


Gamesy: Using Game Mechanics to Boost Intrinsic Motivation in School

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ABSTRACT

Games have existed since time immemorial and have proved to significantly change people's mentality and attitudes towards countless scenarios. Although games are 'time wasters', we should acknowledge the one thing that games offer, constant testing, and learning a simple game engages the brain and proves that games are an asset in mental development. Thus, gamification can be used to provide a fun learning environment. In this article, the authors discuss how gamification has been implemented in various applications over the years, people's take on gamification and gamified apps from a survey and interview conducted, and thereafter design a student-oriented gamified study app, Gamesy, that makes use of game elements to improve performance in school and change/improve study habits in a game environment via progressive game design. With this, better performance may be realized in the tertiary education level.

KEYWORDS

Attitudes, Brain Development, Game Elements, Game Environment, Games, Gamification, Gamified Study App, Learning, Mentality, Non-Game Contexts, Scenarios, Smartphones, Testing, University, Videogames

1. INTRODUCTION

The advancement of technology over the years has brought about a lot of change in our lives, both positive and negative. This has posed new challenges to the social structure of our society and therefore new challenges to education in the twenty-first century. This is due to technological advancement in social media, video games, internet, cell phone applications, text messaging, and more. These have made it easy to access a lot of information and created a whole new world of distractions and

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timewasters for everyone (K.M. Liow, 2021), (Dichev, Dicheva, & Angelova, 2015) (C.M, JOMcai: The Contribution of Computer-Assisted Instruction on Learning Improvement of Science Student, 2016) (C.M, P.S, & K, A Study on Integrating Penetration Testing into the Information Security Framework for Malaysia Higher Education Institutions, 2015). This is seen in most young people who have adopted the modern technology in their lives to a point where they would rather spend more time with a digital display than with people, in reality, a mechanism to avoid reality as it is and following what 'could be' via the modern technology. Therefore, there is a need to integrate some of these technologies into our lives to improve them in reality and not in theory or an abstract world that does not exist (C.M, JOMcai: The Contribution of Computer-Assisted Instruction on Learning Improvement of Science Student, 2016).

Digital games are attractive to frequent videogame players, gamers, without considering the age as they spend a lot of time playing them (Noraddin & Kian, 2014). In the past, playing videogames was considered an activity for young boys but nowadays the average age of a gamer is 35 years, and the distribution of gender has been incredibly balanced (Fonseca, et al., 2017). But with time, the effect videogames have on the players has led to conflict where some people argue that videogames have more negative impacts than positive impacts. There are arguably a number of health issues associated with videogames and mostly focused on the psychological well-being of a person. Behavioural complaints such as violent behaviour among children or, to be more specific, the youth have been emerging and blamed on videogames. Also, some research done on the effect of videogames have proved that violence can be an outcome of playing violent games where the individual may become more aggressive or stimulate aggression during a competition (Dowsett & Jackson, 2019). But, when we focus on the positive impacts videogames have, we see how the core motives for playing videogames are focused on having fun rather than achievements or obsession (Halbrook, O'Donnell, & Msetfi, 2019) therefore, videogames are intended to generate fun but not the other negative outcomes. Video games have been integrated into many sectors and therefore a great method to improve productivity. Apps such as gamified habit tracking apps have come up due to this. Games are made by game designers/teams and consumed by players. They are played and then discarded later by the players but what makes games unique is their unpredictability. The outcome of events is, if not always, unknown and that forms the interesting and addictive feel of playing the games (Fonseca, et al., 2017).

