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THE NEED TO USE ELECTRONIC EDUCATIONAL RESOURCES IN THE ACTIVITIES OF A PHYSICS TEACHER

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Abstract. Currently, within the framework of digitalization of various fields of activity, including education, the introduction of information technologies into the educational process is actively carried out. The use of modern digital technologies in the education system contributes to the modernization of the learning process, improves the educational activities of students, promotes the development of the potential of teacher, ensures the use of online forms of learning. Domestic and foreign scientists in their works consider the use of electronic educational resources in the educational process as one of the most relevant ways to organize effective learning. However, even though a wealth of experience has already been accumulated in the field of digitalization of education, many teachers are cautious about the possibility of using electronic educational resources.

The purpose of this study was to determine the attitude of Physics teacher engaged in teaching activities in secondary education organizations of the Zhetysu region of the Republic of Kazakhstan to the need for the use of electronic educational resources in teaching Physics.

130 Physics teachers formed the population for the study. The survey research method was adopted for the study. A questionnaire was used as a data collection instrument. Frequency counts and simple percentages were used in analyzing the data collected.

As a result of the study, it was revealed that many teachers surveyed favor the use of electronic educational resources in Physics lessons along with traditional teaching tools. Also, because of the study, it was determined the need to organize appropriate training and retraining of Physics teachers, to provide support from the administration of educational organizations and assistance in the development and use of electronic educational resources by teacher in their daily activities. In addition, it was found necessary to consider the possibility of teaching media culture as a component of basic education to improve the information, computer, and media competence of students.

Keywords: electronic educational resources, digitalization of education, information technologies, educational process, quality of education, secondary education, teaching Physics, information and computer competence, media competence, information learning tools

Basic provisions

In the conditions of the rapid development of information technology today, the importance of human information literacy is significantly increasing, which is considered a necessary condition for the socialization of the individual. One of the main tasks of the educational organization is to engage students in active,

independent processing of information using technological tools, and one of the main priorities of education is to form information competencies of students and promote their use in educational activities. Obviously, this problem can be solved only on the basis of the comprehensive use of new information technologies in the educational process.

In this regard, the future task of a modern higher school is to develop and introduce electronic educational resources into the educational process, aimed at effective management of the process of mastering professional activities by students.

Introduction

Digitalization of education and science, being part of the global process, is recognized as one of the key technologies of the XXI century, which for the coming decades will be the key to the economic growth of the state and the main engine of scientific and technological progress.

President of the Republic of Kazakhstan Kassym-Jomart Tokayev in his State of the nation address emphasized that the quality of secondary education is a significant factor in the formation of a successful nation. The President noted the important role of teachers, as well as the importance of strengthening the teaching of subjects of the natural and mathematical cycle in high schools, considering global scientific and technological progress [1].

One of the problems of the education system is the need to improve the quality and ensure equal access to educational resources for all students, regardless of the form of education.

The modern stage of education development is characterized by a close relationship of both information and pedagogical learning technologies, thanks to a successful combination of which it becomes possible to reveal the abilities and individuality of the student.

Digitalization of education objectively entails innovation in educational work, increasing the requirements for the teacher and changing his role, increasing the importance of the role of the student’s personality and his individual characteristics, changing the role of the educational organization, a sharp increase in the amount of available information and educational resources.

Many scientists note that the didactic capabilities of modern information and communication technologies contribute to the intensification and improvement of the educational process, the creation of favorable conditions for learning and the improvement of information literacy of participants in the educational process [2, 3, 4].

Recently, electronic educational resources have become of particular importance as educational, methodological, organizational, informational, reference, etc. means of ICT. Such means allow the teacher to form the educational and methodological support of the implemented subjects in the educational system in the conditions of a real educational process.

Electronic educational resources (EER) are independent interactive electronic publications of complex purpose, which can contain systematized theoretical/practical/control materials using elements of multimedia technologies.

The use of EER provides a modern approach to the organization of the learning process, in which the student becomes the subject of the educational process, as well as an active and equal participant in this process.

