



# Gamification in Education: Designing a Gamified learning App

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**Abstract :** Students today desire to learn concepts in an enjoyable environment. It has been demonstrated that including gamified elements in a study provides scientific advantages including improved concentration, learning, and thinking. The proposed gamified application aims to develop a gamified learning environment where students may engage in competitions and quizzes to learn about various subjects and earn exciting rewards. The mobile app will provide a variety of championship categories based on different themes. This idea will simplify and make learning and self-evaluation pleasurable. Users will be able to select their interests and participate in different tournaments based on those preferences. The outcomes of competitions will be kept and documented to determine users' employability and skill in pertinent domain.

**IndexTerms - Gamification, Gamified Learning, Education**

## I INTRODUCTION

These days, students are seeking for enjoyable ways to learn subjects. Studying with gamified components has been shown to improve focus and broaden learning and knowledge, according to science. We created an app to help students and users understand subjects they find interesting using a gamified method because of this. Gamification has grown in popularity over the past few years. Nowadays, gamification is widely used in a variety of sectors, including business, education, training, and pretty much any job involving virtual reality. Literally, "gamifying a task or a tool that performs a task in a fun way" or "gamifying a tool that can reconstruct the world in the way we want it to be for us" are the definitions of gamification. Because the major goal is to give the impression that it is a game. You might as well be playing in real time. Gamification is a strong option in the context of education. Regarding the outcomes of learning, it offers a lot of benefits. A number of Edu-Tech platforms are making an effort to gamify education. In addition to studying concepts and putting their talents to the test, students are increasingly interested in having fun. Today's students are searching for creative, distraction-free study methods. Gamification has been proved in several studies to support cognitive development. Additionally, gamification increases a student's interest in learning. By participating in various competitions and quizzes, we created an app that is a gamified learning platform where students may learn concepts and win thrilling prize. The mobile app will include several championship categories based on a range of topics. Learning and self-evaluation will be made simple and enjoyable with this project.

## NEED OF THE STUDY.

### Gamification

In the modern world, gamification is a high priority. In many industries today, including business, education, training, marketing, and pretty much any task involving virtual reality, gamification is employed extensively. Literally, gamification refers to making a task, a tool that executes a work in a joyful way, or a tool that can remake the world for us in the way we wish. As the main objective is to make it seem like a game. It resembles real-time gaming. For instance, we enjoy shooting video games. Military services can utilise these kinds of virtual reality games and simulations to assess soldiers' situational awareness and reaction times. MilSim is a tool that the US army uses. Gamification is more in demand than ever before[1]. When Forbes Global 2000 firms were polled in 2013, more than 70% of them stated that they intended to employ gamification for marketing and client retention.

## Gamification in Education

In the context of education, gamification is a compelling choice. It provides a range of advantages related to learning outcomes. Several Ed-Tech platforms are working to incorporate gamification into the classroom. Students are more interested in having fun while learning new things and honing their abilities. Today's students desire fresh, distraction-free learning methods. Many research have demonstrated how gamification may support cognitive growth.[1,2]. Gamification also raises students' levels of involvement in their studies. Scientists performed a study to measure the level of engagement students displayed when utilizing gamification in the classroom. The researchers assigned a point system to various daily class activities. Then the students were measured based on their level of engagement. The researchers found that the game-like atmosphere was favorable in the classroom and increased productivity [3]. Traditional teaching approaches do not need pupils to demonstrate a strong interest in a subject. For instance, reading text and perhaps some visuals in a textbook to learn about cell multiplication in the body or organ function.[5]. Pupils at some time will find that intimidating to only memorise knowledge concerning heart's working. Students will find it more enjoyable to study by seeing organ function or any other event to comprehend visually how appealing science is instead of just reading and memorizing[6].

