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Description automatically generatedMSc Project Report**

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| Start Date: | Submission Date: |

**CONSENT**

I agree

That the University shall be entitled to use any results, materials or other outcomes arising from my project work for the purposes of non-commercial teaching and research, including collaboration.

**DECLARATION**

**I confirm:**

* **That the work contained in this document has been composed solely by myself and that I have not made use of any unauthorised assistance.**
* **That the work has not been accepted in any previous application for a degree.**
* **All sources of information have been specifically acknowledged and all verbatim extracts are distinguished by quotation marks.**

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| Student Signature: Akinyosoye Augusta Oghogho | Date Signed |

**ABSTRACT**

**DEDICATION**

This work is dedicated to the Almighty God, who has been my ultimate strength throughout this journey.

I also dedicate this work to my amazing son Jayden.

**CHAPTER 1: INTRODUCTION**

**1.1 INTRODUCTION**

The combination of education and technologies provides a new way for people to learn in the era of information and communicationtechnology. Liu & Yu (2023).It is possible to transform the educational process, capture students' attention, and foster a lifelong love of learning by implementing gamification and rewards into academic learning. This project is dedicated to creating an exciting learning platform that has a clear goal of redefining education.

**BACKGROUND**

The purpose of education is to create a generation that adds value through its existence. Volatility in the industry environment leads to changes in what is required to be delivered to the students in terms of education. With generations changing, one cannot maintain the same ways of teaching. This has intrigued researchers to decipher how students' motivation and engagement influence their learning, especially with the help of technology in areas like lecture content, evaluations, exams, etc. In the educational sector in the United States, motivation and engagement are the biggest challenges that aim to be tackled through gamification. Some successful gamification examples from the education sector are Khan Academy, Treehouse, Udemy and Duolingo that have used interactive content, created a large database of topic, wise videos and have devised novel mechanisms of tracking student progress with the help of badges and points (Fotaris, Mastoras, Leinfellner, &Rosunally, 2016). Game mechanics generally involve points, badges, and leaderboards (Hew, Huang, Chu, & Chiu, 2016). The article also stated that the advantage of game mechanics in education is that saves time, and it is convenient. Also to award students with the proper points or badges or to change their positions on the leaderboard, teachers do not need to constantly monitor their students' activity.

Gamification is gaining acceptance to drive higher interest and engagement amongst users. Most of the prior research has focused on user perceptions and many experimental studies did not have control groups. Saxena, M. and Mishra, D. K. (2021)

Gamification is a word that has become synonymous with rewards. Most gamification systems focus on adding points, levels, leaderboards, achievements, or badges to a real world setting in order to entice people to engage with the real world to earn these rewards (Reiners and Wood 2015). Deterding, Dixon, Khaled, and Nacke (2011), provide a further definition of gamification as “the use of game design elements in non-game contexts”.

Similarly, Gamification refers to the process of incorporating elements of interactive game design into applications that are not games; it has recently gained popularity in educational institutions (Che Abdul Rani, M. F., Md Yunus, M. and Kasinathan, V. 2023). Gamification mechanics commonly include elements found in games such as points, badges, leaderboards, and progress tracking. A lot of prior researchers studied the strong appeal of video games as game-based learning and have tried to apply the same in education to enhance learner interaction and participation.

**1.2. PROJECT MOTIVATION**

Digital technology has revolutionized all facets of our lives in the 21st century including education. Students who were born in the digital era have grown up in a world where participation, interaction, and promptness are encouraged. It is often difficult fortraditional teaching approaches to maintain students' motivation and interest throughout the learning process. Scholars are searching for creative ways to address the ongoing issue of students' disengagement in educational content and its impact on learning outcomes.Similarly, when presented with difficult learning, pupils are more prone to become overwhelmed because there is no instant reward or win to keep them interested and motivated.A better strategy to look for possible solutions tostudents' unproductive feelings is to develop learning techniques like those used in well-functioning gaming settings.

**SIGNIFICANCE OF THE STUDY**

This paper aims to present the case of gamification through an analysis of the practice of gamification drawn from a range of worldwide examples to help policymakers, educators, and academicians design and implement relevant interventions to use it as an effective tool for Gen Z learners in higher education.

This research explores the intersection between gamification and education, with a specific focus on the development and design of a gamified educational app augmented by a reward system. The central objective of this study is to delve into the multifaceted dynamics of gamification within educational contexts and to ascertain how the strategic integration of reward systems can elevate the overall student learning experience.

