments (in comments to published materials), publication of essays (blog), direct visual contact (video chat), indirect visual contact (viewing photos), audio contact (audio chat), group communication (video and audio conferences, forums), which helps to strengthen emotions, not rational judgments, etc. As O. Bondarchuk (2013) emphasizes, such problems reveal "limitations sensory experience, complicated emotionality and difficulty in nonverbal communication. In addition, most communicators are not sufficiently prepared for subject-subject interaction in general. This can negatively affect the interaction in the digital educational environment, because the real authority in such a space, according to S. Bondarenko (as cited in Ivanova, 2010), is supported by high intelligence, constant help to others, emotional positivity, concern for maintaining one's own reputation, implementation of integrative actions, etc. (Tereshchuk, 2016).

Method

Research Design

We conducted a study of the readiness to use information and communication technologies, ICT competence of teachers and the availability of information and communication technologies for subject teachers as participants of the information educational space of the educational institution. The results of the study, in our opinion, will more effectively influence the content, forms, methods, and means of innovative training of different categories of teachers, which, in turn, will help enhance the use of learning resources to improve education and self-realization of teachers and students.

Study Group

The study covered 9,975 subject teachers (algebra/geometry, physics, history, geography, physical education, labor training).

Data Collection Tools

To achieve the goal of the article, a set of methods adequate to the subject of research was used. Among them, there are theoretical (analysis, study of the current state of the studied problem in a digital educational environment, etc.), as well as empirical (questionnaires, testing, observation, observational experiment). At different stages of the study, psychodiagnostic techniques were used to study the structural components of teacher training, in particular, for:

a. Determining the formation of the cognitive component: "Questionnaire for the study of information and digital competence of teachers" (author's development), questionnaire "Determination of knowledge about successful interaction in a digital educational environment" (author's development);
b. Determining the formation of the motivational component: "Methods of diagnosis of socio-psychological attitudes" by

O. Potemkina (Potemkina as cited in Moskalyova, 2014), the method "Assertiveness of the individual" (Moskalyova, 2014), the method "Motivation to succeed" (E. Ehlers) (Moskalyova & Moskalyov, 2019);

c. Operational component methods of analysis of situations of professional interaction in the digital educational environment (author's development), methods "Determination of readiness for entrepreneurial activity" (V. Petrenko, M. Tabaharnyuk, O. Pasichnyk) (Moskalyov & Karamushka, 2011), test method "Determination" (V. Loznitsa) (Moskalyov & Karamushka, 2011), a method for determining the levels of subjective control (J. Rotter) (Moskalyova & Moskalyov, 2019), RSK test to identify risk propensity (G. Schubert) (Moskalyova & Moskalyov, 2019). The study was conducted on the basis of the Central Institute of Postgraduate Education of the State Institution of Higher Education "University of Education Management", the State Scientific Institution "Institute for Modernization of Educational Content", Lviv University of Banking.

Data Collection

The research uses the following methods: theoretical (analysis of scientific materials, systematization and structuring of selected information, generalization of the obtained results) and empirical (survey). This study provides a survey of teachers of educational institutions as specialists in the use and implementation of ICT in the educational process.

Data Analysis

Statistical data processing and graphical presentation of results was performed using the statistical software package SPSS (version 21.0).

Findings

Information and communication competence is the ability of a person to use information and communication technologies. It is revealed that the structure of psychological readiness of pedagogical workers to interact with students in the educational digital environment contains certain functionally interconnected and interdependent components: cognitive, motivational, operational.

The cognitive component indicates the level of knowledge of teachers about the concepts of "interaction", "interaction in a digital educational environment"; availability of psychological knowledge about the successful interaction of teachers with students in a digital educational environment. It provides an opportunity to identify the degree of mastery of knowledge and understanding of theoretical material on the ability to use the information obtained in the choice of information to use it in professional activities; promotes the use of information and communication and digital technologies to create search, processing, exchange of information in professional activities.

Motivational component represents a set of motives, adequate to the goals and objectives of pedagogical interaction, professional orientation of the individual to effective interaction in the digital educational environment through professional growth, self-development; values, creative expression of a person in joint activities. Operational components characterizes a set of skills and abilities that provide effective interaction with students in a digital educational environment; ability to realize, control intellectual actions in the process of interaction; ability to choose the optimal style of pedagogical interaction with students.