Gamified habit tracking mobile apps help a lot in habit formation. One such app is the popular Habitica app which uses game elements to create a fun and captivating environment for the users. Gamification can be defined differently depending on whom you ask. It can be said to be the design approach of making use of the gameful design in various contexts for producing experiences similar from games to aid different activities and behaviours (Majuri, Koicisto, & Hamari, 2018) or, the application of layers of rewards to an activity to make it enticing and entertaining for the players or participants (Gobron, 2016). It is important to note that these game elements have been integrated into some educational programs. This approach is effective in dealing with the common understanding that "studying is arduous and boring for most students in tertiary learning" (Clarke, Kehoe, & O'Broin, 2018; Y.K., P.S, A.S., & Y.F, 2020; Y.K., P.S., H.C, Y.F., & A.S., FourthComing article). Gamification has become an emerging trend, catching the attention of researchers (Deterding, Dixon, Khaled, & Nacke, 2011), as a tool for building game interactions to help boost overall user engagement (Houtari & Hamari, 2012). This has drawn a lot of attention in the community because of its relevance in academics and others such as business professionals and practitioners (Bockle, Novak, & Bick, 2017). In academics, studying is an extrinsic motivation since it's done out of fear of failure and therefore students only study to pass their exams but not for the sake of learning or out of interest of the specific subject, course, or program (Dichev, Dicheva, & Angelova, 2015) (Alzawi, Al-Faliti, & Al-Blushi, 2016). Games enhance various skills such as algebra, comprehension, build confidence, and problem solving (Sakic & Varga, 2015). If properly categorised for specific courses or programs, e.g. engineering or medicine, they may really enhance one's understanding. There are

some apps that help students to study such as Socrative and Peerwise, but these apps only offer a few ways for the students to study but do not create an environment that apps like Habitica do where the students can form productive habits. Habitica is mostly a to-do list but very effective in habit formation (Clarke, Kehoe, & O’Broin, 2018).

Forming intrinsic motivation to study is the best way to approach this problem. Making sure that students study out of interest instead of feeling forced to do it. This will automatically lead to better performance in school since going through one’s work regularly ensures good performance (Clarke, Kehoe, & O’Broin, 2018). To easily form intrinsic study habits, we can use the same approach as productivity apps but make a student-oriented productivity app to aid in their study as a way to counter the outdated concepts used in colleges and universities. Key factors to consider in the development of this application are time-management, “behaviours aimed at attaining effective use of time while carrying out goal-directed activities” (Cassels & Broin, 2017), and simple game set-ups that are easy to create and use at the go. Such possible game set-ups include some possible fun game elements such as those shown in Figure 1.

Figure 1. Game elements considered in gamification (Sharon, 2013)



Figure 1 shows game elements to be considered in gamification. To better understand and make use of these elements, it is best to understand the “Core drives of gamification”. These are as follows (Chou & Yu-Kai, 2019):

1. **Epic meaning and Calling:** This is where the player gets the impression that he/she is lucky or are attempting a greater action than what they thought. For example, getting that unique sword, that is thought impossible to get, by mere luck.
2. **Development and Accomplishment:** This captivates on one’s drive in making progress in the game, new skills, achieve mastery, and, most importantly, beat difficulties.
3. **Empowerment of creativity and feedback:** Where the player unravels new things in the game and try out different combinations.

4. **Ownership and possession:** This is where the player has a sense of ownership of something within the game and automatically has the need to improve it.
5. **Social influence and relatedness:** Simply because people are driven to achieve what others have if those people's achievements are amazing.
6. **Scarcity and Impatience:** Where some valuable items are rare in the game. This has been used in many games where there are torture breaks (come back after an hour to claim your reward). This haunts the player the entire time since he/she can't immediately get it.
7. **Unexpectability:** This is whereby unexpected events take place in the game and there the player cannot predict what may happen at any time and therefore curiosity strikes. This is seen in gambling.
8. **Loss and avoidance:** Losing what one has achieved through playing the game for a long time is saddening and therefore the motivation to prevent anything negative from happening.

