TECHNOLOGY OF CREATING EDUCATIONAL MOBILE APPLICATIONS

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ABSTRACT

This article discusses mobile learning technologies, educational mobile applications and the technology and stages of their creation. Along with the functional requirements and objectives of the mobile application, data on quantitative criteria for measuring application performance are provided. The subtleties of the educational mobile application development process have been explored.

Keywords: education, m-learning, design, applications, back-end, front-end, technology.

INTRODUCTION

Technology (Greek techne - art, skill, learning) - is a set of methods and tools to achieve the desired result [1], in a broader sense - means a method and means of applying scientific knowledge to solve practical problems [2].

Mobile technology is a technology used for mobile communications. Mobile technology has different meanings in different aspects, mainly in information technology, mobile technology, is based on the interaction of wireless devices (including laptops, tablets, mobile phones, etc.), and the integration of equipment is understood.

Mobile learning technologies (m-learning) - the technology of using mobile services in conjunction with information and communication technologies, regardless of place and time. This technology allows the teacher to be mobile. The learning process is organized using mobile devices (laptops, smartphones, tablets) and allows students to use educational resources, use mobile applications, web sites, communicate with other users create interactive content in the classroom and outside. includes z.

A mobile application *is* a software developed specifically for a specific mobile platform (iOS, Android, Windows Phone, etc.). They will be designed for use on smartphones, tablets, smartwatches and other mobile devices.

Mobile application development technology - understands the methods and tools for creating applications for mobile platforms.

MATERIALS AND METHODS

Mobile applications are written in high-level programming languages and then compiled into the local code of the operating system for maximum performance. App development has its characteristics: mobile devices run on battery and are equipped with less powerful processors than personal computers. In addition, modern smartphones and tablets are equipped everywhere with accessories such as gyroscopes, accelerometers and cameras, which offer unique opportunities to expand the functionality of the application [3].

Mobile applications are divided into 3 groups according to work characteristics.

Figure 1. Groups of mobile applications according to their performance characteristics

Native (local) - mobile applications are created for a specific operating system (iOS, Android, Windows). To attract users, several separate applications are developed for different operating systems. They can perform the same functions, although they have the same design, but have different applications. This need increases project duration and development budget.

Hybrid - occupies an intermediate position between local and web applications. They have partial access to smartphone hardware (camera, microphone, geolocation, address book). Such applications require an Internet connection because they download content from an external source located on the server. Most ad-based mobile apps fall into this category.

Web apps are tailored to websites for smartphone users. Such applications are designed so that the user can access the site at any time, even without using a personal computer or laptop.

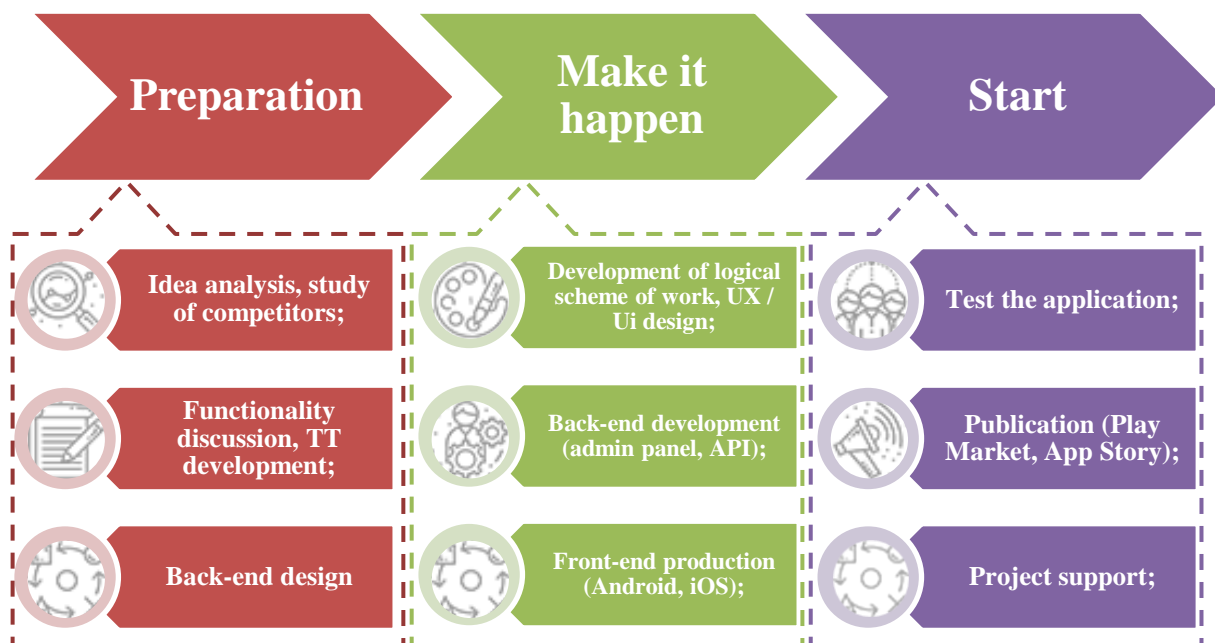The development of an educational mobile application mainly consists of 3 processes and its stages.

