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Gamification methods to improve UI/UX in digital learning

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Abstract. User Interface (UI) design plays a crucial role in digital education, directly influencing user engagement, cognitive load, and learning efficiency. Poorly designed interfaces can lead to confusion, decreased motivation, and hindered skill development, while well-structured UI enhances accessibility and usability. One effective approach to improving UI/UX in educational platforms is gamification, which integrates game-like elements to boost engagement, facilitate learning, and make digital interactions more intuitive. This study explores how gamified UI design can reduce cognitive overload and enhance user experience by incorporating features such as progress tracking, rewards, challenges, and interactive elements that encourage users to engage with learning materials actively. The research examines various applications that successfully implement gamification strategies, analyzing their effectiveness in improving knowledge retention, motivation, and long-term user participation. Additionally, the study investigates the psychological aspects of gamified learning, demonstrating how elements such as goal-setting, feedback loops, and competition can enhance the educational process. By bridging UX/UI principles with gamification strategies, this research provides valuable insights for designers, educators, and developers looking to create more effective, engaging, and user-friendly digital learning environments. The findings suggest that a well-balanced combination of usability, motivation, and interactivity not only improves learning outcomes but also fosters a more enjoyable and immersive educational experience, ultimately enhancing user skill development and platform usability.

Keywords: *ui/ux design, user learning, gamification, education, technology, digital applications.*

1. Introduction

In the modern era of information technology, statistical data from datareportal.com indicate a continuous annual increase in the number of mobile device and internet users [1]. Figure 1 presents statistical data indicating that the average time users spend interacting with digital technologies is approximately seven hours. This trend indicates that the internet and digital devices have become integral components of everyday life for nearly every individual. One of the factors contributing to the growing significance of digital technologies in modern society is online learning.

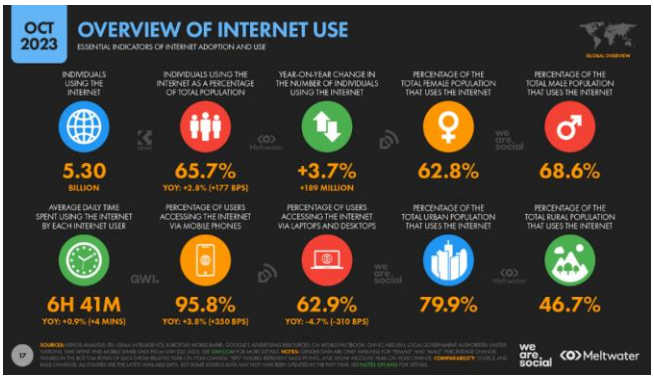

Figure 1. Datareportal.com statistics [1]

Hasugian et al. [2] argue that online courses are currently in high demand, particularly among professionals and students. It is believed that the ability to engage in self-development enhances employability and provides greater opportunities in life. Distance learning provides the opportunity to study at an affordable cost and at any convenient time. Its benefits include access to learning resources, interactive learning experiences and opportunities to share knowledge with other students. Therefore, user experience plays a crucial role, user interface (UI) design is a key factor determining how users interact with digital platforms and applications [3]. At the same time, with the increasing number of available websites and applications, as well as the development of technologies, there is a growing need for user education and the enhancement of their skills in utilizing digital tools [4]. This is particularly relevant, as many of the existing platforms do not allow users to interact directly with instructors [5].

The problem of information overload is a major concern, frequently arising from an overwhelming amount of information and features provided by websites and apps, leading to confusion and difficulties in learning. This issue is further exacerbated by subpar design, which makes it difficult for users to navigate and understand new platforms [6]. Moreover, challenges in navigating the interface and quickly locating necessary information or features add to the learning barriers users encounter. This issue leads to various consequences. Users who struggle to comprehend and operate applications may opt for more intuitive alternatives, causing a decline in user retention [7]. Poor UI design can disrupt workflow and reduce the efficiency of user tasks [8]. Additionally, users might spend unnecessary time and effort trying to understand the interface, which diverts their attention

from core activities, leading to a waste of both time and energy [9].

