LAKBAY: A THREE-DIMENSIONAL GAME ABOUT DRIVING FUNDAMENTALS AND ROAD COURTESY AND SAFETY OF GEAR-1 DRIVING SCHOOL

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CHAPTER 1

INTRODUCTION

Background of the Study

Road accidents happen anywhere, anytime, with anyone. It is an inevitable circumstance that may or may not take or change our lives. It is important that we (both the pedestrians and drivers), as law-abiding citizens must be aware of the road's safety precautions and must strictly follow the rules and regulations. As for the drivers, they are the masters of the road and must be responsible for their actions especially in avoiding road accidents and taking into account the safety of the pedestrians.

The government implemented laws and regulations in order for us to have a safe and sound driving experience. The Filipino Driver's Manual of 2018 is a manual that guides motorists and all driver's license applicants in understanding the process of availing a driver's license as well as the importance and the responsibility of having it (Caguete, Sabela, Menis, & Garcia, 2018). The manual itself is in accordance with the Republic Act No. 4136 also known as the Land Transportation and Traffic Code of the Philippines which enumerates the traffic laws that all motorists (motorcycles, cars, and bike drivers) must follow on the road. Compilation of articles and chapters relative to land transportation and traffic rules to promote good driving practices not only applicable to the drivers but also to the pedestrians and law enforcers (Republic Act No. 4136 | GOVPH, 1964).

Along with this law is Chapter 2 of the Registration of Motor Vehicles which is composed of rules and regulations that an applicant is obliged to observe with regards to the issuance of a Drivers' License. Other sections of the law incorporate the preliminary provisions, responsibility for the registration and operation of the motor vehicles, and traffic rules which include the licensing and other operations related to this matter. Last August 02, 2017, President Rodrigo Duterte signed the extension of

the validity of the driver's license from three (3) years to five (5) years under the same law.

But sometimes all we need is to take the initiative and apply the following ideas: alertness while driving, avoiding aggressive driving, vehicle speed and distance, and special driving situations (Safe driving essays, n.d.). Reaching your destination safely requires attention, stay away from any distractions while driving, put down your phone, stay alert, and focus on the road. Self-control is one basic rule as a driver, there will be a lot of times that he/she will encounter unexpected confrontations on the road and one way to settle things around is having self-control (Safe driving essays, n.d.).

In concerned with this issue, the researchers proposed a study that will help the aspiring drivers and even the non-driver citizens by creating a three-dimensional game to better learn and understand the road (rules and regulations, signs, lights, and precautions).

Overview of the Current State of the Technology

The road is one of the major transportation paths of the people in reaching their destinations, but it is undoubtingly veracious that countless lives have been lost in road crashes due to the lack of proper knowledge and guidance of the drivers with regards to road safety and defensive driving. Knowledge and skills in driving and application of laws and regulations in the road are the safest and the best option to apply for us to be safe while trailing the road.

To guarantee that only the deserving and has satisfactory knowledge on road safety and road courtesy maneuver the roads, the LTO puts into effect the mandatory submission of course certificates for applicants for the student permits and Driver's License pursuit to Sec. 3 of RA. No. 10930 which prescribed the firmer issuance of Driver's Licenses and in accordance to LTO Memo Circular 2019-2176 requiring the compliance of driving course completion certificates as a validation of formal training

from the LTO and/or its accredited Driving Schools effective in 3rd August 2020 (Land Transportation Office, 2020).

In response to this issue, the driving schools of the Philippines are now doing their best to educate and produce responsible drivers. One of those schools is the Gear-1 Driving school, which aims to provide a lawful and practical basis of learning to their students for them to finish the course and obtain the certification as proof of their completion that they are competitive and defensive drivers who will strictly observe the traffic laws and regulations for road safety.

Gear-1 Driving School was founded by Mr. Rafael Atayde and Mrs. Emilia Atayde last 2003 having only one (1) branch, the couple managed the school with Mr. Atayde as the instructor and Mrs. Atayde as the registrar, as time passes by the school was able to reproduce its branches, now the Gear-1 Driving School has 19 Branches in the vicinity of Bacoor, Laguna, and Metro Manila having 45 cars, a training center, 45 instructors, and 45 registrars. The School rents its place and has complete legal documents for business and municipal consent they are also accredited by the Land Transportation Office this simply means that they are allowed to conduct the seminars for the theoretical and practical driving lessons and to manage the School as their business.

Theoretical Driving Course (TDC) is one of the services offered by the school. TDC is a 15-hour seminar that is divided into three 5-hour sessions. The content of lessons on the modules is standardized by the LTO for all the driving schools. The TDC teaches applicants about the basics of driving from Driving Fundamentals to Road Courtesy and Safety. Since TDC is theoretical-based, written exams are done every after sessions for assessing the applicant's knowledge about the lessons. Another service that Gear-1 Driving School offers is the Practical Driving Course (PDC). It is an 8-hour actual driving test wherein applicants with the guidance of the instructors were tested about real-life scenarios on the road. PDC is the application of the TDC wherein

lessons from Driving Fundamentals as well as Road Courtesy and Safety are being practiced.

Statement of the Problem

General Problem

In particular, the study focuses on developing a Three-Dimensional Game Application about Driving Fundamentals and Road Courtesy and Safety of Gear-1 Driving School.

Specific Problem

In conjunction with the main problem, the following problems are expected to be given light throughout the study:

1. Due to pandemic, face-to-face seminars with regards to Theoretical Driving Course (TDC) was temporarily suspended following the advice of LTO, because of that, the Gear-1 Driving School cannot conduct seminars that will educate their students of the Driving Fundamentals and Road Courtesy and Safety.

    As stated by the government, Social gatherings are not allowed during this pandemic for us to be safe, in respect to the authorities, the Land Transportation Office (LTO) temporarily suspended the seminars even webinars of the schools regarding TDC. For driving applicants, these sessions are crucial for them to be knowledgeable about Theoretical lessons in driving wherein, the laws and regulations of the road are being taught.

2. Most of the students enrolled in Gear-1 Driving School are young adults who are said to be accustomed to technological ways because of that, the long hours of seminars using the traditional method of teaching gets them bored which leads to their loss of interest in learning that could affect their overall performance in driving.

The seminars conducted in Gear-1 Driving School is 15 hours in total and is subdivided into three (3) days which is five hours per session and most of their students are young adults who would prefer an entertaining and more "techy" way of learning, but the preparation for this kind of seminar is time -consuming and will add another weight to the instructor.

3. Most students in Gear-1 Driving School are having a hard time in learning lessons specifically in taking Theoretical Driving Course's (TDC) after-exams because those students who are not comfortable with the language used have less scores than other students who are most comfortable with it.

After every lesson during the TDC, there will be an after-exam that the students are encouraged to pass. This set of exams are written in English and students who are not that comfortable with the said language are said to have lesser scores compared to the students who are proficient with it.

Objective of the Study

Overall, the main objective of the study is to develop a Three-Dimensional Game Application about Driving Fundamentals and Road Courtesy and Safety of Gear-1 Driving School that will aid in the dissemination of information about Road Safety and Driving.

The specific objectives of the system are listed as follows:

1. To create a module that will provide reliable lessons to help the students in learning and reviewing the lessons conveniently.

The module will help Gear-1 Driving School in helping to educate their students despite being halted from conducting seminars that are advised by the LTO. In this way, the students will still learn traffic

laws and regulations specifically the Driving Fundamentals and Road Courtesy and Safety which will have a huge impact on their driving ethics.

2. To create a module with fun features that will keep the students of Gear-1 Driving School entertained while learning and making it more convenient for both the instructors and the students.

   The module will give assistance to Gear-1 Driving School in helping to educate students in an entertaining and more "techy" way for them to keep their students engaged in the lessons. This game application will help the instructors to instill proper driving ethics while saving time from creating the lessons for their students which will give them more time to conversate with their students' concerns in the course.

3. To develop a module that will help students specifically with regards to Theoretical Driving Course's exams with their preferred language to use.

   The module will give assistance to students who are not proficient in a single language and will let them freely choose their preferred language with which they are most comfortable and familiar.

Scope and Limitation

The Lakbay: A Three-Dimensional Game Application About Driving Fundamentals and Courtesy and Safety of Municipality of Gear-1 Driving School aims to provide a knowledgeable and useful application that can help and guide ordinary people of Bacoor about Road Safety and Driving.

Scope

The scope of the study revolves around the following:

Access Levels

- **Player**. The player is the one who navigates around the game and plays the playable contents of the game. The player is expected to play the two phases (Linear Play and Free-Roam Play) of the game in either of the two modes (Non-Professional and Professional) available in the game.

Functionalities

- **Theoretical Examination**. The process of taking a driver's license involves taking examinations, this part of this process is taken into account in the game. The game integrates the theoretical examination in a challenging way by adding other mechanics while answering the questions. The questions are all based under the Land Transportation Office's (LTO) Land Transportation Management System (LTMS).

- **Basic Driving Simulation**. Another part of the process of taking a driver's license is the Practical Driving Course (PDC). To integrate this concept into the game, a basic simulation of driving is implemented to the game for the user to experience some of the encountered lessons in PDC. The game allows the simulation of the basics of safe driving practices on the road and aims to test the skills of the player's readiness in driving. To make it more challenging, the player will experience the simulation alongside basic driving missions that the player must need to do.

- **Language Localization**. The player of the game is allowed to play the game in two available languages: English (the default) and Filipino. Players are free to choose the type of language that is convenient to them. Localization almost entirely applies to all parts

of the game, including the User Interfaces (UIs) as well as the assets that are to be used in the game.

- **Aesthetics**. This is the overall look and feel of the game. Things such as User Interfaces (UIs), Head-Up Displays (HUDs), and 3D environments while playing the game all play their part in making the game visually appealing to play.

- **Informative Material**. The game serves as an informative medium through the integration of the Information and Video Modules in the game, wherein the player can use these modules to gain knowledge about the essentials of driving, road safety, and more.

Limitation

Putting aside the functionalities offered by the game, the following are the known limitations:

1. Lakbay is a free-to-play game application that can be used by anyone as long as they have installed the application on their mobile devices. This game has no age limit but is advised to be used by 18 years old and above.

2. The android application is strictly meant to be only played. Gear-1 Driving School can not interact with the players of the game in any way such as their data, etc. Moreover, some part of the application needs an internet connection specifically to watchable videos that are included in the game.

3. The application will only run on phones with an ARMv7 CPU with the minimum requirements: Android 5.1 Lollipop and higher versions, minimum memory (RAM) storage of 1GB, and storage of 300MB.

Methodology of the Study

RAD (Rapid Application Development) is a type of Agile software development model published in the 1980s. Its development was prompted by the shortcomings of regressive traditional development models such as the Waterfall Software

Development Model. One major flaw in the waterfall model was that once the software entered the testing phase, changing its core functions and features became extremely difficult (Deshpande, 2018).

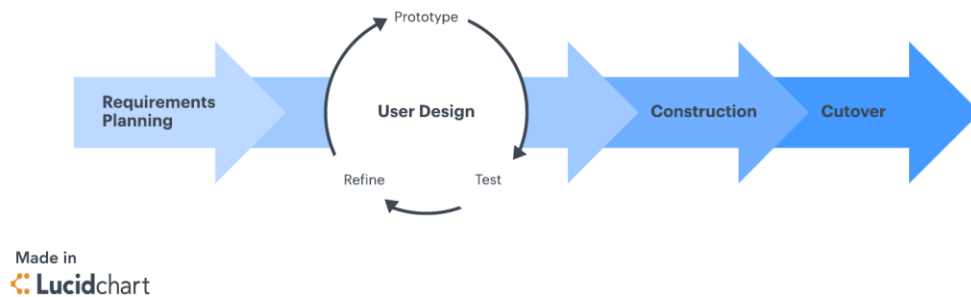Rapid Application Development (RAD)

Figure 1: The RAD Model (Lucid Content Team, 2018)

The developers have chosen this methodology considering the evolving requirements of the software being developed. RAD or Rapid Application Development is the best solution to this issue, through rapidly developing prototypes for the testing of functions and features without affecting the result and providing functionalities such as change of design, adding/removing functionality, and cleaning by eliminating things you don't want to be included while keeping the result safe. It is an advanced developing model that provides more significance to rapid prototyping and quick feedback despite the length of its developing and testing cycle allowing the developer to create a quick software update and multiple iterations. RAD enables low-code rapid application development and yields a more convenient environment both in the competitive marketplace of technology and the lives of the developers.

This methodology will aid the developers to identify the possible problems that may arise in the development process of the system. RAD is focused on prototyping and is acting as a substitute to design specifications, this implies that RAD modeling is best at User interface programs because RAD includes the Agile method and Spiral model (The Economic Times, n.d.).

Below phases are in the Rapid Application Development (RAD) model:

Phase 1: Requirements Planning. On basis of the flow of information and distribution between various business channels, the product is designed. The first phase of this study is the" Requirements and Planning" wherein, the developers consolidated all the data needed in the development of the study, they also conducted a virtual interview with Mr. Darwin L. Atayde of Gear 1 Driving School, the client of this study. This is to learn and break down the problems dealt with by the client and to be able to construct the most suitable solution to the said problems by building an application that will aid the client's necessity.

Phase 2: User Design. The information collected from business modeling is refined into a set of data objects that are significant for the business. The second phase of this model is the "User Design" wherein, the developers started to develop the application and released prototypes to be evaluated by the client to ensure that the needs are met and to provide suggestions for further development of the application for a satisfactory output.

Phase 3: Rapid Construction. The data object that is declared in the data modeling phase is transformed to achieve the information flow necessary to implement a business function. Automated tools are used for the construction of the software, to convert process and data models into prototypes for system testing. The third phase of this model is the "Rapid Construction Phase" wherein, the researchers are working all together to ensure the stability and quality of the system for the client's satisfaction, but if they find something to be improved the client can still suggest the possible output or things to be included in the development of the application.

Phase 4: Cutover. As prototypes are individually tested during every iteration, the overall testing time is reduced in RAD. The fourth and last phase of this model is the "Cutover" wherein, the implementation and launching of the output are done in this phase which includes, which includes data conversion, testing, and changeover to the new system, as well as user training. And the final modifications are made as both developers and clients continue to work for the errors in the system.

Significance of the Study

The development of a Three-Dimensional Game Application about Driving Fundamentals and Courtesy and Safety of Gear-1 Driving School is believed to be beneficial to a certain individual, group of individuals, or organizations.

Gear-1 Driving School. This study is significant to Gear-1 Driving School as they are the client of the study and they will be able to utilize the game application in teaching effective road safety practices and protocols to the students of their school that aspires to drive.

Drivers. This study is significant for aspiring drivers for them to have a portable, useful yet entertaining source of knowledge about Road Safety and Driving. Furthermore, it will help them to familiarize themselves with Traffic Rules and Regulations.

Cavite State University – Bacoor City Campus. This study is significant to the university as it will be recognized to be a part of the development of having an application for Road Safety and Driving.

Driving Schools. This study is significant to schools that educate aspiring drivers. It can help them in introducing basic Traffic Rules to driving applicants with the use of an easy and entertaining platform.

Local Government Institutions. This study is also significant to other Local Government Units as an inspiration to develop their own application pertaining to Road Safety and Driving or the likes

Researchers. This study is important to the researchers as they will gain more knowledge about developing an android application and about Road Safety and Driving. Moreover, it will help them to enhance their skills in developing a game application and aid them in their professional career in the future.

Future Researchers. The study is also important to future researchers and developers as it can be of help to become a groundwork in developing a new

application relevant to the concepts of the system or serve as a related study for their

manuscript.

CHAPTER 2

REVIEW OF RELATED STUDIES

Foreign Literature

Video Games: Developing a New Narrative

Many of us see video games as a foolish diversion with little to no creative or academic merit. In 2010, the renowned critic Roger Ebert published an article saying that video games could never be considered art, noting that "no video gamer today living will endure long enough to understand the technology as a form of art." "His point is that, while the definition of art limits our ability to substantiate this perspective, video games will never be art since there are no present instances of video games that are equal to any great literary or cinematic masterpiece that achieved the distinction of being labeled "art. "However, this viewpoint is limited in its capacity to assess the worth of a video game outside of comparable and outmoded techniques. Telltale Games, an independent game company, has recently made significant breakthroughs in the way these interactive storyline games have altered narrative structure. The Walking Dead and Game of Thrones, their game series have introduced a completely latest way of experiencing story; particularly, the most interesting about these two games is the extent to which these numerous options can impact the game. The effects of decisions taken in various areas of the game can significantly alter the course the story takes critically alter the result of the narrative. The effects of decisions taken in different stages of the game can considerably branch the story's direction and drastically modify the fate of the narrative, leading to various endings. This is exacerbated by the fact that the options you take in one game might cross over into another, as demonstrated between The Walking Dead's seasons one and two, where some of the events and characters might be changed depending on what decisions you did in the prior game. The interactive story is still a novel type of digital literary that is evolving and changing

in fascinating innovative ways. Many game developers have worked hard to push the frontiers of what is now feasible in storytelling and video games, such as this year's SXSW Excellence in Gaming Award (Narrative nominee Her Story and winner The Witcher 3) The fierce search has shown to have a lot of literary quality. Video games are still a relatively new industry that has yet to realize its maximum latent games, however, have given us a glimpse into the industry's future and the potential it provides for storytelling (Joly, 2016).

Synthesis:

Video games are often considered as little to no art but Telltale Games made significant breakthroughs that have given us a glimpse into the industry's future and the potential it provides for storytelling.

The effect of games and simulations on higher education: a systematic literature review

Higher education institutions are concerned with preparing future professionals. To attain this goal, creative teaching approaches such as games and simulations, the focus of this study, are frequently used. The digital games and simulations mature, this research seeks to provide a systematic assessment of the literature on games and simulation pedagogy in higher education. The researchers worked together to use a qualitative method, coding and synthesizing the outcomes based on a variety of criteria. The primary goal is to investigate the effects of games and simulations on accomplishing certain learning objectives. Overall, the findings suggest that games and/or simulations have a favorable impact on learning objectives. When games are integrated into the learning process, the researchers describe three learning results: cognitive, behavioral, and affective. Finally, the authors synthesize evidence for the benefit of higher education scholars and practitioners interested in the effective use of games and simulations for instructional reasons. These proofs suggest

prospective avenues and possibilities for further investigation. Several well-designed empirical research on the influence of serious games on learning outcomes were published in recent years. Sawyer defines serious games as games made by the gaming industry having a significant relationship to knowledge acquisition (Sawyer, 2002). Sawyer's description is expanded by Zyda (2005), who adds that serious games are games whose primary objective is not entertainment, enjoyment, or amusement. These educational games and virtual worlds created for educational reasons demonstrate the potential of modern technologies to engage and encourage people beyond recreational pursuits (Anderson et al., 2009). Simultaneously, there is a large body of study examining the possible learning benefits of game-based learning (GBL), which is defined as the use of game-based technology to convey, assist, and enhance teaching, learning, and assessment (Vlachopoulos, 2017).