## REWARD-BASED LEARNING

Studying looks to be a long-term endeavour, which is why many find it uninteresting or struggle to focus on it. In our current educational system, we regrettably don't always focus on applying new information and developing knowledge; instead, we focus on passing exams, achieving some level of academic accomplishment, etc[4]. The gamification of education will make it enjoyable for students to understand difficult subjects; game elements like leaderboards, contests, quizzes, championships, and one-on-one combat may be utilised to assess students' mastery of a certain subject. The main goal of gamification in education is to pique students' attention and involvement. Thus, we created and built an app that can create an environment where kids may study, compete, and receive rewards while doing so, making learning enjoyable[5].

## II METHODOLOGY

In this architecture, categories are the championships divided in types, e.g python championships, trigonometry championships, etc. User selects a category and then selects a championship. Users can play championships in game modes allowed by admins to that championship.

1 Categories – Categories can be any subject, topic, learning course type, etc.

2 Sub-Categories / Championships – Once user selects a category, user can select championship under that category. Championships are the games that user plays on the app, it contains description, reward structure and other details based on game mode user selects further.

3 Game mode – In the scope of this project, we were supposed to plan for 2 game modes Quick Hit and Select Gift & Play.

3.1 Quick Hit – In this game mode, users will quickly answer 2 questions and win rewards. This is the shortest game mode and easiest to earn coins. Even one wrong answer will cancel the reward.

3.2 Select Gift and Play – In this game mode, users can select their gift / coupon code and then play the game. The gifts will be given after winning the game.

4 Question Bank – Question Bank is the collection of questions of various kind, wide range of questions from a wide field reside on the same question bank, labelled with their subject. Based on these labels, admins can use these questions in a game. The Questions will popout randomly.

