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# ACADEMICIA

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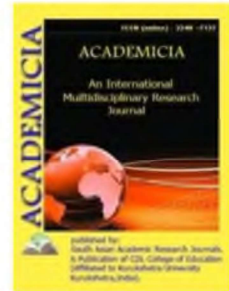
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### DIDACTIC FUNDAMENTALS OF ELECTRONIC BOOKS VISUALIZATION

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#### ABSTRACT

*This article provides information on how to visualize teaching materials in higher education and how to use the visual capabilities of modern programming languages in the creation of electronic books. As a modern programming language, the features of the Java language and the visual environment of Android Studio, as well as the types of designer programs that create android applications, programs that create electronic books for working in Windows OC, their advantages and disadvantages are listed.*

**KEYWORDS:** *Visualization, Android, Java applications, Java Development Kit (JDK), Java Runtime Environment JRE, IntelliJ IDEA (IDE), Android Studio, TheAppBuilder, AppsGeyser, Apps Makerstore, Net2Share, App sGeyser, TheAppBuilder, Andromo, Articulate Story Lectora, iSpring.*

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## INTRODUCTION

The state of development of modern technologies depends primarily on the intellectual potential of society, including the development of education. Issues of content and quality of education are considered a priority in society. In developed and developing countries of the world, special attention is paid to the informatization of education. In this regard, ways to develop education, increase its efficiency are being sought, the issue of introduction of new information technologies and effective software in education is gaining popularity. Teaching using e-textbooks on computers and mobile devices has an effective impact on all aspects of the learning process. The impact of e-textbooks on teaching content opens up many opportunities for learners. This is due to the fact that e-textbooks have a high capacity to demonstrate teaching materials, the introduction of artificial intelligence ideas, a means of conveying a lot of information to students.

The use of e-textbooks for educational purposes changes the activities of students in a positive way. That is, the student will be able to independently search for the necessary information, without having to consult a teacher, that is, to conduct independent research.

**Purpose.** The use of computers and mobile devices, as well as electronic books in the educational process requires the improvement of some theoretical foundations of didactics and pedagogical psychology. In particular, expert systems allow the student to choose the optimal solution to the problem of any complexity, and hypertext teaching systems allow the student to choose the sequence of mastering the learning materials. Only when e-textbooks are of high quality, both in terms of content and appearance, it will be possible to use them effectively in the educational process. The need to acquire knowledge, skills and competencies in an informed society always necessitates a visual representation of the knowledge base. Accordingly, "visualization" refers to the controlled presentation of data using images, graphics, tables to simplify comprehension and processing.

Visualization is the presentation of information in the form of a specific image (photos, drawings, diagrams, tables, graphs, formulas, etc.). Cave paintings of ancient people may be the simplest example of information visualization. In modern society, the effectiveness of information visualization is initially achieved through the visual representation of non-visual information (e.g., temperature change, population density in regions, the presence and intensity of electromagnetic fields, etc.).

In the information society, the possibilities of visual representation of objects of direct observation are greatly expanding. Expanding the variety of options and bases for demonstrating not only objects but also important aspects of their development and interaction, as well as understandable and permissible ways of influencing objects themselves and the events that accompany them. Accordingly, "visualization" refers to the controlled presentation of data using images, graphs, tables, tables to simplify comprehension and processing.

Visualization comes from the Latin word *visualis* - visual, visual, and in the literature the term visualization is interpreted differently. Visualization (in a general sense) is the process of presenting information in the form of an image to increase their ease of understanding. Giving any imaginary object, subject, process, etc. a visible shape, mechanically generating an image (image), using any technical means or thought formation (thought forms) directly with your mind

(mental visualization) can help you understand any complexity and originality. (Actually existing and created in the author's mind) is to create clear, stable, and vivid images<sup>1</sup>.

**Scientific novelty of the article.** At a certain stage in the development of science and technology, the emergence of new textbooks, the role of visualization in the learning process naturally changed and began to be supplemented. Clarity refers not only to images of objects, but also to models of processes or events, schematic structures that facilitate the understanding of complex information, dynamic visual aids using technical means, and then multimedia learning tools.