Synthesis:

The objective of the Higher education institutions is to prepare professionals with creative teaching approaches that will enhance the cognitive skills and provide entertainment by developing serious games in which, these modern educational pursuits the possibility and learning benefits of game-based learning (GBL) to assist and enhance the learning of the students.

The Association Between Video Gaming and Psychological Functioning

With over two billion players globally, video gaming is an incredibly popular pastime (Newzoo, 2017). Our goal in this study was to investigate the relationship between video gaming and psychological functioning in a quite well manner. We investigated psychological functioning for this goal by utilizing a variety of variables like psychological symptoms, coping methods, and social support. The present research adds to gaming expertise by revealing the particular relationships between video gaming and various measures of psychological functioning. Pathological video gaming

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has been linked to pleasant effects and social relationships when playing, as well as to psychiatric problems, maladaptive coping methods, negative affectivity, poor self, and a preference for video games. maladaptive coping strategies, negative affectivity, low self-esteem, a preference for solitude, and poor school performance Incorporating gamers' motivations for playing video games as well as their favorite game types led to a better understanding of the particular and disparate links between video gaming and mental wellbeing. This understanding may aid in the development of appropriate therapies that are implemented prior to this occurrence. This understanding may aid in the development of appropriate therapies that are implemented prior to the occurrence of potentially problematic video gaming-related psychological impairments (Heiden, Braun, Müller, & Egloff, 2019).

Synthesis:

The investigations of the relationship between video gaming and its psychological effects reveal that video gaming has a positive and negative effect on the gamer with regards to his/her psychological functioning and gaming-related psychological impairments on the other hand. This only explains that the type of game the person chooses has an impact on their cognitive skills and their life as a whole.

The Importance of Game Based Learning in Modern Education

The learning methodology is becoming more global, and it is obtaining traction. In our technology age, modern instructional materials are critical and preferable. Technology is used in a modern school system to deliver education. The increasing integration of digital games and applied sciences into learning environments has had an impact on both educators' teaching and students' learning. It has been shown that Game-Based Learning (GBL) is effective in both learning and teaching. It is incorporating games into your lessons. One of the most difficult problems for educators is to impose education effectively in large groups of learners considering that all of

them have different characteristics, capabilities, and learning styles. Students anticipate a different activities, prizes, surprises, and humour from everything digital to maintain their attentiveness in learning. One of the most pressing concerns today is discovering innovative techniques to capture learners' attention that will secure their learning process. A properly designed educational game can integrate the educational system's learning objectives with the entertaining, output of a commercial and/or customized games. Games that are expressly intended for the purpose of training youngsters can greatly inspire self-learning and problem-solving skills. A game-based learning incorporates specified knowledge into games. Incorporating games and activities into the learning process can be done in three ways. The first method involves students designing and developing their games based on their needs; the second method involves teachers, trainers, or developers creating educational games from scratch based on students' knowledge levels; and the third method involves incorporating commercial prefabricated games into classroom activities for efficient knowledge absorption (Dadheech, 2018).

Synthesis:

Game-based learning (GBL) can be helpful in promoting a better learning process where you can integrate entertainment with the lessons to make it more interactive and amusing at the same time that will result in efficient knowledge absorption.

Motorcycle Safety

In May 2019, 014 motorcyclists were murdered and continuously bear disastrous road crashes. Wearing DOT-compliant helmets, being bold, driving clearheaded, and being alert is encouraged to keep everyone safe, especially the motorcyclists. Reducing the number of damages on the highways of the country requires the cooperation of everyone who uses the road. Motorcycle habits like slowing

down and zigzagging - for them to engage themselves properly in the situation and other habits that promote safety to our motorcyclists must be understood and applied. Promoting road awareness Is a way to elevate safety on the highways, and the cooperation of both the drivers and motorcyclists is needed - by providing learning materials about how to attain your Motorcyclists' License, how to ensure the stability of your motorcycle, and how to operate it while wearing proper protective equipment, and how to interact with your fellow motorists responsibly. To protect your head from a severe road crash, wearing a helmet is the safest choice. If you are carrying cargo, you must balance yourself and a load of your cargo by adjusting the tire pressure for additional weight. Checking your motorcycle's condition before every trip is a must. Start by checking your tire pressure and tread depth, hand and foot brakes, headlights and signal gauges, fluid levels, and signs of oil or gas leaks. Veteran motorcyclists do not put themselves at risk by strictly following the local traffic laws such as, avoiding alcohol and drugs, even taking medication that may affect negatively affect your control, balance, and judgment (Seguridad con Motocicletas, n.d.).

Synthesis:

The safety of the motorcyclists is their responsibility and the most effective way of being safe on the road is for everyone to cooperate. The awareness and liability of everyone is also a great factor, motorcyclists are advised to have their Motorcyclists' Licenses and ensure the stability of their motorcycles, to wear protective equipment, and strictly follow the local traffic laws for the safety of everyone on the road.

Pedestrian Safety

We are all a pedestrian at some point. Pedestrian lethalities continue to be a problem, in fact, there were 6,205 pedestrian deaths in the year 2019. The National Highway Traffic Safety Administration (NHTSA) raised awareness of pedestrian risks by providing safety recommendations, educational materials, and other resources.

Protect yourself and your loved ones while walking and how we may avoid accidents while on the road. We must know the pedestrians' safety basics, obey the regulations of the road, and observe the signs and signals. When sidewalks are available, take advantage of them. If the sidewalk is not available, walk as far away from the traffic as possible. Be attentive and do not be distracted by electronic devices that divert your attention away from the road. Cross at crosswalks or intersections where automobiles are standing by for pedestrians. Look in all directions for vehicles, particularly those turning left or right. If you cannot find a crosswalk or an intersection, look for a well-lit spot with a good view of traffic. Wait for the traffic break that will give you enough time to cross safely and keep an eye on the road. Do not anticipate that the driver sees you, make eye contact with them as they come to ensure that you are seen. You may wear bright color clothes in the morning and have some signal-like flashlight at night to make you more visible. Beware if there is a moving vehicle from the parking lots and do not walk under the influence of drugs or alcohol. Road safety is a two-parties liability, as a driver, you must ensure both your and the pedestrian's safety. Be ready for the difficult situations on the road, slow down when it is hard to see anything because of the dark or bad weather, and when entering the crosswalks, stop behind it to let the other vehicle see the approaching pedestrians for them to stop as well and do not overtake in case there may be a stopped vehicle for safety purposes. Observe the speed limit and do not drive when drunk or is under the influence of drugs and be careful when backing up especially in front of a school (Seguridad Peatonal, n.d.).

Synthesis:

The National Highway Traffic Safety Administration (NHTSA) raised awareness of pedestrian risks due to the rising rate of pedestrian fatalities. As a responsible pedestrian, we must observe the sign of the signals and other road safety policies, on the other hand, as a driver, we must also consider the pedestrians and be responsible on the road, learn to give way because both pedestrians and drivers are responsible for road safety.

Driving Drunk

Driving when inebriated is dangerous. Nonetheless, it continues to occur across the United States. If you drive while inebriated, you face serious consequences. You could be arrested, or worse, you could be engaged in a car accident that results in significant injury or death. In the United States, intoxicated drivers account for almost one-third of all fatal auto accidents (with BACs of .08 or higher). In 2019, 10,142 individuals died in crashes that may have been avoided. In fact, nearly 10,000 individuals died per year in drunk driving crashes on average over a ten-year period from 2010 to 2019. Driving while inebriated is against the law in every state; nonetheless, one person died in a drunk driving accident every 52 minutes in the United States in 2019. It's simple to be a responsible driver: don't drive if you've had too much to drink. Pick a good friend who wouldn't even drink before driving. Allowing your buddies to drive when inebriated is not a good idea. If you've had too much to drink, call a cab, a tour company, or a sober buddy. If you're throwing a party with booze, ensure sure everyone has a designated driver and always buckle up. Even a modest amount of alcohol, though, can impair your ability to drive. 1,878 persons were killed in 2018 due to alcohol-related collisions involving drivers with blood alcohol concentrations.01 and.07 g/dL. A breathalyzer, a device that monitors the amount of alcohol in the driver's breath, or a blood test is used to determine BAC (Manejar Borracho, n.d.).

Synthesis:

There are 10,142 deaths in road crashes due to drunk driving in the United States. This happens because of a person's lack of self-discipline and proper education about the road. This simply states that we need to educate the people properly because proper education can shield someone's life from the dangerous journey on the road.

Build quality learning apps, games, and simulations

Learners should be able to enter dynamic worlds and study complicated events and concepts in whole new ways with the next generation of educational technology. Learning that is both interactive and immersive Build once, deploys across numerous platforms, including support for the most cutting-edge VR and AR technology. Innovative: lets the students put difficult procedures into practice, explore ideas in new ways, and improve learning outcomes more effectively than traditional methods. Training simulations are using cutting-edge technology to save training time, improve safety, save equipment costs, and increase staff competence. Effective learning tools Unity Analytics is a personalized service. Visualize game data in a single, easy-to-understand dashboard. Unity Analytics can help you improve everything from the player experience to the in-game economy. Metric Monitor: Get a high-level perspective of how your game is played with the Metric Monitor. Explorer of Data: Investigate use cases, keep track of new product releases, and look up previous events. The analyzer of Funnels: Recognize how players interact with one another and progress through your game. Construct distinct player groupings based on in-game scenarios and behavioral patterns using the Segment Builder. Efficient: The Unity Accelerator is a local network proxy and caching service that reduces iteration times for two primary scenarios: source code download via Collaborate and asset pipeline import, which allows you and your team to focus on building. The Unity Accelerator is a standalone application that may be downloaded for Mac OS X, Windows, and Linux. and it is collaborative where multiplayer games frequently top the charts because shared experiences can produce amazing gaming moments. Build faster and more effectively. Accelerate development while lowering costs: The Unity Asset Store has some amazing offers on learning and training tools (Unity Technologies, n.d.).

Synthesis:

The Learners are learning in an interactive and immersive way of learning, this is considered to have better outcomes compared to the traditional learning method. That is where Unity Analytics becomes effective because it has personalized service, Visualize game data in an easy-to-understand dashboard and it can help you Build faster and more effectively. Accelerate development while lowering costs – considering that the Unity Asset Store has some amazing offers on learning and training tools.

Edu-games hit the market, but not all are created equal

With the recent introduction of high-profile educational iterations of games like SimCity and Minecraft, the repurposing of video games as learning tools is picking up speed. Educational games have always distinguished themselves from commercial games by portraying themselves as serious and avoids the conflation of educational and commercial amusement. Academic institutions or commercial developers are still the primary producers of educational video games. These games frequently incorporate "teacher-only" abilities to impose learning methods or habits on students. They also exist outside of institutional or commercial supervision, and are typically employed by educators on their own.This new era of educational games is a perplexing mix of popular culture's supremacy, new communication channels, and a rising research base for schools. The capacity for the teacher to change the goals, support for both formal and informal learning opportunities, and the opportunity for social networking are all features of good educational games. Shared areas, co-creation, adventure, immediacy, interactivity, permanence, and community are all available in games like Minecraft, Terraria, and King Arthurs Gold. While educational games are unlikely to resolve ongoing debates about curriculum and school funding, there are signs that a growing number of online communities are willing to develop substandard ideas about using video games to educate children who would otherwise be deprived of the opportunity.

Synthesis:

The high-profile educational iterations of games like SimCity and Minecraft are repurposing video games as learning tools. The educational games open the gateway of opportunities for the teachers to provide both the formal and informal way of teaching this may also be the sign that a growing number of online communities are willing to use videogames to educate children.

A good workflow to smoothly import 2D content into Unity, Part I: authoring and exporting

This lesson walks you through setting up a real-world production pipeline. When we talk about workflow, we're talking about all of the procedures and processes that go into creating content and getting it into the game. Regardless of the number of apps required to complete the chain from start to finish, a workflow consists of three key steps: authoring, exporting, and importing are all options. Authoring: It all starts with quality material, and the first step we'll look at is using Adobe Photoshop, the industry's workhorse. One of the best aspects of Photoshop is how easy it is to get started. Creating and altering photos and graphics is simple and painless, and you'll have access to a wide range of tools and approaches as your needs evolve. The significance of layers Scenery is non-interactive content that serves to fill in the gaps between what is visible, communicate a theme, and help gameplay by providing a setting in which items can be hidden. For all objects, "whole" layers are necessary so that it appears to be correct When you wish to create, you employ "obscured" layers. When an item appears to be behind something when it is actually floating in front of it. Exporting: after consolidating everything that we needed, we will start on our application workflow. Photoshop is scriptable using JavaScript doing what we exactly need, as a matter of fact, some of the adobe apps (Fireworks, Illustrator, Flash, etc.)

are also scriptable and we can use this to write our exporter, and if there is no API for a certain thing you desired you may record and convert your actions into command codes and paste them in the scripts. Importing: After successfully exporting all images and meta-data we will proceed to Unity and import all our files (Bibby, 2013).

Synthesis:

The workflow is the process and procedures that got into creating content into creating games. The workflow consists of three key steps. The authoring, exporting, and importing this is where we collect quality materials and alter photos and graphics in Photoshop, starting on our workflow, and import all our files in Unity.

Foreign Studies

Training predictive L2 processing with a digital game: Prototype promotes acquisition of anticipatory use of tone-suffix associations

This study presents an educational digital game application whose primary objective is to provide training in predictive second language (L2) processing. During two-week testing, the prototype of the application was tested with L2 learners who lacking with the targeted anticipatory linguistics cue. The game concept focuses on the Swedish tone-suffix association and has mechanics that built based on the core process of language comprehension. As reflected under the test conducted to the learners, the result indicates that the game successfully promoted the learning of a novel L2 processing strategy. The study also stated that the more time the user spent on the highest level of the game, the greater accuracy gains (Hed, Schremm, Horne, & Roll, 2017).

Synthesis:

The study presented an educational game application that main aims to improve and provide guidance in the predictive second language of the learners. The result of the study stated that the game promotes a good learning platform in the

training of the learners. The study's relation to the current study is that it is an educational game application that consists of testing or prototypes to satisfy the needs of the client. Moreover, both the game application has game mechanics and focuses on a topic which aims to benefit learners.

An educational game on the theories of driver education curriculum: An evaluation

This study aims to evaluate the effectiveness of using a game application for students from driving school about their understanding of driving rules and regulations. An Educational Game on the Theories of Driver Education Curriculum (DEC) was an application developed to improve the visualization, understanding, and memorization of students about the theories about driving rules and regulations. The application also is prepared before taking the driving theory test. To develop the DEC application, the Game Development Life Cycle (GDLC) was used as a methodology of the study and the Game-Based Learning Evaluation Model (GEM) for measuring the effectiveness of the said application. The DEC application consists of initiation, pre-production, production, testing, beta, and release phases. The results of the study indicated that educational game applications helped the students to easily visualize, understand and memorize the theories of driving (Noh, et al., 2020).

Synthesis:

The study evaluated the use of game applications for driving students about their understating in driving rules and regulations. It used different testing tools for the evaluation of the study. Overall, the study promotes that educational game applications help driving students to better understand driving rules and regulations. This study is relevant to the current study because of the topic that has been discussed or evaluated. The topic is about the effectiveness of a game application for improving driving students' understanding of driving rules and regulations. The said topic is

somewhat related to the current study as its primary objective is to develop a game application that will educate and spread awareness for the driving students about their understanding of driving rules and regulations.

Interactive educational game, an android mobile app for children learning alphabets

This study aims to develop and evaluate a mobile educational game application that supports fun learning for children. Laut ABC is an Android-based educational application that was described by the study. The said application is composed of attractive designs that aim to be a learning tool to help the children in learning the alphabet. Data collection, design, and implementation were used as research methods of the study. In designing the application, Storyboard and Waterfall Model for Software Development Life Cycle were used for the study. The results of the study showed that the educational application Laut ABC is an effective learning tool and alternative application for children in learning the alphabet in an interesting and fun-learning concept (Salman & Antoniu, 2017).

Synthesis:

The study aims to develop and evaluate Laut ABC- an Android-based educational game application for learning the alphabet. It shows that the game application is an effective learning tool for fun-learning tool for children. The relationship of this study to the current study is its objective which is to develop a mobile game application for users. Also, the study is relevant to the current one as it aims to develop an android-based educational application that will both entertain and educate the users. Moreover, the methods mentioned above like data collection, design, implementation as well as storyboard will also be used in the current study.

Educational Game Application Development on Classification of Diseases and Related Health Problems Treatment in Android Platform

This study aims to design an android based Klasifikasi dan Kodifikasi Penyakit dan Masalah Terkait (KKPMT) educational application to improved the students understanding about KKPMT course. The study stated the problem about the lack of Reference: exercise in learning KKPMT. Furthermore, the classification and codification of diseases and related problems is one of the competencies of a medical recorder. The study uses a pre-experiment, pretest, and posttest with the waterfall model as their methodology. The participants of the study were students in the medical field and as stated in the result of the study, it showed that after using the KKPMT educational game, the android game software helped the students in understanding the KKPMT subject matter (Sunindya & Purwani, 2017).

Synthesis:

The study aims to develop a game application about KKPMT and aims to improve student's understanding of it. The result of the study showed that the game helped the students better understanding the KKPMT. The study's relation to the current study is that it also aims to design an android game application that will benefit certain users. It is an educational yet entertaining game application that will educate the learners about their understanding of a specific topic, for the current study the topic of study focuses on driving rules and regulations.

The Application Of Cooperative Learning Methods In The Developing And Analyzing The Quality Of An Educational Game

This study aims to develop an educational game application and show the quality of the developed application. Research and development was the methodology used in the study. The results of the study stated that the educational game application

was developed using the CodeIgniter framework and consists of features mainly to assessed the students' learning cooperatively through playing games into teams category. Also, the test results showed that the developed education game application met the ISO/IEC standards in. functional suitability, performance efficiency, usability, security, reliability, and maintainability (Novian, Dwinanto, & Mulyanto, 2019).

Synthesis:

The study is relevant to the current study as it also aims to develop an educational game application for the students. Likewise presented in the study, the current study also aims to develop a game application that will help students to engage themselves in a platform that will both educate and entertain the users.

Improvement of student mathematics learning outcomes through Kahoot learning games application at elementary school

This study aims to improve the students learning outcomes in mathematics through the use of Kahoot learning games application at elementary school. This study adopted from Kemmis and MF Taggart Model were conducted in three cycles for the fourth grade with 22 students at Public Elementary School in Tomohon, North Sulawesi, Indonesia. The results of the study stated that there is an improvement in students learning outcomes from cycles one to three. Moreover, it concluded that Kahoot learning games helped improved the students' mathematics learning outcomes (Umboh, Tarusu, Marini, & Sumantri, 2021).

Synthesis:

The relationship of this study to the current study is that it also involves the use of a game application for learning of the students about certain topics. As stated in the study above, it aims to improve the learning outcomes of students for their mathematics through the use of a game application. On the other hand, the current

study aims to develop a game application in which will educate students about driving rules and regulations.

