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## THE EFFECTIVENESS OF ICT IN TEACHING PHYSICS

In the 21st century, the modern employment cannot be imagined without the using of information and communication technology (ICT). Information technology is a set of mathematical and cybernetic techniques that provide the collection, storage, processing and transportation of information on the basis of modern computer technology. Among all educational disciplines, physics is able to easily maintain a computer subject. For a long time the computer has been successfully used here to facilitate the routine work of performing calculations. But information communication technologies can also be used to study theoretical material, training, as a means of modeling and visualization, etc. The choice depends on the goals, objectives and stage of the lesson (explanation, consolidation, repetition of the material, knowledge test, etc.). The most effective way of world informative education space is to fully supply ICT to each branch of education. This paper shows that the use of modern innovative educational methods and technologies is an important component for organizing an effective educational process in physics lessons. The process of informatization in education raises the level of training of teachers, students and the quality of the profession. It allows the student to self-development, self-education and creativity.

**Key words:** education, physics, ICT, methods, knowledge, pedagogy, e-learning.

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### Физиканы оқытудағы АКТ тиімділігі

XXI ғасырда замануи сабақты ақпараттық-коммуникациялық технологияларды (АКТ) қолданусыз елестету мүмкін емес. Ақпараттық технологиялар – замануи компьютерлік технологиялар негізінде ақпаратты жинау, сақтау, өңдеу және тасымалдауды қамтамасыз ететін математикалық және кибернетикалық әдістердің үйлесімі. Барлық оқу пәндерінің ішінде физика компьютерлік пәнді оңай қолдана алады. Ұзақ уақыт бойы компьютер есептеулерді орындаудың күнделікті жұмысын жеңілдету үшін табысты пайдаланылды. Ақпараттық-коммуникациялық технологиялар теориялық материалды, оқытуды модельдеу және көрнекілендіру құралдары ретінде пайдалану үшін және т.б. пайдалануға болады. Таңдау сабақтың мақсаттарына, міндеттеріне және сатысына байланысты болады (түсіндірме, біріктіру, материалды қайталау, тестілеу білімі және т.б.). Әлемдік ақпараттық ағарту кеңістігінің ең тиімді тәсілі АКТ-ті білім берудің әрбір саласына толығымен жеткізу болып табылады. Ұсынылған жұмыста физика сабағында оқу процесін тиімді ұымдастыру үшін негізгі құраушысы замануи инновациялық білім беру әдістемелері мен технологиялардың қолданылуы болып табылатыны көрсетілген. Білім берудегі ақпараттандыру процесі мұғалімдер мен студенттердің дайындық деңгейі және кәсіптің сапасын арттырады. Студентке өзін-өзі дамытуға, өзін-өзі тәрбиелеуге және шығармашылыққа мүмкіндік береді.

**Түйін сөздер:** білім беру, физика, АКТ, әдістер, білім, педагогика, электронды оқыту.

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**Эффективность ИКТ в преподавании физики**

В XXI веке современное занятие невозможно представить без применения информационно-коммуникационных технологий (ИКТ). Информационные технологии – это совокупность математических и кибернетических приемов, которые обеспечивают сбор, хранение, обработку и транспортировку информации на основе современных компьютерных технологий. Среди всех учебных дисциплин физика способна легко поддерживать компьютерный предмет. Долгое время компьютер успешно использовался здесь для облегчения рутинной работы по выполнению расчетов. Но информационно-коммуникационные технологии могут также использоваться для изучения теоретического материала, обучения, как средства моделирования и визуализации и т.д. Выбор зависит от целей, задач и этапа урока (объяснение, закрепление, повторение материала, проверка знаний и т.д.). Самый эффективный путь мирового информационного образовательного пространства – это полное обеспечение ИКТ для каждой отрасли образования. В данной работе показано, что использование современных инновационных образовательных методик и технологий является важным компонентом для организации эффективного учебного процесса на уроках физики. Процесс информатизации в образовании повышает уровень подготовки учителей, а так же студентов и качество профессии. Это позволяет студенту к саморазвитию, самообразованию и творчеству.