Effective user interface (UI) design can play the role of a key mentor, helping users learn and develop their skills in digital applications and platforms. User interface serves as the bridge between a human and a computer, simplifying interaction and ensuring convenience in task execution. Usability, on the other hand, functions as a tool that offers methods and means for efficient interaction with the aim of achieving specific tasks. Intuitive navigation ensures smooth and quick interaction, while educational elements such as tooltips and videos create a learning environment, removing barriers for newcomers. User support via chat and help desks provides reliable guidance, and gamification encourages users to actively develop skills [10]. Tutorials and step-by-step instructions serve as trusted partners in the learning process, providing users with the resources they need to successfully adapt. These solutions come together in a harmonious UI design that enhances the user experience and builds skills in a digital environment.

2. Materials and methods

2.1. Literature Review

The ease and straightforwardness with which users can access functions right after engaging with an application's interface align with the principles of effective navigation, thus enhancing the overall quality of the user experience (UX). Vlasenko et al. [6] conducted a theoretical review of research papers and resources that provide guidelines for UI/UX design in the development of educational systems. By relying on existing research, designers can benefit from proven methods and best practices, leading to more effective and efficient design decisions. However, depending solely on existing resources and scientific works may limit the scope of the research, as it may not cover all aspects or specific scenarios relevant to the design project. Jusoh et al. [5] used UX research methodology which included qualitative and quantitative data. Qualitative methods such as in-depth interviews can help researchers understand user needs, motivations and problems in a deeper context. But require more time and resources to conduct and analyze the data. Quantitative methods can provide quick results and allow comparisons between different user groups. These methods may not reveal subtle details and context that may be important to the user experience. In another study to examine the platform's usability, willingness to adopt, and comprehension of its various functions, researchers employed questionnaires based on the SUS methodology. Respondents were interviewed and asked to rank the most suitable answer on a scale of 1 to 5 (from «strongly agree» to «agree»). The study aimed to identify challenges related to platform usage [7]. SUS is a relatively simple and quick way to assess the usability of a system. It does not require complex calculations and can be easily adapted to different systems. Focuses mainly on evaluating the usability of the system, and may not consider other aspects such as efficiency, user satisfaction, etc. Nasution et al. [10] employed the design thinking approach, which involves a series of steps focused on identifying and understanding users, their challenges, and potential solutions, enabling the author to define the issue from a specific perspective. The use of prototypes and testing facilitates the practical evaluation of ideas, allowing for refinements based on user feedback. However, the iterative process, which includes phases of research, prototyping, and testing, can demand considerable resources and time.

Table 1. Comparison of the existing approaches

Approaches	Proposed solution	Strength	Limitations
Vlasenko et al. [6]	Theoretical analysis of research papers and resources	Proven methods and best practices from existing research	Limited scope of research
Jusoh et al. [5]	Research methodology which included qualitative and quantitative data	Can help researchers gain a deeper understanding of users' needs, motivations and problems. It is feasible to compare various user groups.	Requires more time and resources to conduct and analyze data. Do not reveal subtle details that may be important to the user
Korableva et al. [7]	Questionnaires based on the SUS methodology	SUS is a relatively simple and quick way to assess the usability of a system	Focuses on evaluating the usability of the system, and may not consider other aspects such as efficiency, user satisfaction, etc.
Nasution et al. [10]	The design thinking method	Test ideas in practice and then make adjustments based on feedback from users	Can require significant time and resources
Pamudyaningrum et al.[11]	Introducing game components into the educational process	Can lead to improved learning and play skills through the application of gamification techniques	Not all users may be motivated by game elements
Laur and Lutoshkin[12]	Gamification combined with UI/UX design	Increasing the involvement and motivation learners	In some cases, the use of game elements can distract from the main objectives if they are not applied correctly.
Shudegova et al.[13]	Analysis existing DLS	An analysis of existing systems allows you to learn from the experience of other organizations and training platforms. This can help to avoid repeating mistakes and implement best practices.	Sometimes analyses of existing systems may not consider student opinion and feedback, which can lead to unsatisfactory results.
Our solution:	Defining Gamified Interfaces to Reduce Cognitive Load and Enhance User Experience.	Gamified interfaces increase motivation and engagement by reducing cognitive load and improving learning.	The effectiveness of gamification varies among users.

