

# EFFECTIVE USE OF MOBILE APPLICATIONS IN IMPROVING THE TEACHING OF ELECTRICAL SCIENCES

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**Abstract.** *The article describes the possibilities of mobile applications, including the mobile application designed for independent study of electrical engineering and electronics, as well as the procedure for using the application, along with digital technologies, in increasing the effectiveness of education. Also, the result of the pedagogical experiment-testing of the research work on the topic "Improving the teaching of electrical engineering sciences in higher educational institutions based on a competent approach" is described.*

**Keywords:** *higher educational institutions, curriculum, specialized subjects, general professional subjects, digital technologies, educational efficiency, mobile application, students' mastery level, pedagogical experimental work.*

**Introduction.** Today, modern energy is understood as a whole digitalized field. Therefore, this field requires all-around qualified specialists, and the task of training such specialists is entrusted to the Higher Education Institutions (HEIs). The system of training in HEIs is conducted on the basis of regulatory documents (qualification requirements, curriculum, curriculum) specified in the legislation. In accordance with the curriculum, students are taught general professional subjects, including electrical engineering subjects, before the specialty subjects. The use of mobile applications along with the use of pedagogical and digital technologies in the teaching of electrical engineering sciences not only increases students' interest in science, but also serves to form their professional competencies at a high level [1].

It is no secret that the rapid development of information technologies, including mobile communication tools, is gaining importance in the lives of young people. Internet resources, computer technologies, projectors, and interactive whiteboards are widely used in the field of education, but the possibilities of mobile communication are not sufficiently used.

Analysis of literature on the topic. When the scientific and methodical literature was studied, Haydarov S.A., who spoke on this topic, in his article "Methodological requirements of the combined use of pedagogical technologies in the lessons of the history of Uzbekistan" wrote "Media education and mobile teaching for students It is no exaggeration to say that it is an educational method that ensures that the imparted knowledge and skills are clear, understandable and memorable. Instead of the teacher's oral lecture, the student will have the necessary knowledge reserve in the lesson conducted with the help of visual aids and modern technologies. In short, as a result of the introduction of information and communication technologies, i.e., media education, mobile education system during the course of the lesson, the ability to teach young people to independent creative work and free thinking is formed"[2].

In the article by M.F.Zakirova, M.M.Nafasov named "Fundamentals of using mobile applications in the educational process" identify that "We define the pedagogical process of education with the help of educational mobile applications as a specially organized, purposeful interaction between teachers and students in time and space. we consider it to be a secret, and we

consider that there are pedagogically reasonable consistent, continuous states of change and stages of development within it [3]".

A.A.Parmonov expressed his conclusion in the scientific research work "Modern digital technologies and the need to introduce them into the educational process". "The digital generation cannot and should not be taught the way our parents learned. It is impossible to use old technologies (blackboard and white chalk) in teaching this generation. Changing the blackboard to white and the chalk to a marker doesn't change anything, it's not the way to motivate today's students to learn and develop the skills to succeed in the job market. Adaptation of the educational system to the digital generation through mass and effective use of innovative educational technologies and didactic models based on modern information and communication technologies is the need of the hour"[4]

S.A.Usarov in his article entitled "Using mobile applications in mathematics classes" states that "Using mobile technologies arouses interest and motivation in students to learn, which certainly leads to an increase in the efficiency and quality of education. Due to the combination of sound, color, animation, etc., the possibilities of presenting educational information are expanding. They came to the conclusion that all of this expands the boundaries of the qualities that are a priority for the modern education system - creativity, critical thinking, communication skills, teamwork skills" [5]. Because the wide use of information technologies (mobile applications) in the educational process not only guarantees the passing of the lesson at a high level, but also prevents the student from having unnecessary problems in learning future topics, improves computer literacy, how to work with new technologies, and keep up with the times. It combines the concept of learning and understanding the core of the problem at work and finding its solution, that is, it forms such characteristics as leadership and creativity.

**Research methodology.** In addition to the introduction of pedagogical and digital technologies in the educational process, it is advisable to implement mobile applications in the following stages.

First of all, it is necessary to take into account the psychological characteristics of the learners in order to choose the educational goal, task and tools correctly, as well as to achieve the result.

Secondly, in using the possibilities of digital technologies, it is important to clarify the content of the chosen subject and to use software tools designed to easily solve engineering problems.

Thirdly, electronic resources related to science, which should be provided to students in order to master science and strengthen knowledge, should be more interesting and meaningful in the form of mobile applications.