Many authors in their scientific papers note that a variety of electronic resources provide an opportunity to individualize the learning process, to organize independent work in the classroom and during extracurricular time, to activate the cognitive activity of students. Training sessions with computer and multimedia support do not cancel traditional forms of education, but help to diversify the forms of work, save time, and effectively use information learning tools [5, 6, 7].

Considering the rapid development of information technologies, the use of EER is relevant for education in general, and, for teaching natural sciences.

Physics is an experimental science, the main approach in its study is to use the demonstration of physical phenomena or processes. Also, the process of mastering new material in Physics proceeds from abstract thinking to theoretical generalization.

In this regard, one of the indicators of the professional readiness of a Physics teacher is the ability to develop and apply EER in the classroom for the assimilation of new knowledge and physical concepts by students. Therefore, this paper explores the need for the use of EER in the activities of a Physics teacher.

The solution to this problem required conducting a specially designed questionnaire among Physics teacher of secondary education organizations to determine their attitude to the need for the use of EER in teaching Physics.

Materials and methods

The article contains the results of a survey conducted on a specially designed questionnaire among Physics teachers of the Zhetysu region. The study was conducted simultaneously, anonymously, using a continuous method.

To achieve the goal of the study, the analysis of psychological and pedagogical literature was carried out, the pedagogical experience of using EER was studied and generalized, methods of psychological and pedagogical diagnostics, in particular, survey were applied.

The developed questionnaire consisted of two parts. While the first section refers to the respondent's personal data, the second section was designed to evaluate statements related to electronic educational resources.

A 5-point Likert scale was used for the assessment. The score was indicated according to the degree of agreement:

1 – Strongly agree;
2 – Agree;
3 – Undecided;
4 – Disagree;
5 – Strongly disagree.

All statements have equal weight.

The data were analyzed using simple percentages and frequency calculations.

Results

The questionnaire was attended by Physics teacher from the city of Taldykorgan, Tekeli and districts belonging to the Zhetysu region. The number of respondents was 130.

Out of 130 (100%) respondents 31 (23.8%) are men, 99 (76.2%) are women. This clearly shows that the owners of the profession of a Physics teacher in most cases are women.

The age of the teachers who passed the questionnaire ranged from 21 to 67 years (Table 1).

From Table 1, it can be concluded that the age of 67.7% of respondents does not exceed 40 years, their average age is 38. Physics teachers with teaching experience up to 42 years took part in the survey.

Table 1- Age and teaching experience of respondents

Age of respondents		
Age	**Frequency**	**Percentage**
21-30	45	34,6%
31-40	43	33,1%
41-50	17	13,1%
51-60	20	15,4%
60-67	5	3,8%
Total	**130**	**100%**
Teaching experience of respondents		
Teaching experience	**Frequency**	**Percentage**
0-5	50	38,5%
6-10	20	15,4%
10-15	18	13,8%
16-20	10	7,7%
21-25	6	4,6%
26-30	10	7,7%
31-35	8	6,2%
36-40	6	4,6%
41-45	2	1,5%
0-5	50	38,5%

According to Table 1, 53.9% of respondents have teaching experience of up to 10 years, the average teaching experience of respondents is 13 years.

The second section of the questionnaire was designed to clarify the degree of agreement of Physics teachers with statements related to the use of EER in teaching activities.

So, 48 respondents (36.9%) strongly agreed, 23 (17.7%) agreed, 23 (17.7%) indicated that they had not decided, 13 (10%) disagreed, 23 (17.7%) strongly disagreed with the statement «The peculiarity of the modern educational system is that traditional ways of transmitting information are giving way to electronic learning tools».

This shows that in most cases Physics teachers are aware that computer-based learning tools are increasingly being used in the modern education system.

Another issue was the commitment to traditional learning tools. To this end,

the following statement was formulated: «In the pursuit of modern technologies one should not forget about traditional means of teaching». The following degrees of agreement with this statement were obtained: 78 (60%) respondents strongly agreed, 22 (16.9%) replied that they are disagree, 15 (11.5%) found it difficult to give an answer, 1 (0.8%) disagreed, 14 (10.8%) strongly disagreed with statement.