Another significant game element not highlighted above is the use of rewards such as badges and points which form an integral part of the motivational pull of voluntary games, this element can be used in the workplace as a means of control (Mitchell, Schuster, & Jin, 2018). In this article's context, this can be implemented for a gamified study app for students and used to control the moulding of their study habits. Since mobile devices are a necessity and mobile games take up a large share in the game industry (Brett & Simons, 2017), this application will be a Smartphone application to enable easy access and therefore fits in easily into our personal lives. Some of the competitors or similar apps to this application are Habitica, Socrative, and Kahoot.

Table 1. Features of similar apps

Features	Gamesy	Habitica	Kahoot	Socrative
Avatar	/	/	X	X
To-do list	/	/	X	X
Quiz set-up	/	X	/	/
Game design	/	X	X	X
Games	/	X	X	/
Rewards	/	/	/	/
Online competition	/	/	/	/
Time management	/	/	X	/
Customizability	/	/	X	X
Leaderboards	/	/	/	/

Table 1 shows the various features of similar apps in the market. It also shows the intended features of the application to be designed, Gamesy.

1.1 Problem Statement, Question and Objective

The various features in the app are aimed at tracking the students' study habits and change them for the better via the use of gamification to make it interesting and build intrinsic motivation. This study is driven towards developing a mobile gamified productivity application to aid university and college students to develop intrinsic study habits and, in the end, make learning fun and fruitful. Certain hypotheses can be deduced from the success of this project:

Hypothesis 1: Gamification of studying and habit formation will generate intrinsic motivation to study.

Using game mechanics in a non-game context environment such as studying and habit formation will greatly improve the students' performance since they will be able to regulate their study time in a fun and effective manner and therefore not force themselves into work that they perceive as "boring", therefore creating intrinsic motivation. This is because the study of using videogames for learning purposes is scarce locally (here in Malaysia), Middle East Arab and underdeveloped states (Noraddin & Kian, 2014), and therefore, integrating such an asset in the current education systems will prove to be beneficial.

Hypothesis 2: Use of game mechanics and game design will make study and work fun and addictive therefore automatically improve performance effortlessly.

Game elements such as conflict, puzzles, chance, and competition will make studying feel like playing a game and therefore making it very fun and addictive. Getting rewards while "playing the game" will automatically motivate the user to "play" more but they are actually studying and therefore create an intrinsic study habit. This will improve performance automatically. With the progressive game design, they will spend less time creating the game and more time "playing", reviewing what they have learned in their course/program, creating a quick play experience.

Hypothesis 3: The gamified productivity app will aid users to improve performance and overall attitude towards their study while measuring their progress.

Games are addictive and played by both children and adults alike (Noraddin & Kian, 2014), so integrating this into studying is a great way to build intrinsic motivation and since the application is for smartphones, it will be always available for the user to access and play. The student should be able to enjoy using the application since enjoyment drives continued use (Merikivi, Tuunainen, & Nguyen, 2017) and therefore continued improvement. The student will also be able to measure his/her progress in terms of mental development via feedback from the application and statistical analysis recorded during gameplay.

1.2 Value Creations

With all the features the gamified study app will offer, the student, or player, will benefit in terms of improved performance in class which thus leads to an easy time at school and more fun. The various game modes aid to mold the students' study habits and attitude towards their studies since they are indulged in a world of gaming rather than the usual 'boring' school environment. Progressive game design offers reduced set-up time and therefore the player spends more time playing rather than setting up the game. Allows the different games to be set-up unanimously. The user can also be able to keep track of his/her progress via feedback and statistics. This will allow them to measure their mental development, whether they are getting smarter.

