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 their 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.

In this time of the pandemic, the school continues its operation, educating the students while adjusting to the crisis they strictly follow the health protocols implemented by the government for a safer transaction. Just like all the other businesses, Gear-1 Driving School also face challenges, they to pay the monthly rent of the establishment for their business to continuously operate while having a trivial amount of customers and not being able to conduct the 15 hours seminar for theoretical driving they can only conduct the practical driving following the order of LTO.

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. Learning in the current generation requires a new approach for the people to focus on, because of this, many people began to lose interest in the traditional way of learning and seeks an innovative platform to use.

    In our current generation, people are learning in a more "techy" and innovative style of learning. They are attracted to things that are appealing to the eyes, in which they find themselves engaged. Learning by reading tons of manuals and scripts might increase the boredom of the reader which can result in their loss of interest in the subject and poor absorption of the lessons.

2. The way of learning Traffic Rules and Regulations is through reading manuals and because of this, people get easily bored and tend to not absorb what they were reading.

    Nowadays, technology plays a big part in the education of the people. They seek a new approach to educate themselves using different devices or platforms. They prefer an innovative platform that will both educate and entertain them at the same time.

3. There is no existing game application in Gear-1 Driving School that promotes awareness to the people about Road Courtesy and Safety and Driving Fundamentals.

    Currently, Gear-1 Driving School has no existing platform or a game application that will educate people about Road Courtesy and

Safety and Driving Fundamentals, because of this, their means of promoting awareness about Road Safety in a game will be enclosed to a narrow audience hence, people who are in-to-games are being left out the chance to learn in a gaming platform.

4. The lack of understanding of both Driver's and Pedestrian's Obligation on the Road causes misleading actions that result in unexpected risks or danger to them. Because of this, vehicular crashes happen frequently and endangers both the lives of drivers and pedestrians.

   Lack of understanding about Road Safety for the Drivers and Pedestrians will cause danger in their lives also, unawareness of traffic rules might result in frequent road crashes.

Objective of the Study

The overall objective of the study is to be able to develop a Three-Dimensional Game Application that will educate the citizens about Driving Fundamentals and Road Courtesy and Safety of Gear-1 Driving School.

The specific objectives of the system are listed as follows:

1. To develop a game application that will both entertain and educate the people in the current generation.

   The proponents created a game that is a visually appealing, educational yet entertaining platform that will challenge and gain the user's attention.

2. To develop a game application with Information Module that will convey Traffic Rules and Regulations effectively.

   This module will help the users to learn more about basic Traffic Rules and Regulations. The said module contains sets of Information about Rules and Regulations on the road.

3. To develop a game application for Gear-1 Driving School that will raise awareness about Road Courtesy and Safety and Driving Fundamentals.

   The proponents will develop a game application for Gear-1 Driving School that will help them to educate the people about Road Safety and Driving. Also, the application will help to broaden the range of audience for it will be a game application.

4. To identify possible reasons on how a game innovates the style of teaching Road Safety and Driving.

   This module will help the users to learn Road Safety and Driving and enjoy the application at the same time. The said module contains games that cover lessons about Road Courtesy and Safety and Driving Fundamentals that are both entertaining and educational.

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

User. The user is the one who controls the player in the game. The main goal of the game is for the player to complete every stage by meeting two conditions, the player must reach the target destination and meet the passing score of that level. Failing to do so, the player will have to redo the level. Upon finishing the stages, a Driver's License will be issued to the player as a prize for completing the game.

Moreover, now that the stages are all unlocked, the player can choose freely on what stage he wants to play.

Functionalities

Below are the general functionalities that the system can offer. These enable the system to operate in different ways and communicate well with the users involved in the system.

Familiarization of Equipment. This refers to the review and familiarization of gears and accessories of the vehicle consisting of images with descriptions of certain equipment.

Introduction of Essentials. This refers to the presentation of the skills and tips on how to survive the game. Skills are assets possessed by the player that will help him/her in completing the game.

Tutorial Phase. This is intended for the new users of the game for them to be familiar with the flow. It is a simple instructional video tutorial on how to navigate and learn the basics of the game.

Scoring and Rating System. It is the numerical and graphical representation of the player's accomplishments in the game. The player will be rated and scored based on their score's percentage, number of correct answers, and how fast the questions are answered.

Leaderboard. This refers to the display of scores and rating of the player in every completion of a level from the late top scores to the recent ones. Each user has the ability to have their own playthrough in a game. The users' top scores will be displayed on the leaderboard in descending order.

Timer Per Question. This is a set timer per question of the game. It is another opportunity for the player to gain a higher score and ratings depending on how fast the question will be answered correctly. Additional coins as a reward will be sponsored to the player in every correct answer within the time limit. Failing to answer within the

time frame will affect the score of the player if the questions will be answered correctly but not within the time frame.

Puzzle Fragments. This is a puzzle piece that will serve as a reward that the player will obtain after completing every mission. At the end part of the game, the collected pieces will assemble and portray a digital representation of a Driver's License template.

Driver's License. Upon finishing the phases, a Driver's License will be issued to the player as a prize for completing the game. It is a graphical representation of the player's license and reflects the information based on the user's inputted data at the last part of the game.