Figure 2. The process of developing an educational mobile application and its stages

RESULTS

Idea analysis, the study of competitors. Every program starts with an idea. What tasks the mobile application will solve in the future is the main criterion of its functionality. The study of the mobile application market, the analysis of existing solutions and the study of models of behavior of competitors and customers are the main stages of the analysis of the idea. The end-user should be kept in mind at each stage of the analysis. This will help users understand together how to use the new app and make it as convenient and understandable as possible.

to understand and determine the idea of the application, what functions it should include, what tasks and for whom it is performed. This results in links to functionality and design.

At this stage:

- Identify application users ;
- competition ;
- Defining the goals and objectives of the application;
- You will need to select a mobile platform for your application.

Analysis and planning begin with identifying use cases and taking into account detailed functional requirements.

Once you have identified the requirements for your application, a product roadmap will be prepared. This includes prioritizing mobile application requirements and grouping them into delivery stages.

Mobile app names should also be unique in each app store. Make sure your app name is not yet in use and timing of mobile application development and to make an informed decision: Functional requirements need to be discussed. It includes the identification of user characters, user descriptions (User Story), creation of a user-wide travel map (Customer Journey Map) and the formation of technical requirements for the service [4].

Thanks to the Terms of Reference, a team of designers and developers clearly understand what kind of service the customer wants to receive and gradually implement the initial idea.

Design is the creation of a graphical map showing the functionality of a future application. As a rule, the map will have a scheme of screens and the transitions between them. The design should be attractive, while at the same time it should not make it difficult for the user to work with the application. Experienced developers do not create awkward menus so that the design elements do not prevent the customer from moving towards the main goal, hide the navigation part of the software on the program screen and adhere to brevity. The main subtleties of modern mobile software design:

➢ simple background (functions and data of the service are well distinguished in it);
➢ effective use of color palette;
➢ Perform swiping gestures (simple or double-clicking, holding and dragging an item);
➢ the presence of social media buttons.

Creating an educational mobile app design is an important step. If it is poorly executed, the software solutions of the previous stages lose their value.

The success of a mobile app is determined by how well users can master and benefit from all its features. The goal of the mobile app's UI / UX[1] design is to create a great user experience to make your app interactive, intuitive and user-friendly.

Mobile app designers often start app design with sketches on paper. Frames are a digital form of sketches and they are conceptual schemes, also called low-resolution models, and provide a visual structure to the functional requirements of the application.

Focus on aesthetics and user experience, not color schemes and styles. Creating frames is a quick and cost-effective approach to designing application schematics and replicating them in the design review process. The special design of the device should be taken into account when creating frames. So, whether your app is used on an iPhone, iPad or Android phone, or tablet, it should provide an intuitive and device-specific user experience.

Style guides are "live documents" that document application design standards, from branding rules to navigation icons.

Application styles include:
- Which font does your app use?
- What is the color scheme?
- How is your brand reflected in app design?

The early creation of a style guide as part of the mobile app development process will increase the effectiveness of mobile app developers. As part of the app design, you should review the Google app design guidelines for Apple and Android apps for iOS.

Models or high-resolution designs are the final renderings of educational mobile app visual design. Models are created by applying style to frames. Once the application design is complete, additional changes can be made to its information architecture, workflow, and aesthetics.

