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Faculty of Mathematics, Informatics and Computer Science

PROJECT PROPOSAL

IOS MOBILE APPLICATION DEVELOPMENT FOR EDUCATIONAL PLATFORM PUBLEAR

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Abstract

For the last decade online means of education have become an integral part of almost every sphere of education – schools, universities, and completely independent learning options such as online schools, and courses hosting platforms. The COVID-19 pandemic brought the EdTech popularity among the masses of students.

Such a great attention to the field of e-learning makes this field an interesting sphere for investments and embodiment of new ideas. Especially considering the fact that strong trends like bite size learning and clip thinking have shown their stability over a long period of time, implementing the product with these key features in mind may show incredible results in terms of retention and admiration across the users. Numerous of research suggest that newly appeared trends could be applied in EdTech and bring the education to the next level by increasing the academic achievements and engagement amongst students compared to traditional ways of obtaining knowledge.

This work uses a scientific based approach in application development. The paper contains not only a detailed explanation of technical parts of the product, but also a fair justification of chosen methods and mechanisms according to research in social science, IT, and neuroscience.

Keywords: `edtech, e-learning, mobile application, ios, bite size learning, gamification`

Introduction

Background

Today the market is full of different EdTech platforms. After the year of 2020 their number has grown dramatically because of the increased need for new ways of education without personal presence. These platforms vary in a number of aspects – the sphere of education (scholar education, individual courses, marathons, etc.), the format of education process – webinars, long read articles and, pre-recorded video courses and many other types, and price.

The market rule in every sphere is pretty simple – business may be successful if the product is demanded. Consequently, the goal is to focus on the distinctive features for new product. Although the ideas may not be original and they might appear in already sustainable products, the key is to implement a set of them in one app to provide users with the best experience. These ideas for Publear are gamification, bite size learning, and interactivity.

Problem Statement

Traditional approaches to offline education are inevitably becoming less claimed in our society because of the changing trends. Furthermore, the EdTech trends appeared even from 5 to 10 year ago are also losing their relevance in modern world.

Though the platform following the up-to-date trends seems a logical solution for the industry. The main problem can be formulated as finding the set of features at currently available platforms on the market, extracting the relevant to our time mechanisms used in e-learning and combining these findings into one new product.

Since the electronic learning in terms of courses is a two players game, the platform must pay special attention to both learners and course creators. For this purpose, it is obligatory to define the key factors which make the learning and publishing processes convenient and productive.

Work Objectives

The aim of the work is not limited by only the scientific papers research or the application implementation, but to combine both of these parts in one work. The list of goals may be formulated as follows:

1. Conduct research on current trends and methodic and justify the proposed solution.
2. Perform a market analysis and extract key features to implement on the platform.
3. Implement the mobile iOS application, backend with API and testing mechanism.
4. Deploy the app, obtain users feedback, and improve the experience via iterative method.

Work Delimitations

The main delimitations relate to the practical part of the work. The platform consists of a set of components, such as backend with courses exporter mechanism, API, client mobile app, mobile app design, web application, etc. Hence the need to create a development team with backend and mobile developers and UX/UI designer. In this work I am personally fully responsible for mobile application development and partially for backend development.

This work mainly focuses on the mobile application development phase and mechanisms implemented on the backend of the app – course exporter and API.

Some main components of server side will be described only in passing, for instance database structure and authorization process.

The other limitation is caused by the time and resource constraints – it is the course creation interface. To save development time for better mobile app development, for the first iterations of the product there will be no web interface for course creators. Instead of creating an application with an editor on the platform our solution proposes to use the existing tools and adapt the infrastructure to use them as the source of content. In order to provide users with a convenient way to create and edit their courses our platform maintains integration with Notion. This process is made easy for course creation by virtue of templates Publear provides for different courses and official tutorials on how to create, publish and evolve courses.

Literature Review

EdTech trends

As stated in the outset, the online education trend is growing for the past years rapidly, the number of EdTech companies increases every year. The main goal of this work is to conduct research on the e-learning industry to obtain a deep understanding of current market trends, the causes of the rising amount of attention to this sphere and best practices in the electronic education applied by other companies and apply retrieved knowledge to the mobile application for educational platform `Publear`. All of these would allow the project to come to life and to be successful on multiple levels – users engagement, popularity, and convenience of the product.

To begin with, the EdTech sphere was not so popular at least 10 years ago. The only way of using electronics for education was e-books and textbooks for university. Even these features of the nascent EdTech were not generally accepted in all the educational establishments.