Linear Play. This is a standard gameplay phase consisting of levels wherein, the player must drive on the road and will need to answer every question that will pop up along the way.

Free-Roam Play. Is a new phase that will automatically unlock after finishing all the levels in Linear Play. In this phase, the player has the ability to roam on the map. It also includes the implementation of driving and parking simulation.

Head-Up Display. The User Interface elements are displayed on the screen. It includes the navigation and control buttons as well as other elements such as icons, indicators, main menu, etc.

Localization. This has two available languages (English and Filipino). Provided for the users to choose the language that is convenient for them.

Modules. This is the breakdown of the major parts of the system. In this system, we have four (4) modules namely:

1. Game Module
    - This module consists of the two phases of the game (Linear Play and Free-Roam Play).
2. Information Module

- This module consists of the actual lessons provided by the LTO for the applicants to learn and/or review the theoretical driving lessons.

3. Video Module
    - This module consists of videos from Youtube for tutorial purposes.
4. Settings Module
    - In this module, the user can customize his or her technical preferences such as Audio Settings wherein, they can adjust the Master Volume, Music Volume, and Sound Volume. Video Settings wherein, the user may adjust the Quality and the Landscape Auto-Rotation of the Game. And the Accessibility Settings wherein, they can choose their preferred language.

Limitation

Putting aside the functionalities offered by the system, 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 for only playing games. The hotline numbers of the national local government offices are provided in the game but it does not mean that it will call the agency directly. Gear-1 Driving School can not send notifications information to android users. Moreover, some part of the application needs an internet connection specifically to the social media accounts and official website of Gear-1 Driving School.

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).

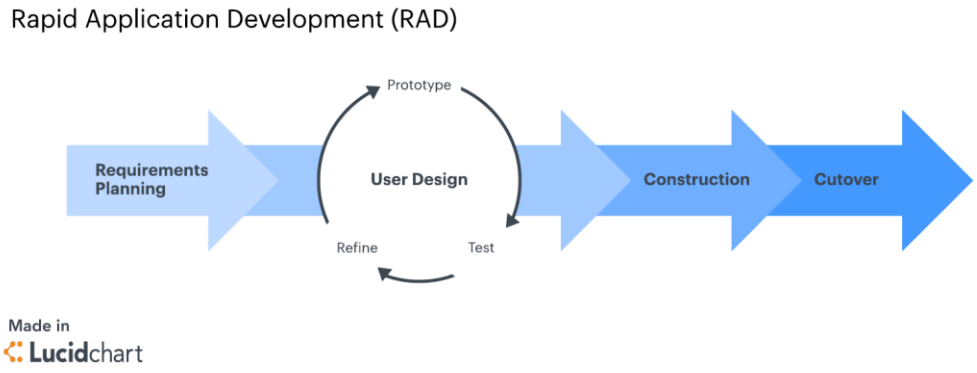

Figure 1: The RAD Model (Lucid Content Team, 2018)

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. This phase corresponds to the project scoping meeting and the most crucial step for the success of the project. During this stage both developers and clients (software users) communicate to each other to determine the goals and expectations of the project as well as evaluating the potential and possible issues during the building of the project will be addressed during this phase. The basic breakdown of this stage consists of: (1). Researching the current problem, (2). Defining the requirements for the project, (3). Finalizing the requirements with each stakeholder's approval.

Phase 2: User Design. This is the development phase of the project wherein the developers will build user designs through various prototype iteration for the client to be evaluated. This phase will let the client evaluates the prototype that has been built to ensure that the needs are being met during the design process of the project. The developers design the prototype then the client (user) tests it, then they communicate to evaluate and discuss what are things need to modify as well as the suggestions of the client. This phase lets the developer to developed prototypes until they satisfactorily met the conditions set by the client.

Phase 3: Rapid Construction. This phase takes both the prototype and beta system from the previous phase and converts them into a working model. As majority and modifications were addressed during the iterative design phase, developers can now construct the final working model that follows the traditional project management

approach. The phase breaks down into several smaller steps: (1). Preparation for rapid construction, (2). Program and application development, (3). Coding, (4). Unit, integration, and system testing.

This phase is important for the developers as they work together to ensure that everything is working properly and satisfy the client's expectations and the project's objective. Throughout this phase, the client still gets the freedom to suggest, modify and atter and even introduce new ideas for the betterment of the project.

Phase 4: Cutover. This is the implementation phase wherein the finished product is now ready to launch. It includes data conversion, testing, and changeover to the new system, as well as user training. 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

How online gaming has become a social lifeline

During the pandemic, gaming has increased, reaching people who had previously avoided it entirely, as well as those who had only played occasionally. According to a new study by NPD, an American business research firm, four out of every five consumers in one survey in the United States played video games in the previous six months. Gaming sales are soaring even at times when many industries are struggling. This year, global revenue is expected to increase by 20% to $175 billion (£130 billion). When the shelter-in-place orders were issued, millions of people around the world opted to tech-fueled entertainments like Netflix Party film viewings, Zoom chats, and video games to stay in touch with family and friends, according to Lufkin (2020). Gaming has burst in fame, affecting people who had previously only dabbled in it or had completely disavowed it. American business-research firm, four out of every five customers in one poll in the United States played video games in the previous six months according to a recent NPD analysis. Gaming revenue is surging at a time when many other industries are hurting. Global revenue is expected to rise by 20% this year to $175 billion (£130 billion). The pandemic "really opened a lot of people's eyes – especially non-gamers – to what games can do to bring people together," according to Daniel Luu, the creator of Nookazon and an active gamer located in Washington, DC. He affirms that one of his site's most renowned top sellers is a 50-year-old woman who has "never played video games in her entire life."

