

Design of Quizzzy Car Game in an Engineering Education

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Abstract: In engineering education it is important that student develop skills to face challenges of Industry. Teachers find it difficult to make student interested in the subjects which affects learning. Traditional teaching makes student passively engaged with content and hence learning do not happen effectively. Active learning makes students engage to enhance the learning and to enjoy the process of learning itself. Introducing games in as a tool to learn makes students feel interested and in a fun way learning can be possible. This paper presents a study of use of “Quizzzy car game to learn concepts in engineering instrumentation subject.

Keywords: active learning, Game theory, Game based learning

I. INTRODUCTION

In recent decades, there is a huge development using methodologies which can be added in engineering curricula to enhance these activities. There are few methods which have been proposed are project-based learning, problem-based learning, cooperative learning, “think-pair-share” discussions, peer review, role-playing activities, and game based learning (GBL) explained in BJARNE A. FOSS(2006). An educational game is one of the methods which can play an important role in the creation of futuristic learning environments. It is necessary to provide an environment to deploy a education game that provides a platform where players will explore and learn in a similar manner to how they do technology in engineering education. Education is a process which is mainly focused on imparting knowledge, methods of teaching, and providing a conducive learning environment. Therefore, there is a need to develop new in the computer games. Hence some protocols needs to be followed by educational games for a successful commercial games. Such games allow greater involvement for the learner to play-act characters and explore practical worlds.

Some of the characteristics of Educational games are spontaneous, entertaining and pleasurable for the player. In Educational games the subject content should be in the background and not appear as the main elements of the game scene. At the same time the adventure, fun, challenges and the puzzle solving are main features that can motivate the players to interact and play.

The platform should not only offer the online course notes but if some form of personal information such as

Name, Email is also asked then the games can offer an incredibly involvement and engaging environment. A Game can have themes embedded in webs of adventure and mystery. Considering these points into mind a Quizzycar Game is designed.

II. GAME THEORY

Students can understand a new concept or idea, take on a different perspective, or can perform an experiment with different variables while paying a Game. Many skills can be developed such as critical thinking, creativity, teamwork, and good sportsmanship through playing a game. The joy, excitement or engaging moments helps to remain in students’ memories, and they get connected to the concepts when they are studying. This positive interactive environment facilitate enhancement in learning. Along with, many feature mentioned above Games can provide a variety of different stimuli, a variety of sensory experiences for students. A education game allows students to actively engage with the content. Different types of game that can be used in education can be

- a) Puzzle games: In this type a problem is put up in front of student with a objective to find out a solution. This solution often involves solving enigmas, learning how to use different tools, manipulating or reconfiguring objects. The player is tested for a logical thinking by trying to solve the puzzle using the means available to him. That makes puzzle games ideal for educational purposes. They can also be simple and do not require complicated graphics or complex programming.
- b) Adventure games are similar to puzzles with a background scene designed that’s suits the theme. The player is required to solve problems while adventuring in a predefined story. He or she is usually can use objects, such as weapons, tools, etc to

achieve the goal.

The possibility of In this type of game student solve a problem based on real situation that is why this kind of games is very appealing and interest student in an engineering education scenario.

- c) In Simulation games, the main objective is to handle and control of real-world objects such as cars, aircrafts or parts of a machine etc. Engineering professionals are trained using these objects in various technical situations and are appropriate for technical education. But they can be hard and time consuming to implement as well as costly to design.
- d) In Strategy and real time strategy games player usually builds structures such as buildings or cities using an available items and a team of people. In this type of Game the player has to make strategic decisions involving the equipment and people in his or her control with for developing his or her structure. Hence it is called as Strategy game. The inspiration of strategy games are often taken from history or fantasy and can be converted into a real life structures which can interests an engineer.
- e) As name clearly signifies Edutainment is a combination of education and entertainment. This game along with educational goal also has a intention of a use an entertaining form of game play hence this type of game is obvious that these types of games are aimed at young children, although they can be played to by older children and even adults as well.[1]

III. LITERATURE SURVEY

Research on the motivations and exploring effectiveness for games playing have been carried out by researchers across a number of disciplines Angelos P Markopoulos (2020) explains types of games and the impact of having gamification in classroom environment. It also highlights general education platforms used for classrooms such as Socrative, KnowRe etc. it also discusses different case studies of gamification approach designed in engineering. BJARNE A. FOSS (2006) Is a detailed Literature Review Investigate the existing literature on Game Based Learning. It defines concepts related to Game based learning, Gamification etc. and then methodology used in recent research. It also summarizes relevant works in the field and recommendations about how future research should be conducted. Petros D Kasidiaris (2015) explains review the literature relevant to games and simulation pedagogy in higher education. It identifies three learning outcomes when games are integrated into the learning process along with experimental results. Kari Alanne (2016) Talks about a game which engages the payer and can be a guide for a student helps them behave like novice to expert. It also explains multiple attractive game features, and an innovative tracking mechanism to mitigates the time and budget constraints associated with a standard lecture-based course. Dimitrios Vlachopoulos (2017) explains about an experiment was conducted with students studying different subjects and from different academic years. A post-test is