Computer gaming and driving education

This study investigates the learning effects of playing computer games such as racing, action, and other sports-category games. Specifically, the study focused on traffic school students driving behavior. Surveys were conducted at three driving schools and students were questioned about their gaming habits. The result of the study stated that experiencing computer games can have a positive effect on the driving performance of the students. It also indicated that experienced gamers were ranked higher with regards to overall driving skills compared to students with low experienced in computer games. Nonetheless, no evidence was found indicating that experienced gamers have a worse attitude towards other road users. Experiments done using a driving simulator reveals that it is possible to provide an entertaining game with serious content. Overall, the study needs further review into the development and utilization of using computer games for education and traffic safety purposes (Backlund, Engström, & Johannesson, Computer gaming and driving education, 2006).

Synthesis:

The study evaluated the learning effects of playing car-related games in student's understanding of driving education. It showed that games can be a potential tool for learning but needs further review about its development in utilizing serious content in the game. The study's relation to the current study is that it also involves games and their effects on the driving behavior of the students of a driving school. As presented in the study, the current study aims to develop a game application that will both educate and entertain driving students about driving rules and regulations.

Games for traffic education: An experimental study of a game-based driving simulator

This study aims to construct and evaluate a game-based driving simulator using a real car as a joystick. The feasibility of using a simulator as a learning tool has been evaluated. The results of the study were from an experimental study of games and traffic safety which was performed in an advanced gaming environment. During the car simulation sessions, data were collected and analyzed to investigate the possible individual and groupings learning effects and their differences. Overall, the study showed that a game-based simulation can be used to enhance learning about driving education (Backlund, Engström, Johannesson, & Lebram, Games for traffic education: An experimental study of a game-based driving simulator, 2008).

Synthesis:

The study aims to develop and evaluate a game driving simulator and evaluate its feasibility in learning. It showed that game simulators can be used to enhance student's learning about driving education. Th is relevant to the current study because they both aim to construct a game-based driving simulator. Also, the study evaluated the use of a game simulator as a learning tool for enhancing learning about driving education which is also present in the current study.

CARLA: An Open Urban Driving Simulator

This study introduces CARLA - an open-source simulator about autonomous driving. It has been developed to support the development, training, and validation of the autonomous urban driving system. CARLA provides open digital assets such as urban layouts, buildings, and vehicles. CARLA was used to study the performance of a classic modular pipeline, an end-to-end model trained via imitation learning, and an end-to-end model trained via reinforcement learning. The environment of the said

driving simulator is composed of 3D objects such as static and dynamic objects as buildings, traffics signs, infrastructures as well as vehicles, and pedestrians (Dosovitskiy, Ros, Codevilla, Lopez, & Koltun, 2017).

Synthesis:

The relationship of this study to the current study they are both games that support the learning about driving. Also, as stated in the study above, the game uses three-dimensional static and dynamic objects and assets that are also present in the current study.

3D Racing Car Game

This study describes a case study that focuses on developing a 3D racing car game based on Agile development methodology. It covers the implementation of real-time graphics, physics engine as well as background music and sound effects. Game designs and concepts in this study are developed and modified as the development of the game progresses. During the development process, the game concept evolved, as more and more features were added to the game. It is composed of the initial concept and second iteration which varies and modified until a final concept was produced for the development (Runing, et al., 2009).

Synthesis:

The study focused on describing the development of a 3D racing car game using Agile Methodology. It covers the basic concepts and contents of a game application for development. The study's relation to the current study is that it also aims to develop a three-dimensional game. Also, as stated above, it uses Agile development methodology in which the current study uses RAD model which is a part of the Agile methodology and it covers the implementation of real-time graphics, physics engine and music and sound effects which are as well present to the current

study. The present study's game concept also changes and is modified until a final concept was produced for the game application development.

Local Literature

What is LTO's Theoretical Driving Course? Know Which Driving Schools Offer This Program

This article stated that starting April 6, 2020, new driving applicants must follow a stricter process if they want to avail of a driver's license. Memorandum Circular 2019-2176 implemented by the LTO stated that the applicants must undergo a mandatory 15-hour theoretical driving course program before applying for a student permit. Through this process, the Land Transportation Office (LTO) aims to ensure that the new generation of applicants must be properly disciplined and equipped with more than average driving skills as well as extensive knowledge on road safety and laws before the issuance of a driver's license.

The Theoretical Driving Course program (TDC) is divided into three sessions and covers lessons from traffic regulations to LTO mandated laws and must be completed within two years from the day an applicant started the course. After every session, there will be a 30- minute written examination to be done by the applicant. Also, a minimum of eight-hour hands-on driving lessons which is part of the Practical Driving Course (PDC) from an LTO accredited driving school is required. This is the actual driving test given where applicants will be reviewed and assessed based on their driving skills and how they managed themselves on the road.

If the applicant completed and passed both the theoretical and practical driving course, a Certificate of Driving Course Completion will be issued to them. The certificate will be used to process their driver's license (eCompareMo, 2020).

Synthesis:

The article above mentioned that there will be a new and stricter process for new driving applicants have to go through. A 15-hour Theoretical Driving Course program (TDC) is required for them to take in which it is divided into sessions and every after the session there will be a written examination to be done. The sessions cover lessons from traffic regulations up to LTO mandated laws. Also, Practical Driving Course (PDC) is required for them to take. It is the actual driving test in which the applicant's driving skills will be observed and assessed. Both courses must be enrolled in an LTO accredited driving school. The article is related to the current study as it aims to develop a game application for a driving school. The application covers lessons and reviewers that are present in the sessions taken during the Theoretical Driving Course program.

Filipino Driver's Manual 2018 (Vol. 2)

Filipino Driver's Manual is a manual that aims to guide all driver's license applicants in understanding the process of getting a driver's license as well as the responsibility and significance that goes with possessing one. It also emphasizes that having a driver's license is not a right but more of a privilege to an individual. The manual contains International and Philippine traffic road signs, signals, and pavement markings that follow or are aligned to the DPWH Safety Design Standards of 2012 which are clearly described and illustrated for better understanding by the road users - motorists, pedestrians, and driver's license holders. Also, the manual introduces to the road users the importance of obeying traffic signs and signals as well as rules and regulations and educates them if the latter was disobeyed. A list of guidelines before driving a vehicle, a reviewer in taking theoretical driving tests, traffic rules and regulations as well as laws that support them are all included in the manual (Land Transportation Office, 2018).

Synthesis:

Overall, the Filipino Drivers Manual aims to increase awareness and compliance about the laws on the road for all road users as well as understanding the process and responsibility of possessing a driver's license. The Filipino Driver's Manual is relevant to the current study as the contents of the said manual were one of the used references in developing the application. Road signs and signals that are presented in the manual and their contents were used in creating concepts in the application. Also, both the manual and developed application aims to spread awareness about the rules and regulations for road users.

UPOU Features Gamification in Teaching in the Third OPEN Talk Episode

Last April 07, 2021, an OPEN Talk entitled "Gamification as a Teaching Tool" was held by the University of the Philippines Open University (UPOU). The online forum is the third episode of the OPEN Talk.

Dr. Diego Maranan, Program Chair of UPOU's Bachelor of Arts in Multimedia Studies (BAMS) also the acted moderator of the forum introduced the topic and its importance to the current educational setting. Along with Asst. Prof. Roel Cantada from the Faculty of Education, UP Open University and Asst. Prof. Gian Carlo de Jesus from the College of Economics and Management, UP Los Baños, and Chief Play-maker of BalaiWari Immersive, further discussed the topic of the session.

During Asst. Prof. Cantada's segment introduction, he stated Caitlyn Becker's definition of gamification saying that "gamification is the use of the game elements in a non-game context. Moreover, he explained that gamification is the use of game elements and applying these elements to non-game things such as a course or a class. He furthered explained in relation to game-based learning that it is the process and practice of learning using games based on the learner's point of view.

On the other hand, Asst. Prof. Gian Carlo de Jesus describes gamification as a process of converting an ordinary event into a game through the use of game

elements and design. According to him, gamification is more of a method in learning and a mindset that emphasized three major things: (1) It elicits empathy; (2) It is applied to learn; and (3) It has a social aspect.

The discussion was loaded with informative insights and information about the use of gamification and its importance for learning the current generation (University of the Philippines Open University, 2021).

Synthesis:

The article on the forum stated above tells that gamification is the use of game elements and design in an ordinary event such as a course or a class. It also further discussed and emphasized the importance and benefits of using gamification in the current generation. This is relevant to the present study because of the gamification concept. The proponents aim to develop a game application which uses game element and design and incorporates the gamification concept in a virtual game-like application in bettering the learning of the current generation for fun-play yet the educational mode of learning.

The gamification of education: Why playing is the future of learning

This article describes the use of gamification and its benefits to education. Gamification has gained a foothold in a wide variety of disciplines including the field of learning. Gamification is the application of game design principles to non-gaming contexts or forms.

Since 2009, Brainly, an online social learning platform, has been using game elements in helping the students to better understand lessons with over a million users around the globe. The Philippines is one of the countries that welcomed the use of the said platform after its recent expansion into Asia which has given rising to Brainly.ph website. The website provides homework assistance for Filipino students from elementary and high school in subjects like Science, Mathematics, and History. The

aim of Brainly is to provide a reliable source of knowledge for students to engage in a platform of learning that is educational effective and entertaining.

Brainly helps in the homework of a student. It follows a question-and-answer form format in which a user can create an account free of registration. After successfully creating an account, the user now has the ability to post questions on the website. The website also gives you the freedom to invite friends and collaborate with them through chats or in the comment sections. One of the main goals of Brainly is to invite Filipino teachers and cooperate with them for the better learning of their students. The article also emphasized the value of "play" for students for them to engage and have the freedom to discover things themselves (Logarta, 2014).

Synthesis:

As stated in the article above, it tells us the use of elements of gamification in different disciplines including the field of learning. Also, it introduced the use of Brainly as well as Brainly.ph in the Philippines which will help the students do their homework as well as give them chance to collaborate and invite other users through the said platform. It also emphasized the value of "play" in learning for students which will let them engaged in learning while playing. The article is related to the present study as it also aims to make use of gamification in student's learning. The present study aims to develop a game application that will help driving students to engage in a learning platform that is both entertaining and educational.

Classroom Gamification

The article stated that children of a young age are more focused and highly engaged in playing video games. They are eagerly absorbed in leveling up and achieving and completing missions and quests in a game. It also defines gamification as a process of using concepts, design, and elements of gaming in a non-gaming environment and introduces it in classrooms. It emphasized that children nowadays

are tech-savvy and tend to hook up to the things that give them a sense of "play" in learning in school. It discussed that games can be an effective teaching tool for children in learning lessons in the classroom (Voice Care Philippines, n.d.).

Synthesis:

The article above mentioned gamification as a process of using concepts, designs, and game elements in a non-gaming environment. It also introduced that gamification of lessons in a classroom can be an effective teaching tool for lessons in the classroom. This is relevant to the present study as they both use the concept of gamification in providing an effective teaching tool to certain individuals for them to be engaged and hooked up to a platform that will let them have the freedom to learn and play at the same time.

Makati schools thank 'gamified' online lessons for higher test scores

The article stated that up to twenty to thirty percent were improved on the recent National Achievement Test (NAT) of public schools in Makati City, Philippines. This fulfillment was thanks to Quipper School, an online platform that is designed to make learning more fun.

According to Maria Theresa Namoro, assistant schools division superintendent of the Department of Education (DepEd)-Makati, the use of Quipper School enables the students from the said city to raise their proficiency in subjects like English, Mathematics as well as Science. It also emphasized that using the said platform, learning is much more fun and effective. It also helps the teachers to monitor and teach students to be more engaged and focused in learning.

Quipper School or simply Quipper is an online learning program that was developed by a London-based education technology firm. It aims to improve the quality of education by transforming teaching into an engaging style of learning. Up to date, the platform was used by over 33 DepEd divisions from Mountain Province up to

Zamboanga City from the south, 1,400 schools nationwide, and over 200,000 average active monthly users which only shows its effectiveness in learning. The lessons on the said platform were based on the competencies from K-12 Curriculum.

As stated by the Quipper county manager Yuki Naotori, Quipper addressed the concern of the increasing number of students who have difficulty in focusing on the conventional style of presenting lessons in school. Furthermore, using Quipper studying is more fun with the use of "gamification" in their school's lessons he added (Yee, 2016).

Synthesis:

The article stated above tells us that the use of Quipper School or simply Quipper - an online learning platform, helps the students in improving their proficiency in subjects like Mathematics, Science, and History. It also stated its effectiveness as it gains popularity in the Philippines after having numerous users worldwide. The said platform uses the concepts of gamification which led to its effectiveness for studying among students in Makati. It also emphasized that through the Quipper learning is more fun and enjoyable. This is related to the present study because of the use of the concepts of gamification for learning. The present study also aims to develop a platform that is engaging, educational, and fun for the users that will let them focused on certain lessons.

What is Gamification: Everything You Should Know to Get Started

This article introduced the term gamification as a fusing of game elements to non-game concepts such as websites, applications, and tasks like school activities or lessons. It also stated the use of the term to gamify a business's approach in increasing user engagement and promotes their products to the people.

As presented in the article, it mentioned Nick Pelling - a British computer programmer and inventor who made up the term "gamification" in 2002. The term was

used as part of the Conundra, a consulting business of Pelling, and was, later on, became famous and widely used in the year 2010.

Gamification in education became famous and widely used in different areas and can be applied in classes, workshops, and even training sessions. Moreover, it helps the users to better understand and absorb lessons and apply what they have learned into practice. Some game mechanics that are applied in learning include the use of Points, Badges, Goals, Levelling up, etc. These techniques when used in game-like tasks make a better learning experience for the users to play. Gamification was also used in corporate aspects and activities to increase sales and for effective product endorsement.

The article also introduced the CIIT Philippines school that promotes gamified learning for a better grasp of student's learning both valuing education while having fun. The said school helps students to put together game mechanics for websites or applications and other mobile platforms (CIIT Philippines School, 2020).

Synthesis:

The article mentioned above defines gamification as a fusing of game elements into non-gaming contexts like school activities for better learning of their students. Gamification was widely used in different areas, be it in corporate aspects, in school lessons, or even in developing applications. It also emphasized the used of gamification to better understand the value of education while having fun. This is relevant to the current study as it aims to develop an application that will integrate some game mechanics and gamification concepts to the game for better engagement of the users while learning. It also aims to produce a game that is both educational yet entertaining for the users.

LTO chief wants standardized training program for driving schools

With the increasing number of vehicular crashes in the country blamed on driver's error on driving, if Mr. Edgar Galvante - chief of Land Transportation Office (LTO) were to decide, he would have to go to the driving school option for educating drivers especially for the new generation of drivers. He also stated in the article that the LTO collaborated with different driving schools in the county to come up with a standardized training program for driving applicants. In this way, the new generation of drivers will be much more educated, disciplined, and knowledgeable about the traffic rules and regulations on the road assuming that this will lessen the rising road crashes in the county. Galvante also emphasized the issue of standardizing the format of modules for the driving schools that are accredited by the LTO about the issuance of a driver's license. Moreover, he added that before a driving school must be accredited by the LTO, they must comply and adopt the standard training program.

The LTO chief wanted to include extensive seminars about traffic rules and regulations and basic troubleshooting in driving training. He wants to put an end to the informal driving training as well as the "widow" style (self-learning or teaching) and increase the theoretical knowledge of an applicant before going through the formal driving training. Through the standardized training program, all driving schools are organized and have a unified standard in teaching for the new generation of drivers to establish better and safe driving for the users of the road (Ilagan, 2019).

Synthesis:

The article above discussed the importance of a standardized training program for applicants in a driving school. Training modules are also included in the program that consists of different lessons such as traffic rules and regulations to further an applicant's theoretical knowledge in safe driving on the road. The article emphasized the standardized training program for all driving schools to help lessen road crashes and built a new generation of more disciplined and educated drivers in the county. This is relevant to the present study because of the theoretical knowledge mentioned above. The present study aims to develop an application that consists of basic driving

knowledge that is included in the game. Also, it aims to spread awareness and educate people about traffic rules and regulations not only for driving applicants but also for other road users.

Games for learning and social change

With the continuous advancement and rising of new technology in the present, Filipino game developers continue to create and use games as a medium to create awareness, educate, and sometimes affect society.

This article introduced games that are both educational and fun to play and aims to promote awareness and designated objectives. Some of the games that are presented are the following:

1. Cognitio Terra by Bob Lester Tusi, Carlo Lazerna, and Nick Kaelar. It is a fast-paced action-paced game that uses Mathematics as part of their game. A character name Terra - a high school student sets forth to defend the Oasis from enemies like aliens, robots, laser swords, and secret agents using Mathematics. Although the game still under development it shows promising game concepts and features. According to its developers, video games can be an effective medium for both learning and entertainment.

2. EagleWatch by FriCher Games. It is an advocacy game that raises awareness about Philippine eagles which starting declining in population a long time ago. Students, as well as developers Osamu Umeda, Rowel Capulong, Shantel Daya, Christian Ibay, and Chino Ilas – otherwise known as FriCher Games, created the EagleWatch. The game concept is that the player must protect the eagles from the enemies while making sure that they grow in a safe environment. They also stated that they want to change the majority of the people's perception about games, that games can be a platform to raise awareness and be educational as well.

3. Mamayani by Meam Genovaña and Crown Patalinghog. Mamayani is a history-type game that educates the users about Filipina heroines. The concept of the game is to allow the players to discover stories about the efforts that Filipina had given during the American and Japanese invasion in the early 1930s-40s. Genovaña emphasized that they aim to educate people about the impact of games in honing the user's values and awareness.

Other games in the article mentioned MUTUAL by Team CMYK, re.Cycle by Hatdo Games and Turtle Tale by Meowfa Games which has their own unique concept to create awareness within their respective concepts and topics (Foster, 2019).

Synthesis:

The article presented different games developed by young Filipino game developers to create and promote awareness about certain topics. They use game concepts to the games for them to be fun to play and educational to the users. Moreover, they use games as a platform to affect people, educate, and raise awareness. This is relevant to the present study because the proponents also aim to develop an application that can educate and create awareness for the game's users. The present study also wants to create a game that is entertaining, fun, and educational for the users.