As the virus spreads and millions of people worldwide face months of social isolation, gaming has proven to be an unexpected lifeline. Those new players can keep

playing even after they are allowed to socialize in person. According to a Google survey, 40% of new gamers plan to keep playing video games after the pandemic.

Synthesis:

Online games have been soaring in this time of pandemic increasing the revenue of revenue is expected to increase by 20% to $175 billion (£130 billion) Globally.). When the shelter-in-place orders were issued, people gave their attention to online entertainment and online gaming has been rising to fame due to the spread of the virus and this opened people's eyes to what games can do in being us together which is supported by the survey done by Google that 40% of new gamers plan to keep playing video games after the pandemic.

Reference:

Lufkin, B. (2020, December 16). How online gaming has become a social lifeline. Retrieved from https://www.bbc.com/worklife/article/20201215-how-online-gaming-has-become-a-social-lifeline#:%7E:text=Gaming%20has%20skyrocketed%20during%20the%20pandemic%2C%20reaching%20people%20who'd,an%20American%20business%2Dresearch%20firm

Everyone is playing video games during the pandemic

Before the coronavirus outbreak, video games were becoming increasingly popular. But they're now all over the place. According to an industry research firm NPD Group, gaming sales in the United States surged 37 percent year on year in August to $3.3 billion. This is the fifth month in a row that sales have increased dramatically compared to the same period last year. 2019 will have a number of periods. Following a "low" point of 26 percent increase in June, sales in the United States have risen in the last two months, indicating that video games remain popular even when quarantines cease, and travel restrictions relax. According to market research firm

NPD Group, gaming revenues in the United States increased 37 percent year on year in August to $3.3 billion. Sales of content (games purchased online or on discs) have surged by double digits since the epidemic began as well as the sales of hardware (consoles and accessories). Consumers are buying more consoles, and those who already own consoles are buying more games to play. These significant increases in game's sales and use are unlikely to endure as people leave their houses more frequently and life returns to normality. When the pandemic permanently transforms our perceptive habits, further engaging the world in game's culture, reverting to a far greater baseline.

Synthesis:

Video games have been popular before the pandemic, but now they are all over the place. According to an industry research firm NPD Group, gaming sales in the United States surged 37 percent year on year in August to $3.3 billion, Sales of content (games purchased online or on discs) have surged by double digits since the epidemic began as well as the sales of hardware (consoles and accessories). This significant increase in game sales is likely to endure as people leave their houses until everything returns to normal, further engaging the world in game's culture, reverting to a far greater baseline.

Reference:

Epstein, A. (2020, September 16). Everyone is playing video games during the pandemic. Retrieved from https://qz.com/1904276/everyone-is-playing-video-games-during-the-pandemic/

Online Gaming During the COVID-19 Pandemic in India: Strategies for Work-Life Balance

The unique coronavirus illness 2019 (COVID-19) pandemic has brought the entire world to a shutdown, that has affected millions of people globally, according to

the World Health Organization (2020). In India, a “lockdown” refers to individuals staying at home, effectively limiting population movement within and outside of specific areas, except for essential tasks. Resulting in many people enduring job and educational insecurity, as well as psychological suffering. The pandemic had little effect on the game business, with user interaction skyrocketed dramatically during this time (Javed 2020). For example, WinZo Games, an Indian-based gaming company, reported three times higher user involvement and 30 percent higher traffic in online mobile gaming. likewise, an Indian mobile-based online gaming platform (Paytm First Games) had a nearly 200 percent increase in user base, with 75,000 new players during this pandemic. During the lockdown, there was also a slight increase in female users, as well as a surge in user interest in online gaming in ages 25–35 years old. Gaming has been seen during all hours of the day, with a peak period between 8 p.m. and 12 a.m. (Bora 2020). The growing popularity of Indian gaming can be linked to the reality that many people are now housebound and have limited entertainment options. nowadays, online gaming has supported public health activities in successfully enforcing social distancing during the epidemic, as seen by the World Health Organization's joint project (#PlayApartTogether) with the online gaming industry, which motivates individuals to stay at home and limit the spread of the virus. gaming as a diseased handling mechanism (i.e., an over-reliance on gaming as a kind of escapism from reality) may have mental health issues. Others may continue to engage in excessive gaming as a result of the pandemic's impact, with detrimental effects. Psychiatrists, psychologists, occupational therapists, and social workers must continuously monitor their patients' psychosocial needs and give the required psychosocial assistance whenever possible. The overall public, particularly weak people, needs the highest level of mental health treatment during this pandemic. Early detection of the affected population should begin as soon as feasible to help address the mental health difficulties produced by the COVID-19 pandemic.