2. METHODOLOGY

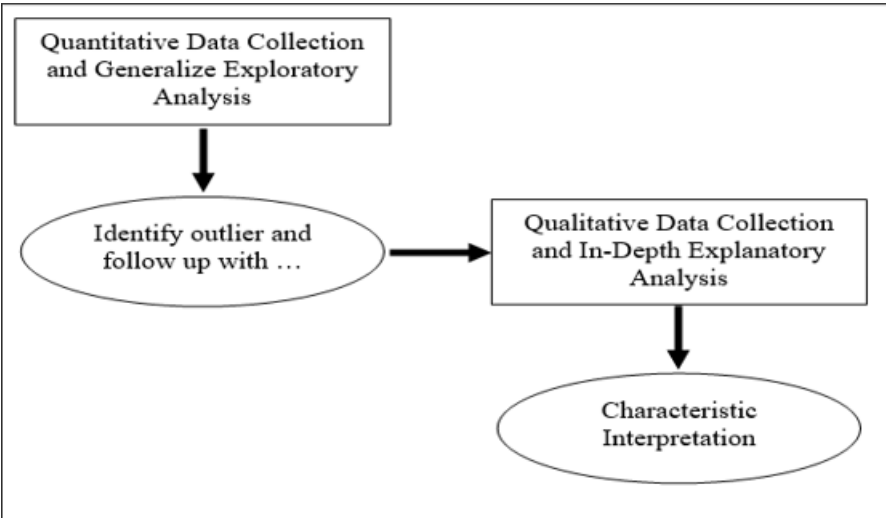
This study will use mixed research method, both qualitative and quantitative research methods, to get information from the target audience for analysis. The data will be collected via the methodology shown in table 2 (Soon J. P., EaaS Optimization: Available yet Hidden Infrastructure Technology inside Medium Size Enterprises, 2018; Soon & Moy, Beyond Barebone Cloud Infrastructure services: Stumbling Competitiveness during Economic Turbulence, 2016; Soon, Yin, Wan, & Nazmudeen, 2011).

Table 2. Methodology

Research Dimension	Sequential Design
Research Methodology	Mixed Mode
Research Methods	Comparative Analysis

As shown in table 2, the research dimension will be using the explanatory sequential design that will explain all the steps taken to collect the data. Figure 2 shows an illustration of this design: (Soon J. P., EaaS Infrastructure Disruptor for MSE, 2019; Soon, Choo, Wong, Phan, & Lim, 2012; Soon J. P., et al., 2016; Xu & Fan, 2018).

Figure 2. Sequential Design (P.S. JosephNg 2021-2011)



For research methodology, mixed research method will be used via interview questions and survey questions. Quantitative data collection will be done via a survey. This is to acquire a general analysis of data collected. This will be followed by Qualitative data collection which will take the form of interviews: questioning people with a good performance record and some who are also fans of videogames. The data from both methods of data collection will be gathered and a conclusion will be drawn from their analysis. A mock data collection is done beforehand to test if the questionnaires are comprehensible for the various subjects of our research which will include around 7 respondents for the survey and 3 for the interview. Necessary changed will be made on the questions, for survey and interview, since some answers may be irrelevant and or respondents do not comprehend the questions themselves. Random people will be selected for the survey, this will comprise of only students in a nearby private university or college since this is the immediate target for this research. This can be done online since that is an easier and cheaper way to get respondents to access the questions. The interview will comprise of students with different performances in their study.

3. RESULTS AND FINDINGS

In the research, data was collected for the survey and interview. The survey and interview were conducted in UCSI university, Kuala Lumpur, and a total of 50 and 9 respondents were involved, respectively. The respondents were from different programs to ensure diversity. The questions were based on the research hypotheses. Thereafter, the Gamesy app was designed using Adobe XD and the interface shared and tested by 29 random students. Since most students do not know much about gamified apps such as Habitica, the questions needed to target specific features of such apps to get accurate information. First, reminders are a common feature in productivity apps. Reminders are supposed to draw attention to future goals (Karlán, McConnell, Mullainathan, & Zinman, 2016). From the survey, 25% of students rarely set reminders and only 32% set reminders to go study as shown in Figure 3.