The rationale for undertaking this research stems from a profound understanding of today's learners' evolving needs and expectations. In an era defined by digital fluency and the ubiquitous presence of technology, educational paradigms must adapt to align with the preferences and behaviors of contemporary students. Gamified educational apps, designed to foster engagement and motivation, hold immense promise as vehicles for educational transformation.

**REPORT STRUCTURE**

This project investigation report is structured into four main chapters: literature review, project specification, methodology, and conclusion. This structure was used to document the body of work that was carried out during the project investigation phase and provides a logical flow of information.

Chapter 2: Literature Review

This chapter deals with the various areas of background research that were undertaken during the project, ranging from the development of the gamified educational web application to setting a reward system to enhance student learning experience and exploration ofchallenges, and barriers, as well as the effect of gamification to the educational system.

Chapter 3: Project Specification

This chapter deals with the specifications of the project, detailing the functional and non-functional requirements.

Chapter 4: Methodology

This chapter discusses the methodology used for this project, the system concept and overview, the design alternative, and the actual design with its justification. The implementation and testing are also discussed in this chapter, as are the system design and architecture.

Chapter 5: Conclusion

This chapter talks about the conclusion of the project and makes recommendations towards a viable solution based on the research findings that are considered to be progress on the project

**CHAPTER 2**

**2.0 INTRODUCTION**

This section ofthe paper aims to present the case of gamification through different conceptsfocusing onthe practice of gamification and reward, drawn from a range of worldwide examples to help policymakers, educators, and academicians design and implement relevant interventions to use it as an effective tool for Gen Z learners in higher education.

**2.1 The Concept of Gamification in Education**

One key sector where gamification is being actively explored (mainly for its potential to motivate) is education. Education plays an important role in the advancement of society and, as a result, influences all of its constituents. According to Aldalur and Perez(2023) Daily, we strive to improve the methods of instruction and learning at all levels of educational institutions. Games thus appear as a potential means of improving the learning process and raising students' motivation levels. Games are known to engender motivation and engagement, and are notably popular, the proposal to incorporate game mechanics and principles to motivate the learner is appealing**.** Similarly, when presented with difficult learning, pupils are more prone to become overwhelmed because there is no instant reward or win to keep them interested and motivated. A better strategy to look for possible solutions to these students' unproductive feelings is to develop learning techniques like those used in well-functioning gaming settings. Fotaris *et al.* (2016).

Gamification in education refers to the introduction of game design elements and gameful experiences in the design of learning processes (Dichev. and Dicheva2017**).**Gamification in education also refers to the introduction of game design elements and gameful experiences in the design of learning processes. It has been adopted to support learning in a variety of contexts and subject areas and to address related attitudes, activities, and behaviors, such as participatory approaches, collaboration, self-guided study, completion of assignments, making assessments easier and more effective, integration of exploratory approaches to learning, and strengthening student creativity and retention (Caponetto et al.2014).

Its entry into educational environments and contexts seems to be constantly on the rise, driven by a large amount of research on this field of knowledge (FURDU; TOMOZEI; KOSE, 2017). Today, it is possible to create meaningful and engaging experiences through reward systems, systems in which a central element is gamification strategies (HILTBRAND; BURKE, 2011). Gamification inserts game element design usually done through badges, point, and stars into the teaching and learning process.

According to Gabe Zicherman in his textbook Gamification by Design, Gamification is “the process of game-thinking and game mechanics to engage users and solve problems” It’s not about developing full-on games, but rather it’s about using gaming attributes to drive engagement, and strengthen skills, or behavior changes. (Utendorf,2013) Learning is not made into a game; the features of games (curiosity, collecting, exploration, and domination to name a few) which entice players to engage are used to draw in learners.

Some successful gamification examples from the education sector are Khan Academy, Treehouse, Udemy and Duolingo that have used interactive content, created a large database of topic wise videos and have devised novel mechanisms of tracking student progress with the help of badges and points (Fotaris, Mastoras, Leinfellner, &Rosunally, 2016).

**Traditional Educationand Gamification**

Traditional approaches to education often grapple with the challenge of maintaining student engagement and motivation throughout the learning process. Students' disengagement from educational content and the resulting impact on learning outcomes have spurred a quest for innovative solutions that address this perennial issue. Gamification, the infusion of game-like elements into non-game contexts, presents an intriguing proposition—a pathway to reinvigorating education by capturing the essence of play and competition while imparting knowledge.