conducted on a control group and analysis was conducted to evaluate the impact of the gamified Student Response System (SRS) on learning of students. It was concluded that students who undergo lecture sessions with a gamified SRS had more positively motivated were more attentive, and have better learning performance than students who undergo lecture sessions without gamified SRS. John M. Pfothenauer (2009) explains the implementation and use of gaming applications in teaching History subject. This subject mainly involves about facts and by highlighting the role of games in education help students for better understanding of a subject. The design of games such as word search, crossword, jigsaw puzzle, brain teasers and sliding puzzle using an open source tool called ProProfs is also discussed in this paper. CÉSAR MORILLAS BARRI (2007) proposes games to develop personal characteristics that can contribute to becoming a good engineer. This paper presents an evaluation framework to assess the efficiency of proposed pedagogical approach in Engineering Education. Victor Samuel Zirawaga (2017) concludes that computer based learning provides short-term knowledge retention. Moreover, the traditional lecture is more effective to improve students' long-term knowledge retention. Carlos Vaz de Carvalho (2012) claims that Gamification enhances the levels of attention by learning through frequent failures and consequently helps in incremental learning. Silmara Rondon (2013) focuses on importance of providing students with interactive learning resources. An experimental study shows that combined use of a traditional exercise with an interactive learning provides positive learning effect on many engineering students.

IV. METHODOLOGY

A subject of Instrumentation was selected as it is theoretical subject and listening passively to lectures becomes boring for students. In the domain of Electronics and telecommunication transducers/sensors are important to take inputs for automation projects. The questions are set as per blooms taxonomy to trigger the cognitive level of students. Keeping objectives in mind a game is designed using Web development technology like html, CSS and JavaScript. A code is written in Vs code as text editor. Since Students of this generation has liking towards racing, adventure etc. a Car Racing game is designed and called as "Quizycar" shown in figure 1

Fig.1 "Quizycar" Game layout



A Game has following features in it.

- a. Students can set their targets: provides goal based learning to students as in fig.2



Fig. 2 Students set goal for themselves

- b. Good Interface: To attract the students the games must have good interface so the students get the good gaming environment and enjoy the game.



Fig. 2 Interface to read instruction

- c. Timer: To increase the student's concentration, focus and speed we had put the timer in question section, so by solving the quiz in limited time, the mind capability of calculation get increased. Also, the students consider this as challenge and try to solve the problems as faster as they can.

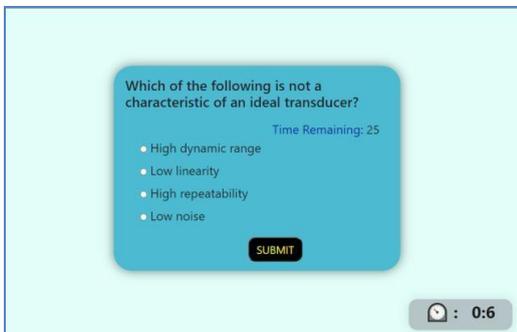


Fig. 3 Page showing a question and a timer

- d. Answer with proper explanation: After students response we had given the answer key with proper explanation in short and simple .so that if students give wrong response , so in that case he/she don't go anywhere to find the correct solution also may be they get wrong solution. That's why to overcome this problem we had put the correct solution after every question which they will get after their every responses.



Fig. 4 Screen showing an explanation in case student attemptincorrectly

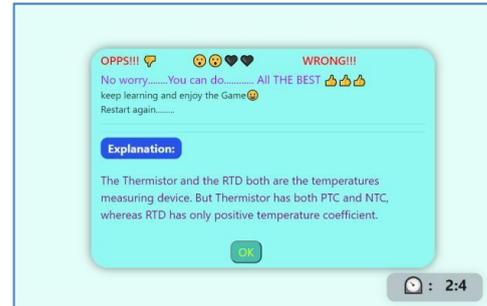


Fig. 5 Page showing encouragement for student

- e. Score board: where you can see your current score and your highest score shown in fig 1.
- f. Motivational Phrases: If students give wrong response then after that they may get demotivated and might be quit the game. Also as this game contain quiz this is a part of learning, so they may get demotivated. Now to overcome these problems we had inculcated the motivation phrases wherever possible. So the students don't get demotivated and can continue with their game and the learning part.
- g. Increasing the Difficulty Level: To make sure good competition and more challenging we will increases the difficulty level of the game gradually as time increases. e.g.: we will increase the count of car on the road after every 2 min. Also, we will reduce the timing to attempt the quiz as time increases.
- h. Report card: For feedback we had introduced report card system. After student response to quizzes, a report card will generated automatically which contain some parameter on which students can analyzed themselves. Parameter like Score , points and their response in the form of good , better , best and excellent so students get motivated and willingly play the game.