According to Pamudyaningrum et al. [11], incorporating game elements into the educational process can boost engagement, generate enthusiasm, and foster both learning and play skills through the application of gamification techniques. However, not all users may find game elements motivating; some may lack interest or even reject this approach. Laur and Lutoshkin [12] pointed out that automating assessments and tracking progress, along with visualizing learning achievements, can further motivate students. Thus puzzles, quizzes, mini-games minimize the lack of student engagement. In some cases, the use of game elements can be ineffective and even distract from the main objectives if they are not applied correctly. Shudegova et al. [13] studied and analyzed the existing distance learning systems (DLS) to identify a list of requirements for a distance learning system. Through this identified positives and negatives sides for different learning platforms.

However, these methods represent a significant advance in user learning, but they often focus too much on the general aspect without considering the specific part that affects learning. Studying theoretical materials on learning platforms and analyzing existing platforms, key characteristics of visual design that facilitate easy learning are identified. To improve efficiency, we identify gamified interfaces to reduce cognitive load and enhance user experience.

2.2. Integration of Gamification to Enhance UI/UX in Educational Platforms

Modern educational platforms often struggle with UI/UX issues, such as information overload, complex navigation, and lack of user engagement [14]. These factors negatively impact the learning process, making it difficult for students to effectively interact with the platform. Gamification offers a promising solution by integrating game design elements into non-game contexts to improve user experience and motivation [15].

2.2.1. Goal-Oriented Engagement

Gamification can be designed to focus on achieving specific goals, encouraging users to return to an app repeatedly. An example of this approach is the Focus Plant app (Figure 2), which helps users stay focused on tasks by discouraging phone distractions. Users set a goal, such as 45 minutes of uninterrupted work. During this period, the app accumulates water, which can be used to nurture virtual plants. However, if the user leaves the app, the accumulated water is lost, reinforcing the habit of sustained focus.

Figure 2. Screenshot of Focus Plant App

2.2.2. Constraints and Limitations

Setting constraints is an effective way to prompt users into action. Deadlines, for instance, can create a sense of urgency, motivating users to complete tasks within a set timeframe. A great example is the MyBook reading app (Figure 3), where users can set personal reading goals within a specific time period. This feature encourages them to return to the app more frequently, increasing engagement and reinforcing the habit of regular reading.

2.2.3. Goal-Oriented Engagement

One of the most effective ways to motivate users is through achievements and rewards, which create an incentive to return and engage further. For instance, the EWA language-learning app rewards users for reaching milestones - learning 50 words, completing 100 lessons, or maintaining a 10-day study streak (Figure 4). Similarly, Duolingo is well-known for its reward-based approach, though many users might already be familiar with it.

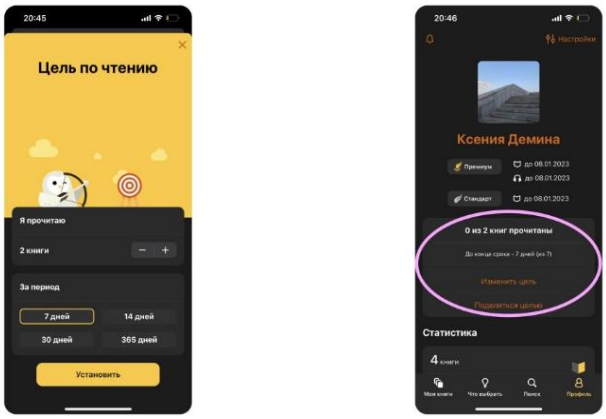

Figure 3. Screenshot of MyBook reading App

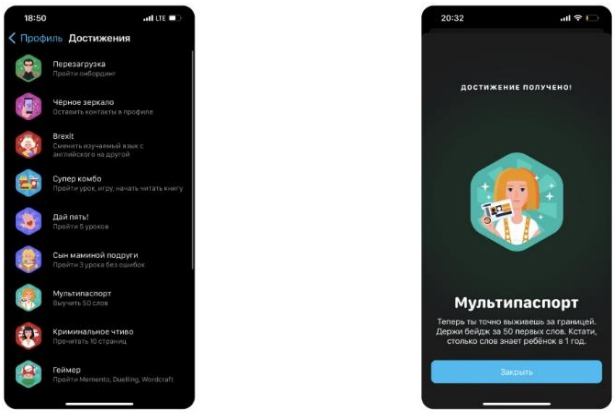

Figure 4. Screenshot of EWA language-learning App

2.2.4. Competition

Introducing competitive elements can be a strong motivator. The drive to become a top player or earn a high-ranking position encourages users to stay active within an app. The EWA app implements this by awarding points for completed lessons (Figure 5). Users who accumulate more than 100 points qualify for weekly competitions, where the top 10 participants advance to a higher league. This competitive structure also integrates the principle of limitations, as the ranking resets every week, prompting continuous engagement.