Education is a social system that teaches children fundamental intellectual knowledge, life skills, and cultural expectations throughout society. Every country in the world has some form of educational system, although these systems vary greatly. The traditional education system was working well prior to the incident in COVID-19. The Internet has provided us with other valuable alternativesto education and learning when compared to the traditional method of learning which has its roots dated back to hundreds of years... Khalil, Humayun, Jhanjhi (2021).

According to Romero & Ventura (2007), The most extensively utilized educational systems are traditional classroom situations. It is built on face-to-face communication between educators and students, which is facilitated by lecturers and teachers.

Similarly, when presented with difficult learning, pupils are more prone to become overwhelmed because there is no instant reward or win to keep them interested and motivated. A better strategy to look for possible solutions to these students' unproductive feelings is to develop learning techniques like those used in well-functioning gaming settings

According to Sobirova& Karimova(2021). The presence of the teacher at the center of the session and in the primary managerial role causes students to become passive participants.He also mentioned that notall students can be motivated by total teacher control. The student's creative initiative is not encouraged by it.There is no requirement to display various modes of communication because each step of the lesson is based on a set of rules and is chosen by the teacher.

Similarly, Aldalur and Perez(2023) stated that students find traditional classrooms boring and do not pay attention to the instructor.This is part of the key reason lecturers are introducing new technologies into the classrooms.

***Student Engagement with gamified Educational web Application***

According to Charles 2020, engagement is a "broad construct intended to cover significant academic as well as certain non-academic aspects of the student experience," which includes "participation in challenging academic activities, active learning, formative communication with academic staff, participation in enhancing educational experiences, and feeling accepted and supported by university learning communities." Coates, H. (2007)

**2.2 Benefit of Gamification in Education**

There are so many benefits attached to gamification. Gamification is effective not just because it encourages students to keep participating to win more points or rewards, but also because it generates genuine and powerful human feelings such as joy, mystery, excitement, and fulfilment (Dakroub et al. 2022; Spahrbier et al. 2022). This is in addition to the fact that gamification simply encourages students to learn more. Che Abdul Rani, M. F., Md Yunus, M. and Kasinathan, V. (2023)

Another reason for using games or game elements in education is that the interactivity needed when playing a game encourages students to play an active role in the learning process, thus supporting active learning, experiential learning, and problem-based learning (Oblinger, 2004). Martí-Parreño, J., Méndez-Ibáñez, E. and Alonso-Arroyo, A. (2016)

On the other hand, teaching methods have undergone incremental innovations aimed at improving student learning. Gamification in education helps to facilitate student exposure to problematic situations.

Gamification can also produce changes in behaviors through the formation of habits, reward reinforcement, and emotional response of individual sparticipating in the experience, thus requiring fewer cognitive resources each time a desired activity is reproduced (ROBSON  etal., 2015).  For this reason, gamification can be a powerful solution  to  solve  motivational  problems  within  learning  or  professional context.

**Gamification and the Reward-Based System**

A fundamental component of games is the reward. A reward is anything that a player receives for completing a task. In most games, the player's ability to earn rewards depends on whether they complete the game's objective, meaning that the emphasis is on the outcome rather than the gameplay mechanics. In addition, because the result in a game with a non-adaptive reward system is constant and predictable, the game will grow monotonous and dull. Because of this, it is important that there is a way to identify and track player behaviours. This will keep gaming from being monotonous and provide the user with more varied challenges since every choice they make will yield a unique reward. A strong rewards system will motivate the player to keep trying and working for the prizes. On the other hand, an ineffective reward system will be predictable and the player won't be driven enough to earn the benefits, which will reduce the player's motivation to play the game. HANNY HARYANTO , SUGIYANT , RONNY HARYANT(2011)

According to Deci, Koestner& Ryan (2001) Schools have historically included things like gold stars, best-student awards, honor roles and other reward-focused incentive programs used frequently to support or enhance student learning.