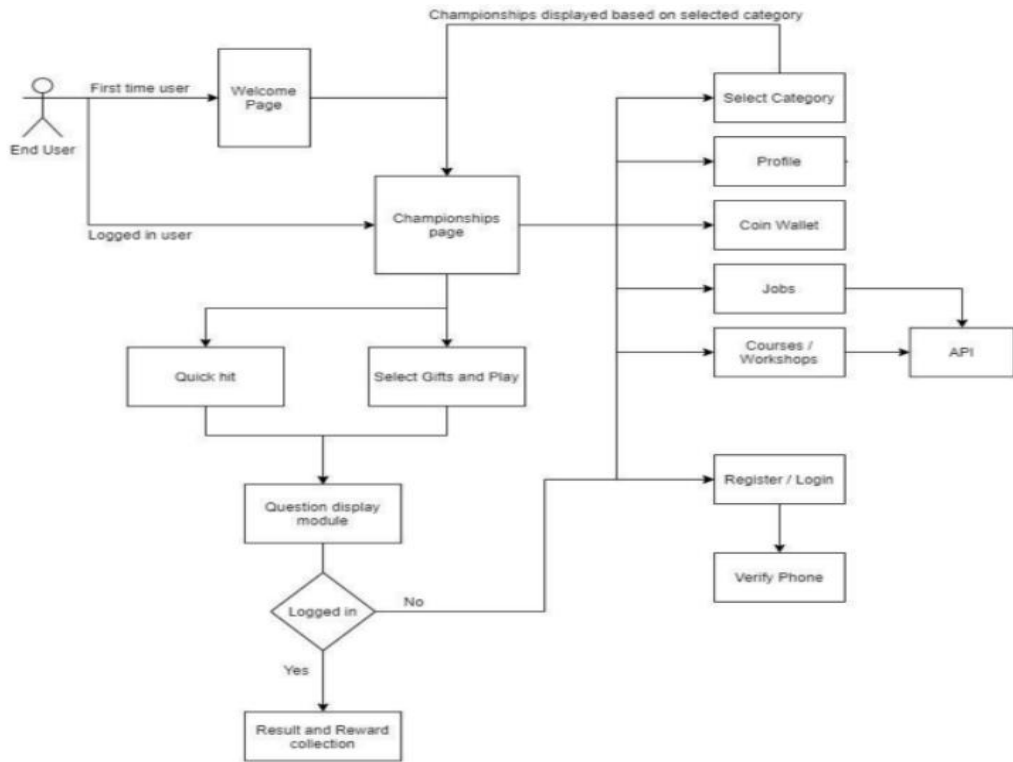


Fig. 1: system architecture

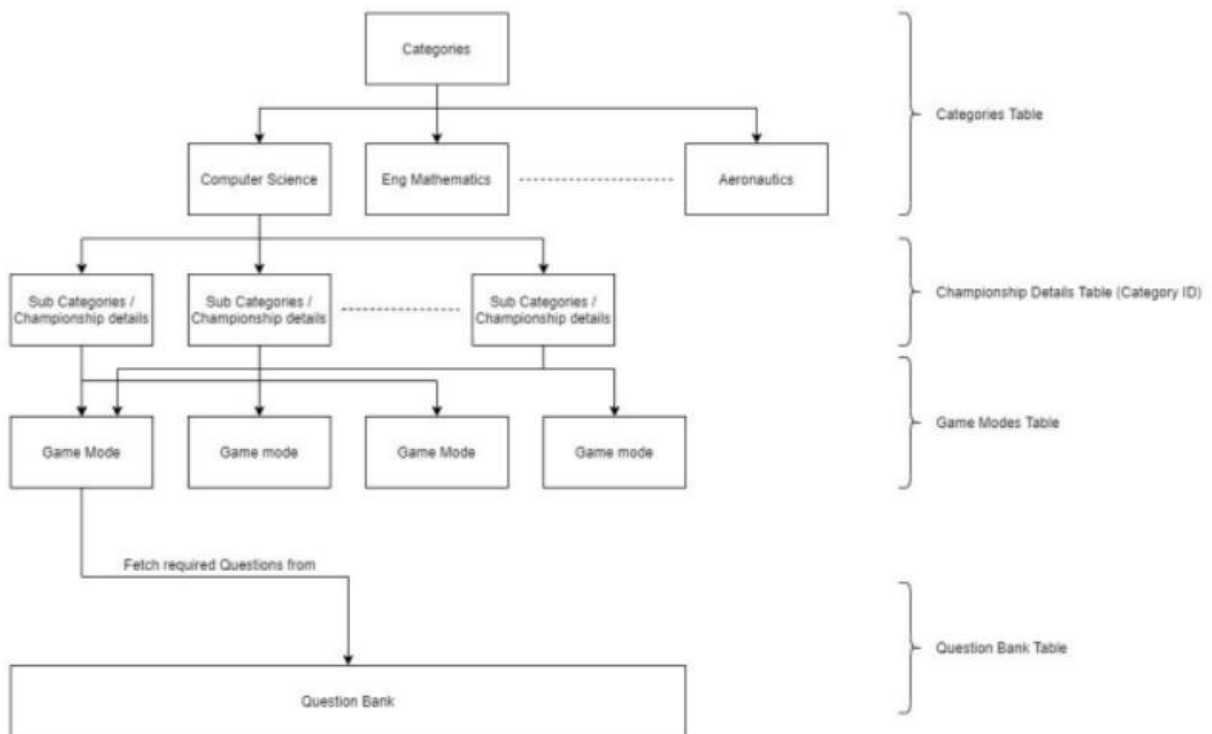


Fig.2: Hierarchical Architecture of Questions and Championships

### 3 DESIGNING GAMIFIED APP

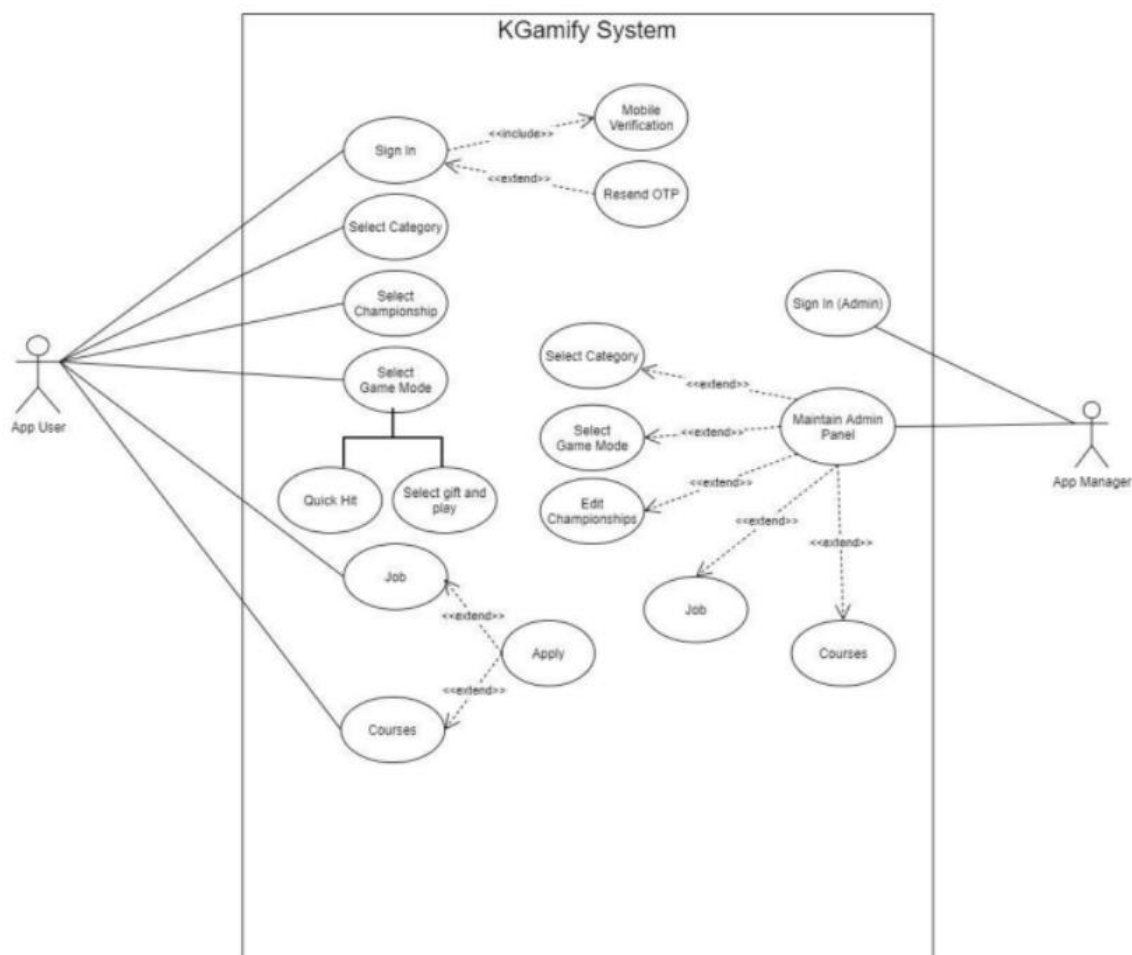
A gamified app needs to be easy to handle, fun to view. Our app lets users create accounts and play championship quizzes in any subject of choice and get rewarded based on performances. In the app, users can sign-in and choose category of championship, then choose a championship and play them by answering questions (MCQ or otherwise) and get rewarded.

#### System Architecture

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#### 3.1 Feature Preferences



**Fig.3: Use case diagram**

1. Register - Users can register using their mobile number and through OTP generation.
2. Login - Initially users can directly get logged in after registration and will stay logged in until they logout. Once they logout they need to again ask for OTP to login.
3. Select Championship category - On the championship page, one can see championship categories and in them, users can select their favorite championship.
4. Play Championship – Users can play championships, answer questions and get rewards (if users aren't logged in already, they must login and then get rewards)



5. Game mode – Users can play in various game modes. Each game mode has a different set of questions and different championship rules.
6. Maintain Profile – Once logged in, users can maintain a profile, see their progress and various other features possible in future updates.

### 3.3.1 Gamification

Each championship has gamification. It is based on extrinsic and intrinsic motivation. User can win various things and scores can be shown to user. Gamification's points will be also given on app download, registrations, profiling and on play activity, try outs, etc.[8].

### 3.3.2 Championships

App will be listing various paid and free knowledge championships. Each championship is divided into various types (Game Mode) and each type can have multiple levels. Each type may have different rules. Each level can have multiple questions. Questions can be based on multiple choice (multi answer can be correct) and subjective also, Championships can be conducted local to global level.

