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THE ROLE OF MOBILE APPLICATIONS IN IMPROVING THE EDUCATIONAL PROCESS OF HIGHER EDUCATIONAL INSTITUTIONS (ON THE EXAMPLE OF SOLID STATE PHYSICS)

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Abstract: This article will consider the possibility of using information and communication technologies in the educational process, in particular, electronic, mobile applications and mobile educational technologies. The content of the initial concepts of the conducted research is defined and presented. Special attention is paid to the mobile application as a modern and effective educational tool. A number of specialized variants of mobile applications that can be used in the educational process are proposed, the positive aspects of their application are identified. A comparative analysis of the available mobile applications used in teaching physics and astronomy is carried out, and the prospects for their use are considered. As a result of the analysis, computer simulation models made on the topic “Crystal structure of solids” are presented, which are the basis for the mobile application “Physics of solids”.

Key words: Apple, Google Play, Windows, mobile application, ICT, smartphones, science, “Solid state physics”, Crystal structure of solids, Miller indices, higher education institutions, education system, mobile technologies, digital technologies, computer simulation models.

INTRODUCTION

Modern students are a new generation, harmoniously developing together with information technologies, ready for electronic and mobile learning, using mobile phones and other digital devices every day. It should also be noted the increasing requirements for a graduate of a higher educational institution, in which the following are recognized as important components of his competence: erudition and education, possession of the latest information technologies, literacy of communicative behavior in written and oral speech genres. This is undoubtedly a powerful incentive for the dissemination of mobile application technologies in education and their introduction into the educational process. All of the above determined the relevance of the research problem and determined the choice of the topic. One of the currently relevant and in-demand areas of activity of IT specialists in the future is the development of applications for mobile devices [1]. This, in turn, is due to the rapidly developing gadget market, the growth of their functionality. There are two main approaches to creating applications for mobile devices: native and cross-platform. The native application is developed for each platform based on its programming language: for iOS it is Objective-C or SWIFT, for Android – Java or Kotlin, and for Windows Phone – C. Native applications are embedded in the software of the mobile device and downloaded through the official Apple store, Google Play and Windows. The native application will function only in this operating system, which can be considered as a certain drawback [2]. Applications developed within the framework of a cross-platform approach lack such a disadvantage. When using it, applications are written simultaneously for many devices, since they use the browser mechanism for their work. They are often created in the markup language and styles (HTML, CSS and JavaScript), as well as mobile sites, the most popular frameworks for implementing this approach can be considered Unity, Apache Cordova, Xamarin.

MATERIALS AND METHODS

The mobile application allows you to organize a convenient mode of duplicating the past so that the information is stored in the student's memory for a long time. In addition, a dynamic change in the types of educational activities is provided. In mobile applications, a large amount of data is presented in the form of a small capacity, which has a positive effect on the memorization process. As a result, the use of mobile applications increases motivation to form a positive attitude to education, as well as to study materials using game elements [3].

S.V. Titova didactically identifies three types of mobile applications:

1. Mobile applications created by publishers, professional groups and commercial organizations;

2. Mobile apps created by teachers for ready-made exercises and tasks based on templates;

3. Educational mobile applications suitable for various operating systems by teachers [4].

Mobile applications allow students to receive important information using audio and video recordings, have quick access to the database, and regardless of their level of knowledge, the teacher can determine by conducting a small test at the end of the lesson. In e-learning, all traditional forms of the lesson (from reading the text to participating in discussions) are implemented using mobile applications. The idea of blended learning refers to a combination of the two models considered, where working with mobile technologies is determined taking into account the technical capabilities of students [5, 80-84].

As a homework assignment, the teacher suggests creating short videos using iMovie, Quik, VidLab video editors. Modern students are able to work in special programs for creating photo and video materials, due to the fact that they are active users of Instagram and Tiktok, so he approaches the implementation of this type of creative work with great interest [6, 46].

When we get acquainted with the capabilities of the Snowbee mobile application, we see that it can also be used to monitor knowledge assessment. With

this application, the teacher prepares the lesson, including the necessary materials: presentation, texts, tests, questions and assignments. The teacher sets the time frame during which this application will be in operation, and sends the PIN code to students by email or in Telegram groups. At the specified time, students log in and complete the task. The teacher can track who is logged in and who is not completing assignments. [7, 98-102].