Numerous gamification systems that offer rewards induce an abrupt increase in user engagement as they attempt to become more familiar with the new system. Nicholson, S. (2015)

***Types of Reward***

1. Intrinsic rewards: In their healthiest stages, humans are energetic, inquisitive, interested, and playful beings from infancy on. They constantly show a desire to learn and explore new things, and they don't need outside incentives to do so. The act of engaging in an activity for its own inherent benefits rather than for a secondary benefit is known as intrinsic motivation. When a person is intrinsically driven, they are motivated by the fun or challenge involved rather than by external pressures or rewards. Ryan & Deci (2000) Page 60.
2. Extrinsic rewards - Students receive these outside rewards for completing activities or achieving goals, such as grades, compliments, or access to privileges.
3. Tangible reward - These types of rewards are often given to people as an incentive to encourage them to engage in behavior that they otherwise might not engage in. Deci, Koestner& Ryan (2001)

**CHAPTER 3: PROJECT SPECIFICATION**

This section covers the detailed project specifications based on the literature review.

**3.1 Project Description**

This research explores the intersection between gamification and education, with a specific focus on the development and design of a gamified educational app augmented by a reward system. The central objective of this study is to delve into the multifaceted dynamics of gamification within educational contexts and to ascertain how the strategic integration of reward systems can elevate the overall student learning experience.

Also, the incorporation of a reward system for learners who participate in the gaming activity will serve as motivation to the learner, sustaining the interest of the leaner to continue with studies. Therefore, points and badges are being made ready for learners who have successfully finished a particular task.

**3.2. FUNCTIONAL REQUIREMENT**

Functional requirements refer to a comprehensive detailed specification that describes the specific function and behavior of an application or software system to satisfy the need of its user. These specifications clearly define what the system should do and the features it must have to satisfy its user need. As this project focuses on a gamified educational web app with a reward-based system, we used the user story style to describe each requirement while using the MoSCoW technique.

1. Must have (Mo) are the requirements that must be included in final design of the product.

2. Should have (S) specifies the requirements that should be included, if possible.

3. Could have (Co) specify the requirements that are desirable and could be

Included in the product.

4. Won’t have (W) specifies the requirements that stakeholders want to have but will not be

Included or implemented in the product.

**FUNCTIONAL REQUIREMENT USING USER STORY**

**MUST HAVE**

1. As a user I want to be able access this application from any browser of choice, so that I can be able to view the content on the application home page without Login credentials.
2. As a user I want to be able to create an account and login to the application, so that I can have a personalized experience.
3. As a user I want to be able to Access the educational content on the web app, so that I can view available courses and choose from available options
4. As an administrator I want to be able to manage educational content, so that I can upload new content in various file formats such as PDFs, videos, edit and delete educational content.
5. As an admin I want to be able to manage user feedback, so that I can be able to sustain user satisfaction and make possible changes to the app if neccessary.

**SHOULD HAVE**

1. As a user I want to be able to engage in quizzes on the app, so that I can be able to enhance my knowledge and reinforce learning.
2. As a user I want to be able to earn points and badges and be able to view my achievements once I login to my profile.
3. As a user I want to be able to access feedback option easily on the application so that I can comment and give suggestion on educational content and the app.
4. As a user I want to access a chat room, so that I can be able to meet other users and share ideas.
5. As a user I want to be able to manage my profile, so that I can add courses to my library delete courses and edit profile.

**COULD HAVE**

1. As a user I want to be able to get notification, so that I can be able to keep track of new educational content.
2. As a user I want to be able to see my changes in levels, so that I can be able to track my progress
3. As an admin I want to be able to view the number of registered users so I can be able track increase in the application usage.

**WON’T HAVE**

1. As a user I want fantasy in the application, so that I can be able to feel like I am in a gaming environment.

**NON-FUNCTIONAL REQUIREMENT**

The non-functional will Usability, Security, performance, compatibility, scalability and accessibility.

1. Usability

* The web app must have a simple and easy to use interface that makes it possible for people with little to no expertise to use.
* The web app must be intuitive and user friendly for seamless navigation.

1. Security

* The web application must protect user’s data from third party.
* The web application must have a secure authentication and access control.

1. Performance

* The application should be fast and should respond to the interaction of users within a time frame. It should not take longer than 15 seconds to load the web page.

1. Compatibility

* The application must run and function correctly on different web browsers
* It must be compactable with various devices such as tablets, mobiles and desktops.

1. Scalability

* The application should be designed to handle increased user load.

1. Accessibility

* The application must be accessible to all users irrespective of location
* The web application should be designed with a carefully chosen colour scheme, front size, images and other design element to ensure all users including those with accessibility needs such as colour blindness can easily navigate through the app.