The study involved subject teachers from secondary schools from different regions of Ukraine. The results of the study on age differentiation (Fig. 1) show that most of the participants in our study were subject teachers of the age category "40-49 years" - 32%, in the category "up to 30 years" - 14%, in the group "60 years and older" indicator is - 7%, in the categories "50-59 years" and "30-39 years" - 25% and 22% respectively.

An effective policy for introducing innovations into the education system must take into account that the role of the teacher changes quickly enough: they become leaders, managers of the educational process, teachers-trainers, begin to design, adapt, manage and evaluate the educational environment. Therefore, it is important that teachers are provided with the latest computer equipment and have constant access to ICT tools in the educational institution.

Having correlated the responses of subject teachers to the provision of ICT, we obtained the following results: many teachers today are not provided with a personal computer 70%. Accordingly, we can say that 30% of subject teachers are not provided with ICT. A small number of teachers indicated that they bring personal laptops, which they use as needed for professional activities in the educational institution.

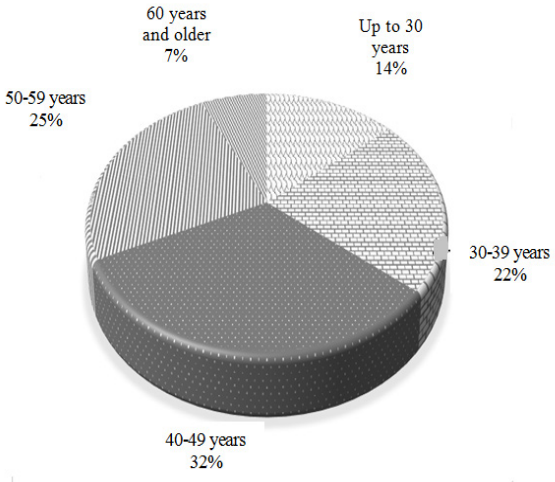

Fig. 1: Distribution of answers to the question: "Your age?"

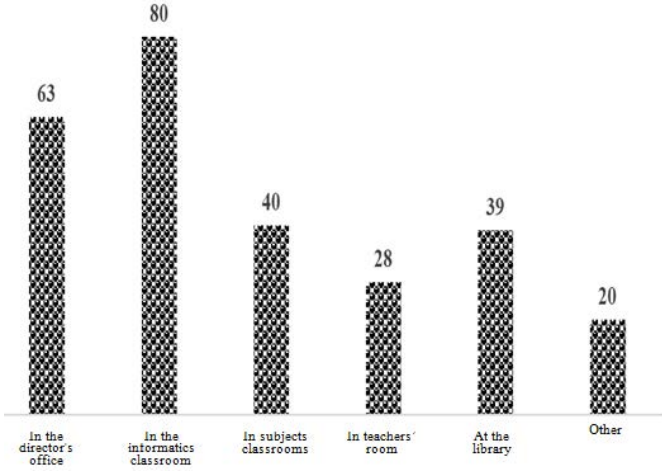

Fig. 2: Distribution of answers to the question: "Indicate where the computers used by the administration and teachers are located?"

It should be noted that the vast majority of respondents (80%) indicated that they can use a computer only in the classroom of computer science (Fig. 2). Of all respondents, 20% said that computers are located in the offices of the secretary, psychologist, deputy principals, teacher-organizer of social pedagogues, school laboratories, educational division, methodical office, office of clerk and accountant, multimedia classroom, departments of educational work and information and computer center, office, administration office, training hall and technical studios.

At the same time, 96% of the respondents said that computers, printers, scanners, touch boards, projectors, and Internet connections are available in the classrooms.

According to the survey on the use of ICT in teaching, most teachers (96.2%) said that they own and use these technologies in their daily work. However, there is a percentage of teachers (3.8%) who indicated that they do not use ICT tools and do not see the need for this. The vast majority of "no" answers were given by physical education teachers, noting that the specifics of teaching their subject do not always require the use of ICT.