Synthesis:

When Covid-19 startled the world, the gaming industry skyrocketed, for example, WinZo Games, an Indian-based gaming company, reported three times higher user involvement and an Indian mobile-based online gaming platform (Paytm First Games) with 75,000 new players during this pandemic. This is also an effect of the lockdowns which affected the people's mental health wherein, they continue to engage in excessive gaming as a form of escapism that's why Psychiatrists, psychologists, occupational therapists, and social workers must take action with early detection of the affected population should begin as soon as feasible to help address the mental health difficulties produced by the COVID-19 pandemic.

Reference:

Amin, K. P. (2020, July 10). Online Gaming During the COVID-19 Pandemic in India: Strategies for Work-Life Balance. Retrieved from https://link.springer.com/article/10.1007/s11469-020-00358-1?error=cookies_not_supported&code=c6f4a9b8-35b5-4f34-b176-24487fafc8c5

Mobile games thrive, even as Covid-19 pandemic keeps players home

During the pandemic, players are increasingly turning to mobile games for fun and fellowship, and an increasing number of women are participating in them. "People have not begun playing games on their phones because they're locked up at home," SensorTower mobile analytics specialist Craig Chapple explained. "Mobile gaming, on the other hand, became successful." compared with console games with hypnotic worlds that can last hours, smartphone game play consists of taps on touchscreens with only a few moments of play at a time, frequently while enjoying coffee or waiting for public transportation. Women account for more than 40% of mobile gamers, according to research firms Newzoo and Statista. Players who utilize consoles or personal computers, according to researchers, are anticipated to be males between

the ages of 12 and 35. Fans of mobile games quickly realize that playing console or video games. on trains, buses, or cars is not an option, however, smartphones can be brought out and used anywhere to perform a few motions. Millennials, whose age is from 23 to 38 years old, make up around 72 percent of all active mobile game players globally. People around the world where smartphones are the primary, if not the only, means of connecting to the internet constitute a greater audience for mobile games. "It's incredibly massive in emerging markets, particularly China and India," Garrard added. Considering that mobile games are easily available to the world's more than four billion smartphone users drives revenue. Because the action is being driven by data centers, a trend toward cloud streaming services will almost certainly boost mobile gaming, as games that were previously only available on consoles will become available on mobile devices. Developers will leverage high-capacity, ultra-fast 5G telecom networks to bring console-quality visuals and action to mobile devices, drawing more die-hard gamers.

Synthesis:

During this pandemic, people have been engaged in online games for fun mobile gaming, on the other hand, became successful. Women account for more than 40% of mobile gamers while millennials, whose age is from 23 to 38 years old, make up around 72 percent of all active mobile game players globally, it's incredibly massive in emerging markets, particularly China and India considering that the world has more than four billion smartphone users the developers idealized the leverage high-capacity, ultra-fast 5G telecom networks to bring console-quality visuals and action to mobile devices, drawing more die-hard gamers.

Reference:

Mobile games thrive, even as Covid-19 pandemic keeps players home. (2020, October 13). Retrieved from https://www.straitstimes.com/tech/tech-news/mobile-games-thrive-even-as-pandemic-keeps-players-home

Mobile Health Apps on COVID-19 Launched in the Early Days of the Pandemic: Content Analysis and Review

Because of the risk of disseminating inaccurate information that could harm users, the usage of mobile health (mHealth) apps is a major source of worry. Health care providers may find it challenging to ordain an app for coronavirus disease (COVID-19) knowledge and self-monitoring. The purpose of this research is to explore and assess the contents and features of COVID-19 mobile apps. The findings will assist health care clinicians in identifying suitable mobile applications for COVID-19 self-monitoring and education. The mobile app assessment findings might theoretically help mobile app developers improve or adjust their present mobile app designs to attain the greatest results. Between April 18 and May 5, 2020, a search for mHealth apps in the Android market was conducted. A hunt for mHealth apps in the Android-based Play Store and the iOS-based App Store was undertaken between April 18 and May 5, 2020, undertaken in the United States, and a virtual private network app was used to identify and explore COVID-19 smartphone applications from all countries on the Google Play Store. The fundamental features evaluation criteria utilized for comparison were the requirement for a free subscription, internet connectivity, instructional or advising content, app size, capacity to export data, and automated data entry. According to the findings, 30 (19.9%) of the 223 COVID-19–related mobile apps found in the App Store and 28 (44.4%) in the Play Store matched the inclusion requirements. The apps' functionality was evaluated using COVID-19 awareness, tracing or mapping of COVID-19 incidents, home monitoring surveillance, online consultation with a health authority, and official applications maintained by health authorities. Finally, the majority of iOS apps give infographic mapping of COVID-19 cases, but the majority of Android apps contain home tracking features rather than COVID-19-specific instructional materials.