Sky Safari is a mobile application that allows you to explore celestial objects from anywhere in the world. By pointing your smartphone at a particular part of the sky, you will be able to see a map of this space. The application has an interactive database, as well as beautiful graphical components. A huge database in the application allows you to learn more about the object you are interested in. The popularity of this application is due to the interest of students in practical activities.

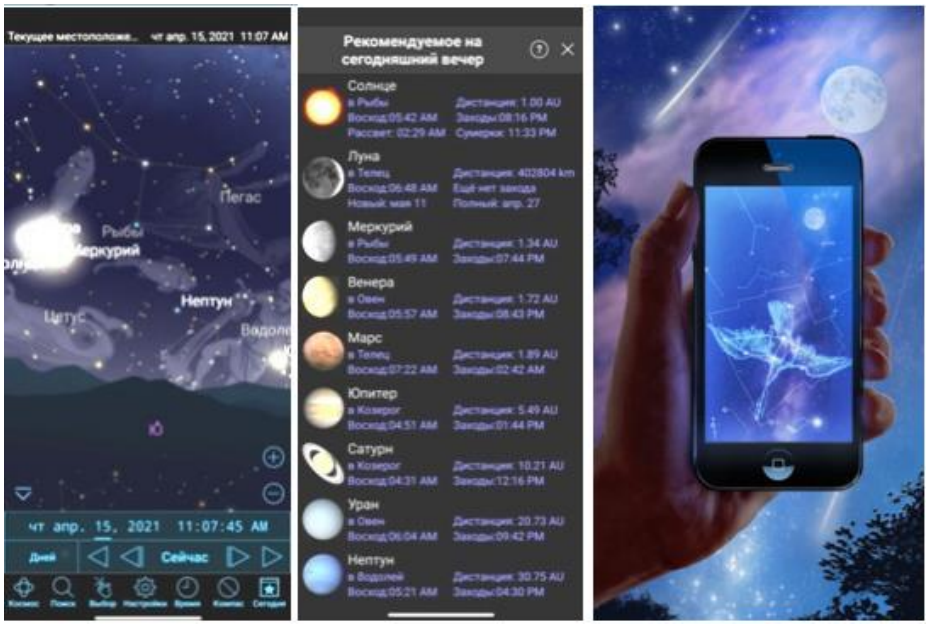

Figure 1. Sky Safari Mobile App

The study of a particular celestial object or phenomenon will be more interesting with the help of mobile applications. The mobile application that you can use when studying the phases of the Moon is called the NASA lunar reconnaissance mission. [8, 118-124].

Figure 2. Mobile application "Phases of the Moon".

As can be seen, with the development of information technologies, the introduction of innovations in various spheres of human life and professional activity, the need for the use of new technologies in the field of education is increasingly developing. This can be fully related to the teaching of physics, the nature of which includes mastering the essence of technical devices and processes, conducting experiments, scientific and technical creativity of students.

There are many possibilities of mobile tools, but, from our point of view, programs that support specific subject experience related to conducting educational experiments in teaching physics are still relevant.

Researchers M.A.Goryunov and M.B.Lebedeva focused on the following features of the mobile application:

1. Provides an opportunity to implement new approaches to assessment – increasing the role of reflexive assessment tools using computer tools by reducing the interference of the human factor in the process of assessing students' cognitive abilities;

2. Focus on increasing the proportion of students receiving independent education;

3. Ensuring the expansion of the range of information resources (electronic textbooks, electronic educational resources, cloud tools and services) used in teaching [9].

When we apply mobile education, mobile applications to the learning process, we see the following advantages:

1. Interaction of students with each other and with the teacher;
2. The convenience of providing the audience with technical devices (for example, more space is required to accommodate a computer than for a mobile phone or tablet);
3. Compactness of mobile learning tools;
4. Ease of information exchange between students and the teacher;
5. The ability to use mobile devices anywhere and anytime;
6. To increase the motivation of students who actively use mobile applications in teaching in accordance with their interests and needs [10].

V.A.Kuklev identifies the following learning tools based on mobile applications:

1. “As mobile tools for studying mobile content (mobile textbook, e-book, mobile dictionary, interactive translator, mobile television equipment, online presentations, a set of pockets for letters for resources, the possibility of using mobile catalogs (manual) ;
2. The following services are provided as a means of communication with teachers based on mobile applications (mobile chat, mobile email, mobile video conference, mobile forum, mobile blog);
3. As mobile knowledge control tools (SMS testing tools; SMS polling, voting tools; mobile forums and chat polling tools, mobile testing tools in smartphones and communicators, knowledge testing tools for mobile Internet devices);
4. Mobile tools for the formation of skills and abilities (mobile games and simulations, mobile training, mobile group project, mobile research);
5. Mobile means of education support (mobile information and information system; means of using information on a computer in mobile networks)” [11].