**PROJECT METHODOLOGY**

A professional Agile project management software development life cycle with scrum will be used for this project. Agile methodology was chosen for this project because its nature allows flexibility, responsiveness to user needs and continuous improvement in designing an application that aligns with user expectation.

**CHAPTER 4: DESIGN**

The chapter outlines the design phase of the development of the gamified education application with a reward based system.

**4.1. SYSTEM DESIGN**

System design is the process of designing and creating architecture, components, modules, interfaces and data for a system to meet defined requirements. It entails converting user specification into a model describing how the system will be built, organised and implemented.

**4.1.1. SYSTEM ARCHITECTURE OVERVIEW**

**HOME PAGE**

The home page serves as the default landing page for all user and is accessed by entering the URL into a browser.

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| **User** | **User Story** | **Outcome** | **Priority** | **Acceptance Criteria** |
| All users | As a user, i want to be able to enter the URL of this application into any brower of my choose | So that I can be able to gain easy access to the application from anywhere and also view the content of the homepage. | Must Have | By inputting the URL on any browser of choose the user Must be able to view the content on the application home page. |

**3.4. USER REGISTRATION/ LOGIN PAGE**

The User Registration/Login page is the secure entrance point to the web application, designed to provide our users with a seamless and secure experience. This allows users to create an account on the website, so as to login and log out before and after gaming activities on the gamified educational web application

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| --- | --- | --- | --- | --- |
| **User** | **User Story** | **Outcome** | **Priority** | **Acceptance Criteria** |
| All Users | As a user, i want to be able to:  To create an account, using my email as my Username and set up a password for my account  Login to the application my using account credentials (Username and password) I created.  Recover my password using the password recovery function | So that I can be able to:  Create an account  Login using my account credentials  Reset my password when I can’t remember my existing password. | Must Have | The user MUST be able to create an account successfully by inputting his username and password.  The user MUST be able to login using the already created account credentials (Username and Password).  The user MUST be able to reset the password  The user MUST NOT be able to log in with incorrect credentials. |

**3.5. EDUCATIONAL CONTENT**

Educational content is the most critical of this system. The priority is set as a MUST HAVE in the web app design.

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| --- | --- | --- | --- | --- |
| **User** | **User Story** | **Outcome** | **Priority** | **Acceptance Criteria** |
| All Users | As a user, I want to be able to:  Access the educational content on the web app | So that I can be able to:  Search courses from available educational materials  Track progress through completed courses  Participate in quiz section | MUST HAVE | The user MUST be able to:  View course of interest from available course  Track progress of the chosen course  Engage in quizzes to reinforce learning. |

**3.6. POINT/BADGES**

This application will fundamentally rely on points as a primary game mechanism due to their efficiency in providing an easy-to-understand metric to track accomplishments or track advancement and also badges which visually symbolize the accomplishments users attain after achieving high score.

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| --- | --- | --- | --- | --- |
| **User** | **User Story** | **Outcome** | **Priority** | **Acceptance Criteria** |
| All Users | As a user, I want to be able to:  Earn points and badges | So that I can be able to:  Keep track of my progress and accomplishments | MUST HAVE | The user MUST be able to:  Receive points upon completion of courses and quiz  Earn badges on achieving high score.  View total points earned on my dashboard |

3.6. CONTENT MANAGEMENT

Content management is critical for ensuring that the gamified educational app contains high quality, interesting and well organized library of educational content.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **User** | **User Story** | **Outcome** | **Priority** | **Acceptance Criteria** |  |  |  |  |  |
| Amin | As a Admin, I want to be able to:  Manage educational content within the application | So that I can be able to:  Provide users with a variety of engaging educational material | MUST HAVE | The Admin MUST be able to:  Upload new content in various file formats such as PDFs and videos.  Edit and update educational content. |  |  |  |  |  |

**3.7. FEEDBACK**

Feedback from users helps to ensure the educational content is impactful and relevant.

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| **User** | **User Story** | **Outcome** | **Priority** | **Acceptance Criteria** |  |  |  |  |  |
| All User | As a user, I want to be able to:  Provide feedback on educational content | So that I can be able to:  Help enhance the content and share my learning experience | SHOULD HAVE | The User be able to:  Easily locate and access a feedback on the  System.  Provide detailed feedback which can be comment or suggestion. |  |  |  |  |  |
| Amin | Manage user feedback | Maintain user satisfaction and promote desired changes on the app |  | View user feedback that has been submitted |  |  |  |  |  |

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