Synthesis:

Because of the risk of disseminating inaccurate information that could harm users, the usage of mobile health (mHealth) apps is a major source of worry and that's where the purpose of this research is to explore and assess the contents and features of COVID-19 mobile apps. The apps' functionality was evaluated using COVID-19 awareness, tracing or mapping of COVID-19 incidents, home monitoring surveillance, online consultation with a health authority, and official applications maintained by health authorities wherein, the majority of Android apps contain home tracking features rather than COVID-19-specific instructional materials.

Reference:

Ming, L. C. (2020, September 16). Mobile Health Apps on COVID-19 Launched in the Early Days of the Pandemic: Content Analysis and Review. Retrieved from https://mhealth.jmir.org/2020/9/e19796/

Literature Review in Games and Learning

Computer games have become an important element of our society; the global industry is worth billions of dollars, related activities range from published periodicals to impromptu internet groups, and the impact of playing games on youths has piqued the attention of the media. Three-quarters of children play on a regular basis. The result of the study on the interaction between games and gamers, as well as the theoretical and practical consequences for learning, are discussed in this overview. The study of computer games or game players cannot be reduced to a single research discipline, the evidence is complicated and dispersed. Computer science, education, psychology, youth and media studies, and cultural studies are all relevant fields of study. Resulting in the features of research into games and games that might 'cross' various academic disciplines.

Game Development for Education, there are two major themes that run throughout the creation of educational games. Specifically, there is a passion to

leverage the motivating potential of games in order to ‘make learning entertaining.’ The concept that ‘learning by doing' in games such as simulations is a learning experience. In an attempt to mimic the levels of engagement and harness this to allow more traditional learning, software meant to enhance young people's learning is frequently obtained from game design. And the outcomes do not always satisfy a discriminating gamer because the shots are not consistently successful.

Synthesis:

The global industry is worth billions of dollars, related activities range from published periodicals to impromptu internet groups, and the impact of playing games on youths has piqued the attention of the media that’s why computer games have become an important element of our society. Computer science, education, psychology, youth and media studies, and cultural studies are all relevant fields of study resulting in the features of research into games and games that might ‘cross' various academic disciplines. In an attempt to mimic the levels of engagement and harness this to allow more traditional learning, software meant to enhance young people's learning is frequently obtained from game design.

Reference:

Kirriemuir, J., & Mcfarlane, A. (2004, July). Literature Review in Games and Learning. Retrieved from https://www.researchgate.net/profile/John-Kirriemuir/publication/32231341_Literature_Review_in_Games_and_Learning/links/566fce2108aecdcd23573c69/Literature-Review-in-Games-and-Learning.pdf

Assessing Video Games to Improve Driving Skills: A Literature Review and Observational Study

Playing video games is a promising way for anyone, particularly older ones, to improve their driving skills. Gaming consoles are an appealing simulation tool due to

their ease of use, wide availability, and interactivity. The goal of this research was to investigate the feasibility and consequences of installing video game consoles in the homes of people who want to enhance their driving skills. To analyze the influence of video games on enhancing driving skills, a comprehensive literature review was done. Observational research was carried out to assess the viability of employing an Xbox 360 Kinect console to improve driving skills. In the literature, there are twenty–nine papers that discuss the use of video games to improve driving skills. According to our findings, the Xbox 360 with Kinect is efficient in improving both physical and mental capabilities. These activities, however, did not address manual dexterity, visuospatial awareness, or binocular vision. Xbox video games were developed to employ players in physical, visual, and cognitive skills such as endurance, postural sway, response time, eyesight, eye movement, attention and focus, orientation challenges, and semantic fluency. Xbox Kinect (by combining Kinect sensor capacities) was found to integrate the physical, visual, and cognitive involvement of players. These findings were constant with the findings of the literature review. Based on studies, we may infer that video game consoles are a suitable tool for enhancing users' physical and mental health. We propose that in the future, we will conduct a complete examination of the impacts of video games on driving skills in old persons. There are numerous advantages to using video games to improve driving skills, according to our studies. Aging and a lack of exercise cause mental and physical deterioration. Exercising, on the other hand, has been demonstrated in studies to slow the degeneration of the body and mind. Physiotherapy sessions and swimming are two options for accomplishing this, however, for many people, these activities may be difficult to attend. Another option is to exercise at home, both physically and mentally, by doing crossword puzzles from newspapers and magazines. The problem with this strategy is that these exercises may get tedious for some individuals, leading them to abandon them.

Synthesis:

Gaming consoles are an appealing simulation tool due to their ease of use, wide availability, and interactivity and is a promising way for anyone, particularly older ones, to improve their driving skills which aligned the objective of this research which is to investigate the feasibility and consequences of installing video game consoles in the homes of people who want to enhance their driving skills. There are numerous advantages to using video games to improve driving skills, according to our studies, the problem with this strategy is that these exercises may get tedious for some individuals, leading them to abandon them.

Reference:

Sue, D., Ray, P., Talaei-Khoei, A., & Jonnagaddala, J. (2014, August). Assessing Video Games to Improve Driving Skills: A Literature Review and Observational Study. Retrieved from https://www.researchgate.net/publication/272080351_Assessing_Video_Games_to_Improve_Driving_Skills_A_Literature_Review_and_Observational_Study

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.