This shows that many respondents support the use of traditional learning tools along with information technology.

For teachers of secondary education organizations to actively use electronic educational resources in their activities, there is a need to master new teaching methods and new ways of communication. Teachers' opinions on this statement were distributed as follows: 66 (50.8%) strongly agreed with this, 37 (28.5%) agreed, 12 (9.2%) indicated that they found it difficult to answer, 3 (2.3%) disagreed, 12 (9.2%) strongly disagreed with such statement.

According to the collected data, more than half of the respondents agreed that it is impossible to carry out activities in an electronic educational environment without mastering new teaching methods and various ways of communication.

Modern information technologies offer teachers new ways of educational communication and interaction. But for the successful implementation of teaching using EER teachers must be able to make sure that there are new opportunities that open activities in the electronic educational environment. Thus, 75 (57.7%) Physics teachers surveyed strongly agreed, 22 (16.9%) agreed, 13 (10%) undecided, 5 (3.8%) disagreed, 15 (11.5%) strongly disagreed with the statement «Modern information technologies open up great opportunities for educational communication and interaction».

As can be seen, most Physics teachers noted that with the help of modern information technologies, new learning opportunities are opening.

The respondents were also offered the statement «The use of electronic communication and multimedia allows to increase the intensity and efficiency of the learning process». According to the results of the survey, the following answers were received: 72 (55.4%) strongly agreed, 28 (21.5%) agreed, 12 (9.2%) found it difficult to give an answer, 8 (6.5%) disagreed, 10 (7.7%) strongly disagreed.

It is interesting to note that in comparison with the previous statement, when marking the degree of agreement with this statement, much fewer respondents expressed disagreement. This means that Physics teachers are aware of the possibility of increasing the intensity and effectiveness of learning using EER.

Since students are also active subjects of the educational process, when using EER, it is necessary to consider the information and computer competence of students. On this occasion, respondents expressed the following degrees of agreement with the statement «Educational communication in an electronic environment is effective only with a high level of information and computer competence of both teachers and students»: 60 (46.2%) respondents noted that they strongly agreed with the statement, 37 (28.5%) agreed, 14 (10.8%) indicated that they undecided, 6 (4.6%) disagreed with the statement, 13 (10%) strongly disagree.

The data obtained confirm the importance of information and computer competence of students when using EER.

The next statement offered to the survey participants was the statement «In order to increase the effectiveness of educational communication in the electronic environment, it is necessary to increase the level of media competence of participants in the educational process». The following responses were received: 74 (56.9%) teachers strongly agreed with this, 32 (24.6%) indicated that they agreed, 10 (7.7%) undecided, 3 (2.3%) replied that they disagreed, 11 (8.5%) noted strongly disagreement with the statement.

This shows that a significant majority of respondents consider it necessary to increase the media competence of participants in the educational process to improve its effectiveness.

The obtained results of respondents' agreement with the proposed statements are shown in Figure 1.