Discussion

According to the results of the study of the psychological readiness of teachers to interact with students in the digital educational environment, it is determined that more than half of teachers have an average level of cognitive component of psychological readiness to interact with students (53.8%), a third respondents low (30.0%) and only about a fifth of respondents a high level (16.2%). Thus, only a small number of surveyed teachers know the peculiarities of interaction with students in a digital educational environment, while in the rest of the teachers the level of formation of this component was insufficient.

A high level of formation of the motivational component of psychological readiness of teachers was found in a small part of the respondents (21.6%), the average level in the third part (33.8%) and a low level in 44.6% of respondents. Thus, a significant number of subjects stated an insufficient level of formation of the motivational component, which indicates: lack of motivation for effective interaction; lack of interest in socio-psychological attitudes to self-deepening knowledge about communication, communication in the digital environment; "The desire for atypical, non-normative behavior, to initiate the creation of an image or even a group of images in which the individual tries to realize their secret visions and desires, which may or may not meet universal norms and rules of interaction" [5]; show indecision in making independent decisions in the process of performing complex computational tasks; lack of desire to master digital technologies in e-learning and distance learning, motivation to develop and implement in the digital educational environment author's programs of academic disciplines.

The group of pedagogical workers with a low level of operational component of psychological readiness includes 30.9% of respondents who do not show interest and knowledge in digital technologies, do not understand the need to use them, do not independently focus on analysis and forecasting of psychological and pedagogical situations in digital educational environment, do not know how to identify and analyze the psychological problems of such interaction. 46.1% were in the group with an average level, and only 23.0% found high rates of formation of this component.

When asked about the impact that the use of ICT has on the learner, more than 80% of all respondents answered that the use of computer technology has a positive effect on learners and helps to increase learning interest in the subject. Another positive impact of ICT noted by teachers is the formation of skills of independent productive activity, said 59% of respondents.

The study found out how educational institutions use the following software products: local electronic diaries, electronic diaries, Internet placements, electronic logs and electronic educational online resources (Fig. 3). The answers were distributed as follows: respondents answered that the primary school uses local electronic diaries (10%), electronic diaries posted on the Internet (36%), electronic logs (33%), e-learning online resources (92%). At the same time, 58% of respondents indicated that the educational institution does not use software products in its pedagogical work.

The opinion that the use of ICT contributes to the success of students in the subject and allows them to express themselves in a new role, is supported by more than 87% of respondents. A significant number over 48% of respondents believe that the use of ICT helps to create a situation of success for each student (Fig. 4).

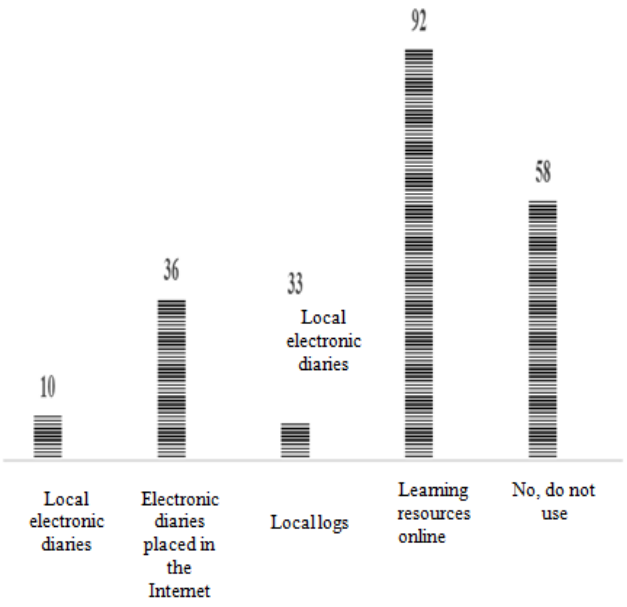

Fig. 3: Distribution of answers to the question: "Do you use the following in your school:"