Why You Should Take Driving Lessons and Top Driving School Philippines

The article discussed the reasons why it is beneficial to attend driving school in the Philippines. The stated reasons are the following:

First, You need it to get a Driver's License. Attending driving school is now mandatory before issuing a driver's license. All students are required to take a 15-hour driving course from an LTO-accredited driving school or from any LTO-Driver Education Center. The said course contains both the Theoretical Driving course and the Practical Driving course. Second, Learn from Certified Professionals. Driving

schools in the Philippines hire professional instructors both certified by TESDA and accredited by the LTO to ensure the quality of education and learning of an applicant. Someone who is professional will give an applicant the quality of education he needs in theoretical and practical knowledge about driving. Third, Get Structured Driving School Training. A structured and systematic method was used in teaching in a driving school with it, an applicant can deeper understand what proper and right driving mean. Also, driving schools in the Philippines follow and adopt a standardized training program for all applicants. It consists of like basic vehicle troubleshooting and traffic rules and regulations. Fourth, Reduce Your Risk of Getting Into an Accident. Undergoing in a professional educational institution helps a driver to develop defensive driving skills and reduces mistakes on the road. Fifth, Learn Car Maintenance. Driving schools also teach applicants not just about driving but also proper maintenance of the vehicle. Next, Prevent Damage to Your New Car. Although an applicant can use his/her vehicle, driving schools provide vehicles that are insured for applicants' training. Next, Get Help with Your Driver's License Application. After passing and completing the course training, driving schools provide assistance for applying for a driver's license. Lastly, Gain Confidence on the Road. Proper training and being professionally trained in a driving school will make an applicant be confident and discipline on the road. Also, the article mentioned different Driving Schools in the Philippines Accredited by the LTO: A-1 Driving School, Honda Safety Driving Center, Precision Driving School, Prestige Driving School, Smart Driving School, Socialites Driving Institute, and Universal Driving School (Zoleta, 2021).

Synthesis:

The article discussed the reason why attending a driving school is beneficial for an applicant or soon-to-be driver. It discussed the importance and advantages of having proper training in an educational driving institution, which will make the applicant be more knowledgeable, discipline, and wisely trained before driving on the road. It also mentioned different driving schools that are accredited by the LTO. It is

relevant to the present study because the client of the developers is a driving school and aims to develop a game application that is beneficial for a driving applicant. Also, both the Theoretical and Practical Driving Course concepts will be used to create the content of the application.

Local Studies

Road Safety and Traffic Education (RoSTed): The Institutionalization, Certification, and Standardization of Road Safety and Traffic Education in the Philippines

This paper is a part of a three-fold system for an orderly regulation of traffic situations in EDSA and is focused on the distribution of the driving laws, road safety, traffic education, institutionalization of Road Safety and Traffic Education (RoSTed) in Philippine schools and local communities including the professionalization of Public Utility Vehicles driver and issuance of Driver's license. Ensuring that everyone in EDSA the pedestrians and drivers will be aware of their rights and obligations is the goal of this paper by professionalizing the driving services provided by the drivers a Public Utility Vehicle building institutionalized training centers and driving schools in our country (Quito & Quebral, 2016).

Synthesis:

The objective of the research is to educate the people of the traffic laws and regulations, road safety, and the issuance of a Driver's License that is to ensure the safety of everyone in EDSA and lessen the casualties on the road.

The State of Road Safety in the Philippines

The major causes of road crashes are human error (the drivers themselves and their vehicles), the road itself may also be the cause of the crashes. While high-income

countries' road accident statistics are improving, the majority of developing countries' statistics are deteriorating. Most countries face the same transportation and traffic issues in terms of mobility, environment, safety, public transportation, and energy while developing countries suffer the most. Accident rates remain untreated in developing countries. In these countries, the focus on safety is overshadowed by other objectives such as infrastructure development for improved efficiency and acknowledging the need for a higher quality public transportation system. The recurrence of accidents is commonly used to assess a country's or region's level of road safety. The number of accidents (fatal, injured, or property damage) and accident rates are key aspects. The majority of accidents (72.44%) took place in the National Capital Region (NCR) or Metro Manila. In terms of rates per population, Metro Manila continues to have the highest rates, followed by Region 10. (Northern Mindanao). In terms of rates per registered vehicle, however, Region 10 ranks first, followed by Metro Manila. Traffic safety is a measure of how the road system is performing, given in terms of deaths per unit of travel, per registered vehicle, or unit of length of the road system. Because summaries and totals do not develop the relative degree for different sets of conditions, these rates are used (Sigua, 2000).

Synthesis:

The study is educational and it promotes awareness about road safety and its consequences if not observed. For the needs of the higher quality in public transportation, the researcher investigated the current situation of the state and provided liable information, and conveyed certain ways with regards to this issue.

LOGIT MODEL OF MOTORCYCLE ACCIDENTS IN THE PHILIPPINES CONSIDERING PERSONAL AND ENVIRONMENTAL FACTORS

The aim of the study is to identify key personal and environmental variables in detecting motorcycle accidents in the Philippines, discuss the results to those in other

countries, and suggest potential government interference. A total of 177 people were polled for information by the use of a survey in a licensing center in Metro Manila's largest city.

The model's variables were used to estimate the probability of an accident using logistic regression. Age, driving activity, and gender were found to be major determinants of motorcycle accidents. and the form of intersection. Accidents are more likely to occur in younger motorists. The Relevance of Age Similar models considered this to be trivial, which was surprising. The probability of an accident is predicted by driving conduct, specifically undertaking violations. Motorcycle accidents are also predicted by driving at t- and y-intersections. A special set of variables was discovered in the Philippines to determine motorcycle accidents. While previous research had demonstrated the impact of these variables on the risk of an accident, the combination was unexpected. Interventions aimed at these three factors may be prioritized by government agencies (Seva, Flores, Gotohio, & Paras, 2013).

Synthesis:

The study discusses the road crashes themselves, their factors, the involvement of a person's gender and age, interference of the government, and the impact of these variables on the risk of an accident and in educating the people of the pros and cons of their actions in the road.

A study on the road accidents using data investigation and visualization in Los Baños, Laguna, Philippines

Road safety is one of the most important aspects of any country's daily economic development. It has a significant impact on public health, particularly in the Philippines. Safeguarding its protection would be extremely beneficial to a country's economic development. In Los Baños, Laguna, predictive algorithms such as Decision Tree, Nave Bayes, and Rule induction have been used to recognize factors causing

accidents. The proponents acquired significant findings using these three classifiers: Decision Tree achieved 92.84 percent accuracy with 0.797 kappa, Nave Bayes achieved 91.50 percent accuracy with 0.741 kappa, and Rule Induction achieved 92.50 percent accuracy with 0.783 kappa. The researchers found that the accident's location has no bearing on the victim's casualty. Contrastingly, researchers discovered that the time and day of a road accident, especially a car crash, has a significant impact on the casualty and extremity of the accident (Asor, Catedrilla, & Estrada, 2018).

Synthesis:

The study aims to promote awareness for road safety and safe driving and tackles road crashes, their frequency, and the liability of everyone involved in the scene. In line with this issue, the researchers used the three effective methods (Decision Tree, Nave Bayes, and Rule induction) to detect the cause crashes.

Occurrence of Traffic Accidents in the Philippines: An Application of Poisson Regression Analysis

A road accident is described as a collision between vehicles, pedestrians, or an object that results in death, injury, or property damage. Driver error (26%) was the leading cause of road accidents, followed by mechanical failure (12%), overspeeding (18%), a drunken binge before driving (1%), and damaged roads (5%). The number of traffic incidents during the day was found to be higher than at night.

The research looked at the number of traffic incidents from 2001 to 2006, and events were analyzed using the causes that predispose accidents. Using the factors of accidents and the time span of occurrence, an analytical model was developed to predict the number of accidents. Since a road accident is a rare incident with a positive integer number of occurrences, using Poisson Regression analysis to analyze the number of incidents with the factors of traffic accidents and the time of the incident (Tamayo, 2009).

Synthesis:

The study discusses the road crash in its theoretical and practical application, the factors such as drunk driving, the speed, and mechanical issues of the vehicle to educate and promote awareness of road accidents to the people.

Understanding of traffic signs by drivers in the city of Manila, Philippines

One of the most reliable control systems for guiding the safe and orderly movement of vehicles and pedestrians is by using traffic signs. These are required to provide drivers with route information, directions, and warnings. To express the intended message, these should be explicit. This is a warning that all road users should be aware of. Road signals are often disregarded by drivers, and officials choose not to administer them. Correspondingly, the majority of Filipino drivers lack discipline, and traffic signs are given less weight. Furthermore, a large number of Filipino motorists were not able to receive adequate instruction, with a lack of understanding of various road signs as a result. Thereafter, a survey was conducted to determine drivers' awareness of such traffic signals. The objective of this study is to figure out what makes drivers different when it comes to reading traffic signs. The role of drivers' characteristics in understanding traffic signs in Manila is crucial to preventing the rising accidents in the city. In Manila city, 535 drivers were polled for the study. The findings revealed that there are a lot of drivers having a poor understanding of what traffic signals meant. 76.25 percent is the average comprehension of degree in terms of percentage right answers. The respondent's familiarity with traffic signs is largely determined by its abundance in the area where the respondent often travels and the simplicity of its nature, which allows the road user to quickly evaluate its purpose. The analysis also establishes the impact of socio-economic status and driving behaviors (Fernandez, Paringit, Salvador, Lucero, & Galupino, 2020).

Synthesis:

The study discusses the road signs, the significance of road knowledge and discipline, the importance of its implementation and observation of the people, and the significance of playing your role appropriately. This is to awaken the people and the government that road literacy is as crucial as the education of the citizens because it will save the lives of the people on the road.

Larong Pinoy: An Android Game Application

"Larong Pinoy: An Android Game Application" is a game developed in Unity 3D, designed in Adobe Photoshop and CrazyTalk Animator 2 for creating the characters. This game was intended to teach the younger generations of the different Filipino Traditional Games which are slowly fading in our era. The game was tested and evaluated by ten (10) IT Experts and Thirty (30) mobile users while the improvement and performance of the application were tested in conformance and compatibility test and was evaluated in Android Core App Quality (developer.android.com) with the criteria of functionality, performance and stability, and Google Play. The result of the evaluation was fair enough to tell that the applied mechanics and guidelines were met and it proved the game's purpose and capacity. The game was able to be recognized as fairly acceptable garnering an average score of 2.87 with a Standard Deviation of 0.09 and what's good about this game is that it can be played offline.

The project is a 3D game application developed in Unity Game Engine for the functions, Adobe Photoshop for the logos and designs, and CrazyTalkAnimator 2 for the creation of the characters and animations. The game was created to give information about the different Filipino Traditional games and can be played on android phones, also, this game contains history and mechanics on how to play and it makes things easier for the players (Autriz, Casitas, Enriquez, & Nocon, 2016).

Synthesis:

The study aims to conserve Filipino traditional games which are slowly fading in our era by developing this android application in Unity 3D, designed in Adobe Photoshop and CrazyTalk Animator 2 for creating the characters. This is to educate the younger generations in a more innovative way and is convenient for them.

CREATING A COMMUNITY BASED DISASTER RISK MANAGEMENT SYSTEM THAT HIGHLIGHTS RESPONSE METHODS AND RESOURCE ALLOCATION

This study will help the community in dealing with disasters with the use of information technology. BDRMS or Community-Based Disaster Response System was given the name of Pandora 2 and it highlights the resource allocation and disaster response of Barangay Banaba in San Mateo Rizal together with Buklod Tao Inc. - a non-government organization. The purpose of this project is to assist the disaster response by supervising their present disaster resource allocation during flood and storm disasters and to provide post-disaster assessments and enhanced disaster preparedness with mapping as its concept using Google Maps Technology to carry on relief distribution in different evacuation centers and plot emergency exit routes, and the use of push and pull SMS Technology to enhance the existing process of the missing person's monitoring at the rivers water level and releasing of evacuation warning levels.

Another set for the business process for disaster response was proposed to be used in the CBDRMS and the findings of other standard Community-based IT solutions and research said that an improvement is needed with the current disaster response processes. This project is a continuation of Pandora 1 which is focused on disaster alleviation and preparedness phase of the cycle to Barangay Banaba with the intervention of the Buklod Tao Inc. and this project will serve as a model to local and national government units and non-governmental organizations to support the communities in response to disaster with the aid of ICT.

The proponents used RAD methodology for faster and quality development of the system. Considering that RAD depends on heavy prototyping and user-engagement resulting in modification of the system (Tan, Reyes, Ricasio, Uy, & Pineda, 2013).

Synthesis:

The study aims to create an android application that will assist the BDRMS to supervise the present disaster resource allocation during flood and storm disasters, provide post-disaster assessments, and enhanced disaster preparedness with mapping. Using the RAD modeling as its methodology for better development of the application and for them to better educate the community with the use of enhanced technology.

HiStorya: A Mobile Game for Araling Panlipunan

The purpose of this research was to design and develop a game-based mobile learning system for the Araling Panlipunan (AP) subject to be used as a supplement for Grade 8 students. Its specific goal was to: 1. consolidate relevant information and knowledge about the K-12 curriculum in AP, specifically the a) topics discussed, b) teaching strategies/methods used, and c) teacher evaluation techniques. 2. To learn the students' game pReference:s; 3. Design and build an interactive learning application based on the a) AP curriculum of Grade 8; b) the students' game pReference:s. Figure 2 depicts the Android application's main menu. Play Games, Instructions, Sync, Update, Quit, Music Control, Stats, and About are among the menu items. The game categories are displayed in the Play Game menu. The player's game statistics are displayed in the stats. The player may upload his stats to an online database and this is allowed by the Sync feature, which the teacher can access for evaluation purposes. It also includes an update feature, which allows the player to download updated questions from the online database. Figure 5 illustrates the four

levels of each game category. These levels correspond to the four AP curriculum units. To play the next level, the player must first unlock it. The player must correctly answer the required number of questions to unlock a level. This feature is intended to make learners feel immersed and absorbed while playing the game, as well as to uplift them to continue playing and overcoming the challenges of each game level. The Quiz game consists of multiple-choice questions, and when the player correctly answers the question, a Trivia associated with the answer is displayed.

The Analogy Game allows the player to analyze how the images are related and choose the best word to describe the four images. The Memory Game category seeks to assess students' ability to acknowledge significant images related to Asia. An image is shown, and the player must identify what is being displayed (Nisperos, Miguel, & Salvador, 2014).

Synthesis:

The main objective of the research is to develop an android application game that promotes awareness about Araling Panlipunan (AP) specifically to define the students' way of learning the strategies/methods used, and teacher evaluation techniques this is to to build an interactive phase of learning with the users which will enhance their cognitive and locomotor skills by playing the game.

Quizzes: Quiz Application Development Using Android-Based MIT APP Inventor Platform

This project focuses on the creation of an Android-based multiple-choice question examination system known as Quizzes. This application was created for educational purposes, letting the users practice multiple-choice questions for provincial and national examinations. The application's objective is to allow the users to practice subjective assessments used for admissions and recruitment, focusing on the Computer Science field. This quiz app has three main modules: (i) computer science,

(ii) verbal, and (iii) analytical. There are several sub-categories within the computer science and verbal modules. This quiz has three functions: I hinting, (ii) skipping, and (iii) pausing/lifelines. A user can only use these functions once. During quiz play, it displays progress feedback, and at the end, the app displays the result. Students and learners are required to prepare for various examinations directly through the use of Smart-Phones and tablets in their hands. The primary goal of this project is to help students learn, gain, and improve their knowledge skills. Meanwhile, our application entertains them so that they can prepare for interviews, entrance exams, or any other corresponding purposes in a good mood and are not bored or frustrated by the dullness of the application. We created the application to allow users to take short quizzes using portable devices such as smartphones and tablets. The goal of this project is to create an Android-based system that includes the following features: I a question bank, (ii) a timer, (iii) lifelines, (iv) data storage, and (v) multimedia support (pictures, snapshots, tables). The goal of developing this Quiz app is to assist users in preparing for necessary educational purposes in the Computer Science and IT fields by making it accessible directly on their Android phones. Users can use our app to learn and prepare for interviews, tests, and exams on Android phones, as well as to increase their general knowledge of Computer Science, Verbal, and Analytical, anywhere and at any time (Asghar, Sana, Nasir, & Iqbal, 2016).

Synthesis:

The main objective of the research is to develop an android application game that promotes awareness about (i)computer science, (ii) verbal, and (iii) analytical subject, also to build an interactive phase of learning with: I hinting, (ii) skipping, and (iii) pausing/lifelines as functionalities of the game for the users to enhance their cognitive and locomotor skills by playing the game.

CHAPTER 3

THEORETICAL FRAMEWORK

The theoretical framework of the study contains information about the existing theories and ideas that are used within the development of the study. It explains and gives elaboration to these concepts in order to facilitate a better understanding of the core concepts that build the game application.

Road Safety

Road crashes play a quite large percentage in injury and death tolls globally. For injuries, road crashes cause 20 to 50 million injuries every year. While the fatality that it inflicts reaches up to 1.3 million per year. These numbers alone are already daunting on many levels, but to simplify things, road crashes are the major cause of death among all age groups and are said to be the leading cause for the death of children and young adults from age brackets of 5 to 29 years old. Additionally, when it comes to economic status, countries with low-income have a higher risk of death rate when it comes to road crashes. Almost three times larger than high-income countries.

The number of people that can be affected by road crashes can be greatly alleviated by implementing road safety protocols and guidelines. Protocols that will mostly focus on aspects that are vital in roads such as drinking, driving, use of seatbelts, child restraints, and motorcycle helmets. On the other hand, for the government, the plotting of right road signs, improvement in vehicle standards, as well as serving better emergency response can also save many lives (World Health Organization, 2018).

Driving Simulation

The prevailing technologies nowadays help in different endeavors and researches. One thing to consider as part of this is the advent of the development of

driving simulators. Driving simulators can be considered a sophisticated application since they can be used in different disciplines. Advanced driving simulators are used by engineers and experts in improving vehicle design. One of the other perks that a driving simulation can give is the ability to provide a safe testing environment that the user can interact. This prepares the drivers themselves before engaging in real-life driving. Thus, reducing the chance of causing accidents and road violations (Chang, 2015).

Game-Based Learning in Modern Education

The study utilizes the use of a mobile game to impart education to students. In this case, to teach some of the essentials of road awareness and protocols to the students of Gear-1 Driving School.

Game-Based Learning or GBL has been existing for quite some time now. One of the main reasons for its existence is the continuous evolution of new technologies. Mobile phones and smartphones now allow people to run various applications at the ease of their pace, and that includes games that can be installed around Android devices. GBL introduces a new way of learning that makes use of these new technologies. Somehow, this new method of learning eliminates the known "dullness" that is usually experienced when someone is trying to learn something new. The use of GBL allows interactive learning that immerses the players thoroughly in the educational objectives and topics of the game. As a result, players get immediate feedback on the topic and of their performance, like how well they did on the game and more. These advantages of GBL are what made GBL an indispensable part of modern-day education (Dadheech, 2018).

C# Programming Language

The C# programming language is what powers the development of the game. C# is a modern, type-safe, and object-oriented programming language. Modern

because even though its roots came from the C language itself, the syntaxes that it incorporates are comparable to the known and popular programming languages nowadays, such as Java. The language allows developers to build applications that are robust and secure. This is because the language runs on the .NET ecosystem. The .NET ecosystem is the framework and runtime where the C# programming language is built. It contains several languages as well, and C# is one of them.

Another features why the C# programming language is considered an ideal language because of its Garbage Collection. This alone can make the application run efficiently while saving tons of resources. Lastly, the language is compiled first before it gets run. This ensures that applications built around C# are less prone to errors (Microsoft, 2021).