Synthesis:

Gaming consoles are an appealing simulation tool due to their ease of use, wide availability, and interactivity and is a promising way for anyone, particularly older ones, to improve their driving skills which aligned the objective of this research which is to investigate the feasibility and consequences of installing video game consoles in the homes of people who want to enhance their driving skills. There are numerous advantages to using video games to improve driving skills, according to our studies, the problem with this strategy is that these exercises may get tedious for some individuals, leading them to abandon them.

Reference:

Joly, R. (2016, December 19). “Video Games: Developing a New Narrative,” by Randy Joly. Retrieved from https://www.worldliteraturetoday.org/blog/words-thought/video-games-developing-new-narrative-randy-joly

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 (Connolly, 2007).

Synthesis:

Higher education institutions are concerned with preparing future professionals and have conducted research on the effectiveness of games and simulations for instructional reasons. Sawyer defines serious games as games made by the gaming industry having a significant relationship to knowledge acquisition 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 (Connolly, 2007).

Reference:

Vlachopoulos, D. (2017, July 10). The effect of games and simulations on higher education: a systematic literature review. Retrieved from https://educationaltechnologyjournal.springeropen.com/articles/10.1186/s41239-017-0062-1

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

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.

Synthesis:

Video gaming is a perfect pastime with over a billion gamers all over the world. That led the researchers to investigate the relationship between video gaming and psychological functioning in a quite well manner by utilizing a variety of variables like psychological symptoms, coping methods, and social support and has found out that Pathological video gaming has been linked to pleasant effect 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. 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.

Reference:

Heiden, J. V. M. (2019, July 16). The Association Between Video Gaming and Psychological Functioning. Retrieved from https://www.frontiersin.org/articles/10.3389/fpsyg.2019.01731/full

Foreign Studies

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

Abstract:

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.

Synthesis:

This 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.

Reference:

Schremm, A., Hed, A., Horne, M., & Roll, M. (2017). Training predictive L2 processing with a digital game: Prototype promotes acquisition of anticipatory use of tone-suffix associations. *Computers & Education*, *114*, 206–221. https://doi.org/10.1016/j.compedu.2017.07.006

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

Abstract:

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 preparation 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.

Synthesis:

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.

Reference:

Othman, Z., Zain, N. H. M., Ismail, I., Affandi, S., Noh, N. A. M., & Yasin, A. M. (2020). An educational game on the theories of driver education curriculum: An evaluation. *International Journal of Evaluation and Research in Education (IJERE)*, *9*(4), 1088. https://doi.org/10.11591/ijere.v9i4.20659

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

Abstract:

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 a fun-learning concept

Synthesis:

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.

Reference:

Salman, A. G., & Antonius, C. (2017). Interactive educational game, an android mobile app for children learning alphabets. *Library Hi Tech News*, *34*(5), 20–22. https://doi.org/10.1108/lhtn-04-2017-0021

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

Abstract:

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.

Synthesis:

This 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.

Reference:

Rudy, B., & Hasti, N. (2017). Educational Game Application Development on Classification of Diseases and Related Health Problems Treatment in Android Platform. *International Journal of Advanced Computer Science and Applications*, *8*(9). https://doi.org/10.14569/ijacsa.2017.080919

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

Abstract:

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.

Synthesis:

This 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.

Reference:

Novian, D., Dwinanto, A., & Mulyanto, A. (2019). The Application Of Cooperative Learning Methods In The Developing And Analyzing The Quality Of An Educational Game. *Journal of Physics: Conference Series*, *1387*, 012122. https://doi.org/10.1088/1742-6596/1387/1/012122

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

Abstract:

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.

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.

Reference:

Umboh, D., Tarusu, D., Marini, A., & Sumantri, M. S. (2021). Improvement of student mathematics learning outcomes through Kahoot learning games application at elementary school. *Journal of Physics: Conference Series*, *1869*(1), 012124. https://doi.org/10.1088/1742-6596/1869/1/012124

Computer gaming and driving education

Abstract:

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.

Synthesis:

This 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.

Reference:

Backlund, P., Engström, H., & Johannesson, M. (2006, January). *Computer gaming and driving education*. Retrieved from https://www.researchgate.net/publication/228987973_Computer_gaming_and_driving_education

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

Abstract:

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.

Synthesis:

This study 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.

Reference:

Backlund, P., Engström, H., Johannesson, M., & Lebram, M. (2008). Games for traffic education: An experimental study of a game-based driving simulator. *Simulation & Gaming*, *41*(2), 145–169. https://doi.org/10.1177/1046878107311455

CARLA: An Open Urban Driving Simulator

Abstract:

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.

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.

Reference:

Dosovitskiy, A., Ros, G., Codevilla, F., Lopez, A., & Koltun, V. (2017, November). *CARLA: An Open Urban Driving Simulator*. Retrieved from http://proceedings.mlr.press/v78/dosovitskiy17a.html

3D Racing Car Game

Abstract:

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 initial concept and

second iteration which varies and modified until a final concept was produced for the development.

Synthesis:

This 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 modified until a final concept was produced for the game application development.