Actually, numerous of research advocates that the amount of e-learning applied for educational purposes started to increase rapidly only just since the COVID-19 pandemic (Xue & Crompton, 2024). Likewise, the number of corresponding EdTech companies started to grow. That happen due to the leak of personal communications and safety precautions during the lockdown phase. The education could not be stopped for such a long time, thus the alternatives had to appear soon. The same conclusion appeared in the '*Research Trend on Educational Technology Issue: Post Pandemic Instructional Preference on Digital Utilization*' with ever higher scale of influence on many spheres of modern society (Susilana, 2023).

Despite the fact that many of the giant companies in the EdTech industry had been founded before the 2019, they were not such popular in the past. That could be seen from the EdTech market size analysis. The upward trend has begun in the first quarter of 2020. The stock prices for such companies as Coursera, EDX and Udemy were performing a decline since the issue of shares until the year of 2020. Mainly such upgrowth was caused by the intensive rise of the users or learners on the platforms.

According to Pavlo Korpalo's research, the number of students on EdTech platforms has doubles during the two-year period since 2019 to 2021. And they forecast this trend to continue up to the 2050, attracting more than 2 billion new users (or customers in terms of business) to the industry (Korpalo, 2022).

The other crucial point to understand is the overall trends in electronic education and in content consumption. Number of studies showed that currently users are more inclined to something called bitesize learning. This approach includes fine splitting the information of the topic to make it easier to stop at some kind of checkpoint and resume the reading (watching, listening) from where the student stopped. Because of the trend on short stories and videos, that became popular since 2020, people more and more often consume content in this manner, using as least time as possible. This pattern also brings another problem that is required to be solved – the user's retention. Platform must apply a variety of mechanisms to retain attention of the user inside the product.

Gamification, attention, and academic achievements

There are many examples of different mechanisms that are used to retain users in the app. Some of them relay on the overall appearance of the application – it should be designed with UX techniques in mind, such as suitable color schemes, handful navigation and elaborated user scenarios. Plenty of research

testifies that the gamification feature not only enhances engagement and retention, but moreover increases the information assimilation and academic achievements. According to the science research hold by Pechenkina (Pechenkina, 2017), gamified mobile apps provide exactly these results. The work confirmed the retention increase by more than 12% in one semester and also defined a strong correlation between completing the mobile app tasks and university grades: 'A significant positive correlation of .40 was found between performing well on the app tasks and achieving higher academic grades …' (p.6).

To add more, gamification is a common principle used in Duolingo ecosystem. The whole education journey is built with game scenario in mind. To emphasize the significance of trends exploration, the great example is the changings in the reading techniques. According to the research (Klinton Bicknell, 2020):

"… the human brain has learned to optimize eye movements in reading even at the fine-grained level of character-position targeting, reflecting efficiency-based sensitivity to ongoing cognitive processing" (p.1).

This evidence suggests that the people's behavior changes over time and it's vital for the product to maintain the newly appearing trends in order to achieve success.

Mobile development

In terms of the project implementation, the main focus is on the mobile app development. There are a number of critical points vital to achieve in order to get the application that satisfies the needs of the customers. These include such requirements as great performance, application reliability, responsiveness and thought out to the smallest detail interface, that covers various user scenarios.

UI framework and UI architecture patterns

Starting from the very beginning, SwiftUI has been chosen as the main UI framework. According to the Ronneling's research (Ronneling, 2023) on the UIKit and SwiftUI performance comparison, the UIKit still holds the superiority over the relatively new Apple's UI framework. In spite the work that showed the slight (less than 25% in common scenarios) superiority of UIKit over SwiftUI in memory and CPU usage, the simplicity and speed in writing code cover the possible shortcomings. The conclusion Ronneling comes to in his work suggests the following:

'… although UIKit exhibited slightly faster performance and lower memory consumption than SwiftUI, the benefits provided by SwiftUI, including faster development time, reduced code length, and live previews should not be overlooked' (p.75-76).

After the UI framework was chosen, the appropriate architecture should be picked. According to Miroiu and Bucerzan (Miroiu, 2023) the MVVM pattern fits perfectly with SwiftUI, moreover it also allows to easily reuse the common components inside application and helps to avoid cluttered patterns such as VIPER in cases then there is no need for them.