Computerized visualization of educational information is a visual image on the screen of an object, in general, its parts or their models, which, if necessary, has the ability to reflect different angles, details, internal parts and, if necessary, their development in space. In addition, the visualization of educational information focuses on the importance of visual perception for man, the leading role of figurative cognition in cognitive processes, the need to increase the information load of man and prepare him for the conditions of improving information activities, experience. Visualization has the following advantages:

- Visualization allows you to visualize an event or phenomenon that is difficult to reproduce directly;
- Allows efficient transfer of learning information by assembling its components into a visual image;
- Contributes to the formation of professional thinking.

At present, due to the development and compaction of information technology, part of the information exchange process is carried out using mobile devices. This, in turn, makes it necessary to create and share information in a way that is compatible with both personal computers and mobile device software. Today, personal computers and mobile devices around the world, as well as software that supports the connection, are divided into three types of separate OC (operating system). These are Windows, Linux and Macintosh for PCs and Windows Phone, Android OS and IOS OS for mobile devices. The operating systems that have the most users are the Windows OS designed for PCs, while the Android OS is designed for mobile devices. In Windows OS, apps are created in \*.exe format, while in Android OS, apps are mostly created in \*.apk format.

In order to effectively increase the theoretical and practical knowledge and skills of students in higher education institutions, it is necessary to increase the number and quality of electronic books. Given the above, it is important to focus on what you need to focus on in order to create e-textbook applications compatible with Windows OC and Android OS. Here are the processes for creating apps in \*.apk format, originally designed for Android OS for mobile devices<sup>2</sup>.

It is advisable to use the Java package when creating Android applications. The first aspect required for the development of Java applications is the Java Development Kit (JDK is a Java compiler, standard Java) created by Oracle (Oracle Corporation is a software manufacturer specializing in database management systems and business applications). class libraries are a set of Java applications distributed by Oracle Corporation, which includes various utility systems). The Java Runtime Environment (abbreviated as JRE-, is a Russian-language working

environment for Java. A virtual machine required to run Java programs without a compiler and other production tools) is used to run applications on your computer.

Based on the IDE - Integrated Development Environment, it offers the ability to create many useful visual programming tools that programmers need. Android Studio is an IDE officially developed by Google to create Android apps<sup>3</sup>.

**Results and practical applications.** Android Studio must have the necessary knowledge, skills and abilities in the Java programming language, Android APIs and Android application architecture when creating an application for the Android platform. Today, Android Studio has taken the lead with its capabilities. Google Android Studio is designed for Windows, Mac OS X and of course Linux platforms. To get acquainted with the Android development platform, you can download it from the official website of the Android studio (developer.android.com). The SDK (Software Development Kit) for Android Studio from here is a production tool that allows software developers to create software for a specific software package, basic software, hardware platform, computer system, operating systems and other platforms. package can be found. To use Android Studio, you must first install it on your computer and perform the following steps:

Set up Android Studio, in the next step we go to the next Android Virtual Device (AVD) panel by clicking Next. To install Android AVD, select Default settings, click Next again and go to the Configuration Settings section. This will clarify where Android Studio will be installed. The selected memory must have at least 500 megabytes of free space. Click Next to go to the Choose Start Menu Folder panel. Here, without touching anything, click Install and the Installing process will begin. When the installation process is complete, click Next again, and when the process is complete, the Finish button will open. With the click of the Finish button, Android Studio will start automatically and first, the app will ask you whether or not to open the project belonging to the android studio. Here, if a pre-saved project exists, the first radio button can be selected, the second option is applied, and the process continues. Android Studio Splash Screen, Finding Available SDK Components Find the required SDK and start the download process. The Android Studio Setup Wizard dialog appears when you download the required SDK for Android Studio. The settings are set when the Next button is pressed. Select the installation type, click Next, and in the next step, select the optional theme, then click Next to proceed to the next window. The final part is the process of downloading all the necessary files. The process of uploading the required files by clicking the Finish button takes some time. As a result, when the process is complete, clicking Finish will take you to the Welcome Android Studio window.