**Analysis and results.** After training on the effective use of digital technologies, especially mobile applications, in the teaching of electrical engineering, pedagogical experiments were conducted in order to determine the results of mastering the subject by students.

Initially, the project of creating a mobile application was developed, and through it, theoretical information on electrical engineering and electronics, which should be presented to students, was selected.

For independent study of electrical engineering and electronics, the mobile application is used in the following order:

- the application is installed on a smartphone, Android or tablet device;

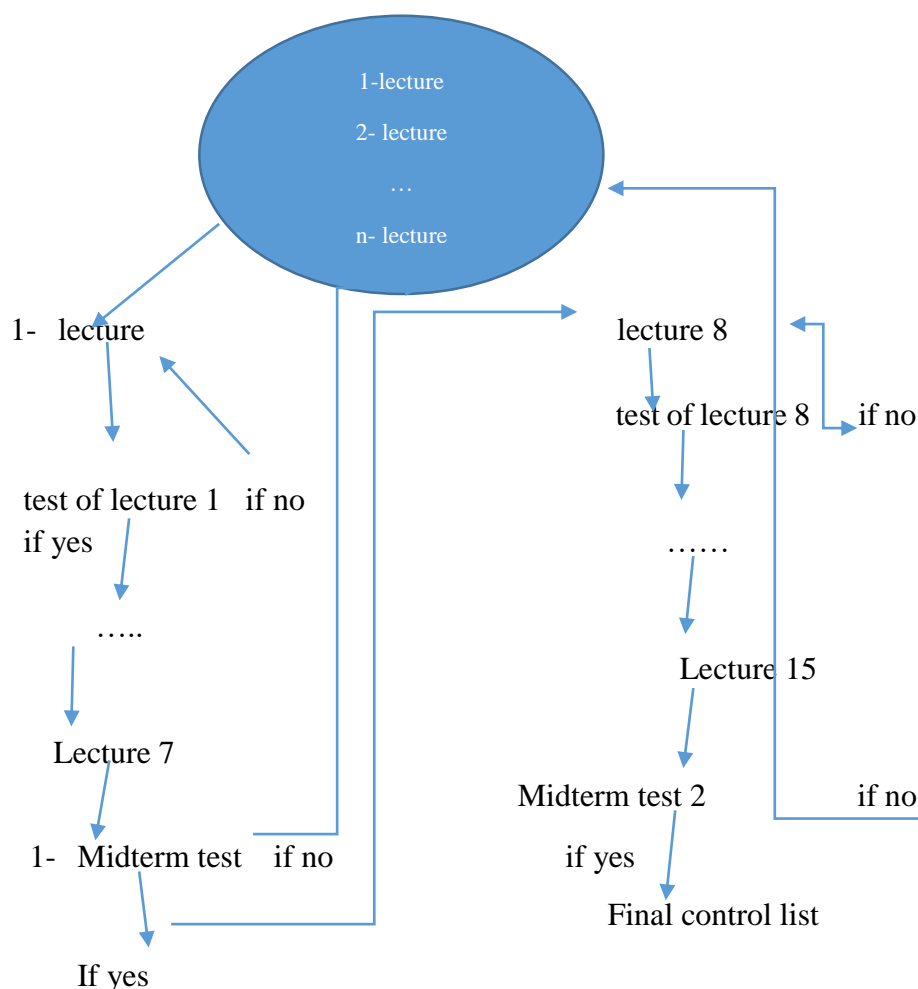
- when the application starts, a working window opens, in which 15 lectures on science are displayed;

- after choosing the first lecture, the lecture opens and information about the topic is presented, at the end of the information, a link to test questions about the topic serving to determine the mastery level will appear;

-after going to the link, it is possible to solve the test related to the topic, if a successful result is obtained from the test, it is possible to go to the second lecture, in cases where the result is less than 60%, it is returned to relearn the information of the first lecture;

In this sequence, it goes up to the seventh lecture, then the 1st intermediate control test prepared on the basis of the data of the seven lectures is opened, after successful passing of it, it is possible to go to the eighth lecture, etc. 15th After successful completion of the lecture, the 2nd midterm control test will be opened. If you fail the 2nd interim control test, it is recommended to start the course again and study the given information carefully.

A student who has successfully passed the tests is guaranteed to pass the final test with good results [6].