**Ключевые слова:** образование, физика, ИКТ, методы, знания, педагогика, электронное обучение.

## Introduction

Physics is a fundamental science that studies the simplest and at the same time the most general patterns of natural phenomena, the properties and structure of matter and the laws of its movement. During this period, it has changed qualitatively in the educational process, and there was a transition from the board, simple overhead projectors and players, tasks and handwritten cards to personal computers, multimedia projectors, printers, copiers, and interactive boards, digital schools with mobile classes, polyvalent halls, and digital equipment. The classic textbook and the teacher inevitably become suppliers of outdated knowledge in the environment where the amount of information doubles in every few years. Nowadays it is easy for teacher to create easier new conditions for the assimilation of educational material. The main purpose of information technology is to educate a diverse individual so that the student can use the personal computer tools in life activity in line with modern society needs. The rapidly developing scientific and technical progress has become the basis of the global process of informatization in all spheres of public life. The material and technological base of the society is the creation of various systems based on computer engineering and computer networks, information technology and telecommunications. In addition, the information infrastructure will be created, on the basis of which advanced information is produced, processed and stored by progressive

electronic equipment. The choice of correct educational method is very important. It depends from the choice if a student feels bored in the lesson and the theme will slide over his brain and do not leave any knowledge or a student will perceive the theme as a game, as a part of his life and he will get the knowledge for all his life. It depends from the choice if a class will look upon the lesson as a drudgery and misbehave in the lesson or a class will be interested in the lesson and will behave well and help to the teacher to lead the educational process [1-4].

The main goal of today's teacher is to develop critical thinking of students using ICT, and to encourage learners to develop discipline. To achieve the goal, research is being conducted to determine the use of electronic textbooks, web sites, programs, their functioning principles, their proper use and effectiveness in teaching physics. Each of us is asked to answer questions about how to increase the student's motivation and interest towards the lesson, how to use his / her critical thinking, how to develop creative abilities, what lessons, and when to use the lesson [4-8].

Effectiveness of using information and communication technologies in teaching:

- student's self-study;
- learning more at a compressed time, gather time;
- checking knowledge and skills through test tasks;
- possibility of distance learning;

- opportunity to receive the necessary information in a prompt manner;
- possibility of immediate receipt of required information;
- economical effectiveness (lack of access to material costs, travel, accommodation, etc.);
- impact on the quality of education. It is especially evident in the development of language classes (English, Russian, Kazakh, etc.).

Assessment of learning is the process of finding and interpreting data used by students and teachers for determination of the stage in which they are studying, how to develop and to achieve the required level. In other words, it means formative assessment. Here the pupil also appraises and trains himself. Thus, it is possible to use modern technologies in the field of formation of students' knowledge.

### Classification of educational ICT

The application of computer technology in science education has become commonplace with the rapid development of information and communication technology (ICT). ICT addresses visual and auditory senses and facilitates the

learning and teaching in many courses. The education technology is also used in science teaching in many forms such as the micro-computer based laboratories, simulations and micro-words, interactive video discs, multimedia, hypermedia. Computer simulations among of them provide the interactive, authentic and meaningful learning opportunities for learners. Simulations facilitate the learning of abstract concepts since students would have the chance to make observations and get instant feedback. The investigation in science teaching reveals that computer-assisted learning is as effective as the laboratory method. Besides, combining the use of computer simulations and laboratory activities has been found to be more effectively than the use of the individual strategies. It is important to evaluate the quality of students' views, attitudes and beliefs at the designing of learning-teaching environment [12-17]. At present, the country's education system is moving to a trilingual teaching method. In this regard, it is very effective to use new technologies both for subject and for language purposes. For example, the Quizlet application is for learning by heart fixed new terms and words that run on mobile phones and testing them.