### 3.3.3 Question Bank

MCQ (multi answer possibility) will randomly appear to user for answering. In different Level it is possible question's answer could be subjective and answer is required to be written and uploaded to system.

### 3.3.4 Gifts

User can win gifts based on the terms and condition of the championship. Gifts can be digital or physical in nature. Gifts will be delivered by vendor or picked up by user based on type of gift. The tool is developed using a Java (Android studio) and AWS DynamoDB (MEAN stack) database. And Admin Portal with HTML, CSS, JavaScript. This new interface shall enable the student /users to play championships. To use this system, the student should have registered with the system. Each student shall have a logged in. The admin shall have the right to create and manage this user from the Admin portal. When the student / user login to the system upgrade view shall be displayed with display all the newly created championships and other features. It also gives the details about the start and end. It gives a brief description about the championships and rewards. Using the play/start button the students/users will be able to play the championship

## IV. Challenges and Limitations

Since the app is supposed to be gamified, having an easy-to-use architecture and navigation in very important. It was necessary to make app design attractive and 'game-like'. Although, it is a challenge to make it game-like and not to mention, less addictive. Any game or gamified application can get incredibly addictive, which is what game companies want. They like it when consumers play their game for longer periods of time. It is easy to make a game addictive as games have natural factors such as scoring, beating your competitors, discovery, community relationships, etc. These factors are necessary for our app also, so remembering that app is for education purpose, we need to curb the addictive nature of the app design. You may argue that how can a gamified education app's addiction be a problem as such, every parent will love their children having addiction to learning. At the end of the day it's just playing a game, spending extra hours on it may increase their knowledge, but may shorten their vital physical activities which are necessary for students anyway.

Making the app 'less addictive' by our side is what has been the challenge. We propose solutions like hour limits for students to play. Also, what we can do is reduce the reward frequency if a user uses the app for too long. This is a technique used by many game companies, they simply reduce or completely block rewards the user gets if user plays game for a long time. This may play a part in ensuring that users don't spend more time on the app than recommended.

## V CONCLUSION

Gamification is a trend today in education sector. This industry has been growing and developing since 2010, and over 800 major companies have already launched gamification projects for various needs. Mainly businesses use gamification in two major ways. Content gamification: changing content significantly, e.g., by creating a story or mystery inside of it; users enjoy going through the exciting content rather than just reading the material; Structural gamification: applying game mechanics without altering the content itself, e.g., creating quizzes and challenges, encouraging competition, giving points and rewards, etc. We used both gamification types to design this gamified platform. We tried to implement visual design, reward system, competition and learning as pillars of this system.

Gamification will have a great impact on learning process of students and revolutionize learning, Game has a personal and emotional aspects that can be used for education purposes. The system that we have is also having a reward- based element to it. Rewards are both personal and emotional at a level of game. Also, there are many more benefits like higher concentration spans, interest in learning, etc. Higher scores is one thing every student wants, these things create a competitive environment. On one side it is not good practice for students trying to learn genuinely, on the other hand, students attempting for competitive exams need to have that sense of competition, not like, who knows more, but like who can execute the knowledge better. This app can help both scenarios. For students who are trying to learn, they can enhance their knowledge by a competitive method, like championship leaderboard.

Gamification in education is getting rapidly popular. Students are enjoying a fun way of learning; Parents are enjoying their children being interested in learning and Teachers are happy that their students are interactive and productive in their thinking. Traditional education makes it difficult to focus, when education is game-like, the chances of students focusing increases. In the app we designed, the students can choose a subject of their choice and play a series of quizzes to test ones knowledge. Certain rank in quizzes will bring certain rewards that will encourage students to learn more and get rewarded again. The rewards can be some coupon that can be used for their respective discounts, or coins / badges to play more championships and make in-app purchases, etc. We already know and have discussed the advantages of gamification in education like better focus, increase in student's interests, interactive nature, etc. Although the disadvantages like more screen-time are irreversible in many ways in these times, we have made attempts for reducing the addiction or screen-time

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