Reference:

Runing, S. A., Hallman, M., Anderson, N., Andersson, S., Toft, F., & Nilsson, R. (2009, May). *3D Racing Car Game*. Chalmers. Retrieved from http://www.cse.chalmers.se/~uffe/bachelor/kandidatarbetestartpaket/3D%20Racing%20Car%20Game%20-%20Project%20Lloyd.pdf

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.

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.

This 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.

Reference:

eCompareMo. (2020, March 27). What is LTO's Theoretical Driving Course? Know Which Driving Schools Offer This Program. Retrieved from https://www.ecomparemo.com/info/lto-theoretical-driving-course

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.

Synthesis:

Overall, the Filipino Drivers Manual aims to increase awareness and compliance about the laws in 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.

Reference:

Land Transportation Office. (2018). Filipino Driver’s Manual 2018 (Vol. 2). Retrieved from https://lto.gov.ph/images/Transparency/Volume_2_v2.pdf

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 of the current generation.

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 article 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 educational mode of learning.

Reference:

University of the Philippines Open University. (2021, April 15). UPOU Features Gamification in Teaching in the Third OPEN Talk Episode. Retrieved from https://www.upou.edu.ph/news/upou-features-gamification-in-teaching-in-the-third-open-talk-episode/

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 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 on 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.

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.

This 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.

Reference:

Logarta, B. M. (2014, June 11). The gamification of education: Why playing is the future of learning. Retrieved from https://www.gmanetwork.com/news/scitech/technology/365281/the-gamification-of-education-why-playing-is-the-future-of-learning/story/

Classroom Gamification

This 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.

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 article 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.

Reference:

Voice Care Philippines. (n.d.). Classroom Gamification. Retrieved from https://www.voicecarephilippines.com/classroom-gamification.html

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 a 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" on their school's lessons he added.

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 article 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.

Reference:

Yee, J. (2016, May 15). Makati schools thank ‘gamified’ online lessons for higher test scores. Retrieved from https://newsinfo-inquirer-

net.cdn.ampproject.org/v/s/newsinfo.inquirer.net/785627/makati-schools-thank-gamified-online-lessons-for-higher-test-scores/amp?amp_js_v=a6&_gsa=1&usqp=mq331AQFUAKwASA%3D#amp_ct=1621432025757

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 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.

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 study 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.

Reference:

CIIT Philippines School. (2020, February 26). What is Gamification: Everything You Should Know to Get Started. Retrieved from https://www.ciit.edu.ph/what-is-gamification/

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.

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 article 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.

Reference:

Ilagan, A. (2019, April 2). LTO chief wants standardized training program for driving schools. Retrieved from https://www.topgear.com.ph/news/motoring-news/lto-standardized-driving-training-a00188-20180523?ref=article_tag

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, to 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.

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 it 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 study 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.

Reference:

Foster, G. (2019, May 25). Games for learning and social change. Retrieved from https://www.rappler.com/technology/features/games-for-learning-social-change-feature

Why You Should Take Driving Lessons and Top Driving School Philippines

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

1. 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.

2. 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.

3. 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.

4. 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.

5. Learn Car Maintenance

Driving schools also teach applicants not just about driving but also proper maintenance of the vehicle.

6. Prevent Damage to Your New Car

Although an applicant can use his/her vehicle, driving schools provide vehicles that are insured for applicants' training.

7. Get Help for Your Driver’s License Application

After passing and completing the course training, driving schools provide assistance for applying for a driver's license.

8. 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.

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.

This article 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.

Reference:

Zoleta, V. (2021, April 1). Why You Should Take Driving Lessons and Top Driving School Philippines. Retrieved from https://www.moneymax.ph/car-insurance/articles/driving-school-philippines

Local Studies

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

Abstract:

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.

Synthesis:

This is related to the study because the objective of the research is to educate the people about traffic laws and regulations and road safety by conducting the study.

Reference:

Quito, B., & Quebral, V. (2016, March). *Road Safety and Traffic Education (RoSTed): The Institutionalization, Certification, and Standardization of Road Safety and Traffic Education in the Philippines*. Retrieved from https://www.researchgate.net/profile/Benjamin-Quito/publication/297715282_Road_Safety_and_Traffic_Education_RoSTed_The_Institutionalization_Certification_and_Standardization_of_Road_Safety_and_Traffic_Education_in_the_Philippines/links/56e1349108ae9b93f79c46d1/Road-Safety-and-Traffic-Education-RoSTed-The-Institutionalization-Certification-and-Standardization-of-Road-Safety-and-Traffic-Education-in-the-Philippines.pdf

The State of Road Safety in the Philippines

Abstract:

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.

Synthesis:

This is related to the study because it is educational and it promotes awareness about road safety and its consequences if not observed.

Reference:

Sigua, R. (2000, December). *The State of Road Safety in the Philippines*. Retrieved from https://cids.up.edu.ph/wp-content/uploads/The-State-of-Road-Safety-in-the-Philippines-vol.4-no.2-July-Dec-2000-5.pdf

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

Abstract:

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.

Synthesis:

This is related to the study because the research discusses the road signs its functions and the road crashes themselves, this is also educating the people of the pros and cons of our actions on the road.