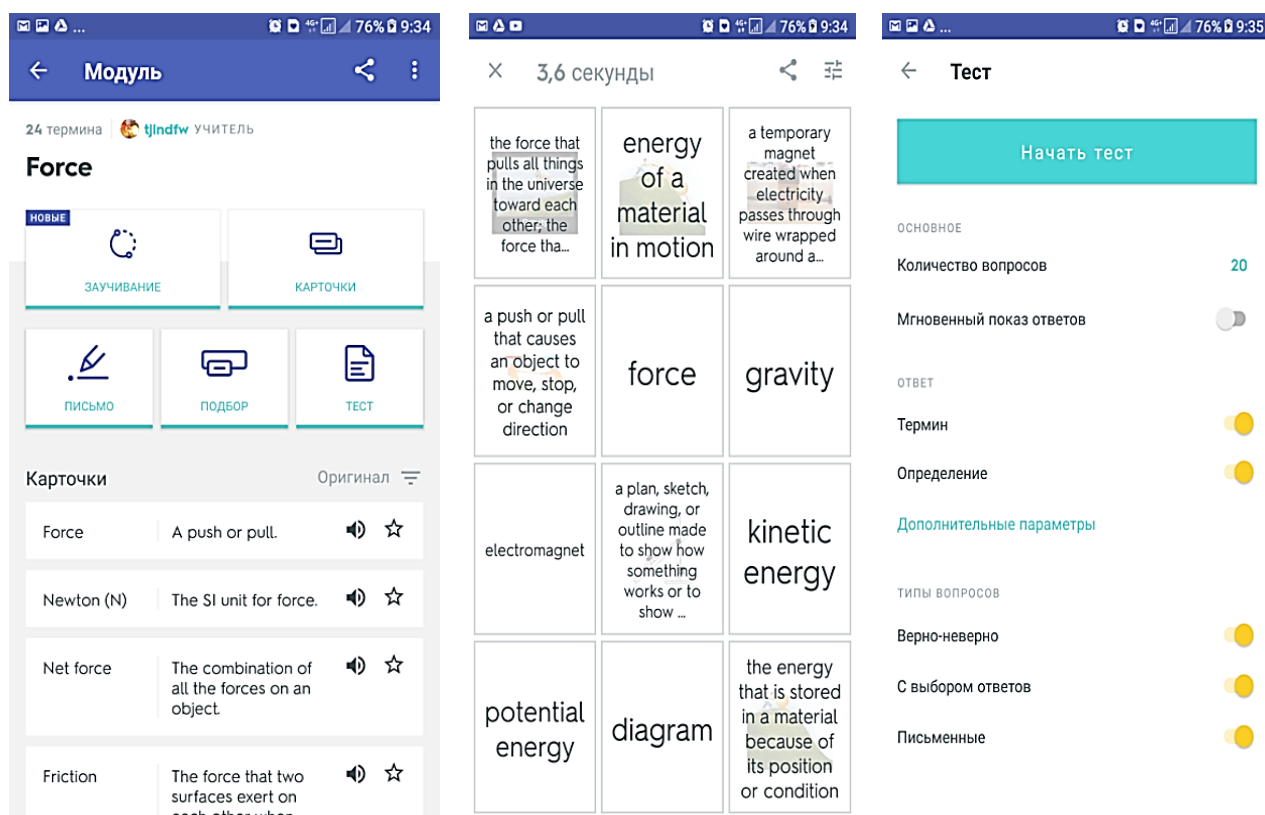


Figure 1 – The application of Quizlet as an additional technology on theme of the types of Forces

Quizlet can be used in the learning process to listen the learning material, personal training and interactive lessons. For example, students get acquainted with the new terms, they can see how well they use their words and evaluate themselves by answering their questions with the help of this program in class. The peculiarity of this program is that students can hear and repeat the correct pronunciation of new terms, they can see its translation, perform tasks like fixing new words, matching, correcting, and seeing its results (Figure 1). It is the up-to-date technology of trilingualism, Quizlet is an indispensable technology in all disciplines.

ICT provides many opportunities for teachers to check students' knowledge and skills in the field of verbal testing. One of them is a program that will be installed on a mobile phone called "ZipGrade". This is a program that quickly summarizes the results of the test written by the students. Here, students can print their own form of replies with any type of writing tool (paint, marker, pencil, pen), and then the teacher can quickly see results by scanning works on a mobile phone software. The usage of the program is that it has a special coloring card (Figure

2), which can be used repeatedly by laminating of forms, the teacher can give students up to 100 questions. Registration of pupils, classes on the phone to see quickly their results. The test results will be stored on your phone separately as long as you have them to analyze.

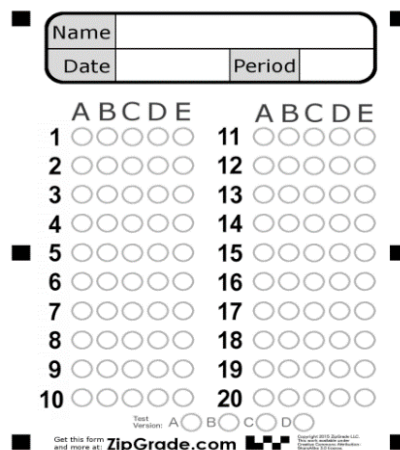


Figure 2 – Reciprocal form of the application “Zipgrade”