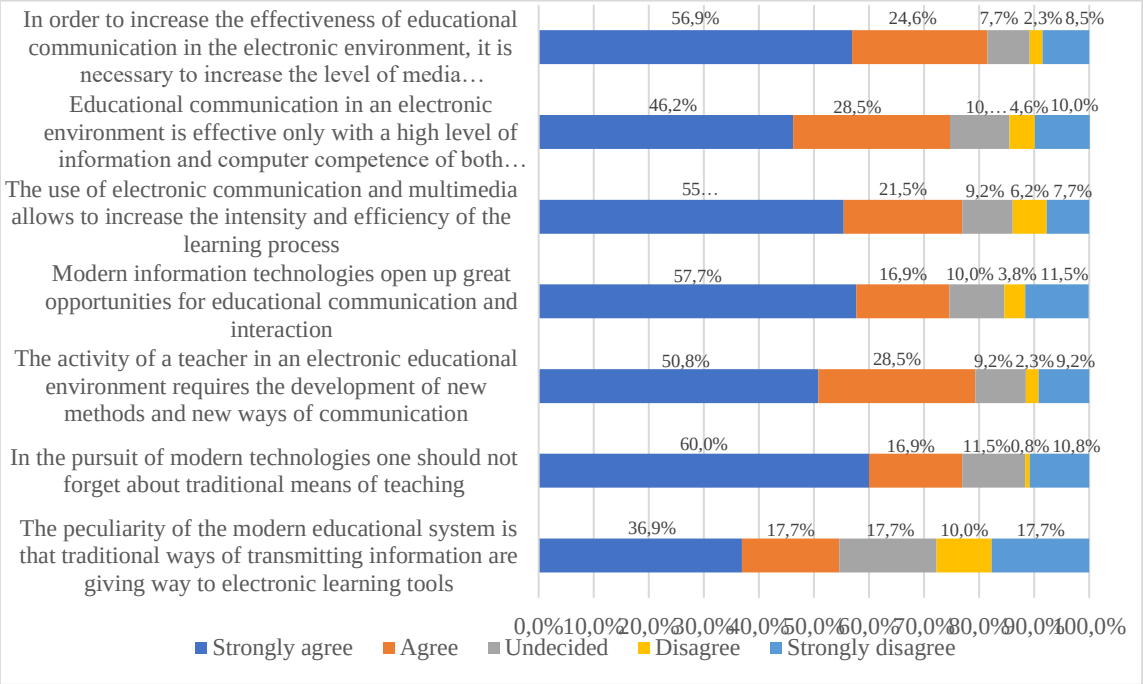

Figure 1 - The obtained results of respondents' agreement with the proposed statements

The results of the survey made it possible to conclude about the opinion of teachers about the need to use electronic educational resources in teaching Physics.

Discussion

Currently, there is a tendency that electronic learning tools are increasingly used in the educational process. Information technologies are designed to become not an additional link in learning, but an integral part of the holistic educational process, significantly increasing its effectiveness.

Information technology can improve the learning process by supporting the four main characteristics of learning:

1) active engagement.

2) participation in groups.

3) frequent interaction and feedback.

4) connections to real-world contexts [8].

However, the education system in Kazakhstan is built in such a way that modern pedagogical technologies are used along with traditional teaching means. In this regard, to ensure the necessary systematic character and depth of knowledge acquisition by students, both modern and traditional teaching methods should be used in the education system [9, 10, 11].

To apply modern information technologies in teaching Physics, it is necessary to master new approaches to teaching, new teaching methods and methods of using various tools of communication. For each teacher the conditions allowing to improve its skills in the field of IT shall be created. It will allow to provide productive functioning of information educational environment and productive application in it new digital technologies [12].

Researchers have found that the use of modern information technologies contributes to increasing the productivity of teachers and students, optimizing educational processes [13].

The use of digital technologies in educational activities opens new opportunities, adequate methods for dissemination and management of digital information, development of necessary competencies based on digital literacy, ensuring equitable access for all who wish to obtain necessary knowledge and decision-making skills, ensuring demand for school graduates in the world labor market in situation of digital economy [14].

The humanization of modern education is characterized by the development of the subject-subject relationship of the teacher and the student. The student is transformed from an object of education into its active subject. The position of the student as a subject is characterized by the fact that he demonstrates the desire for introspection, self-reflection, self-improvement of the acquired knowledge, search for the necessary information on the subject, can and should play one of the leading roles in the learning process.

In this regard, for the effective use of EER in the process of teaching Physics, one of the necessary conditions is a high level of information and computer competence not only of teachers, but also of students. Modern society is interested in the student learning to acquire knowledge independently, using various sources of information and being able to work with this information (apply it in practice) using various methods of cognitive activity [15].

The development of modern electronic educational resources focuses on traditional pedagogical categories such as knowledge, skills and abilities. However, effective educational resources should allow the student to master the competencies that modern society requires from a person. Media competence and related activities are modern guidelines for the use of electronic educational resources. Moreover, the concept of media competence is expanding due to the use of new digital technologies that allow manipulating images, sound, hyperlinks and text. Modern electronic educational resources should allow students to acquire such competence due to the possibility of realizing information needs by means provided by electronic resources and the educational environment.