This will install Android Studio and the first Android project will be launched by clicking the Start a new Android Studio project button. One of the simplest ways to get acquainted with Android Studio is to create the simplest app and call it simply World Hello. Click on the Start a new Android Studio project button to go to this window. After that, it is given a name to save the program project in memory. Open the optional directory, display it in Project Location and click Next to allow Android projects to be stored there.

The Target devices command allows you to select the factors you need for your Android Studio project and leave it unchanged by clicking Next. Now select the type of activity required to set the activity command, continue the installation process and click Next. If you are installing Android Studio for the first time, it is advisable to download some files that belong to the Android Studio constraint layout and click Finish to create a user interface<sup>4</sup>.

As a result, when the Android Studio application is launched and the Run command is activated, the Hello World Application will appear on the screen, and it will be possible to get acquainted with the Android Studio User Interface in detail and explore its capabilities. This, of course, requires the ability to work with the Java programming language.

With the development of mobile technology, the mobile app market is evolving, including the mobile app market for Android OS. Until now, programming was done only by advanced programmers, now this opportunity is available to anyone with relevant knowledge of the concept of programming language and access to the Internet. The following are a few utilities that can be used to create Android apps without software code, and their disadvantages and advantages are analyzed:

**The App Builder.** This program is a convenient tool for creating applications, and its use does not require any additional funds. Its main drawback is that this software product does not support the Russian language. Important functions of a software product may include:

- There are a large number of options when creating Android OS apps, it is easy to choose one of the recommended options in the templates if you need to create a simple app;
- Ability to view detailed statistics on the created program;
- The created simple and clear electronic edition and google play application can be used in this application.

**Apps Geysar** is a remarkably high-quality tool that doesn't have to have software under the Android OS, as mentioned above. Everything in the program is simple and straightforward, with the ability to combine it in minutes from the "designer" part to the project. It will be possible to analyze the capabilities of the recommended software tools below, namely:

- There is a large archive of templates on various topics, restaurants, photo studios, holidays, sports, radio, shipping and many other templates, it is necessary to make the right choice for the need and edit it;
- The tools installed when promoting a new application sometimes take a lot of time and effort to promote a new application promotion, and the advertising tools installed on the designer have the ability to simplify this task;
- The program has the ability to connect to the advertising network, so you can earn extra income using the created program.

**Apps Maker store.** This app is a convenient and simple tool for creating mobile apps for Android OS, its main advantage is that it is able to create mobile apps for six types of mobile operating system at the same time, in addition, its useful features are:

- Ability to work with a simple and straightforward online designer;
- It is possible to register an account at no additional cost;
- In a large archive designed for the Android OS app, you will be able to record the required app in a simple way.

**Apps Geysar.** This app is one of the online services that does not require additional funds when creating Android apps based on web content. To get the finished program, go to any site and



select the name required for the program, describe it, select a specific category, you will be able to get the .apk file of the application in a few minutes. The service application provides distribution, advertising, statistics viewing services at no additional cost. The Russian version of AppsGeysler is available and implemented in practice. This program uses a specially created HTML code or document, DOC, DOCX, PPT or PPTX format. Apps created with AppsGeysler are placed on the Android Market, its official websites are <http://www.appsgeyser.com> and <http://www.appsgeyser.ru>.

**The App Builder.** This software service is a very efficient HTML5 software developer. Apps developed using it do not have to be placed in online stores. Because they can be sold directly. In this case, users are required to use the completed application. This service is provided via QR codes and SMS-messages. A distinctive feature of TheAppBuilder service is the wide selection of templates and settings. Data encryption based on the AES-128 standard has the ability to integrate with Microsoft SharePoint and Active Directory. Similarly, HTML5 for creating applications for Android platforms can be implemented on iPhone platforms, using Web App web design languages. The technical support service website is provided at this <http://www.theappbuilder.com> website<sup>5</sup>.