Adobe Photoshop

Assets and resources were used in making the game. Things such as images and icons and other graphic assets were made possible by using a multimedia application such as Adobe Photoshop.

Adobe Photoshop is a very popular raster image editing software application. It enables users and enthusiasts to complexly edit or manipulate images through the use of layers and numerous tools that are essential in the editing process. It was created by brothers Thomas and John Knoll in 1988. Later on, it was sold to Adobe Systems and was named "Photoshop." Adobe Photoshop now became the defacto standard when it comes to image manipulation and raster-based editing of images as it is packed with different comprehensive tools that can make anything possible through editing (Techopedia, 2017).

Visual Studio Code

Visual Studio Code or also known as VSC served as the game's Integrated Development Environment (IDE). Although VSC is not entirely an IDE, it is capable of operating under such conditions.

Visual Studio Code is a source code editor or text editor that comes with developer tools such as IntelliSense code completion and debugging. It is a lightweight and fast cross-platform editor that allows developers to quickly edit and amend their codes. It supports various languages from plain text files to the known programming languages. It offers syntax highlighting, bracket-matching, auto-indentation, and more. It is also fully customizable aesthetically and operationally. Keyboard shortcuts can be utilized for faster workflow and development (Microsoft, 2016).

Android Operating System

The Android OS is a popular operating system that is mainly used in smartphone devices. It was written using the Java programming language and is based on Linux operating system, thus making it an open-source operating system that is contributed by different developers all over the world. It is now acquired and maintained by Google. The Android OS allows users to run different applications on their smartphone devices. This includes games as well since the operating system can support both 2D and 3D rendering of graphics. Which makes the operating system suitable for running portable games on the fly (Techopedia, 2018).

Android Software Development Kit

The Unity Game Engine is integrated with Android SDK which is used for developing android applications.

Android SDK allows developers to develop and run applications on android devices. Android development now supports different programming languages in developing applications that can run under the Android operating system. Nevertheless, despite the preferred language, Android SDK is a prerequisite that is

necessary for developing any kind of Android application. The Android SDK also provides tools that are required to emulate Android applications on other devices such as personal computers and laptops (Vaishnavi, 2019).

Unity

Unity is a game engine used by developers globally. It is a game engine that supports both 2D and 3D game development across different platforms. With Unity, one can develop a single code-based game using the C# programming language then run and build it into different platforms such as Android, iOS, Windows, Mac, Linux, and more. Unity comes with comprehensive tools that are necessary for developing games, so it also acts as an Integrated Development Environment. Additionally, Unity also allows quick prototyping through its built-in tools and free assets that can be downloaded from Unity's official Assets Store (Sinicki, 2021).

Flowchart

In visually elaborating the process of the different modules of the game, flowchart diagramming was used.

A flowchart is a type of diagram used to depict a process, system, or computer algorithm. Shapes with meanings as well as connectors are used in a flowchart. The connectors are very effective in showing the flow of the process, while the shapes give meaning to the process indicated in a flowchart. Flowchart diagramming is known very well and quite easy to compose, this is the reason why it is used by both technical and non-technical people in showcasing a process (Lucidchart, n.d.).

Use Case Diagram

To showcase the way the users involved in the game interact with the game itself, use case diagramming was used.

A use case diagram is a part of the Unified Modeling Language (UML) that is used to summarize the details about the user and how it interacts around the system. A use case diagram is very effective in showing how the different aspects of the system connect and flow around the user/s of the system (Lucidchart, n.d.).

Hierarchical Input Process Output Diagram

For documentation purposes, HIPO Diagram was used to effectively show the hierarchy of modules in the game.

Hierarchical Input Process Output (HIPO) Diagram is a software analysis design tool used to provide a hierarchical overview of the main functionalities and modules of a system. It is commonly used for documentation purposes to better understand how the different parts of a system nest altogether to make the system function and work. The downside of HIPO is that it does not explicitly highlight the flow of control and data (Tutorialspoint, n.d.).

Alpha Testing

The testing type that was mainly used in assessing the game was Acceptance Testing, specifically Alpha Testing.

Alpha Testing is a type of Acceptance Testing use to identify the different problems associated with the game. Bugs and issues are tested within the organization or the developers themselves. Alpha Testing is done early on near before the end of the development of the software just before the Beta Testing. Alpha Testing mainly involves Blackbox Testing where the users themselves do not have an internal idea about how the game works or is implemented. In Alpha Testing, critical bugs are also identified and fixed immediately (Rungta, Alpha Testing Vs Beta Testing: What's the Difference?, 2021).

Theoretical Framework
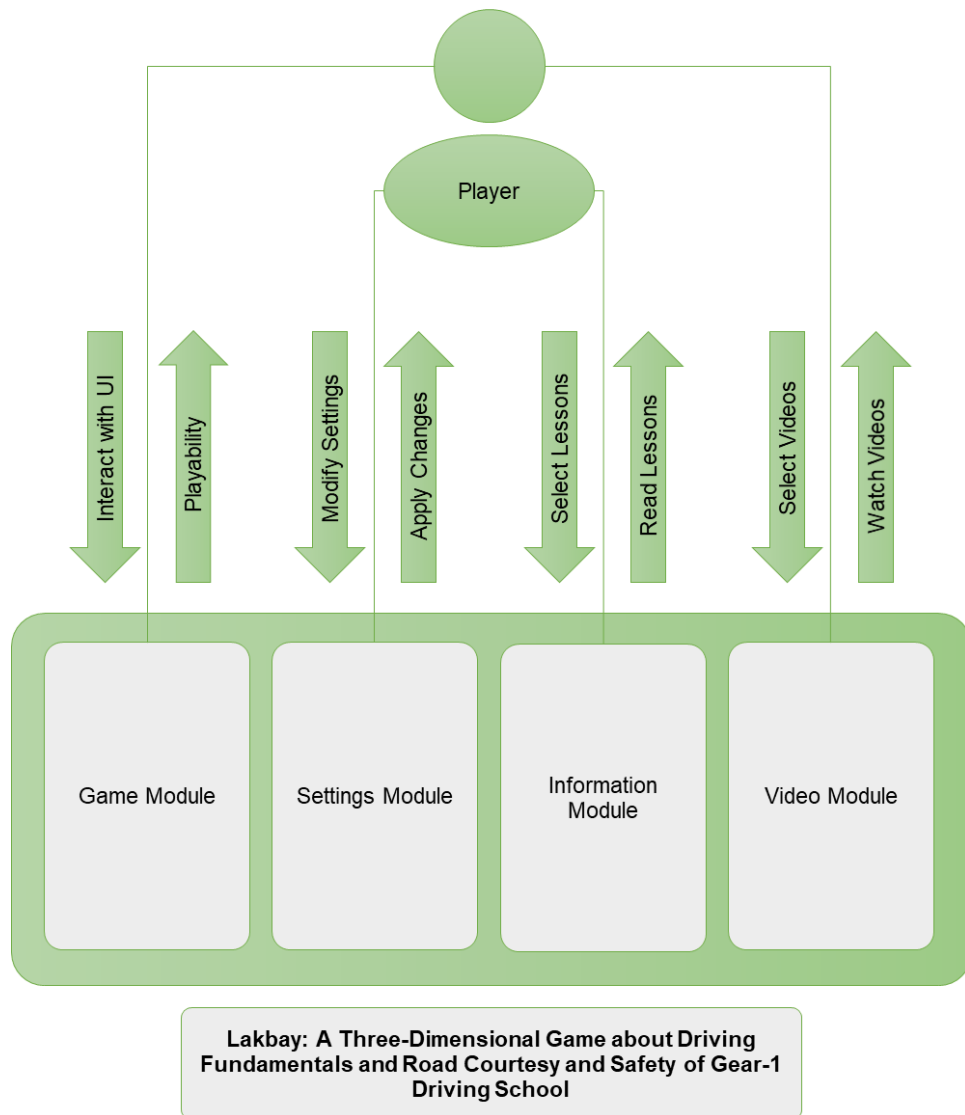
Figure 2: Theoretical Framework Diagram of Lakbay

The game is composed of four modules. These four modules work in an independent manner to provide functionalities to the player as well as to make the game operable. The four modules of the game are the Game Module, Settings Module, Information Module, and lastly, the Video Module.

Game Module. This module contains the playable content of the game. The playable content of the game is divided into two; Linear Play and Free-Roam Play. These are the so-called phases of the game, and each one is put under two modes, which are the Non-Professional and Professional modes. The two modes provide little variations in the way these two phases are played. In Linear Play, the goal is for the player to reach the end of the road using a controlled vehicle while answering

questions that are triggered through checkpoints that are distributed evenly along the road. To add some challenge, the player must also avoid any approaching vehicle, otherwise, this could lead to losing a life. Additionally, the player is also accompanied by usable perks such as hints for the questions, and coins for the fuel. The Free Roam Play is the next phase played after finishing the Linear Play phase. The goal is to complete missions related to driving. All of these are interacted by the user using controls found in the User Interface of the game.

Settings Module. This module contains the options that the user can personalize for the purpose of better playability or just preference. The settings module is divided into three categories namely the Audio, Video, and Accessibility categories. The Audio category contains controls that can alter the volumes of the game. The game uses three channels in playing audios. These channels are the Master, Music, and Sounds. The Master affects the volume of the remaining channels, while the Music channel is used for playing background music, and Sound is used for playing sound effects in the game. The Video category contains two options that are related to the viewing and graphic performance of the game. The quality sets the graphics quality of the game and the auto-rotation option allows the game to be rotated on both left and right sides in landscape orientation. Finally, the Accessibility category offers an option that allows the players to access the contents of the game with ease. The language option lets the player choose between playing the game in either English (the default) or Filipino.

Information Module. This module offers viewable contents that are accessible offline. The materials provided in this module are categorized for better browsing of lessons. The categories that the user can pick are Driving Fundamentals, Road Courtesy and Safety, BLOWBAGA, and Others. All of the lessons included in this module are used in the theoretical lessons that are encountered when getting a license for driving. Additionally, the contents of the lessons are also curated by LTO since the source of these readable materials is the reliable Land Transportation Management

System (LTMS) under the Land Transportation Office. The Information Module can be found under the Wiki of the game.

Video Module. This module contains watchable videos that the user can use as a source of information about driving aside from the Information Module. This can be combined with the Information Module to better impart knowledge to the players by targeting learners that learn through reading as well as those that learn more by watching. Like the Information Module, this module is also placed under the Wiki of the game and contains categories that groups the videos available to watch. The availability of the videos requires an internet connection.

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APPENDICES

Transcript of Interviews

Republic of the Philippines
CAVITE STATE UNIVERSITY
Bacoor Campus
SHIV, Molino VI, City of Bacoor
☎ (046) 476-5029

Lakbay: A Three-Dimensional Game About Driving Fundamentals and Road Courtesy and Safety of Gear-1 Driving School

Name: Darwin Lacanilao Atayde   **Gender:** Male
Job Position: Instructor/Lecturer/Office   **Date**: May 14, 2021
Registrar

INTERVIEW REPORT

Interviewers:
- Defacto, Hannie May Gabasa
- Consuelo, John Paul Ruado

Objectives:
- To gather information about the tasks and responsibilities of Gear 1 Driving Schools

Interviewer: What is a Driving School?
Interviewee: It is an educational institution for people who wants to learn proper driving.

Interviewer: What is the purpose of a driving school and why is it important to enroll and finish the course before having a Driver's License?
Interviewee: The purpose of a driving school is to produce educated and disciplined drivers
on the road. Enrolling in a driving school is now a mandatory process that an applicant needs to take before having a driver's license. You need to be able to learn proper driving as well as the driving rules and regulations in the Philippines.

Interviewer: What are Traffic Rules and Regulations and why is it necessary to obey them?
Interviewee: Set of Guidelines and Laws on the road that people need to follow to have a safe road for the road users.

Interviewer: In what year was Gear 1 was established and why is the school named Gear-1?
Interviewee: Gear 1 was established in 2003 with only one branch. It was named "Gear 1" because of the background of the work of the business which is related to cars.

Interviewer: How many employees are there in your driving school and who are the people in charge?
Interviewee: For this branch (Molino), we have two employees- instructor and office registrar. The couple Mr. Rafael L. Atayde and his wife Emilia L Atayde are the owners of the school.

Interviewer: What is the average number of enrolled students in Gear-1 Driving School and what are the processes to enroll?

Interviewee: During Summer and December, we can reach up to 50 applicants per month while on the regular basis, half of it. In the rainy season or what we called "ghost month", we have fewer customers.

An applicant needs to book a schedule first to will attend a 15-hour seminar for Theoretical Driving Test (TDC). The seminar is divided into 3 sessions and in every session, there will be a written exam to take. The last session's exam will be the final exam that is crucial for an applicant to pass the TDC. After successfully passing the exam, the applicant will now need to pass the Practical Driving Test (PDC) or the actual driving test. A Certificate of Driving Course Completion will be issued to the applicant after completing and passing both the TDC and PDC.

Interviewer: Do you have any other branches aside from Molino? Where are they located?

Interviewee: Yes, Gear 1 driving school has 21 branches:

Cavite (10 branches)	Metro Manila (4 branches)	Laguna (7 branches)
Trece Martires	Parañaque (Better Living)	San Pedro (Landayan, Pacita)
General Trias	Sucat (Lopez)	Biñan (Saplatero)
Dasmariñas (Langkaan, Salitran, Salawan)	Las Piñas City (SM Southmall)	Sta. Rosa (Sta. Rosa and Dila)
Imus	Muntinlupa (Putatan)	Cabuyao
Bacoor City (near Jollibee Molino, SM Bacoor near Meralco, Molino 2)		Calamba
Noveleta		

Interviewer: What are the responsibilities of Gear 1 Driving School?

Interviewee: We assist every applicant to the best of our abilities as we aim to produce knowledgeable, discipline, and responsible drivers.

Interviewer: How does Gear 1 promote Traffic Education and Safety driving?

Interviewee: By teaching applicants based on the standardized format of modules on the Theoretical Driving Test given by the Land Transportation Office (LTO).

Interviewer: What are the services offered in Gear 1 driving school and how does the school deal with the new normal?

Interviewee: Theoretical Driving Course (TDC), Practical Driving Course (PDC), student permit assistance on LTO, and schedule-reschedule of applicant's test in case of emergency. During this pandemic, we comply with the standard health protocol procedures by the IATF for both the applicants and the school's employees.

Interviewer: Are there other organizations and/or departments that the Gear 1 Driving School coordinates with regard to road safety and driving?

Interviewee: None. But Gear 1 was accredited by the Land Transportation Office (LTO) and we follow LTO standards to operate our driving school.

Interviewer: What is a Driver's License? How to avail and maintain the ownership?

Interviewee: It is a legal permit to drive a vehicle. You can avail of a driver's license by completing and passing the TDC and PDC. You can maintain the validity of a license by avoiding grave offenses in Traffic Rules and Regulations.

Interviewer: What are the hotline numbers and social media accounts of Gear-1 driving school?
Interviewee: You can contact us at our hotline 553-4151 (Gear 1 Main Office) and by email at gear1drivingschool@yahoo.com

Interviewer: Are you willing or interested to have an android application for Road Safety and Driving? Why?
Interviewee: Yes, to educate people with regards to Road Safety and Driving.

Interviewer: What do you want to add or suggest to our proposed study?
Interviewee: Add Lecture videos about Road Safety and Questions in the game that should have two languages: Filipino and English and based on Land Transportation Management Portal or the LTO Drivers Manual booklet.

DARWIN L. ATAYDE
Signature of the Applicant

Certifications

Republic of the Philippines
CAVITE STATE UNIVERSITY
Bacoor Campus
SHIV, Molino VI, City of Bacoor
☎ (046) 476-5029

May 14, 2021

Gear-1 Driving School Molino III Branch
Molino Road, Molino III
Bacoor, Cavite

Dear Sir/Madam,

Greetings in peace!

We, the Junior Bachelor of Science in Information Technology (BSIT) students who are currently enrolled in one of our major subjects which is **ITEC 200A - Capstone Project And Research 1** under New Curriculum would like to create research entitled **Lakbay: A Three-Dimensional Game about Driving Fundamentals and Road Courtesy and Safety of Gear-1 Driving School**.

In relation to this, we are also requesting from your good office to please allow us to conduct an interview in **Gear-1 Driving School Molino III Branch**. Please be assured that the information to be gathered will be treated with the utmost confidentiality.
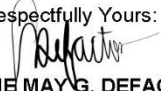
We are hoping for a positive response. God bless you.