The MVVM architecture is also recommended by the Apple in the SwiftUI guides. This pattern has a lot of benefits in conjunction with SwiftUI. One of them is the out of the box reactive programming support with the Combine framework. However this framework is one of the Apple's first party library, it is not currently as deeply accepted as RxSwift is, according to the paper. Alessandra Pereira (Pereira, Gama, Zimmerle, & Castor, 2023) addresses the research to the problem of insufficient amount of information in the IT community about the newly appeared Combine framework, thus the development phase might take longer

than that with RxSwift development. The problem she determines using the data mining techniques formulates as '… research gap that exists in Swift Combine by identifying and understanding the key challenges …' (p.2-3).

The work is based on the research listed above, going even further, creating components built on the newly created system of CommonViews and CommonViewModels. The presented approach brings to existence the new way of using RxSwift binding with Combine and SwiftUI frameworks.

Global architecture and Testing

The next development stage is the global architecture. This step is significant due to a number of reasons. Firstly, this defines the way the app scales while new features appear. Also, the architecture determines the application testing methods that could be applied. El-Morabea wrote a work on Dependency Injection (DI) mechanisms usages in mobile development where described the positive outcomes from using the DI in application design that lets the developer to add mocks to the framework for testing purposes without having an invasive code base change – 'using them is essential for having an application that's highly covered with tests and makes our tests more stable' (p.2-3).

The other common testing phase is the public beta testing. Huy Le (Le, 2016) provides the descriptive overlook on the TestFlight system usage for the beta testing purposes. That mechanism enhances testing process via using the real users' data and experience, which help fix problems before they occur in the production phase: 'With the use of real users and data, it would be easier for developers and testers to detect bugs' (p.28-31).

Methods

As for technical part, the work is based on several methods, applied on different levels of the development. Firstly, the project management phase (to take under control teamwork and the project's convergence time) uses Agile system paradigm. Secondly, the mobile development process with different architecture approaches. To be more precise, this includes global app architecture with DI components and POP development paradigm, local architecture patterns such as MVVM pattern for UI side and dependencies factories, and frameworks usage. The development mostly relies on technical and statistical research on mobile app development, especially UI performance and effective work with data.

Furthermore, the product relies on massive scientific research, which showed a positive impact of adding gamification and interactive elements in application. Thus, the app was developed with these methods in mind. It affected not only the development phase, but it formed the basis of the application at the level of idea and design.

To determine the success factors of the project, basically, 2 marketing methods were used: competitors and target audience research. The first method involves existing online education platforms analysis. At this stage, foreign and Russian applications and websites were reviewed, the advantages and disadvantages of each platform were analyzed. The results were presented in the form of a comparative table. The second approach involved conducting a survey with potential users from both sides: students and educators. The target audience was categorized by age, gender, level of education, and learning and teaching objectives. The study was carried out in the form of a survey with multiple-choice answers. Based on the results of the survey, the needs of the target group and the challenges associated with existing solutions on the market were identified. With

the help of the described customer development process, a user-specific orientation was configured to best match the user's request.

Anticipated Results

Upon completion of the work several results are expected. They could be split into categories: development, fullness of content, and deployment. As for development part, this work implies the creation of fully functional mobile platform with all basic features described earlier implemented in ready to release stage. This includes mobile app with courses learning flow, authorization, general and account settings. The great attention should be paid to modern application interface, responsive UI, and overall performance. Fullness of content is not a number one priority task for this part of project. However, platform must contain a number of courses to present for user, including sample courses for testing purposes. Courses presented on the app should represent the technical functionality of the platform, which makes it necessary to have courses that vary in spheres and in kinds – mini and full courses. Also to demonstrate the practice flow, some courses have to provide practices in all the supported formats.

Application deployment consists of testing and release phases. For performing a high-quality testing, several mechanisms must be implemented, like A/B testing and Unit testing. Testing also must include TestFlight program to obtain users' feedback. Application should be ready to release publicly (or for a limited number of people) in the AppStore, thus the app must pass Apple app quality check and follow Apple's Human Interface Guidelines (Apple Inc., 2024).

Conclusion

In conclusion, the main points of this paper may be summarized. This work focuses on using scientific based approach for creating an EdTech platform in form of a mobile application. The Publear platform introduces the gamification and interactivity as key features of the product to enhance the education process and stimulate better academic achievements.

The exhaustive examination of existing mechanisms of gamification and achievements system undertaken in this work provides valuable insights that have the potential to augment the perception of the product by the target audience.

This product aims to become a strong base for an education platform in the future by presenting the most valuable features which are vital for production stage.

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