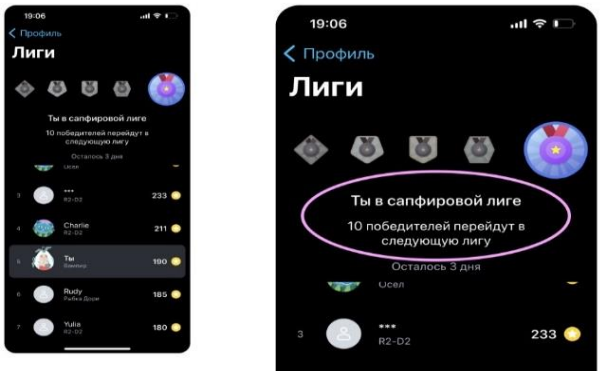

Figure 5. Screenshot of EWA language-learning App

2.2.5. Points and Leveling Systems

Gamification can also be implemented through a structured point or level system, where users earn points for specific actions or achievements. For example, in EWA (Figure 6), users receive points for every completed lesson, game victory, or book read. As they accumulate points, they progress through levels, fostering a sense of accomplishment and sustained motivation.

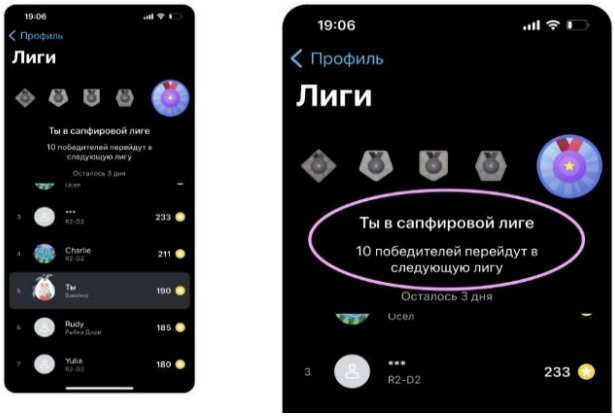

Figure 6. Screenshot of EWA language-learning App

3. Results and discussion

The implementation of gamification in UX/UI design offers significant advantages in enhancing user engagement, motivation, and retention. By incorporating goal-oriented tasks, constraints, rewards, competition, and point systems, applications create a more immersive and interactive experience. Each method serves a unique purpose - goal setting encourages habit formation, constraints foster urgency, rewards provide positive reinforcement, competition drives engagement, and point systems sustain long-term involvement [16-17]. However, while gamification can improve user experience, it must be applied thoughtfully. Poorly executed gamification may overwhelm users, create unnecessary distractions, or fail to align with the app's core purpose. Therefore, a balance between usability and engagement is essential to ensure that gamification elements effectively contribute to user satisfaction rather than hinder the experience.

4. Conclusions

Gamification is an effective strategy to mitigate UI/UX challenges in educational platforms, enhancing user engagement, improving navigation, and reducing cognitive load [18-19]. Educational platforms can enhance the learning experience by incorporating game features like rewards, interactive lessons, and mini-games, leading to a more engaging and effective environment for learners. However, careful implementation is required to ensure that gamification remains a tool for enhancing learning rather than distracting from it.

Future research should focus on optimizing gamification techniques to suit diverse learning preferences and improve the overall digital learning experience. Additionally, further exploration into the long-term effectiveness of gamification in educational settings will help refine strategies for sustainable engagement. By understanding the nuanced impact of gamification, developers and educators can create more inclusive and effective digital learning solutions.