Figure 3. Setting reminder to study

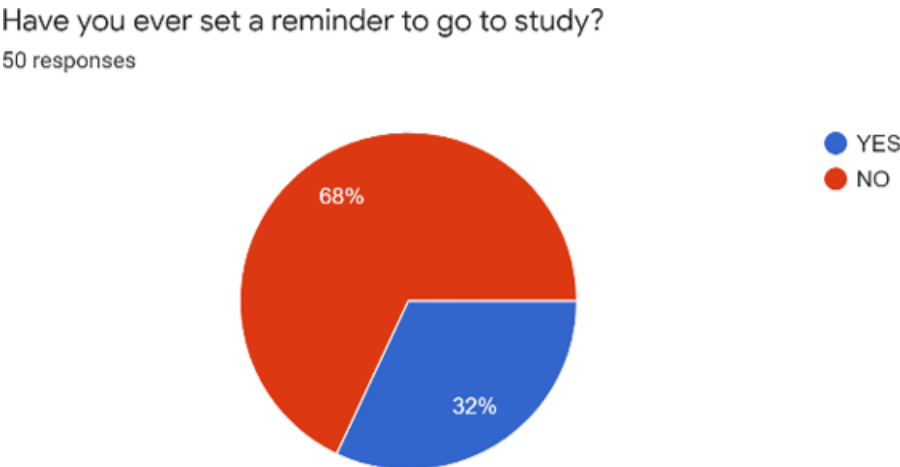


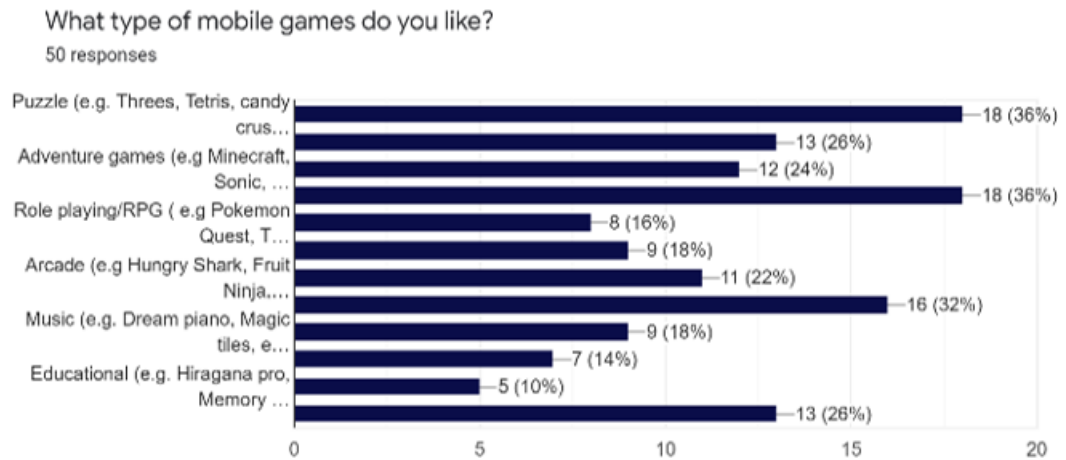
Figure 4. Gifts for studying



Second, Rewards and gifts are also a common feature in gamified app since this is a vital element in a game. 64% of students stated that they would like to get gifts for studying as shown in Figure 4.

Gifts promote motivation to do something. This was also proven true since one of the respondents in the interview stated that they like “The challenge and reward system” when answering the question ‘What do you like most about videogames?’. Videogames have categories that have been recently recategorized to fit more elements into just one game therefore the player gets the idea of what he/she will play (Doherty, Keebler, Davidson, Palmer, & Frederick, 2018). The most commonly liked game genres among the students are puzzle games and action games, 36% of students picked this as one of their favorite genres amongst others as shown in Figure 5.