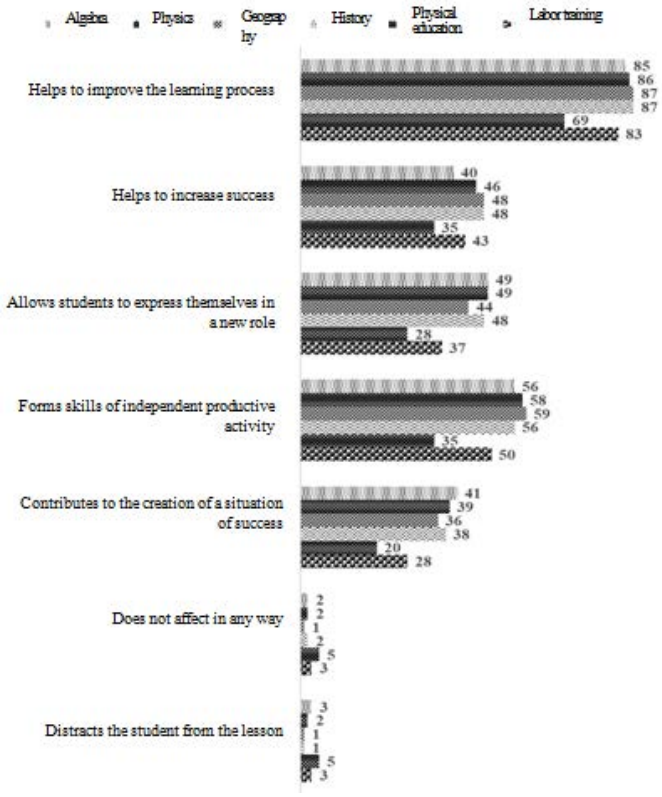

Fig. 4: Distribution of answers to the question: "What impact do you think the use of ICT has on the learner?"

Given the high educational potential of modern ICT and the pace of their development, due to continuous development and improvement, teacher education today also needs constant improvement, development of its ICT competence and information culture in general. Under such conditions, it is very important for the teacher to determine the level of their knowledge, skills and experience that are needed to solve educational problems, which will, in turn, allow each teacher to outline an individual educational trajectory to increase ICT competence.

Therefore, educators were asked to assess their level of ICT proficiency.

Assessment of ICT competence of teachers was carried out on a 5-point scale according to the following parameters (Fig. 5):

- work with the file system;
- work in a text editor;
- creation of presentations;
- graphic image processing;
- work with e-mail;
- work with the Internet.
- It should be noted that 36% of teachers rate the level of ICT proficiency at a maximum of 5 points, 35% of respondents rated their level at "4", at "3" points 21%. Accordingly, 8% of respondents rate their level "1" and "2".

According to the generalization of the levels of components of psychological readiness of pedagogical workers to interact with students in the digital educational environment, an insufficient level of formation of such readiness as a whole was revealed (Table 1).

As we can see from the above in Table 1, the level of formation of psychological readiness of teachers to interact with students in the digital educational environment is insufficient. Analysis of the results of the study showed that although a significant number of teachers (45%) are characterized by an

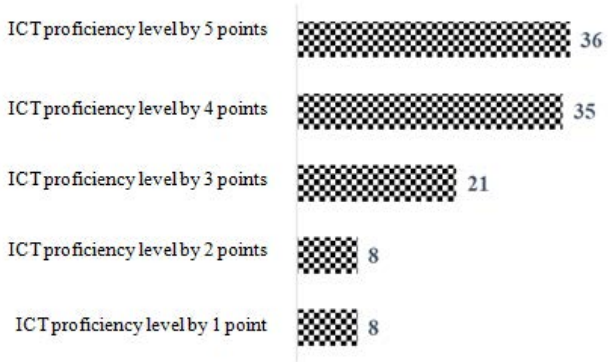

Fig. 5: Distribution of answers to the question: "Please rate your level of computer technology fluency on a 5-point scale:"

Table 1. Levels of formation of psychological readiness of pedagogical workers to interact with students in the digital educational environment

Levels	Number of subjects (in %)
low	35
middle	45
high	20

average level of such readiness, but 35% are those teachers who are not ready to interact with students in the digital educational environment, often behave irresponsibly in situations of interaction, do not worry about the consequences of their actions, do not burden themselves with the consequences of their actions (Bondarchuk, 2013), have a deficit of emotional manifestations and difficulties in non-verbal communication, which is known to provide a significant contribution to the understanding of the participants of each other's interaction (Bondarchuk, 2013).

Only 20% of the studied teachers are psychologically ready for effective interaction with students in the digital educational environment, which is manifested in: understanding the role of interaction in the activities of the pedagogical worker; solving problems and tasks during communication in the digital environment, professional and personal interaction, communication.