RESULT AND DISCUSSION

If we observe the process of melting and solidification of crystalline and amorphous bodies, we can see that crystalline bodies have a melting point at which the substance is in a stable state in both phases – solid and liquid. Amorphous bodies, gradually softening when heated, do not have a certain temperature corresponding to the transition of the solid phase into the liquid.

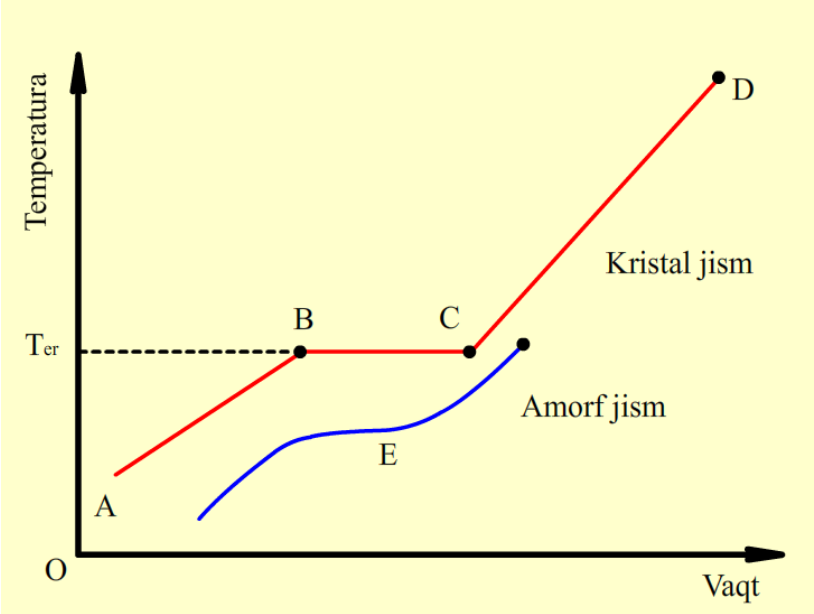

Figure 3. Melting of solid and amorphous bodies.

Graphically, this is shown in Figure 3. Section B of the graph corresponds to the melting process of a crystalline body. The amount of heat received by the heated bodies from the heater per unit of time can be approximately considered constant. However, at the sun site, the body temperature does not change, although the heat from the heater is still supplied to it. The heat is spent on the melting process [15].

The position of the crystal plane is determined by specifying the coordinates of three atoms lying in this plane. If each of the three atoms is located on one of the three-crystallographic coordinate axes, then the position of this plane can be set by the corresponding coordinates of the atoms along the axes in units of lattice constants. A more common method of describing the position of a plane, which is widely used in structural analysis, are Miller indices, which are defined as follows: find the points at which this plane intersects the main coordinate axes, and write

down their coordinates in units of lattice constants, take the inverse values of the numbers obtained and bring them to the smallest integer multiple of each of the numbers. The result is enclosed in parentheses.

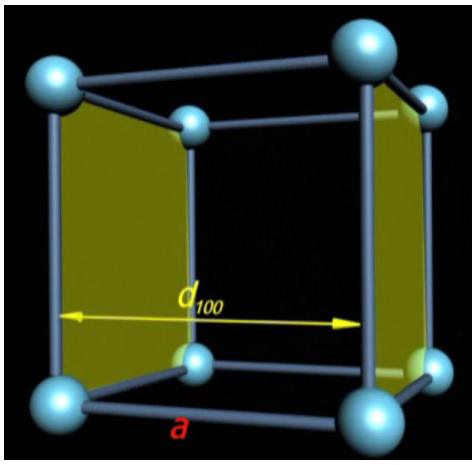

Figure 4. Miller Indexes (100)

$d_{100} = a$

a – side of the grid

d_{100} – index distance (100)