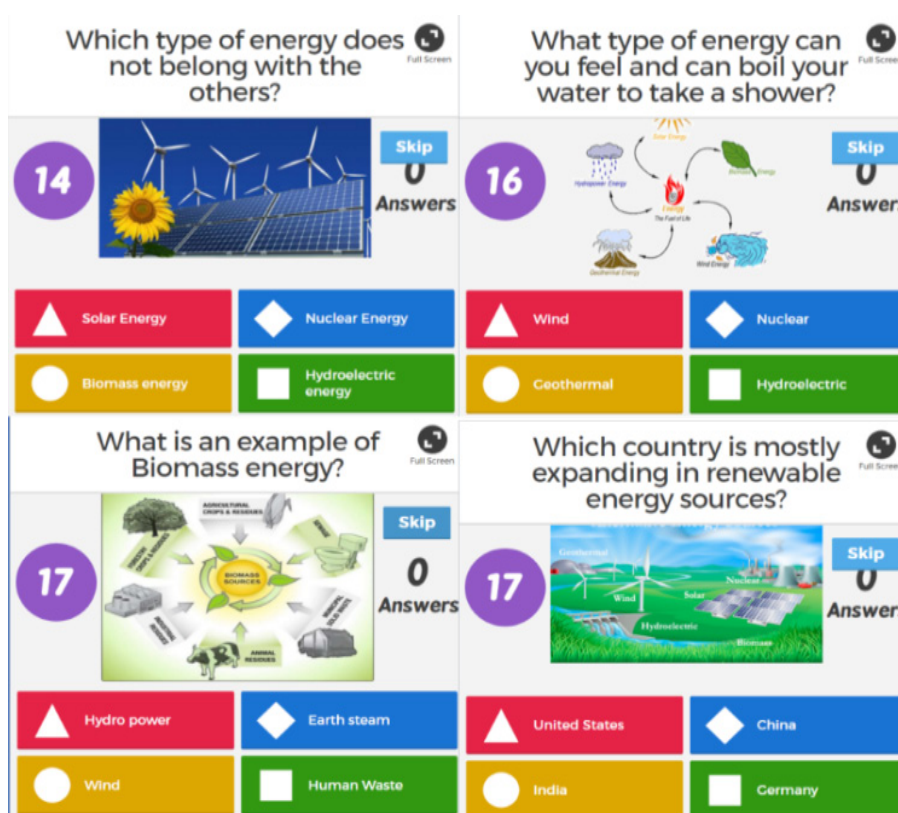


Figure 3 – The application of Kahoot program in the physics lesson.

Kahoot is a program for online quizzes, tests, quizzes; also it can be used for training sessions, extracurricular activities and DDs.

The advantages of using information communication technologies that have been observed during the research:

It increases the amount of information that should be spoken within the context of teaching or for a certain period of time.

Education can be achieved through a variety of educational institutions located at any distances.

Multivariate learning improves the quality of their education and training.

The student can work independently or together with other students.

The cognitive performance of the student increases and the ability to perform their own work faster.

## Conclusion

The most important condition for successful professional life in the informative society is having a computer literacy of citizens. The consistent use of ICT in the field of education is based on creativity of learners and teaches them to choose the right source and loyal material from the information source.

In search of teachers:

– Teacher will improve own knowledge with working on the Internet;

– Teacher will organize the cognitive activities for students in the learning process;

– There is ethno pedagogical education in the classroom;

– Students are motivated by creative work;

– Students develop self-studying learning from tutorial providing additional information, etc.

In the learning process the objective necessary of using of visual aids and technical means lies in their enormous influence on the process of understanding and memorizing. With an experimental test of the effectiveness of memorizing text, it was established that with auditory perception, 15% of the information is assimilated, with visual, 25% of the information. 65% of the information was assimilated with visual and auditory at the same time, and if a person was involved in active actions in the process of learning, the digestibility of the material increased to 75%.

In conclusion, “XXI century is the century of new technologies for humanity, and the implementation of their to the life and development of these new technologies will be the result of today’s young generation ... The 1<sup>st</sup> President of Republic of Kazakhstan said “The destiny of the younger generation is in the hands of teachers”. During the day when the information is upgraded and processed, the teacher can develop intellectual and practical thinking skills for herself and also for students, by drawing up modern ICTs in teaching methods and curriculum.

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