Approved By: Respectfully Yours:
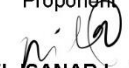
KHWEEN PRINCESS MONCAYO   **HANNIE MAY G. DEFACTO**
Thesis Adviser   Proponent

PAULO M. RODRIGUEZ   **JOHN PAUL R. CONSUELO**
Thesis Critique   Proponent

                                      NOMMEL ISANAR L. AMOLAT
                                      Proponent

DARWIN L. ATAYDE
Instructor/Lecturer/Office Registrar

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Gantt Chart of Activities

Phases		April				May				June			
		1	2	3	4	1	2	3	4	1	2	3	4
Requirements Planning		■	■	■									
User Design					■	■	■						
Rapid Construction								■	■	■			
Cutover													
Documentation		■	■	■	■	■	■	■	■	■			

Appendix Table 1: Gantt Chart for April 2021-June 2021

System Design

Appendix Figure 1: Lakbay v2020.05.14 - Main Menu
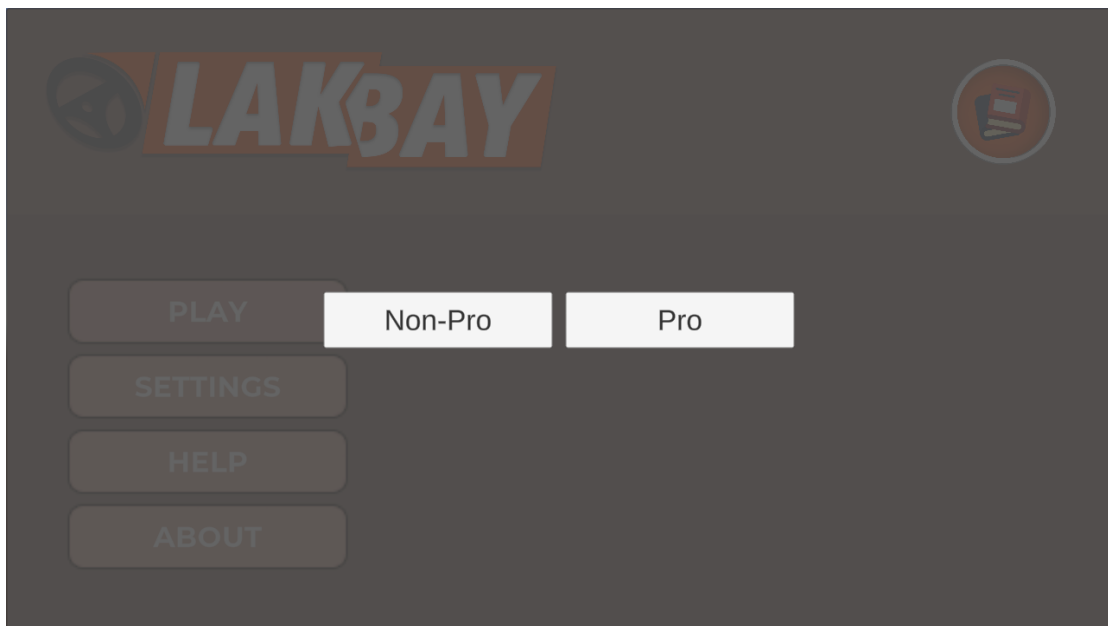
Appendix Figure 2: Lakbay v2020.05.14 - Play Panel
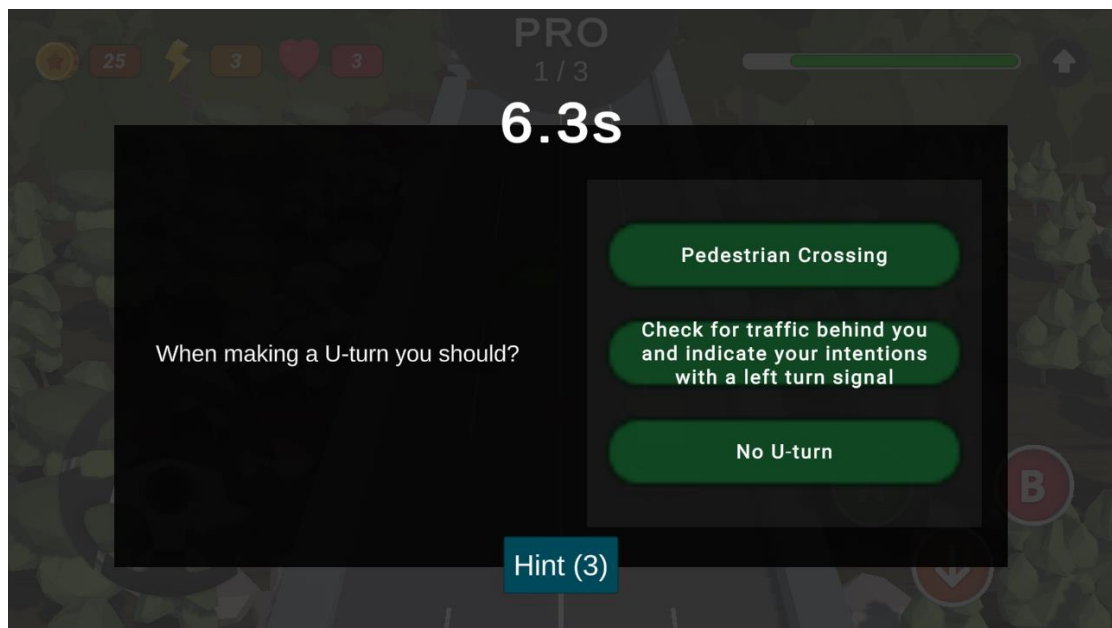
Appendix Figure 3: Lakbay v2020.05.14 - Linear Play

Appendix Figure 4: Lakbay v2020.05.24 - Main Menu
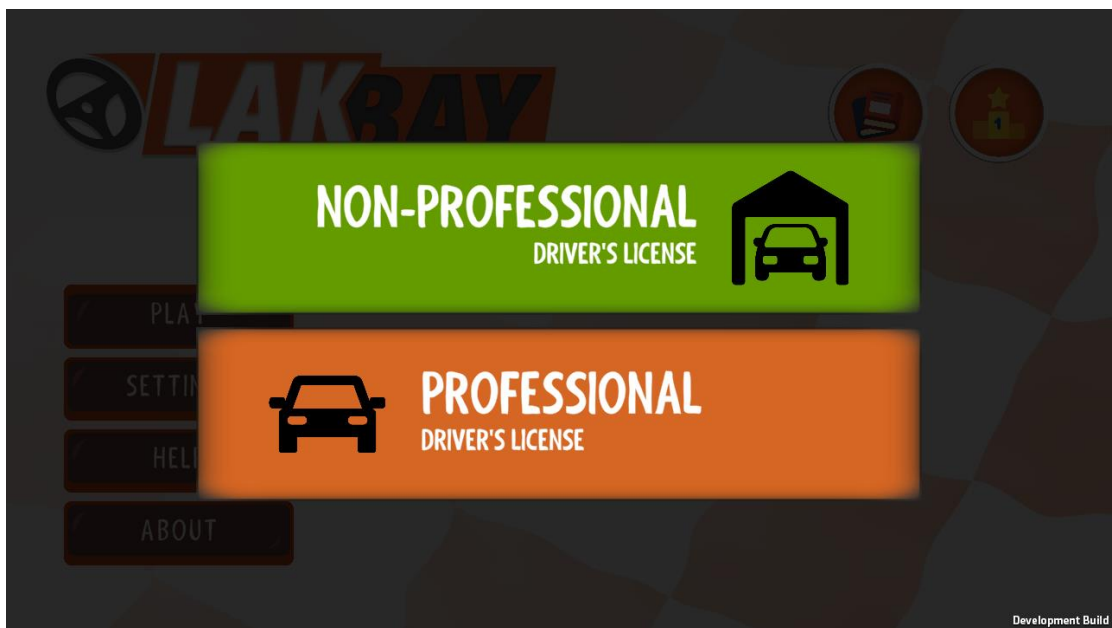
Appendix Figure 5: Lakbay v2020.05.24 - Play Panel
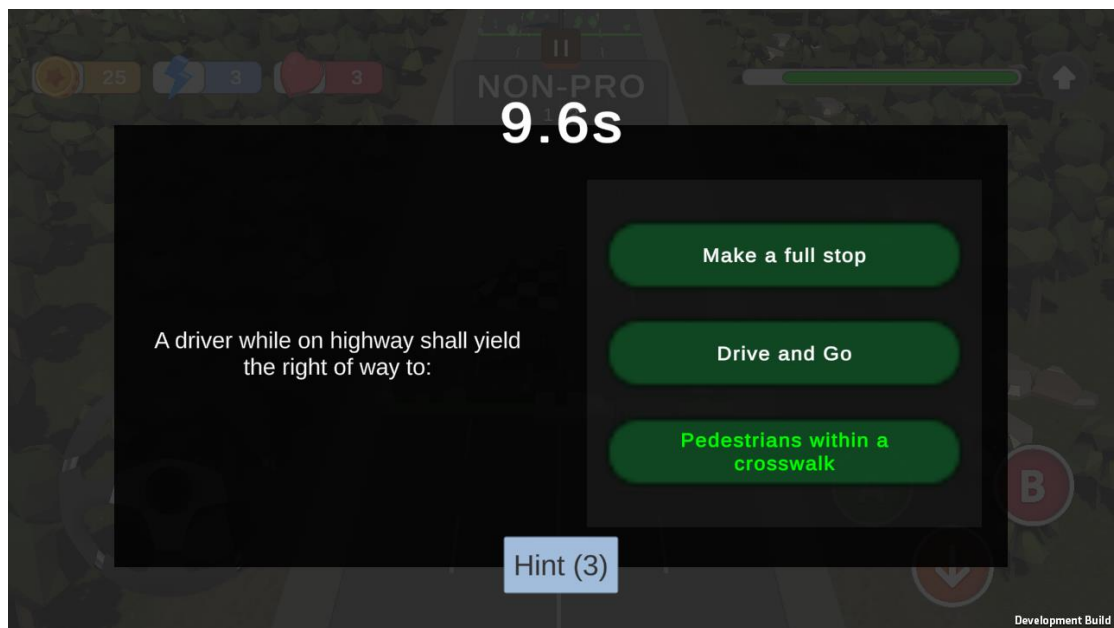
Appendix Figure 6: Lakbay v2020.05.24 - Linear Play
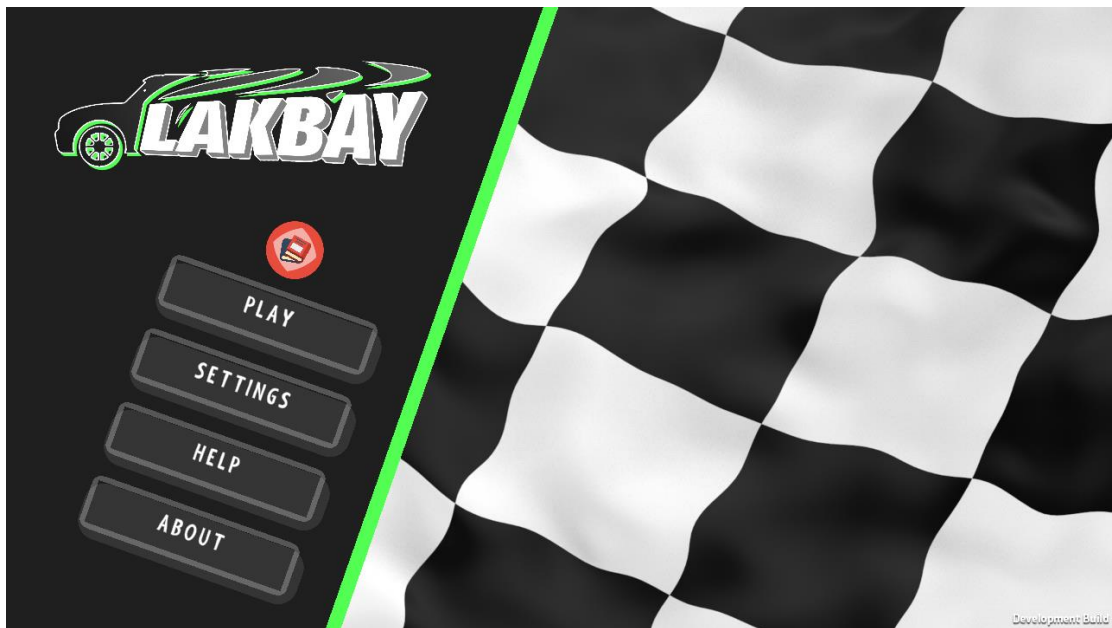
Appendix Figure 7: Lakbay v2020.06.04 - Main Menu
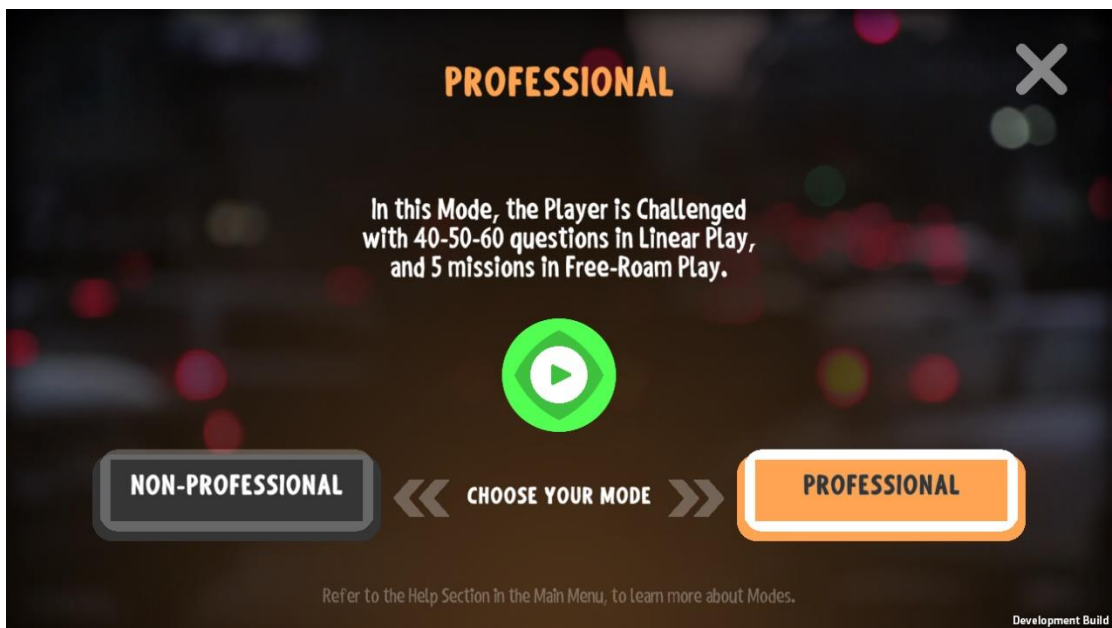
Appendix Figure 8: Lakbay v2020.06.04 - Play Panel
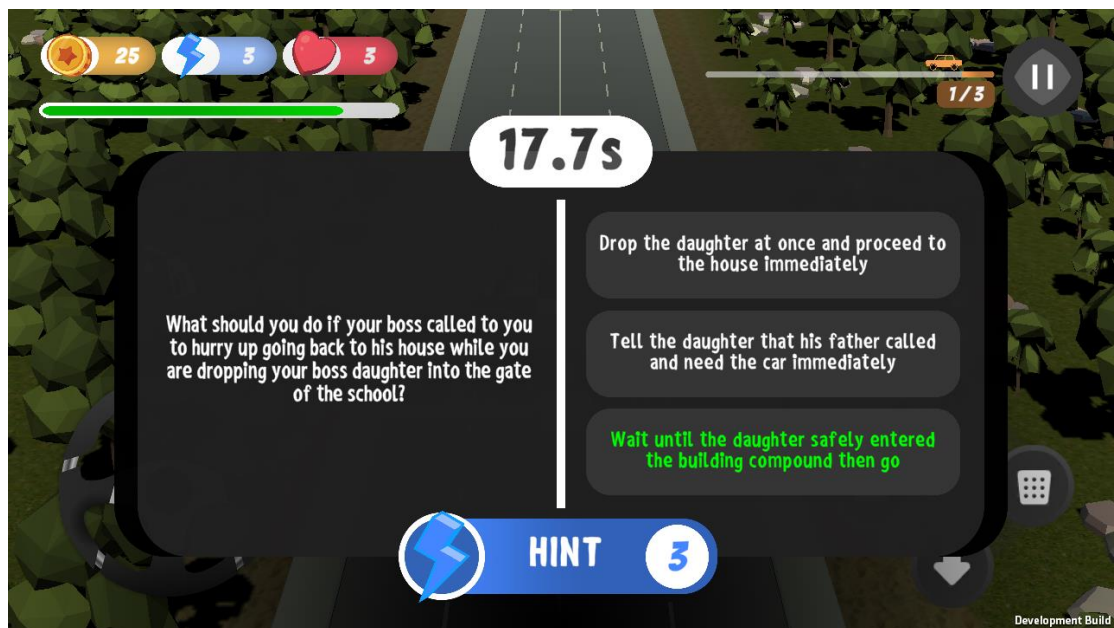
Appendix Figure 9: Lakbay v2020.06.04 - Linear Play

User's Manual

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MODES

Modes are the offered variations of gameplay that the player can choose. Each of the modes sets specific settings for the game.

There are two game modes in the game: Non-Professional and Professional. Each mode runs through the two phases of the game: Linear Play and Free-Roam Play.

Overall, the modes were constructed based on their specific purposes in the game. The differences between these two modes are stated below:

Non-Professional Mode

Linear Play Phase
- Sets the total number of questions to be answered to 40 items.

Free-Roam Play Phase

Professional Mode

Linear Play Phase
- Sets the total number of questions to be answered to 60 items.

Free-Roam Play Phase

LINEAR PLAY

Linear Play is one of the so-called phases of the game. Once a player chose a mode, the game will directly lead the player to the Linear Play phase of the game.

This is a standard gameplay phase consisting of three (3) levels wherein, the player must drive on a straight road and answer every question that will pop up along the way, as well as avoid approaching vehicles.

Entities

Entities are any objects that are present and placed in the game itself, objects that can be seen by the view of the player.

- The Player's Vehicle is the main controllable entity in the game. The player can control the vehicle using the controls and the vehicle itself can cause interaction around other entities.
- Approaching Vehicles are the Non-Player entities of the game. They randomly spawn at different lanes of the road. The goal is for the player to avoid them as much as possible to avoid losing life integrity that can eventually lead to losing a life.
- The environment is the actual setting of the game. This is made up of objects that serve as aesthetics for the game. These include the roads, street lights, trees, buildings, and houses.

Controls

Controls are the interactable user interfaces that allow the player to navigate around the game. These controls are found in the different parts of the screen. In the top-right, the Pause Button. In the bottom-left, the Fuel Top-up Button and Steering Wheel. Lastly, In the bottom-right, the Accelerate, Brake, and Reverse Buttons.
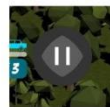
- The Pause Button temporarily halts the current progression of the game and summons the game menu. The game menu offers some of the navigations that are available in the main menu.

- The Fuel Top-up Button replenishes the fuel bar of the player by converting a coin into fuel while being held. The Steering Wheel, on the other hand, enables the player to steer and change the direction of the main vehicle. The maximum steering angle of the vehicle is set to 30 degrees, and to fully steer at this angle, the player must hold and rotate the steering wheel at 360 degrees, quite similar to real-life steering wheels.

- The Accelerate Button (Left) drives the vehicle forward. The Brake Button (Right) decelerates the car until its movement is stopped. The Reverse Button (Bottom) moves the car in a backward motion.

Indicators

Indicators are user interfaces that are meant to be viewed only to indicate the statuses that are useful to the player.

- The coin indicator shows the current coin count of the player.
- The hint indicator shows the remaining available hints that the player can use when a question pops in.
- The life indicator shows the remaining number of respawns that the player can use.

- The progress indicator shows the current level that the player is in, as well as the remaining distance needed to be traveled before reaching the end of the road.

Mechanics

There are several things to consider in Linear Play.

- The goal is for the player to reach the end of the road while answering correctly the questions along the way and at the same time avoiding any approaching vehicles.
- The player starts the game with initial coins, hints, lives, and fuel. These persist across the levels of Linear Play.
- Coins are used to replenish the fuel of the player.
- Hints are used to eliminate half of the choices in a question that are wrong.
- Lives are the number of respawns and retries that the player can have when fuel is emptied or when life integrity is broken.
- Life Integrity is the armor of the player's life. Life Integrity always resets once a life is lost. Life integrity determines the number of times that the player can hit approaching vehicles without losing a life. Once broken, it will cost a player's life.
- Question checkpoints are distributed evenly on the road, and once the player's vehicle reaches these checkpoints, timed questions will pop up and the progression of the game is halted.
- Answering a question correctly means an increase in the coin count.
- Answering a question incorrectly or not answering it means a decrease in the fuel gauge of the player.
- Hitting an approaching vehicle means losing life integrity. And eventually, losing a life.
- Losing a life means respawning at the last question checkpoint encountered by the player and having full life integrity again. If no question yet has been encountered then the player will respawn at its starting position.
- Reaching the end of the road will move the player to the next level of Linear Play.
- Once the three levels of Linear Play are finished, a summary report will be presented to the player. The eligibility of the player to proceed to the Free-Roam Play will also be decided at this point.

