USING THE MOBILE APPLICATION «PLICKERS» TO TEST THE KNOWLEDGE OF STUDENTS

N. Bondarenko
VSU named after P.M. Masherov, Vitebsk, Belarus

In the modern world, almost every student in secondary school has a mobile device. Moreover, schoolchildren use mobile devices not only for entertainment or for obtaining diverse information, but also for solving various educational issues. In this regard, the importance of mobile applications is growing in education, and the main reason of it is the opportunities they provide: the joint work of students on the tasks during the lesson and in extracurricular activities; file sharing; organization of distance learning and interaction with parents.

Great importance in the educational process has the testing of knowledge and skills received by the student. By the way, traditional form of testing, which is often used, has several disadvantages. They are: low efficiency in conditions of mass education, time consuming, subjectivism. The most effective way to test knowledge, which is used in education more increasingly, is computer testing. The convenience of this type of knowledge testing is provided by the ability of quick analyze of the correctness of the answers and storage of the results of students' work. However, for such forms of testing computer classes are required in which the number of seats is limited.

For the organization of various types of knowledge testing, you can use the mobile application developed by the founder of the company «Plickers» and a high school math teacher in Richmond (California) Nolan Amy [1]. Through the use of QR- codes, a special program «Plickers» allows you to evaluate the answers of students instantly when conducting a frontal survey (written or oral) [2].

The purpose of the research at this stage is to investigate the functional and didactic possibilities of the «Plickers» program for testing students' knowledge when studying functions at the lessons of algebra.

Material and methods. The pedagogical experiment was conducted with students of 8 "A" class "State school № 45 Vitebsk." In the experiment the program «Plickers», a smartphone under iOS or Android running were used.

Findings and their discussion. The «Plickers» program is installed on the tablet or the phone of the teacher (under iOS or Android running) in order to read QR-codes from students' cards. A list of the class is created in the application with the help of it you can find out exactly how each student answered the questions. The program «Plickers» builds diagrams of answers and allows you to establish quickly the level of learning and the formation of skills of students.

The pedagogical experiment was conducted out after studying the topic "Quadratic function". In the application a list of nine tasks was made on the studied topic. To make a task you can use a text or an image.

During the experiment each student received a special square card, the layout of it is available for download on the official website of the program [2]. The sides of the cards correspond to the answers of the tasks presented by the teacher (A, B, C, D). After the presentation and making the task participants of the experiment almost at the same time lifted the cards up with the answer by that side, which they consider correct.

Figure 1 – raising cards

Using the «Plickers» mobile application installed on the teacher's smartphone the answers were scanned instantly. They are saved in a database and can be displayed on the screen of a mobile phone. In addition, the teacher has the opportunity to export the results to an Excel table, where they will be processed and systematized. Scan results can be analyzed directly during the survey or after it.

The table displays: a list of students who participated in the survey, a list of asked questions and the percentage of correct and incorrect answers. For clarity, diagrams are compiled.

This table allows the teacher to analyze quickly the level of learning the material of the whole class and each student individually.

As a result of the experiment, the following difficulty was revealed: the teacher needs to ensure that QR-codes are not obstructed by scanning.

Otherwise, there are problems with their reading by the mobile device. This difficulty is easily overcome after several uses of the application.

In our opinion, «the Plickers» program can be used to organize various types of knowledge testing: preliminary (diagnostic) testing, used to study the level of students' readiness for perception of new material; current testing designed to check the learning of the previous material; thematic testing, the purpose of which is to compile and systematize the educational material of the whole topic; final testing, aimed at checking the specific learning outcomes.

Conclusion. Practical use of the mobile application «Plickers» allows you to reduce the time required to survey students, to visualize the results of testing and analyze the level of learning the studied material.

Reference list:

1. Founder and chief executive officer of Plickers. [Electronic resource]. – Access mode: https://2018.edcrunch.ru/speakers/nolan-emi/ – Access date: 09/06/2018.

2. Plickers is a powerfully simple tool. [Electronic resource]. – Access mode: https://www.plickers.com – Access date: 12.09.2018.

ANALYTICAL SOLUTION OF CUBIC MATRIX EQUATIONS WITH COMMUTATIVE MATRIX FACTORS OF SIZE [2X2]

M. Chernyavsky
VSU named after P.M. Masherov, Vitebsk, Belarus

Nonlinear matrix equations are found in numerous applications. Iterative methods, for example, modification of the method of Newton-Kantorovich and algorithm Bernoulli are often used for their solutions [1–2]. Also, the exact analytical solution for some types of matrix nonlinear equations, in particular, cubic ones, is interesting.

The aim of the research is to present an algorithm for the exact analytical finding of a cubic matrix equation with commutative matrices-coefficients of size $[2 \times 2]$.

Material and methods. The material of the research is cubic matrix equations with commutative coefficients and methods of their solution. Research methods-methods of mathematical and functional analysis.

Findings and their discussion. It is necessary to remind that in the scalar case of the solution of the cubic equation with complex coefficients of the form (1) can be found using the formula Cardano (2) [3, p. 235]:

$$x^3 + px + q = 0 \qquad (1)$$

$$x = \alpha + \beta = \sqrt[3]{-\frac{q}{2} + \sqrt{\frac{q^2}{4} + \frac{p^3}{27}}} + \sqrt[3]{-\frac{q}{2} - \sqrt{\frac{q^2}{4} + \frac{p^3}{27}}}, \qquad (2)$$