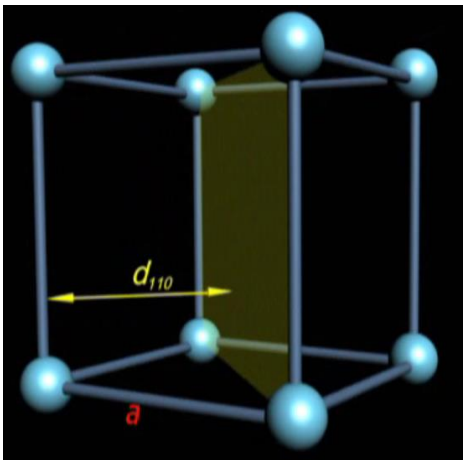

Figure 5. Miller Indexes (100)

$d_{100} = a\frac{\sqrt{2}}{2}$

a – side of the grid

d_{100} – index distance (100)

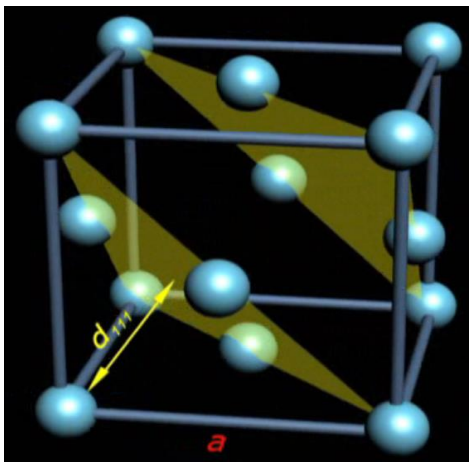

Figure 6. Miller Indexes (111)

$d_{111} = a\frac{\sqrt{3}}{3}$

a – side of the grid

d_{111} – index distance (111)

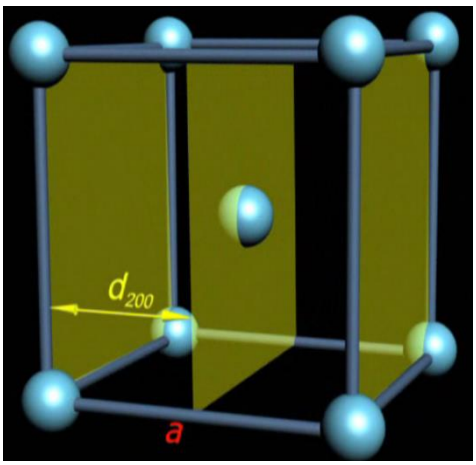

Figure 7. Miller Indexes (200)

$d_{200} = a\frac{\sqrt{2}}{2}$

a –side of the grid

d_{200} – index distance (200)

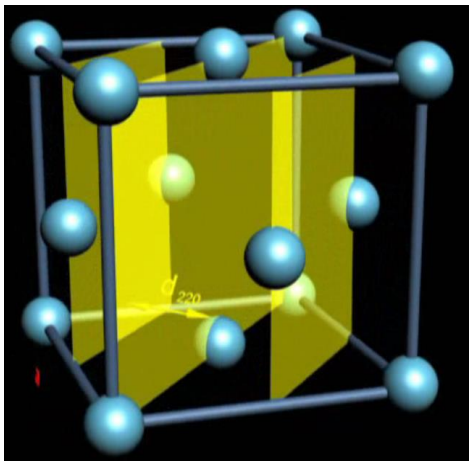

Figure 8. Miller Indexes (220)

$$d_{220} = a\frac{\sqrt{2}}{4}$$

a –side of the grid

d_{220} – index distance (220)

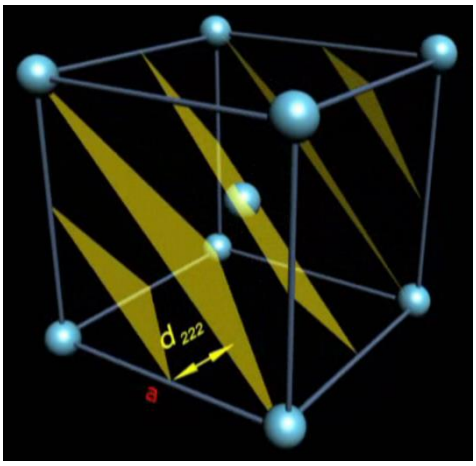

Figure 9. Miller Indexes (222)

$$d_{222} = a\frac{\sqrt{3}}{6}$$

a –side of the grid

d_{222} – index distance (222)

On the subject of “Physics of solids”, computer simulation models of all the above drawings were prepared.