While mock-ups reflect the functionality of a mobile app using static designs, they can be turned into prototypes using tools like Invision and Figma. Prototypes will be needed to mimic the expected user experience and application workflows from the finished product. Prototype development can take a long time, as they

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[1] User Interface (UI) user interface, User Experience (UX) - user experience. (source -wikipedia.org)

suggest testing the design and functionality of a mobile app at an early stage. Often, prototypes help identify changes to an application's proposed function.

Back-end/server technology - includes the database and server-side objects required for the mobile application's support functions.

API (Application Programming Interface) is a method of communication between an application and a server/database.

The front-end is a local mobile application used by the end-user. In many cases, mobile apps consist of an interactive user experience that uses an API and a background environment to manage data. In some cases, an app can use local data storage if it needs to allow users to work without an internet connection.

Almost any web programming language and database can be used for the back-end. For native mobile applications, you need to select the technology package required for each mobile OS platform. iOS apps can be developed using the Objective-C or Swift programming language. Android apps are mostly will created using Java or Kotlin. For creating mobile applications - the key is to choose the technology that best suits the planned educational mobile application.

DISCUSSION

Conducting a comprehensive quality assurance test during the development of mobile applications makes applications stable, usable and secure. To provide a comprehensive application test, you must first prepare test cases that cover all aspects of the application test. Just as use cases control the process of developing mobile apps, test cases also test mobile apps. Test cases Perform test steps, record test results to evaluate software quality and design to make corrections for retesting. Familiarity with the functional requirements and objectives of the application will help to create clear test cases. To provide a quality mobility solution, an educational mobile application must pass the following test methods [5].

An important step in testing mobile apps is to ensure that the final app is consistent with the user experience created by the design team. The visuals, workflow, and interactivity of your app will give end-users the first impression of your app. Make sure the application uses consistent fonts, styles, color schemes, fill-in-the-blanks, icon design, and navigation.

The accuracy of the mobile app's functionality is critical to its success. It is difficult to predict the behavior and usage scenario of each end-user. For this reason, the functionality of the application should be tested by as many users as possible to cover as many potential test conditions as possible.

If two different users try the same feature but get different results - this can lead to defect detection.

The purpose of the functional test is to ensure that users have seamless access to application functions. It can be divided into a system test (the application works as a whole) and a unit test (the individual functions of the application work properly).

If you are creating an app for iOS and Android mobile platforms, your functionality test should include a comparison of features between the two versions of your mobile app. There are many quantitative criteria for measuring application performance.

- How well does your app respond to user queries?
- How fast are app screens loading?
- Is the app consuming a lot of phone battery power or is it running out of memory?
- Does the app make efficient use of network space?
- Is the application size larger than expected?

Even if the application has passed the basic performance criteria, it is necessary to test the API and server loading capabilities by increasing the maximum number of users at the same time.

CONCLUSIONS

Security is the most important issue for mobile applications. Any potential vulnerability can lead to disruption. If the application requires users to log in, these login sessions should be monitored on the device and back-end. If a user is idle for an extended period (typically ten minutes or less in a mobile app), user sessions should be interrupted by the system. If the app stores user credentials to make it easy to re-access the device, you need to make sure you use a secure service. To make sure the data doesn't leak, the data entry forms in the mobile app need to be tested.

On average, every 12 months, new mobile devices enter the market with new hardware, firmware and design. Mobile operating systems will be updated in a few months. Many mobile device manufacturers such as Samsung, LG, HTC and Motorola use the Android platform, but they adapt the platform for mobile devices (because Android is open source). The devices come in different sizes and shapes.

The complexity of testing mobile applications on all mobile devices, the constant support costs, and the difficulty of managing mobile devices are the main reasons for the tendency to create educational mobile applications for a single mobile platform.

Local mobile app development requires submission to app stores, the Apple App Store for iOS, and Google Play apps for Android. However, before launching the mobile app, you'll need a developer account in the Apple App Store and Google Play Store. The release of the application in the application store requires the preparation of metadata, including: 1) Application name; 2) Description; 3) Category; 4) Keywords; 5) Start icon; 5) App Store screenshots.

The group set up to create educational mobile apps is different from a typical mobile app developer group. Since the process is related to education, there should be professionals with a high pedagogical level among the group members and who have a good understanding of the psychological aspects of e-learning resources or have such abilities.

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