**Figure 1. Algorithm of the mobile application for independent study of electrical engineering and electronics.**

In the spring semester of the 2022-2023 academic year, pedagogical experiment-testing was carried out by the 103-21 EM(own) group of the Islam Karimov Tashkent State Technical

University, Faculty of "Mechanical Engineering" 60711100-Energy Mechanical Engineering undergraduate course and 60720800-Technology of mechanical engineering, equipment and automation of mechanical engineering production was held in groups 107-21MTMIA of the undergraduate education. 24 students from the 103-21 EM group were selected as the experimental group, and 24 students from the 107-21MTMIA group were selected as the control group in the pedagogical experimental work.

The level of development of knowledge of electrical engineering and electronics by students who participated in the pedagogical experimental work at the end of the experiment (Table 1).

*1-Table*

№	Number of groups and experiment participants	Degrees and number of eligible students			
		Excellent (5)	Good (4)	Satisfactory (3)	Not satisfactory (2)
1	Experiment (e <sub>1</sub> ) 103-21, 24 people	3	15	6	0
2	Control (c <sub>2</sub> ) 107-21, 24 people	1	11	10	2

The average coefficient of the level of development of the knowledge of electrical engineering and electronics by the participating students was calculated as follows and included in Table 2, and the corresponding diagram is shown in Figure 2 [7].

For experimental groups:

Average value for 103-21 groups  $x = \frac{5 \cdot 3 + 4 \cdot 15 + 3 \cdot 6}{24} = 3,875$

square value  $x^2 = 3,875^2 = 15,016$

The quantity  $m = \frac{15.016}{24} = 0,626$

For control groups:

The average value for 107-21 groups is  $y = \frac{5 \cdot 1 + 4 \cdot 11 + 3 \cdot 10 + 2 \cdot 2}{24} = 3,125$

The quantity  $y^2 = 3,125^2 = 9,766$

square value  $m' = \frac{9.766}{24} = 0,407$

So, the average learning of the experimental group was greater than the average learning of the control group:  $X = 3,875 > Y = 3,125$ .

Efficiency coefficient

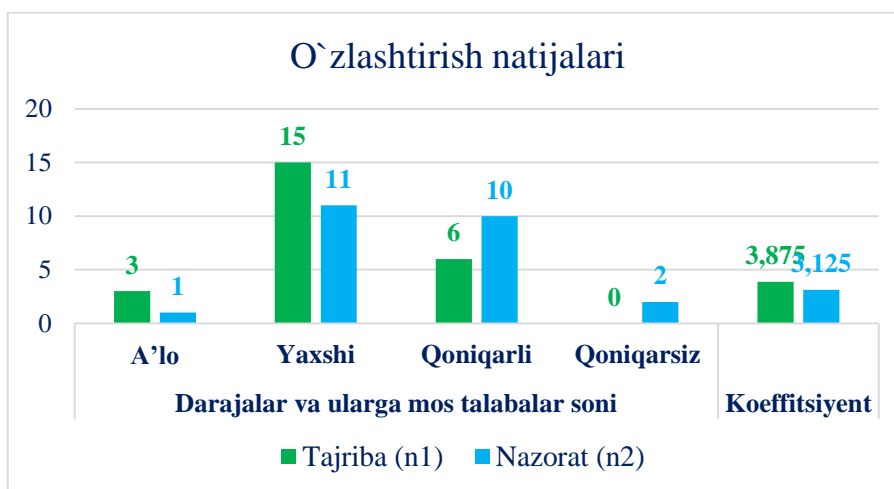
$$\eta = \frac{3,875}{3,125} = 1,2$$

**Conclusions and suggestions.** This mobile application was used in pedagogical experiments and it was proved that it serves to increase the effectiveness of education.

It was found that students who used the mobile application along with active participation in classes in electrical engineering and electronics had a significantly higher level of achievement compared to students who did not use the application. It can be seen from the coefficient of effectiveness that the mastery result of the students of the experimental group increased by 1.2, i.e. 12%, compared to the mastery result of the students of the control group.

*2-Table*

№	Number of groups and experiment participants	Degrees and number of eligible students				Coefficient
		Excellent (5)	Good (4)	Satisfactory(3)	Not satisfactory (2)	
1	Experince (e <sub>1</sub> ) 103-21, 24 people	3	15	6	0	3,875
2	Control (c <sub>2</sub> ) 107-21, 24 people	1	11	10	2	3,125



**Figure 2. Results of learning of students of experimental and control groups.**

In conclusion, it is worth noting that in the organization of classes in electrical engineering, the use of mobile applications, along with the wide use of the possibilities of digital technologies, can improve the quality of education and make it possible for students to spend their free time meaningfully. creates.

As mentioned above, the use of mobile applications does not choose time and place, and the user can use them whenever and wherever he wants, in convenient conditions, which creates the need to create mobile applications in all disciplines.

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