Figure 5. Favorite game genres



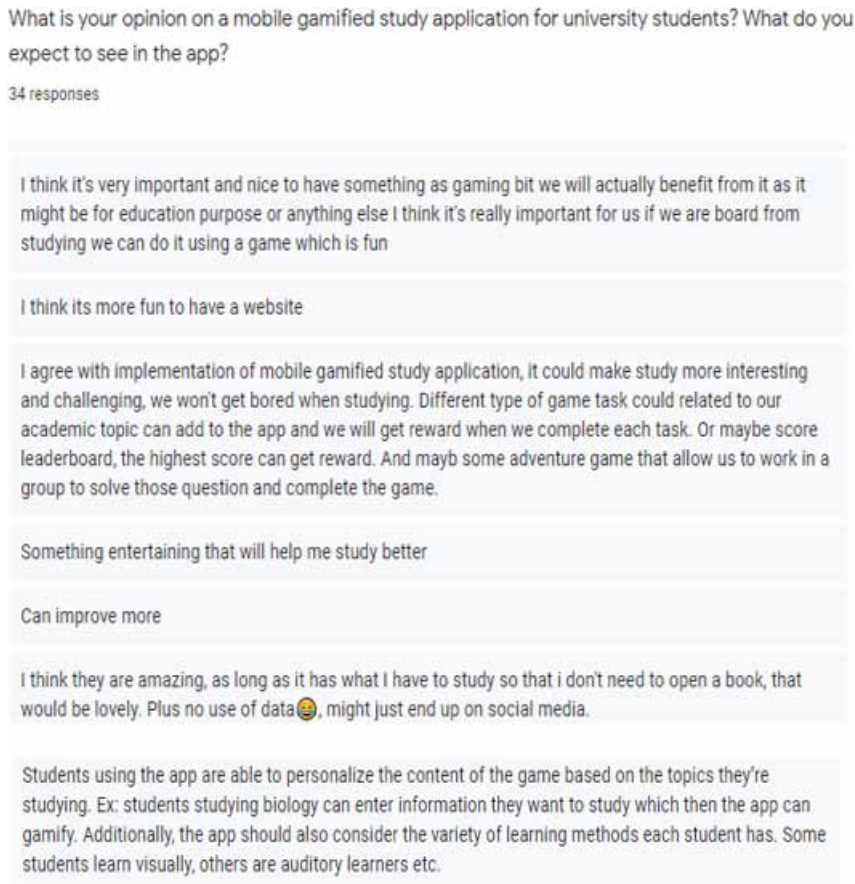
There was a consistency that was noted in choosing the game genres: students in mathematical courses or programs such as accounting picked mind and puzzle games while most who took IT and engineering often picked the action genre and therefore these two would need to be vital genres needed in Gamesy. Designing your own game is one of the features in the Gamesy app. 50% liked this idea while 30% were not entirely sure. This feature is thus feasible since only 20% did not like it. In this, most respondents agreed that Fun and Productivity are the most important aspects when designing a ‘study game’ since, according to one respondent, “the goal is ultimately to study, making it fun just makes it endurable”. The goal of the app is to make the student feel smart and also appear smart amongst others. 38% of students believe an average number of people think they are smart and 72% would like to know how intelligent they are. Also, the study method is a major focus for improvement since 98% would like to know how well their study method is. Therefore, there needs to be a method to measure progress and rate it. To properly design the application, students were asked what they expect from or their opinion on a gamified study app and some stated as shown in Figure 6.

The gamified study app’s user interface prototype was later designed using Adobe XD. There was no existing code for the app since it was still in development (see Figure 7).

In the Gamesy home page, the student has access to games, account, work, and schedule (study), friends, statistics, gamify (make a custom game) and settings as shown in Figure 7. The logo was designed using logomakr.com.

In the games page (see Figure 8), the student should be able to play different pre-installed games or custom created games. Other games with more interactivity would need to be added in later functional prototypes and the final application as well.

Figure 6. Expectations and opinions



The Work and Schedule page (see Figure 9) allows student to activate subjects to be involved in the games. When activated the subjects are involved in the game where statements and terms are asked in the game or need to be chosen to continue and get rewards. The 29 students involved in the survey gave their feedback on the design of the app after navigating through the prototype: 72.4% rated the app as good (4&5 out of 5), 69% would enjoy using such an app and 72.4% rated the design as good (4 and 5 out of 5) (see Figures 10 and 11).