While the main advantage of the above apps is that they can be used to create e-textbook apps for any specialty without programming language skills for Android OS, the downside is that the app can't claim copyright for the app. Now it is possible to create e-textbook applications for any specialty without the skills of programming languages for Windows OC, but programs that do not require copyright, as well as their advantages and disadvantages are listed:

**Articulate Storyline** is one of the most popular programs for creating courses, it is flexible, easy to use and designed to create different purpose courses. Articulate Storyline is a three-utility package (Presenter, Quizmaker, Engage) that allows you to create training courses, presentations, tests and other forms of content in Flash and HTML5 formats that can be viewed on the iPad and integrated into distance learning systems. The feature of this program is easy to master. The rollers developed in Articulate products look more modern and dynamic than other e-learning editors. The main features of the program:

- Simple interface allows you to create courses from scratch or based on templates without requiring additional user training. The interface looks similar to Microsoft PowerPoint.
- Records screen situations and demonstrates how to work with an electronic course of recording.
- Support of HTML5 and Flash technologies, as well as mobile devices. Publish courses in a variety of formats for iPad, PCs, laptops, Android, iPad, and other devices, and support SCORM and AICC (reporting) standards.

**CourseLab** is a powerful and easy-to-use software tool for preparing interactive learning materials (e-textbooks) for use in distance learning systems, CDs, or any other storage device. The main features of CourseLab are:

- Does not require the user to know HTML or other programming languages.
- An objective approach has a mechanism for creating educational materials of any complexity and automatic creation of tests.
- Allows training courses to host files of any Rich-media type - MacromediaFlash, Shockwave, Java and any video format.

- Ability to place presentations in Microsoft PowerPoint format in the training material.
- Allows a skilled user to add JavaScript directly to the properties of program files.
- Depending on the type of application, the training materials created with CourseLab comply with the following e-learning standards: AICC and SCORM 1.2.

**Lectora** is a program that allows you to create e-learning content and create e-learning complexes in the distance learning process. The program has the following icons:

- in the creation of distance learning courses;
- when creating presentation files;
- when creating control tests;
- when converting ppt files to other learning formats (SCORM or AICC);
- Widely used in the creation of intellectual training courses. Courses created in the Lectora program can be published in SCORM and AICC, which are e-learning standards. Lectora software meets the requirements of existing LMS systems. The training courses created in the program can be conducted with the click of a button in the form of a dynamic website, HTML, CD-ROM, .exe, compiled into a single file, without knowing any programming languages in SCORM and AICC standards.

**iSpring** is usually used in preparation for a presentation, in most cases, Microsoft - PowerPoint software. It has many features that help the material presented to be better understood by those who see it. The program has options such as iSpring Free, iSpring PRO and iSpring Presenter. Today, this product is one of the best PowerPoint converters in Flash in terms of speed, conversion quality and number of options. Compared to the iSpring PRO version, the iSpring Presenter version has the following features:

- Presentation content protection: password viewing, protection of the presentation, the presentation can be opened only in the authorized domains, these features are available in the Protection version of the Publish dialog;
- Add video and sync it with animations;
- creation of SCORM / AICC compliant courses for use in distance learning system;
- Availability of Action Script API to convert presentation at application level<sup>6</sup>.

## CONCLUSIONS AND SUGGESTIONS

In order to ensure the effective use of modern information technologies in education, electronic books and their authoring software are widely used. Using similar programs in higher education institutions on the subjects taught, it is possible to increase the performance of students in education through the introduction of multimedia lectures.

Visualization of teaching materials in the educational process expands students' imagination and independent thinking skills in relation to science. As a result, the interdependence and continuity between science topics is further strengthened. The above methods used by online designers for android apps in creating e-textbooks and visualizing learning materials are not actually related to software development. Because, in some cases, all of these programs have their own characteristics, they cannot claim the right to be called a "real program". In the future, based on a positive approach, they can be widely used in practice. The problems of improving the quality and effectiveness of teaching in higher education institutions will be solved with the creation of e-learning manuals with e-programs and applications using modern technologies and visual

software. Because, whether he is a programmer or a designer, the software tools created by them are initially divided into the number of electronic books and thus the ability to increase their quality.

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