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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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# 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, 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 …’ (Pechenkina, 2017).

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:

“… 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” (Klinton Bicknell, 2020).

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 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’ (Ronneling, 2023).

After the UI framework was chosen, the appropriate architecture should be picked. According to … 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 MVVV 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 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 …’ (Pereira, 2023).

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 (El-Morabea, 2021) 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’.

The other common testing phase is the public beta testing. Huy Le 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’ (Le, 2016).

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