CONCLUSION

The role of independent education and independent work in learning based on mobile applications is incomparable, the reason for this is the lack of hours in the classroom. New forms of learning based on mobile applications give students a motivational attitude, providing them with diversity in the learning process, removing psychological barriers. There are also such physical processes in our research work that it is difficult for students to understand it under normal conditions. That is why we have prepared computer simulation models from the topic “Crystal structure of solids”, which will become the basis for the mobile application “Physics of solids”. When training is conducted on the basis of these prepared mobile applications, students' interest in education increases even more when they see conditions that cannot be seen with the naked eye in normal conditions.

REFERENCES:

[1]. The most popular IT professions in 2020 have been named. – Text : electronic // Rossiyskaya Gazeta rg.ru . – URL: https://rg.ru/2019/11/12 / nazvany-samye-vostrebovannye-it-professii-v-2020-godu.html (accessed: 08.07.2022).

[2]. Evolution in your pocket: how mobile apps have evolved. – Text : electronic // Apptractor. – URL: https://apptractor.ru/info / articles/evolyutsiya-v-vashem-karmane-kak-razvivalis-mobilnyie-prilozheniya.html (accessed: 08.07.2022).

[3].Rusak A.N. Mobile educational applications as an electronic learning environment / A.N. Rusak // Science – education, production, economics: materials of the XXIII scientific and practical conference (February 15, 2018) / ed.: I.M. Prishchepa, V.Ya. Kuzmenko. – Vitebsk: VSU Publishing House, 2018.

[4].Titova S.V. Didactic problems of integration of mobile applications into the educational process / S.V. Titova // Bulletin of the Tambov University. Series: Humanities. - 2016. – Vol. 21, No. 7-8.

[5].Pogulyaev D.V. Possibilities of using mobile technologies in the educational process / D.V. Pogulyaev // Applied Informatics. – 2006. – №5 (5). – Pp. 80-84

[6].Manshin M.E. The use of mobile applications (playlists, booktrailers) in literature lessons / M.E. Manshin // Izvestiya Volgograd State Pedagogical University. – 2019. – №3 (136). – Pp. 46-49.

[7].E.I. Sharova “MOBILE APPLICATIONS as A means OF TEACHING LITERATURE” SOCIO-PEDAGOGICAL issues of EDUCATION AND UPBRINGING Cheboksary, June 25, 2021 Pages: 98-102

[8].E.S.Meshcheryakova “The Use of Mobile Applications In the Study of Astronomy" Topical issues of modern science and education: Materials of the Scientific session of the Borisoglebsky branch of the VSU ISBN 978-5-00204-264-7 05/31/2022 Garmashov M.Yu. Methodology of formation of research competencies of secondary school students through a video computer physical experiment // The school of the future. - 2013. — No. 3. — pp. 118-124.

[9].Goryunova M.A., Lebedeva M.B. Mobile learning in the context of the implementation of the Federal State Educational Standard // CHIO, 2016. No. 4 (49). pp. 91-95.

[10].Golitsyna I. N., Polovnikova N. L. Mobile learning as a new technology in education [Electronic resource]. // PHOTO, 2011.No.1. URL:http://cyberleninka.ru/article/n/мобилное-obucheniekaknovayatehnologiya vobrazovanii

[11].Kuklev V.A. The formation of a mobile learning system in open distance education: abstract. ... diss. Doctor of Pedagogical Sciences: 13.00.01: protected 26.10.10. Ulyanovsk, 2010. 46 p.

[12].Nefedov I.V., Popova K.A. M-learning as an innovative tool in teaching RCT // Izvestia of the Southern Federal University, 2016. No. 3

[13]. Saveliev, I. V. Course of general physics: in 3 t. t. 3. Solid state physics: textbook. manual for higher education institutions / I. V. Savelyev. – M. : Nauka, 1982.

[14]. Kittel, Ch. Introduction to Solid State Physics / Ch. Kittel; translated from English; edited by A. A. Gusev. – M. : Nauka, 1978.

[15]. Bushmanov, B. N. Solid State Physics: textbook. handbook for universities / B. N. Bushmanov, Yu. A. Khromov. – M. : Higher schools, 1971.

[16]. Epifanov, G. I. Solid State Physics: textbook. manual for higher education institutions / G. I. Epifanov. – M. : Higher School, 1977.