The contradiction of the modern education system is the problem between the

increasing volume of information received and the insufficient competence of participants in the educational process to master, use and apply it. The use of EER in teaching Physics with a sufficient level of information, computer and media competence of the teacher and the student allows not only to increase efficiency, motivate students, but also to differentiate the educational process considering the individual characteristics of each of them.

With the development of media competence of students, along with traditional methods, it is important to build work on the active use of information and communication technologies and EER, that is, an environment of spontaneous communication that requires pedagogical presence. Thus, there is an obvious need to teach media culture as a component of basic education.

In addition, one of the primary problems on the way to the widespread creation and application of EER in teaching Physics is the appropriate training and retraining of Physics teachers.

When forming the readiness of Physics teachers to use EER, it is important to ensure proper administrative support from the educational institution when organizing advanced training courses, seminars, forums, round tables on this issue, as well as providing assistance in mastering the principles of EER construction and specific methods of their use in the educational process.

Physics teachers should not only have deep theoretical knowledge and practical experience in the field of Physics, but also be able to actively develop EER in Physics, have a sufficient level of readiness for their use in teaching the subject, as well as possess the methodology of digitalization of educational activities.

Thus, the requirements for a Physics teacher should consist of traditional requirements for any teacher and specific requirements related to the use of modern information technologies and electronic educational resources.

Conclusion

The conducted research has shown that the use of electronic educational resources in teaching Physics becomes the most important component of the educational process. At the same time, opportunities in professional activity are expanding, the availability of modern teaching methods, didactic materials, the best practices of teaching Physics is ensured and the quality of education is improving.

The data obtained because of the survey allowed to draw the following conclusions:

- To improve the efficiency and quality of teaching Physics in the conditions of the education system of the Republic of Kazakhstan, it is necessary to use electronic educational resources along with traditional teaching tools;

- A necessary condition for the widespread use of electronic educational resources by Physics teachers is the development of new approaches to teaching, new teaching methods and methods of using various means of communication, for which it is necessary to organize appropriate training and retraining of Physics teachers, provide support from the administration of educational organizations and assistance in the development and use of EER in daily activities;

- For the use of EER in Physics lessons to have an appropriate effect,

educational organizations need to ensure a high level of information and computer competence of students. To this end, it is necessary to consider the possibilities of training media culture as a component of basic education.

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ФИЗИКА МҰҒАЛІМІНІҢ ҚЫЗМЕТІНДЕ ЭЛЕКТРОНДЫҚ БІЛІМ БЕРУ РЕСУРСТАРЫН ҚОЛДАНУ ҚАЖЕТТІЛІГІ

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Аңдатпа. Қазіргі уақытта әртүрлі қызмет салаларын, оның ішінде білім беруді цифрландыру аясында білім беру үдерісіне ақпараттық технологияларды белсенді түрде енгізу жүзеге асырылуда. Білім беру жүйесінде заманауи цифрлық технологияларды қолдану оқыту үдерісін жаңғыртуға ықпал етеді, білім алушылардың оқу қызметін жақсартады, мұғалімдердің әлеуетін дамытуға ықпал етеді, онлайн оқыту нысандарын қолдануды қамтамасыз етеді. Отандық және шетелдік ғалымдар өз еңбектерінде оқу үдерісінде электрондық білім беру ресурстарын қолдануды тиімді оқытуды ұйымдастырудың өзекті әдістерінің бірі ретінде қарастырады. Алайда, білім беруді цифрландыру саласындағы жинақталған мол тәжірибеге қарамастан, көптеген мұғалімдер электрондық білім беру ресурстарын қолдану мүмкіндігіне сақтықпен қарайды.