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Цифрлық оқытудағы UI/UX жақсартуға арналған геймификация әдістері

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Аңдатпа. Пайдаланушы интерфейсінің (UI) дизайны цифрлық білім беруде маңызды рөл атқарады, ол пайдаланушының қызығушылығы, когнитивтік жүктемесі және оқу тиімділігіне тікелей әсер етеді. Нашар ойластырылған интерфейстер түсінбеушілікке, мотивацияның төмендеуіне және дағдылардың баяу дамуына әкелуі мүмкін, ал жақсы құрылымдалған пайдаланушы интерфейсі қолжетімділік пен ыңғайлылықты арттырады. Білім беру платформаларындағы UI/UX жақсартудың тиімді әдістерінің бірі – пайдаланушылардың қызығушылығын арттырып, оқуды жеңілдетуге және цифрлық өзара әрекеттесуді интуитивті етуге бағытталған ойын элементтерін енгізетін геймификация. Бұл зерттеу геймификацияланған UI дизайнының когнитивтік жүктемені азайту және пайдаланушы тәжірибесін жақсарту үшін қалай жұмыс істейтінін қарастырады. Ол үшін прогресті бақылау, марапаттау жүйесі, тапсырмалар және интерактивті элементтер сияқты мүмкіндіктер қарастырылады, олар пайдаланушыларды оқу материалдарымен белсенді жұмыс істеуге ынталандырады. Сонымен қатар, зерттеу геймификация стратегиялары табысты қолданылған түрлі қосымшаларды талдап, олардың білімді есте сақтау, мотивация және пайдаланушылардың ұзақ мерзімді қатысу деңгейін жақсартудағы тиімділігін зерттейді. Зерттеу аясында геймификацияланған оқытудың психологиялық аспектілері де қарастырылады, атап айтқанда, мақсат қою, кері байланыс циклдары және бәсекелестік элементтері білім беру процесін қалай жақсарта алатыны көрсетіледі. UX/UI қағидаттарын геймификация стратегияларымен ұштастыра отырып, бұл зерттеу білім беру платформаларын неғұрлым тиімді, тартымды және пайдаланушыға ыңғайлы етуге ұмтылатын дизайнерлер, оқытушылар және әзірлеушілер үшін құнды мәліметтер ұсынады.Зерттеу нәтижелері көрсеткендей, қолайлылық (юзабилити), мотивация және интерактивтіліктің теңгерімді үйлесімі тек оқу нәтижелерін жақсартып қана қоймай, сонымен қатар оқыту процесін анағұрлым қызықты әрі тартымды етіп, пайдаланушылардың дағдыларын дамытуға және платформаның ыңғайлылығын арттыруға ықпал етеді.

Негізгі сөздер: *UI/UX дизайн, пайдаланушы оқуы, цифрлық қосымшалар, білім беру, технологиялар, геймификация*.

Методы геймификации для улучшения UI/UX в цифровом обучении

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Аннотация. Дизайн пользовательского интерфейса (UI) играет важнейшую роль в цифровом образовании, напрямую влияя на вовлеченность пользователя, когнитивную нагрузку и эффективность обучения. Плохо продуманные интерфейсы могут привести к путанице, снижению мотивации и замедлению развития навыков, в то время как хорошо структурированный пользовательский интерфейс повышает доступность и удобство использования. Одним из эффективных подходов к улучшению UI/UX в образовательных платформах является геймификация, которая включает в себя игровые элементы, чтобы повысить вовлеченность, облегчить обучение и сделать цифровое взаимодействие более интуитивным. В данном исследовании рассматривается, как геймифицированный дизайн пользовательского интерфейса может снизить когнитивную перегрузку и улучшить пользовательский опыт за счет включения таких функций, как отслеживание прогресса, вознаграждения, задачи и интерактивные элементы, которые побуждают пользователей активно работать с учебными материалами. В исследовании рассматриваются различные приложения, в которых успешно реализованы стратегии геймификации, анализируется их эффективность в улучшении запоминания

знаний, мотивации и долгосрочного участия пользователей. Кроме того, в исследовании изучаются психологические аспекты геймифицированного обучения, демонстрирующие, как такие элементы, как постановка целей, петли обратной связи и соревнование, могут улучшить образовательный процесс. Соединяя принципы UX/UI со стратегиями геймификации, данное исследование дает ценную информацию для дизайнеров, преподавателей и разработчиков, стремящихся создать более эффективную, увлекательную и удобную для пользователей цифровую среду обучения. Результаты показывают, что сбалансированное сочетание юзабилити, мотивации и интерактивности не только улучшает результаты обучения, но и способствует получению более приятного и захватывающего образовательного опыта, что в конечном итоге повышает уровень развития навыков пользователей и удобство использования платформы.

Ключевые слова: *UI/UX дизайн, обучение пользователей, цифровые приложения, образование, технологии, геймификация.*

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