Thus, we should note that a small percentage of teachers have theoretical knowledge of the basic concepts and methods of informatics, knowledge of information and communication technologies, their capabilities knowledge that reflects the system of modern information society, the ability to be creative, flexible, critical, systematic, including cognitive component.

The results of the respondents' answers (Fig. 6) showed that they most often increase the level of qualification in the implementation and use of ICT in advanced training courses (38%). Less, but still a significant part of such training is self-study (36%). 22% of respondents take computer literacy courses. So, as we see, teachers are mastering effective information technologies, expanding their use in organizing the educational process in the school.

Given the Figure 7, we can state that more than 70% of all subject teachers consider it necessary to improve the level of qualification in the use of ICT. Teachers want to improve their ICT skills, and understand that training new generations of students on the basis of digital technologies enables competitiveness in today's conditions. History teachers have the greatest desire to improve their skills in the use of ICT (83%). Teachers of algebra and physics (23%), physical education (22%), labor training (21%), geography (19%) and history (17%) showed less interest in such training. But these indicators need to be considered together with the following (Fig. 7).

The results of a survey on the potential of computer work (Fig. 6) show that a large proportion of teachers are confident users of ICT. Physics teachers (51%) and physical education teachers (37%) are the most confident in their abilities and feel satisfied when they succeed in learning and using ICT. Many respondents experience some difficulties, but are confident that they will be able to if they make the effort. Physical education

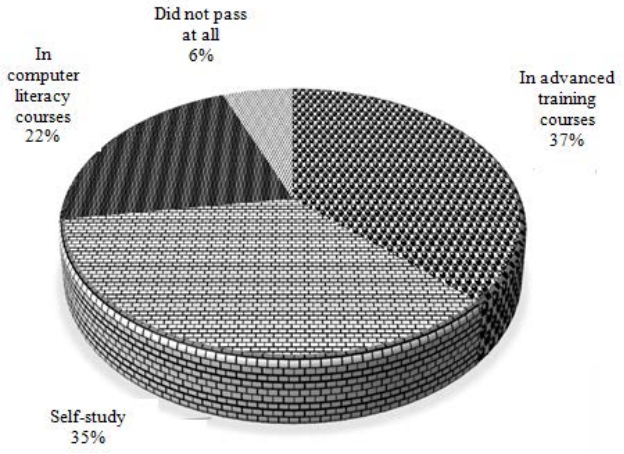

Fig. 6: Distribution of answers to the question: "Where did you receive training and advanced training in the implementation and use of ICT?"

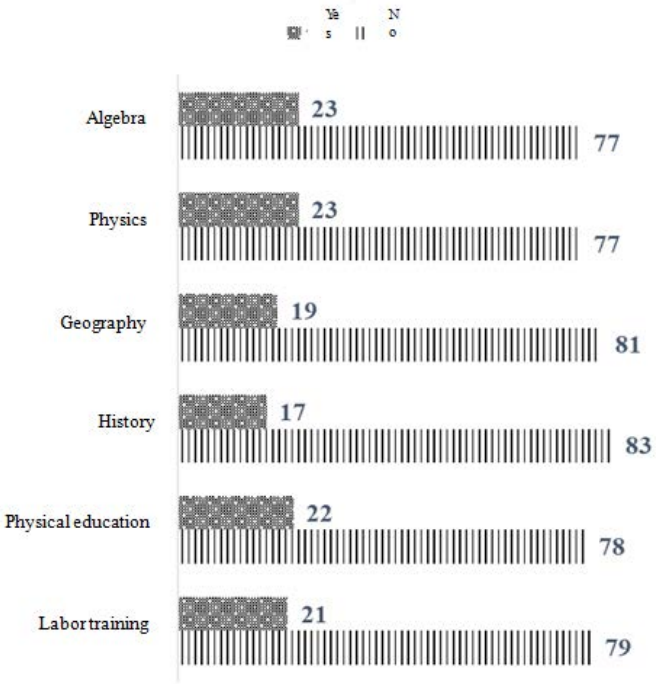

Fig. 7. Distribution of answers (%) to the question: "Do you need to improve your skills in the use of ICT?'

teachers experience the most difficulties in this group (54%), and physics teachers (34%) are the least concerned about this.