Fig. 6 Screen showing result at the end of the game.

V. EVALUATION

Due to Pandemic this experiment was conducted in a online mode as a pilot study. Based on this study in future this experiment can be conducted for entire class in offline mode. This experiment can be conducted in lab session where students are attending in a batch of 20 to control and for smooth conductions. This game was played by total 14 students of different age category. Some of them where from school section and some of them were from higher education. After playing the game, feedback was taken by all of them and analysis is presented below. They were asked questions related to their experience when playing the game, their learning experience and about different features and result is presented.

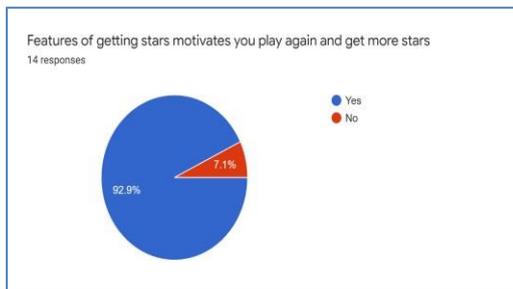


Fig. 7 Feedback 1

92% of students feel giving stars after completion of task makes then motivated to play the game again

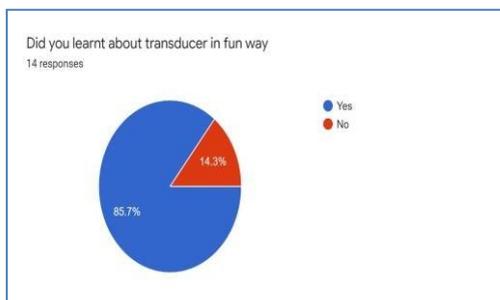


Fig. 8 Feedback 2

85% students feel that they learn the concept of transducer after playing the game.

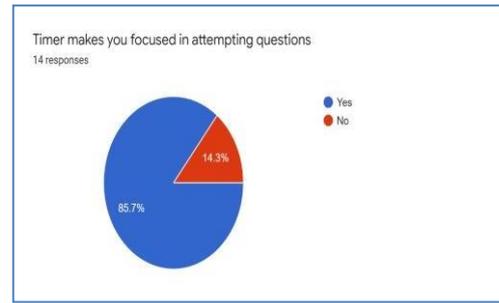


Fig. 9 Feedback 3

85 % of the students feel that feature such as timer makes them focused and engage with the activity.

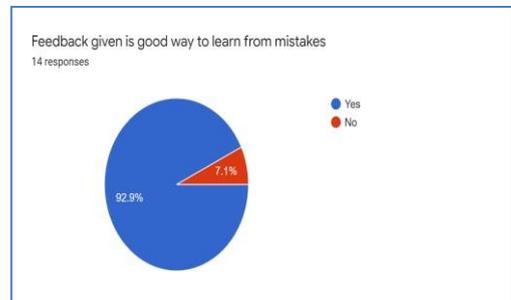


Fig. 10 Feedback 4

92% of the students feel that giving explanation after attempting question with wrong answer is a good practice for learning

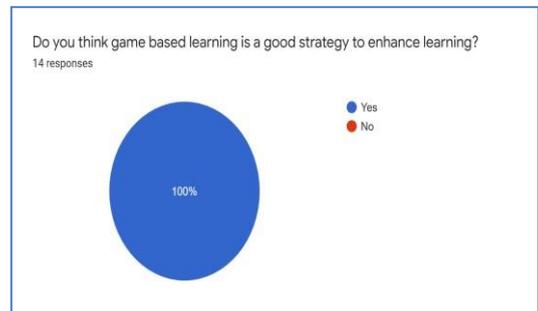


Fig. 11 Feedback 5

All students feel that game based learning is good strategy for learning.

VI. CONCLUSION

Game based learning an active learning technique where games can be used for enhancing learning. An experiment on trial basis was conducted in online mode in which students were asked to play a car game to learn concept of transducer and results are presented. User’s feedback and suggestions are taken by a survey form. Based on the suggestions obtained Quizzycar will be improved in future. It will be played in offline mode during a laboratory session of the same subject.

VII. ACKNOWLEDGMENT

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Link for Game

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