Осы зерттеуді жүргізудің мақсаты Қазақстан Республикасы Жетісу облысының орта білім беру ұйымдарында оқытушылық қызметті жүзеге асыратын физика мұғалімдерінің физиканы оқытуда электрондық білім беру ресурстарын қолдану қажеттілігіне деген көзқарасын анықтау болды.

Зерттеуге 130 физика мұғалімі қатысты. Зерттеуде сауалнама алу әдісі қолданылды. Деректерді жинау құралы ретінде сауалнама пайдаланылды. Жиналған деректерді талдау кезінде жауаптар жиілігін және пайыздарды есептеу жүргізілді.

Зерттеу жүргізу нәтижесінде сауалнамаға қатысқан мұғалімдердің көпшілігі физика сабақтарында дәстүрлі оқыту құралдарымен қатар электрондық білім беру ресурстарын пайдалануға оң қарайтындығы анықталды. Сондай-ақ, зерттеу нәтижесінде физика мұғалімдерін тиісті даярлау мен қайта даярлауды ұйымдастыру, білім беру ұйымдарының әкімшілігі тарапынан қолдауды қамтамасыз ету және мұғалімдердің ЭОР-ды әзірлеуіне және күнделікті қызметте пайдалануына көмектесу қажеттілігі анықталды. Сонымен қатар, білім алушылардың ақпараттық-компьютерлік және медиақұзыреттілігін арттыру үшін негізгі білім берудің құрамдас бөлігі ретінде медиамәдениетті оқыту мүмкіндігін қарастыру қажеттілігі анықталды.

Тірек сөздер: электрондық-білім беру ресурстары, білім беруді цифрландыру, ақпараттық технологиялар, білім беру үдерісі, білім беру сапасы, орта білім беру, физиканы оқыту, ақпараттық-компьютерлік құзыреттілік, медиақұзыреттілік, оқытудың ақпараттық құралдары

НЕОБХОДИМОСТЬ ПРИМЕНЕНИЯ ЭЛЕКТРОННЫХ ОБРАЗОВАТЕЛЬНЫХ РЕСУРСОВ В ДЕЯТЕЛЬНОСТИ УЧИТЕЛЯ ФИЗИКИ

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Аннотация. В настоящее время в рамках цифровизации различных сфер деятельности, в том числе образования, активно осуществляется внедрение информационных технологий в образовательный процесс. Применение в системе образования современных цифровых технологий способствует модернизации процесса обучения, улучшает учебную деятельность обучающихся, способствует развитию потенциала педагогов, обеспечивает применение онлайн форм обучения. Отечественные и зарубежные ученые в своих трудах рассматривают применение электронных образовательных ресурсов в учебном процессе как один из актуальных способов организации эффективного обучения. Однако, несмотря на то, что уже накоплен богатый опыт в области цифровизации образования, многие педагоги с осторожностью относятся к возможности применения электронных образовательных ресурсов.

Целью проведения данного исследования было определение отношения учителей физики, осуществляющих преподавательскую деятельность в организациях среднего образования области Жетысу Республики Казахстан, к необходимости применения ЭОР в обучении физике.

В исследовании приняли участие 130 учителей физики. В исследовании был использован метод анкетирования. Анкета использовалась как средство сбора данных. При анализе собранных данных был произведен расчет частоты ответов и вычисление процентов.

В результате проведения исследования было выявлено, что большинство опрошенных педагогов благосклонно относятся к использованию на уроках физики электронных образовательных ресурсов наряду с традиционными средствами обучения. Также в результате исследования была определена необходимость организации соответствующей подготовки и переподготовки учителей физики, обеспечения поддержки со стороны администрации организаций образования и помощи при разработке и использовании педагогами ЭОР в повседневной деятельности. Кроме того, была установлена необходимость рассмотрения возможности обучения медиакультуре как компоненту основного образования для повышения информационно-компьютерной и медиакомпетенции обучающихся.

Ключевые слова: электронные-образовательные ресурсы, цифровизация образования, информационные технологии, образовательный процесс, качество обучения, среднее образование, преподавание физики, информационно-компьютерная компетентность, медиакомпетентность, информационные средства обучения

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