Comments concerning the design of the Gamesy prototype were also stated in the last section of the survey. The following are some of the significant comments.

“It’s a creative idea that’ll make learning much more interesting and breaks the norm of cliché learning habits”, “I think generally it’s a good start but try and improve upon the graphics and also make it more user friendly. Generally, you have done a good job. Keep it up!”, “Simplistic enough but needs to look a bit more professional and involve less colours”, and” There seems to visibility conflict with the home button and the other buttons on the background. Not a big issue at all but maybe repositioning or giving the home button a black background bezel, maybe even if it’s a little transparent, it would be amazing. But regardless this is amazing stuff.”

The general design of the prototype was good, but some features would need rectification such as some colour choices and icons.

Figure 7. Gamesy homepage



4. CONCLUSION, LIMITATION AND FUTURE WORKS

Gamification of academic studies via the use of a gamified study app, Gamesy, is a viable and feasible technique to improve the overall performance of students in both university and college. This is by enhancing the intrinsic motivation to study enjoyably and excitingly by using the progressive nature of the game and the in-game rewards from playing it. This will give the aspect of “play more, study more” which forms a new approach of academic learning. Though the application can improve the performance of the students, it does not guarantee success if the student doesn’t become committed to improving his performance. And therefore, it depends on the user’s effort as well. In this research, there were a few limitations such as limited time for research and data collection. Future work will aim to improve the scope of data collection and add more personalized features other than progressive game design and rewards.