Appendix Figure 10: User's Manual of Lakbay

Storyboard

General Rules (Gameplay Constraints)

- Two phases: Linear Play and Free-Roam Play.
- Answer all the questions per level correctly as much as you can.
- Levels must be completed chronologically before succeeding to the next one.
- Complete and pass the Linear Play to unlock the Free-Roam.
- In Linear Play, incoming vehicles must be dodged by steering in a lane where no incoming vehicles are present, otherwise the player will lose a life after three consecutive collisions from the incoming vehicles.
- Complete the Missions in Free-Roam to finish the game.
- In Linear Play, you begin with 3 lives, 3 hints, and 25 coins but as you go along you can gain coins by answering questions correctly.
- The Coins you earned can be used to buy Fuel in the game.
- Fuel is what drives the vehicle.

Essentials

Essentials are assets that will help the player throughout the Linear Play. The default number of Essentials the player can possess are 25 coins, 3 hints, 3 lives, and 100 fuel.

- **Coins**
  - Can be obtained by answering questions correctly.

- **Hints**
  - Can be used to remove two wrong choices on a question.

- **Life**
  - The number of times the player will respawn once the gas runs out. Life is also reducible once the player is hit by incoming vehicles three times consecutively.

- **Fuel**
  - Fuel is what drives the player's vehicle, once it runs out game ends unless the player has remaining lives. Fuel can be refilled using the coins earned in the gameplay.
  - The default Fuel bar at the beginning of the game is fully filled. Once the player is dead, the player will respawn with a half-filled Fuel tank.

Modes

There are two game modes in the game. Each mode runs through the two phases of the game. The only difference between the two is the number of questions.

- **Non-Professional Mode**
  This mode consists 40 questions

- **Professional Mode**
  This mode consists 60 questions

Phases

Phases are the points in the game that the player must play in each of the said two modes. There are two phases in the game that the players must complete in order to finish the overall game play.

- **Linear Play**
  - The phase of the game wherein the player must answer a set of questions and pass the passing score to unlock the Free-Roam Play. The player must avoid the arriving vehicles and successfully reach each question checkpoints. It is composed of three levels. The number of questions per level varies depending on the level.
  - This phase is composed of three levels:
    - City Road
    - Provincial Road
    - National Road

Phases

- **Free-Roam Play**
  - This is the phase of the game wherein, the player must complete 10 missions. The player can roam around the map to do each mission. The missions are categorized into five and every category has its subtopics.
    - **Backing and Turning**
      - Turning right and left in an intersection.
      - Backing inside or outside of the street.
    - **Road Crossing and Light Traffic**
      - Road crossing.
      - Driving at light traffic.
    - **Maneuvering**
      - The "Y" turn and about maneuvering style.
    - **Garage Driving**
      - Outside the garage
      - Into the garage using the backing procedure.
    - **Parking**
      - Entering/leaving angle parking space.
      - Perpendicular Parking
      - Parallel Parking.
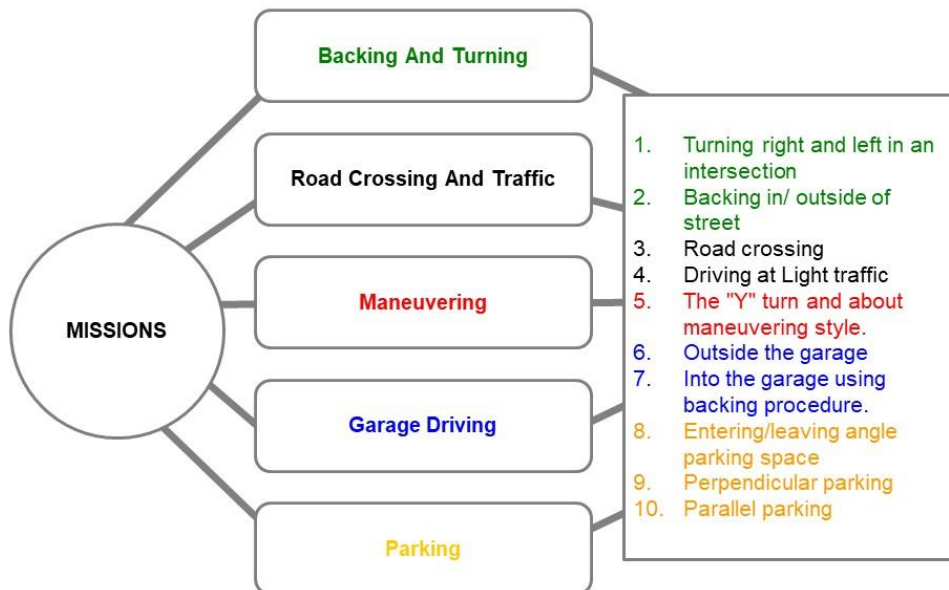
Figure 1: *Free-Roam Play Diagram*

Figure 2: *Linear Play Diagram*

Figure 3: *Free-Roam Play Diagram*
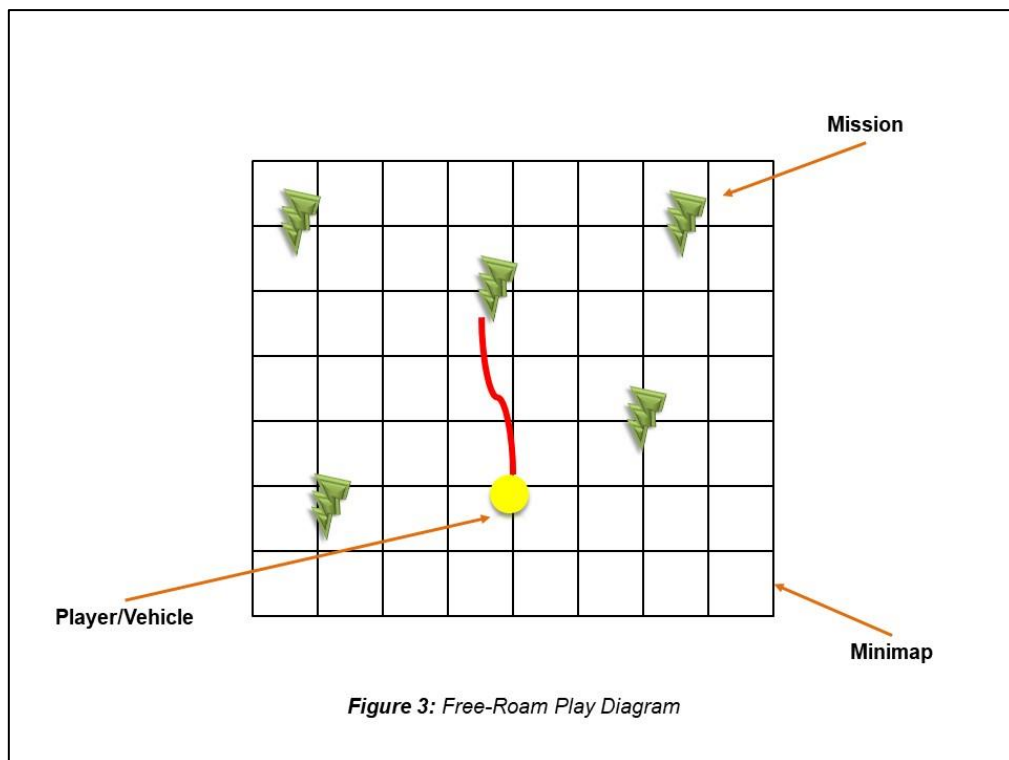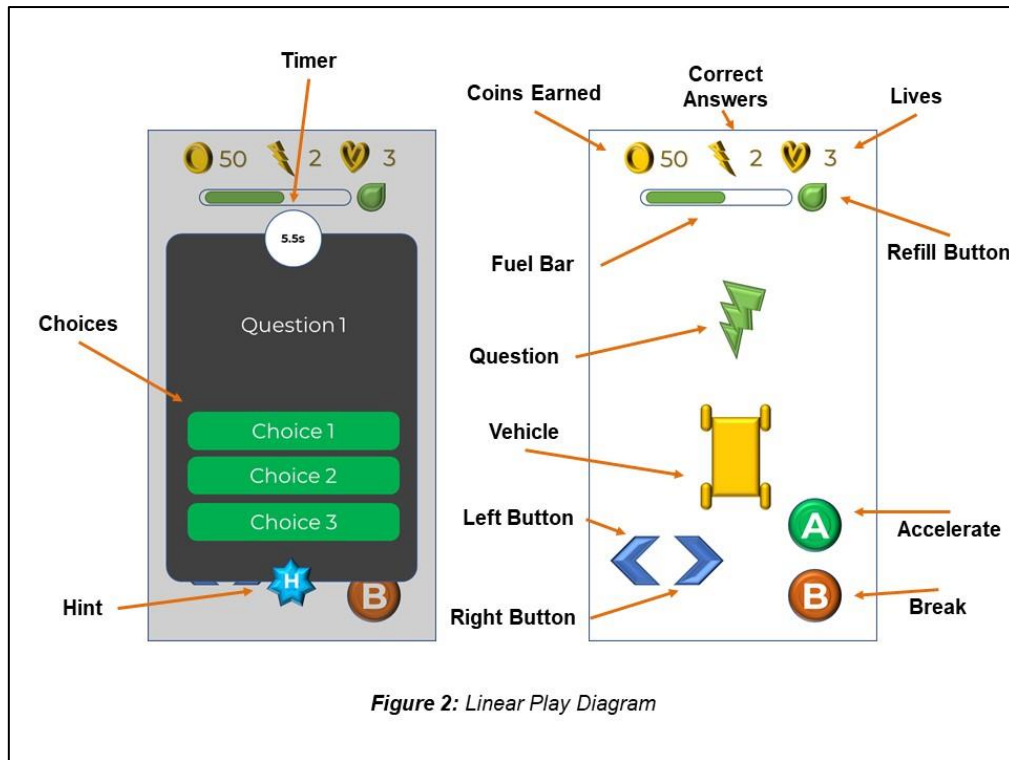
Phase Goals

- Clear each level and reach the passing score on your chosen mode for Linear Play.

MODES	PASSING SCORE	No. Of Items
Non- Professional	30	40
Professional	45	60

Table 1: Passing Scores per Mode for Linear Play

- Clear each level and reach the passing score with your chosen mode for Linear Play.
- Reaching the passing score of the Linear Play will unlock the Free-Roam Play.

Phases' Goals

- For Linear Play, as you progress each level, questions begin to increase and becomes more difficult to answer.
- The mode that the user has chosen will have a different total number of questions.

Figure 4: Linear-Play's levels Diagram
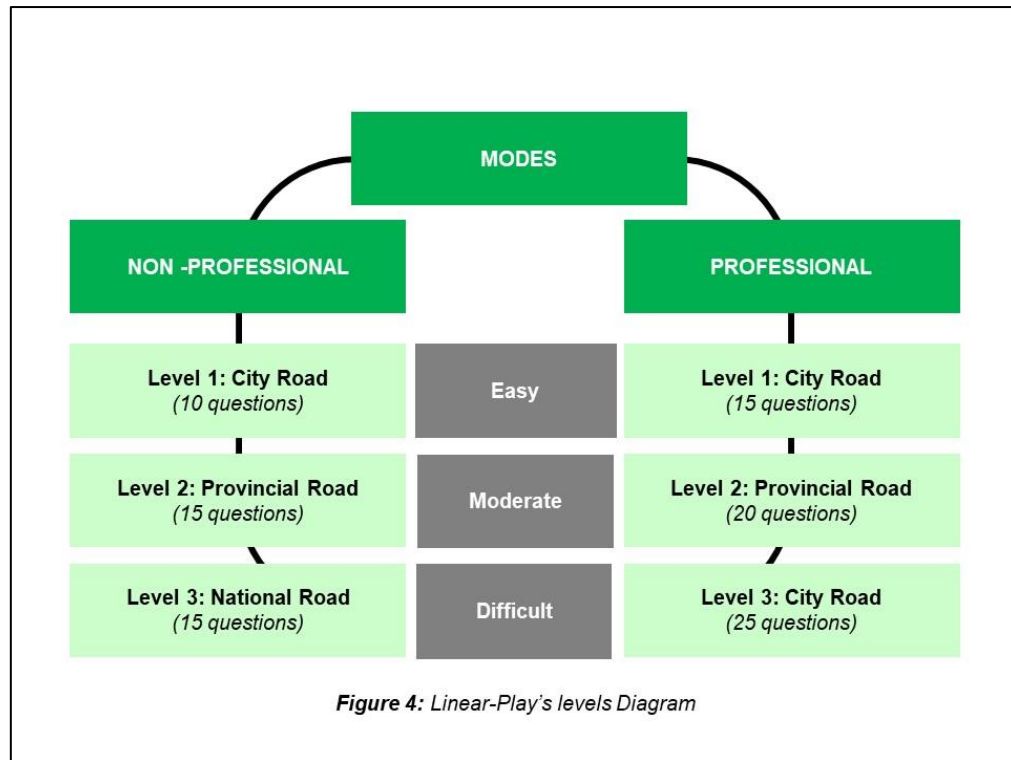
Appendix Figure 11: Early Storyboard of Lakbay
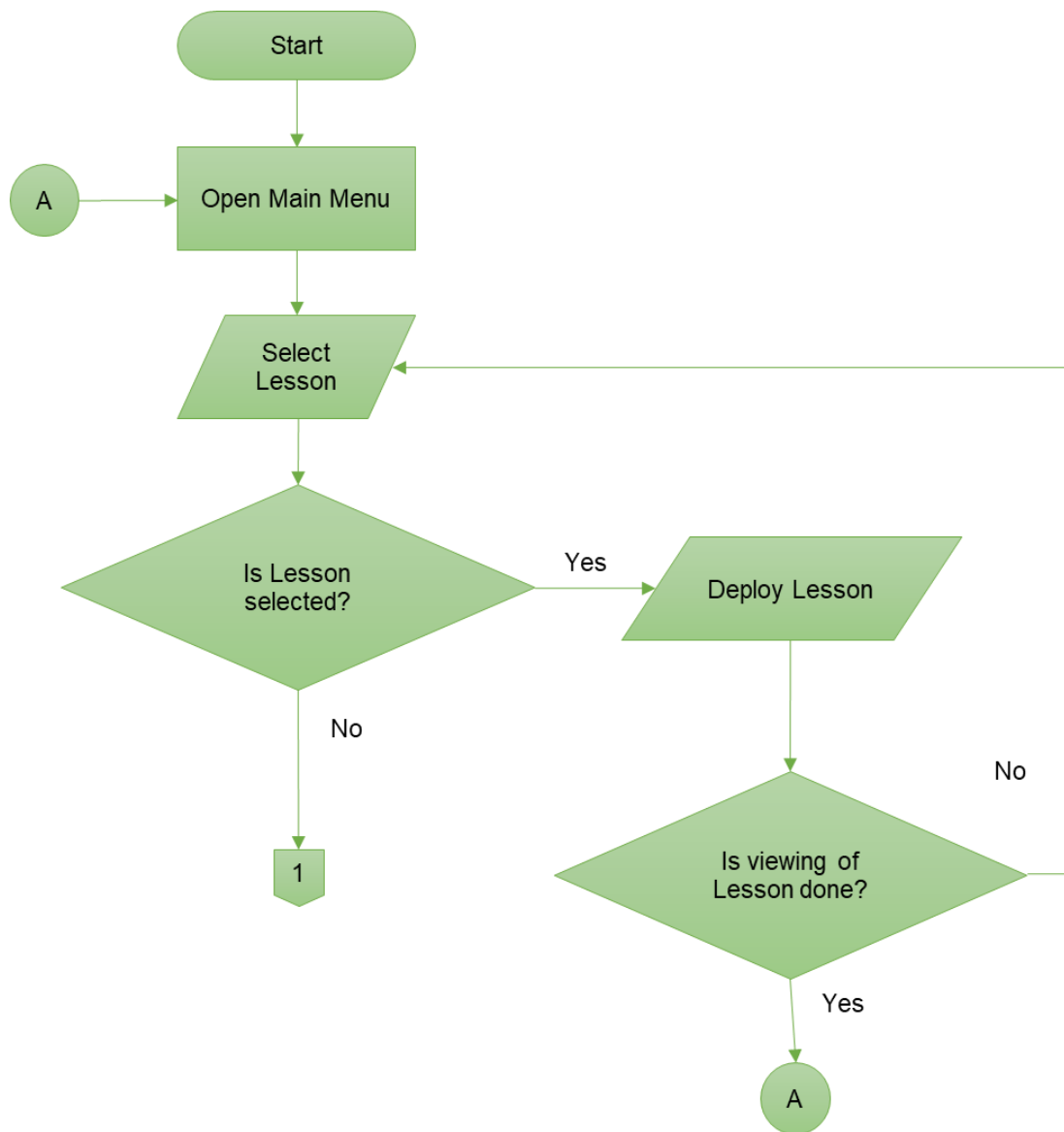
Flowcharts