Few teachers (1-3%) feel fear of the computer and uncertainty that they will be able to master computer technology. Therefore, we can say that teachers systematically study and improve the methods of modern teaching of their disciplines, an integral part of which are information and communication technologies.

Given the Figures 8 and 9, we can conclude that teachers use ICT in lessons. ICT subject teachers most often use ICT when teaching new material (demonstration and encyclopedic programs, presentations, etc.) - 85% of geography teachers, 83% of physics and history teachers.

Physics teachers (55%) are mostly engaged in virtual laboratory work with the use of educational computer programs.

Teachers spend enough time consolidating educational material (trainings, laboratory work, etc.) with the help of ICT (physics - 43%; algebra - 37%, history - 35%, geography - 33%, labor training - 23%).

From 22% to 35% of teachers pay attention to the independent work of students using a differential approach in the selection of tasks (encyclopedias, development programs, etc.), depending on the subject they teach.

In studying the educational process and determining the level of educational achievements of students, information and communication technologies help from 10 to 22% and from 15 to 39% of respondents, respectively.

During the integrated lessons using the method of projects, the result of which will be the creation of Web-pages,

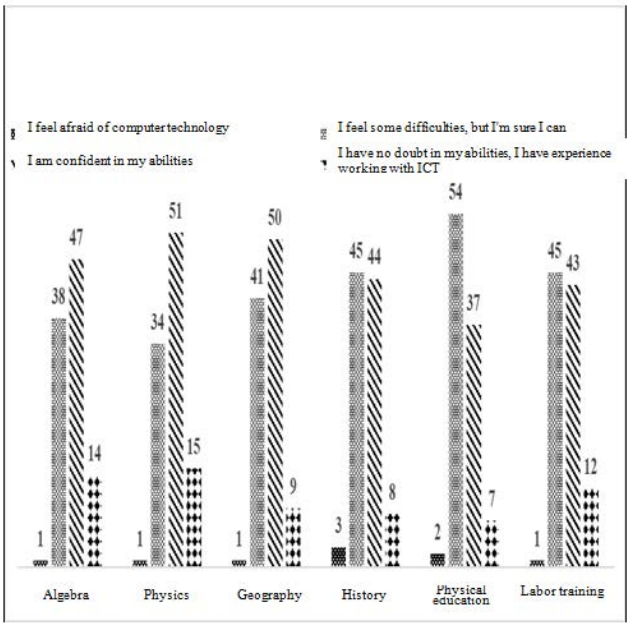

Fig. 8: Distribution of answers to the question: "Please evaluate your potential computer skills"

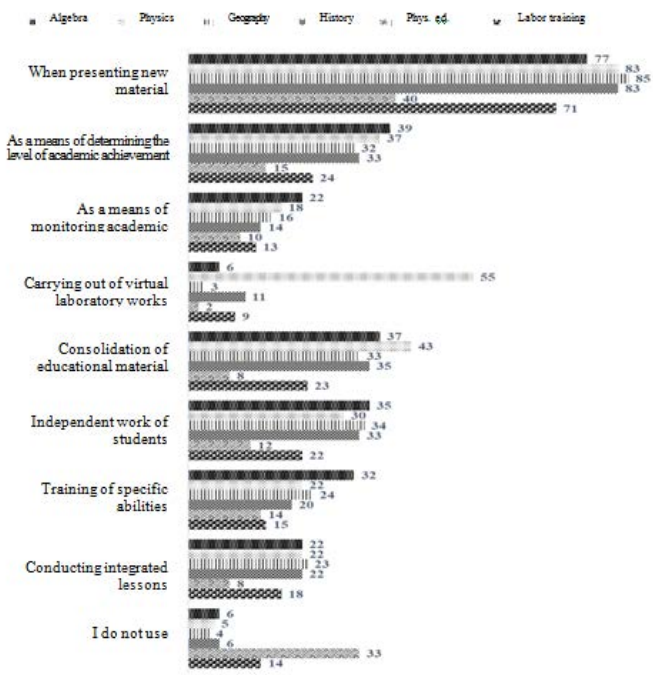

Fig. 9: Distribution of answers to the question: "Do you use ICT tools in class?"

