



GAMIFICATION: THE BEST APPROACH FOR STUDENT ENGAGEMENT

Bindu Priya

Education and Research, Infosys Limited, Hyderabad, India

Kalpna

Education and Research, Infosys Limited, Hyderabad, India

ABSTRACT

Gamification is a mechanism in which we use game design concepts in non-game context. This notion is used for better engagement of students in higher education. In this paper, we discuss about the role of gamification in higher education and its impact. This paper also explains the design and development of a game on OOP concepts that have adopted gamification. We expect this game design to be helpful for better student engagement.

Keywords: Gamification, Higher Education, Gaming.

I. INTRODUCTION

In [1] Deterding et al. describe gamification as the use of game design elements in non-game contexts, focusing on using computerized, competitive elements in a situation where the user does not choose to play a game, i.e., in a situation that is changed to contain a game and not specifically designed to be a game.

Gamification is a relatively new concept in the marketing, business and education circles, but usage of games to encourage the end users to indulge in doing something has been around for years. One example of using games to motivate the people in the marketing / business perspective is giving reward points on purchase using debit / credit card is implemented by PAYBACK or I-mint. In the Educational area, the usage of games is still evolving to motivate the students to understand the concepts in a simpler way. In order to have better student engagement in the learning circle, we can adopt the concept of gamification through which the performance of the students can be improved.

Khan Academy has brought the innovation of gamification into their course learning structure which grabs the involvement of the student during the learning process through which the student can easily grasp the concepts explained through simple game kind of strategies.

Gamification is one way to engage, motivate the students to solve the problems by introducing reward points, badges, time limit and feedback about their performance. The games can be designed in many ways. Some of them are Story telling approach, Time constraint based, interactive games where the student has to provide his/her inputs to complete that level. Introducing features like multi-player, role-playing, augmented reality into the game design will make it more interesting and as well as challenging.

There is a very little research happening in the gamification of Education space. We have to use proper game design elements and aesthetics to motivate the students to learn. Teaching through games help students to familiarize themselves with the technology, it helps them to analyze their performance and decision-making. Through playing games students will get motivated to create their own game by researching the subject of creating games.

In this paper we demonstrate gamifying the concept of Object-Oriented Programming so that learning programming concepts becomes student friendly and helps them grasp the concepts easily. The model created to teach OOPs concepts in this paper has the reward point feature to assess the understanding of the student about the concept and also motivates the students to improve themselves.

II. BACKGROUND/RELATED WORK

The research about Gamification started in the 1980's by works of Malone and Bowman. They mentioned about what makes computer games so attractive to players and how those aspects could be useful in education in order to improve student motivation and participation.

A. Game Dynamics

In order to make the learning enjoyable with games, certain game dynamics need to be incorporated while designing the game. Some of the factors that help in better engagement in the game are listed below.

- **ENJOYABLE:** Players will be more engaged if the game experience is enjoyable. Game should have educational purpose at the same time apart from being enjoyable.
- **SOCIALIZER:** If there are multiple players for the game, then the game should have support for collaboration among the players to complete the challenge. Players should have provision to share, comment and help each other,
- **CHARACTER:** Each individual player should be identifiable by a visible character or by giving an identity to each player so that they can display their performance publically.
- **FEEDBACK:** Feedback about each player should be delivered in a timely manner.

B. Existing Games for Education Purpose

Some of the programs which used the concept of Gamification in the education space are discussed in this section.

Khan Academy is a free online learning site which has around 1800 lessons and 2100 videos. The courses range from basic Mathematics, History and Computer related topics. In addition to the lessons it also has the quizzes, brain teasers to challenge the students about their understanding.

The innovation brought in Khan Academy is the use of different Game mechanics to make the learning fun and addictive. The few elements of Gamification it has used are courses are organized as visual arrangement on Google Map. The game rewards the quick problem solving of correct answers when you open up a challenge. It also keeps track of the user progress every time he/she login.

Khan Academy uses a lot of game mechanics such as “Skill- Growth- Trees” to unlock the new classes and learn new skills. It uses the concept of badges to give feedback on their achievement. In the end, most of the game mechanics are just a way of providing more detailed feedback to the users. Students should feel good about their accomplishments of every single day and encourage them to overcome their personal records or challenges.

The other online program which is using the game mechanics is **ClassDojo** which is a real-time behavior management system for teachers to track the progress of their students. A teacher/facilitator can create an account and add students to create his/her own classroom and can assign avatars to each student.

In a class, we can select a student and award a point for his/her behavioral activities like creativity, hard work and so on and can also award a negative point for bad behavior for not completing the home work, if he/she comes late etc., There is a provision to generate the report cards to assess the performance of a particular student in the form of charts. It has used the game dynamics like reward points, badges and Feedback and etc.

The paper “Entering the Education Arcade [2]” describes three of those games made by the Microsoft-MIT iCampus project, namely Supercharged! , Environmental Detectives and Revolution.

III. GAME DEVELOPMENT

In this paper, we created a small game to explain and test the concepts of Object-Oriented Programming to the Engineering students. Generally, students feel learning programming concepts is hard and even teaching them is also equally hard.

Most of the today’s students are well familiar with the use of computers. Most of them have experience with computer games, social networking sites, Microsoft office tools and messaging applications. However most of the students do not have prior experience with the programming concepts. So, learning the programming concepts is hard because of lack of problem solving and analytical skills while writing the software programs.

One difficulty in teaching the programming concepts is to hold the attention of students throughout the module. We have to make the teaching attractive so that learning programming concepts will be fun for them.