Appendix Figure 12: Flowchart of Information Module
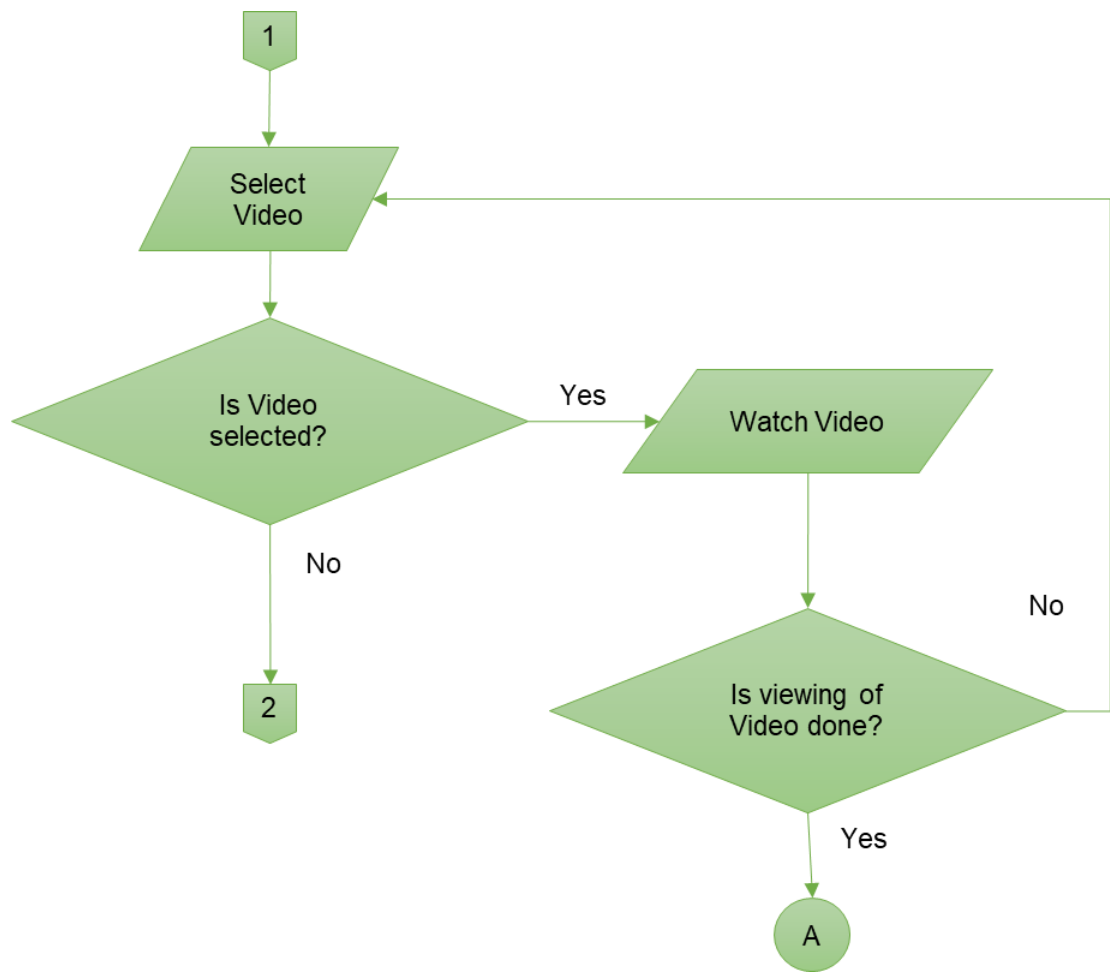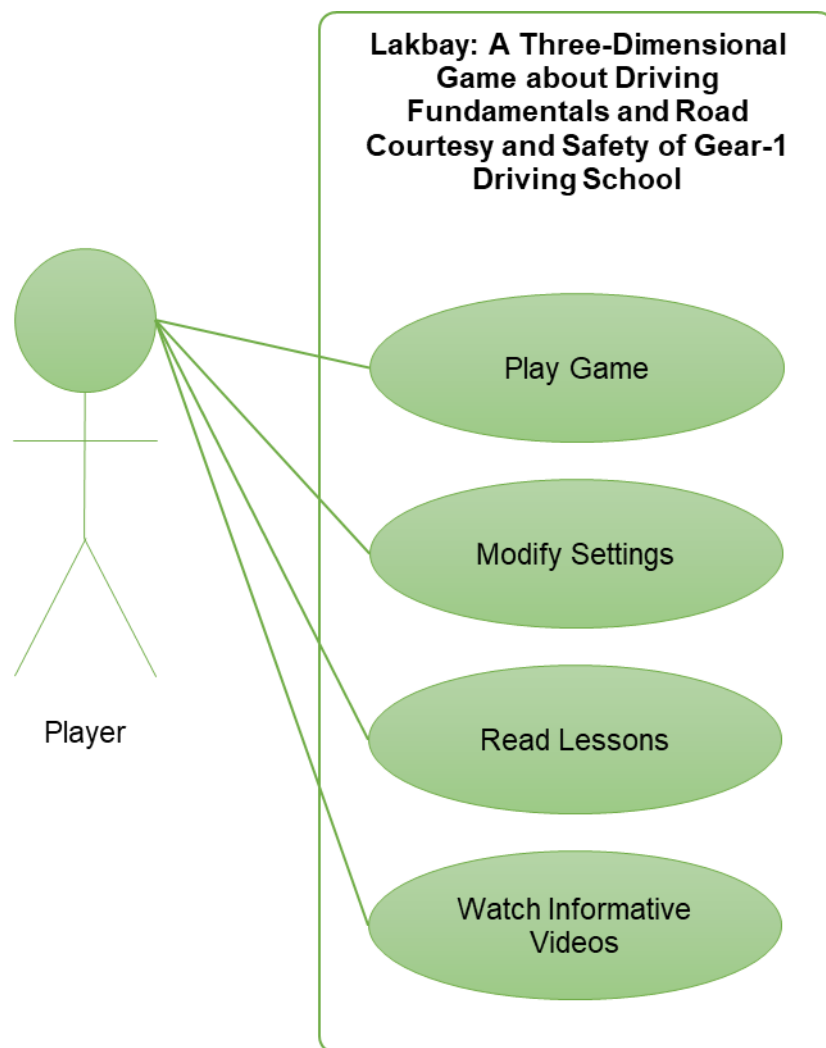
Appendix Figure 13: Flowchart of Video Module
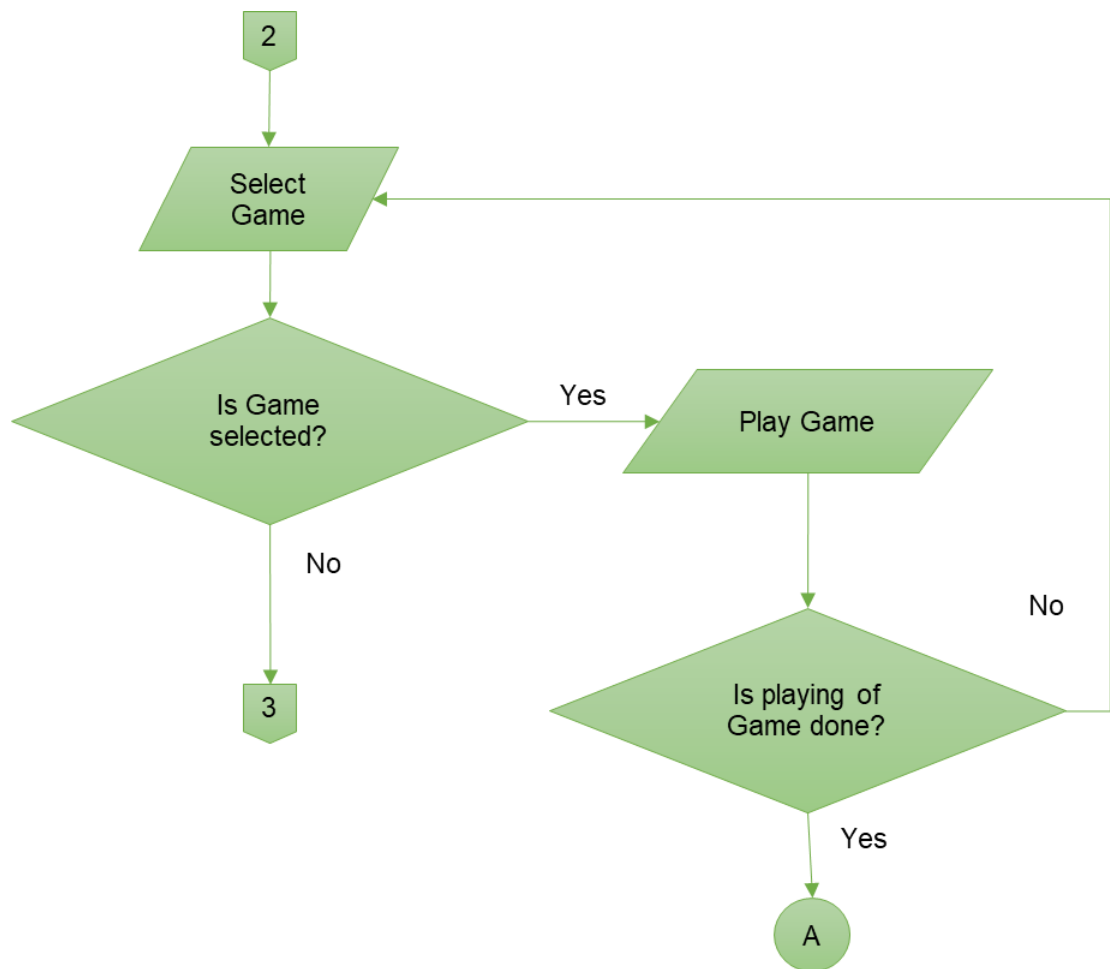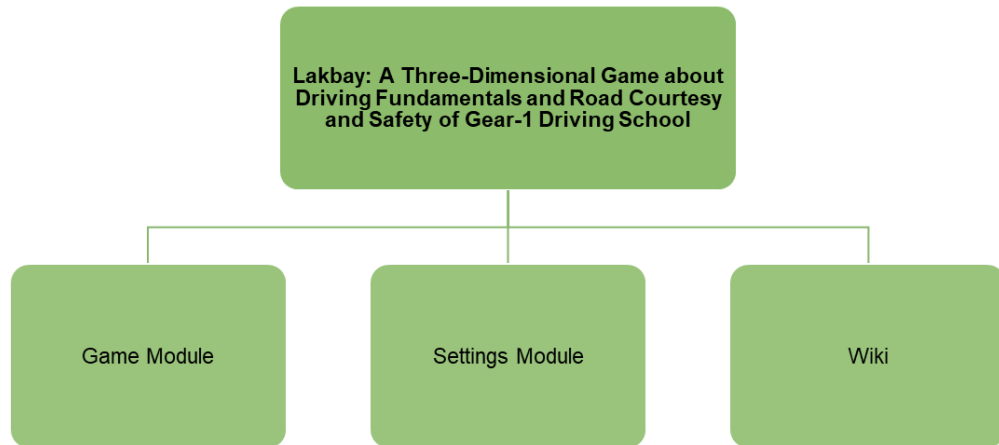
Appendix Figure 14: Flowchart of Game Module
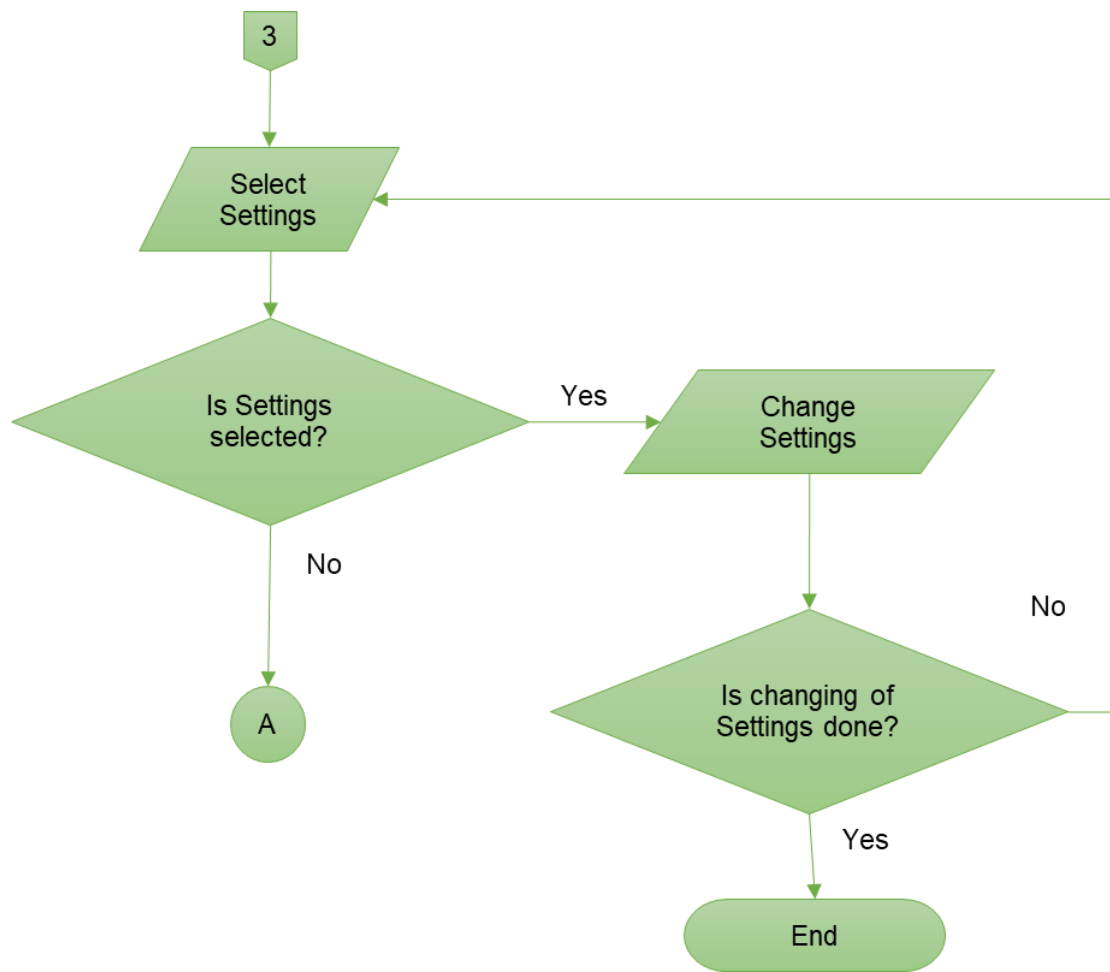
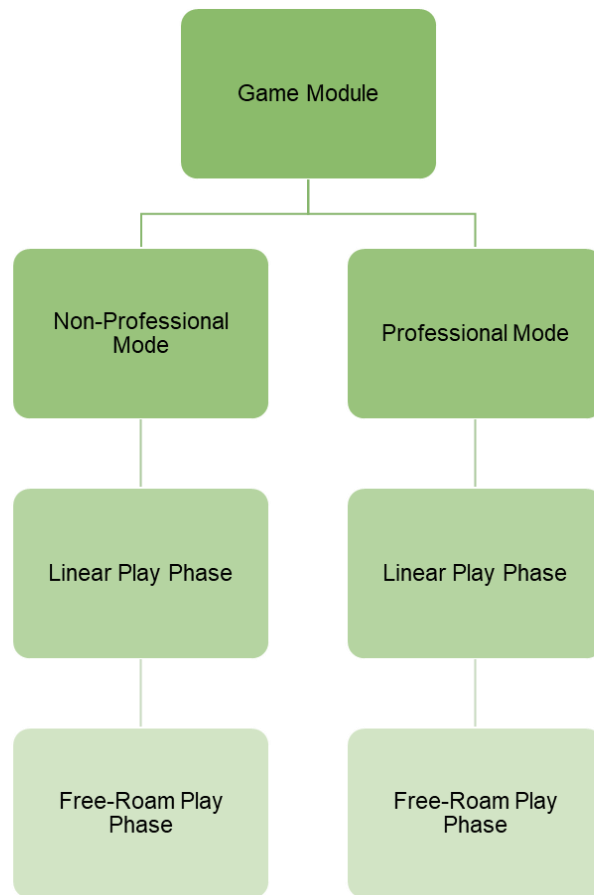**Appendix Figure 15:** Flowchart of Settings Module

Use Case Diagram

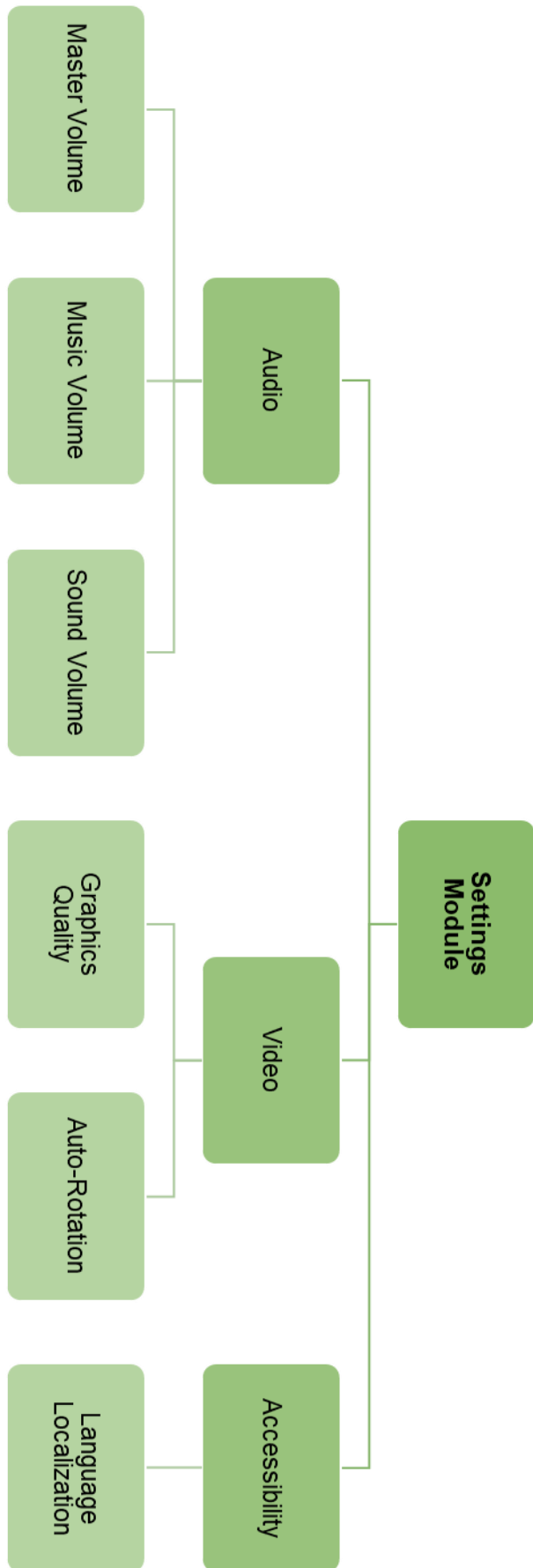**Appendix Figure 16:** Use Case Diagram of Lakbay
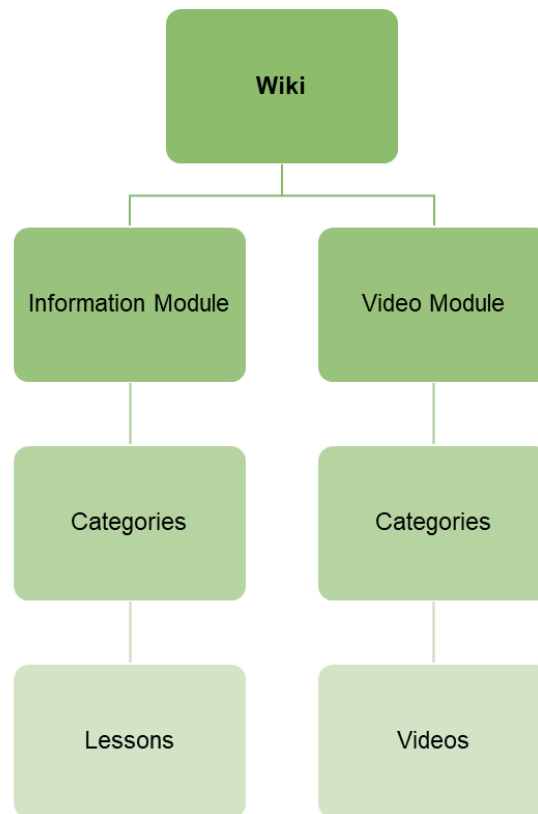
HIPO Diagram

Appendix Figure 17: HIPO Diagram of Lakbay

Appendix Figure 18: HIPO Diagram of Game Module

Appendix Figure 19: HIPO Diagram of Settings Module

Appendix Figure 20: HIPO Diagram of Wiki