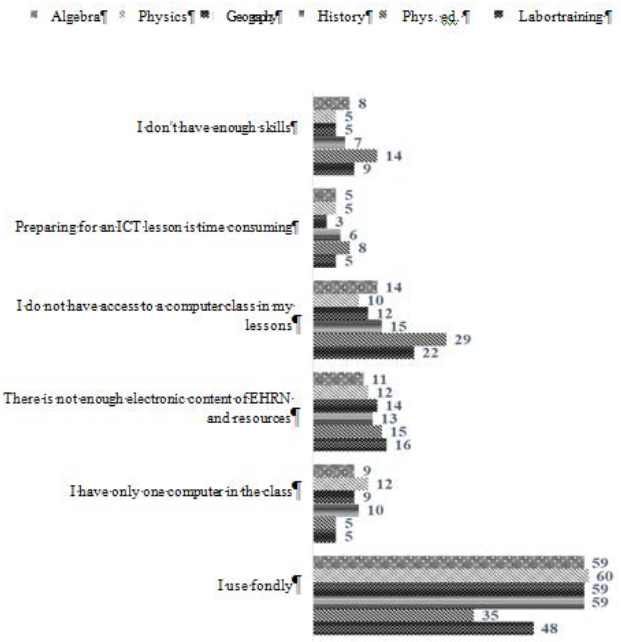

Fig. 10: Distribution of answers to the question: "If you do not use ICT in lessons, please indicate the reasons:"

teleconferencing, etc., the use ICT in the lesson is inherent in 18-23% of respondents.

A small proportion of respondents (4-14%) say they do not use ICT in their daily work.

With the help of one of the research questions, the reasons for the reluctance to use ICT tools in teaching subjects were clarified (Fig. 9). One of the reasons for the analyzed answers is the lack of access of teachers to the computer class (10 - 29%). Also one should note such reasons as "I do not have sufficient skills" (physical education 14%, labor training 9%, algebra 8%, history 7%, physics and geography 5%) and "I do not have time, and the preparation of ICT lessons takes a long time" was said by 8% teachers of physical education, 6% history, 5% - algebra, physics of labor training, and 4% teachers of geography. The reasons such as "insufficient electronic content and resources" and "I have only one computer in the class" were indicated by 11 to 16% and from 5-12%.

But, nevertheless, despite the above problems, the majority of respondents (60-93%) love to use ICT in the classroom.

Conclusion

1. Psychological readiness of teachers to interact with students in the digital educational environment is a set of knowledge, skills, motives, and personal qualities that ensure effective use of the Internet and other global data networks.
2. A model of psychological readiness of teachers to interact with students in the digital educational environment is proposed, which has a three-component structure: cognitive (teachers' knowledge of the concepts of "interaction", "interaction in the digital educational environment"; psychological knowledge of successful interaction of teachers with students in a digital educational environment), motivational (professional orientation of the individual to effective interaction in the digital educational environment through professional growth, self-development; values, creative expression of the person in joint activities), operational (a set of skills that provide effective interaction with students in a digital educational environment, the ability to understand, control intellectual actions in the process of interaction, the ability to choose the optimal style of pedagogical interaction with students.
3. The results of the empirical study revealed an insufficient level of psychological readiness of teachers to interact in the digital educational environment (only one-fifth of the studied educators have a high level of such readiness).

Suggestion

Despite the fact that the provision of ICT is insufficient, most of the surveyed subject teachers have considerable experience in using such tools. That is, the indicator that reflects the time during which teachers use ICT is quite good. Teachers want to improve their ICT skills, and understand that training new generations of students based on digital technologies will allow them to be competitive in today's environment.

Given the high educational potential of modern IT and the pace of their development, teacher education today requires continuous improvement, formation and development of ICT competence and information culture in general, and this, in turn, requires educational bodies, institutions and organizations of new forms, methods, and means of training teachers to teach the younger generation.

In the future, it is advisable to develop and test in terms of postgraduate education program for the development of psychological readiness of teachers to interact with students in a digital educational environment.

Limitation

The limitations of presented study include small size of the considered samples, as well as restriction of the research within one country without taking into account the level of education system development and country' cultural profile. However, the scope of article did not allow conducting full-fledged integrative study, thus it will be the topic of our further studies in the field.

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