Kolb [3] developed Experiential Learning Theory (ELT) called Kolb Cycle or Learning Cycle as shown in Figure 1.

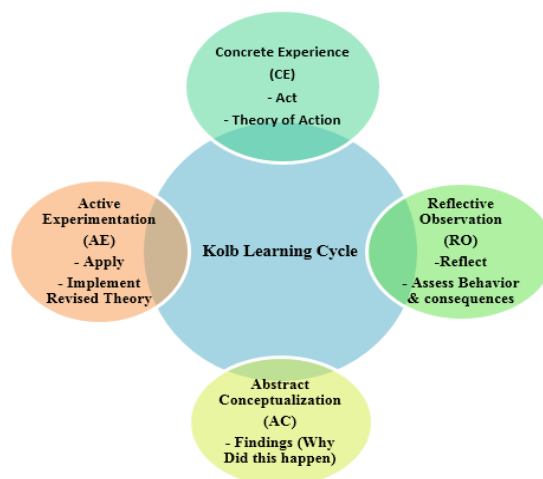


Figure 1

The learning cycle contains four stages: Concrete Experience, Reflective Observation, Abstract Conceptualization and Active Experimentation. Kolb views the learning process as a context of people moving between the four stages of the cycle. We can enter into the cycle at any point but all the stages should be followed in a sequence for effective learning to take place.

Listed below is the example for learning cycle

Learning to drive a bicycle

- Reflective observation - Thinking about riding and watching another person ride a bike.
- Abstract conceptualization - Understanding the theory and having a clear grasp of the biking concept.
- Concrete experience - Receiving practical tips and techniques from a biking expert.
- Active experimentation - Leaping on the bike and have a go at it.

The Kolb cycle implies that it is not enough to have an experience to learn, but the reflection after the experience does. It is critical to reflect on the experience to formulate concepts which can be applied to new environments. Finally, the learning will be tested in new situations and new settings. In this way, theory, action, reflection and practice are linked into a dynamic cycle and complement each other [4-8].

We have applied the Kolb Learning cycle in the delivery of Object-Oriented Programming Concepts rather than impending the problem in simple way.

We have used the ALICE Tool to design a game using the GUI interface provided in the tool without writing a single line of programming code. This tool provides a GUI environment to learn Object-oriented design. Students can design and develop a game with no prior programming knowledge with ALICE drag and drop feature. The game that we had created is used to test the understanding of the students about the Object-Oriented Concepts. The Home Screen of the game is shown in the Figure 2.



Figure 2

Once the user clicks on the text “Click Here to Start”, the second screen gives the instructions on how to play the game as shown in the Figure 3.



Figure 3

In the next screen, the character on the screen gives the definition of Object and gives a problem to the user like identifying the state and behavior of a given Object. Once the user identifies the State and Behavior of the given object, final score will be displayed to the user giving him/her the instant feedback on their understanding. Below are the few screen shots of the game as shown in Figures 4, 5 and 6.



Figure 4

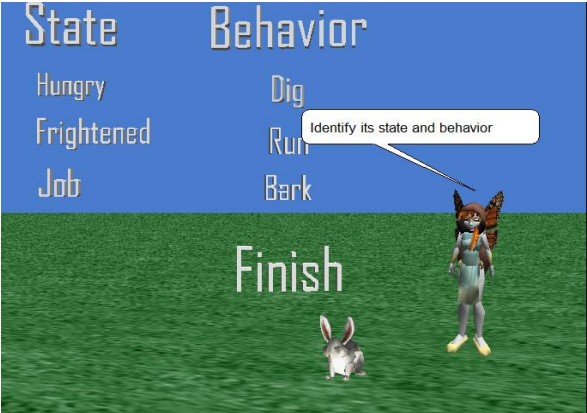


Figure 5

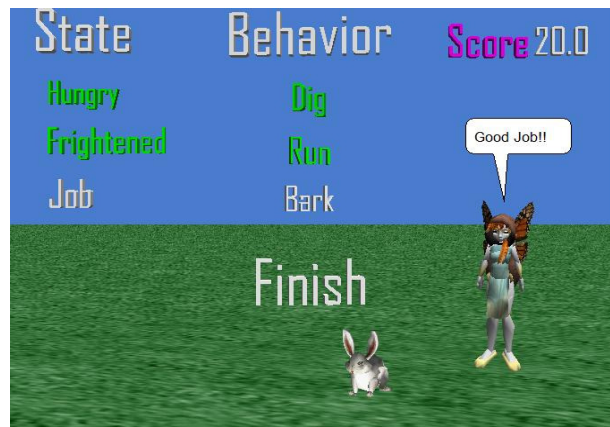


Figure 6

We have presented our approach to teaching the Object-Oriented Concepts with game dynamics and mechanics. This approach may be considered by using graphically rich examples or through creating games. Our proposed approach delivers a positive environment in which students can learn the OOP concepts by keeping them interested, involved and to strengthen the programming principles.

IV. CONCLUSION AND FUTURE SCOPE

In Conclusion, the above approach showed promising results. Gamification elements can be implemented in the Learning process as they will have positive impact on factors like Student Engagement, Class Attendance and etc. But there are some challenges in bringing gamification in education space. They are cost to convert the course content into games, have to check whether all the content can be gamified, and instructor's lack of knowledge of how Gamification works.

Thus, gamification can add value to the classroom teaching, and this paper has explored only few of the game mechanics that can be used.

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