Figure 8. Gamesy Play page

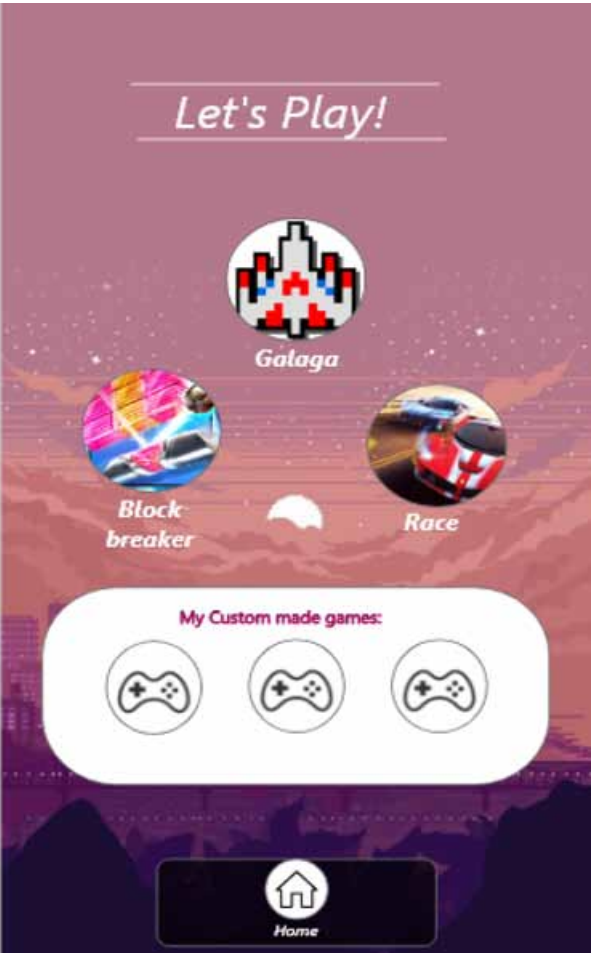


Figure 9. Gamesy Work and Schedule page

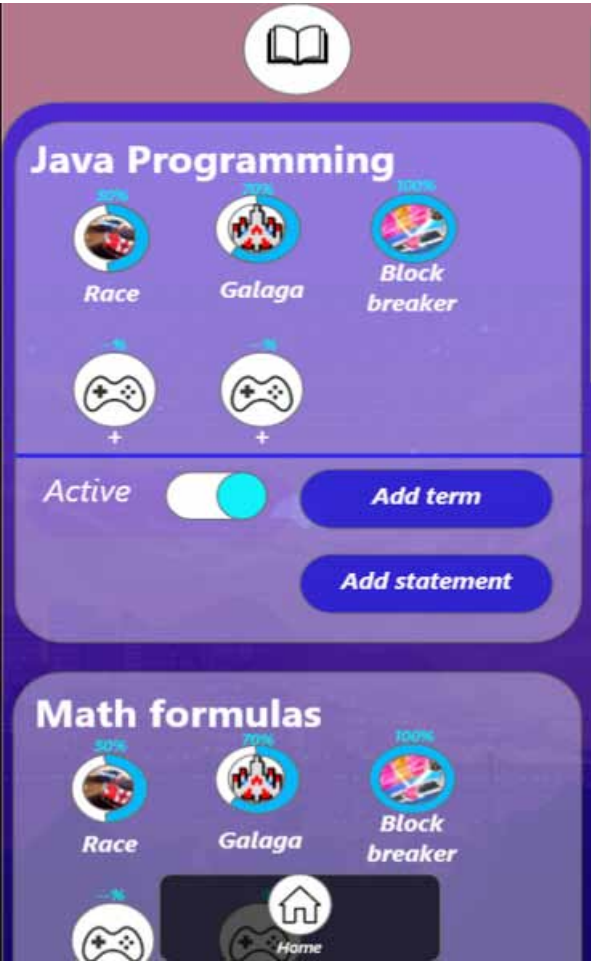


Figure 10. Enjoy using such an app

Would you enjoy using such an app?
29 responses

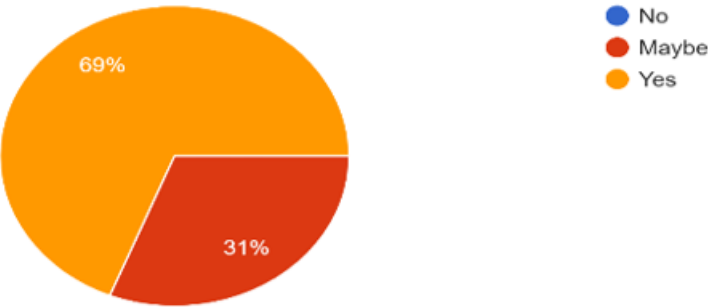
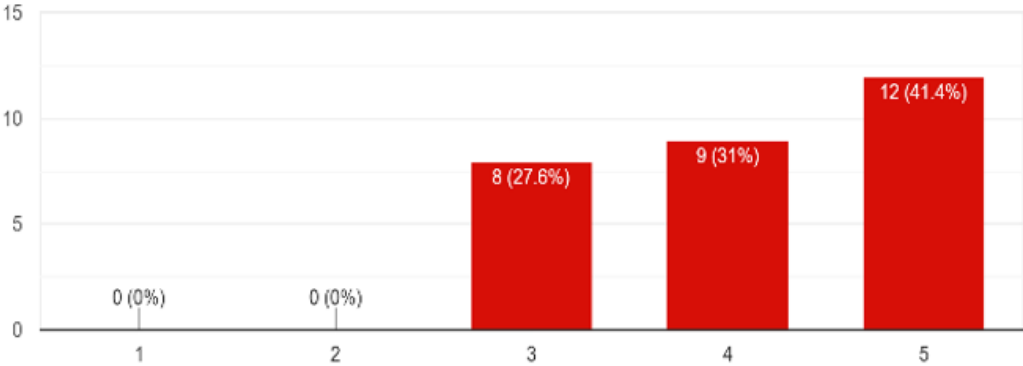


Figure 11. Design of the app

How would you rate the design of the app?

29 responses



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