Reference:

R. Seva, R., T. Flores, G. M., T. Gotohio, M. P., & C. Paras, N. G. (2013). LOGIT MODEL OF MOTORCYCLE ACCIDENTS IN THE PHILIPPINES CONSIDERING PERSONAL AND ENVIRONMENTAL FACTORS. *International Journal for Traffic and Transport Engineering*, *3*(2), 173–184. https://doi.org/10.7708/ijtte.2013.3(2).06

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

Abstract:

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.

Synthesis:

This is related to the study because this research tackles road crashes, the time when crashes frequently happen, and the liability of everyone involved in the scene also it is promoting awareness for road safety and safe driving.

Reference:

Asor, J. R., Catedrilla, G. M. B., & Estrada, J. E. (2018). A study on the road accidents using data investigation and visualization in Los Baños, Laguna, Philippines. *2018 International Conference on Information and Communications Technology (ICOIACT)*. Published. https://doi.org/10.1109/icoiact.2018.8350662

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

Abstract:

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.

Synthesis:

This is related to the study because it is educational and it promotes awareness of road accidents and the most common factors of its occurrence.

Reference:

Tamayo, A. M. (2009). Occurrence of Traffic Accidents in the Philippines: An Application of Poisson Regression Analysis. *SSRN Electronic Journal*. Published. https://doi.org/10.2139/ssrn.1438478

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

Abstract:

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.

Synthesis:

This is related to the study because this research is educational and is promoting awareness of road safety, the factors of road crashes, the importance of road knowledge, and the application of road laws and regulations.

Reference:

Fernandez, J. J., Paringit, M. C., Salvador, J. R., Lucero, P. I., & Galupino, J. G. (2020). Understanding of traffic signs by drivers in the city of Manila, Philippines. *Transportation Research Procedia*, *48*, 3037–3048. https://doi.org/10.1016/j.trpro.2020.08.183

Larong Pinoy: An Android Game Application

Abstract:

“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.

Synthesis:

This study is related to the game because it has the same objectives which are to provide information and leisure to the users. It also used Unity 3D for game development and Adobe Photoshop for the design.

Reference:

Autriz, R. J., Casitas, M., Enriquez, G., & Nocon, K. N. (2016). Larong Pinoy: An Android Game Application. *International Journal of Computer Science and Information Technology Research*, *4*(2), 127–141. Retrieved from https://researchpublish.com//upload/book/Larong%20Pinoy-3123.pdf

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

Abstract:

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.

Synthesis:

This is related to the game because it has the same objectives which are to enhance cognitive skills by providing educational materials in the game and the study also used RAD Methodology.

Reference:

Tan, D. V., Reyes, E. L., Ricasio, J. C., Uy, J. V., & Pineda, V. (2013, March). *CREATING A COMMUNITY BASED DISASTER RISK MANAGEMENT SYSTEM THAT HIGHLIGHTS RESPONSE METHODS AND RESOURCE ALLOCATION*. De La Salle University Manila. Retrieved from https://www.dlsu.edu.ph/wp-content/uploads/pdf/conferences/research-congress-proceedings/2013/SEE/SEE-I-001.pdf

HiStorya: A Mobile Game for Araling Panlipunan

Abstract:

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.

Synthesis:

This is related to the study because the objective of this research is to develop an android application game that promotes awareness of a certain subject also to build an interactive phase of learning with the users which will enhance their cognitive and locomotor skills by playing the game.

Reference:

Nisperos, S. F., Miguel, Z. G. P., & Salvador, R. (2014). HiStorya: A Mobile Game for Araling Panlipunan. *International Journal on Open and Distance E-Learning*, *1*(2). https://doi.org/10.13140/RG.2.1.2759.4000

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

Abstract:

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 for 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.

Synthesis:

This is related to the study because the objective of this research is to develop an android application game that promotes awareness of a certain subject also to build an interactive phase of learning with the users which will enhance their cognitive and locomotor skills by playing the game.

Reference:

Zubair, M., Sana, I., Nasir, K., Iqbal, H., Masud, F., & Ismail, S. (2016). Quizzes: Quiz Application Development Using Android-Based MIT APP Inventor Platform. *International Journal of Advanced Computer Science and Applications*, *7*(5). https://doi.org/10.14569/ijacsa.2016.070508

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, 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).

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 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).

REFERENCE: LIST

About Cavite Province. (n.d.). Retrieved from Wayback Machine: https://web.archive.org/web/20070311051458/http://www.cavite.info/cavite.php?id=13#5

Amin, K., Griffiths, M. D., & Dsouza, D. D. (2020, July 10). *Online Gaming During the COVID-19 Pandemic in India: Strategies for Work-Life Balance*. Retrieved from International Journal of Mental Health and Addiction: https://link.springer.com/article/10.1007/s11469-020-00358-1?error=cookies_not_supported&code=c6f4a9b8-35b5-4f34-b176-24487fafc8c5

Asghar, M., Sana, I., Nasir, K., & Iqbal, H. (2016). Quizzes: Quiz Application Development Using Android-Based MIT APP Inventor Platform. *International Journal of Advanced Computer Science and Applications, 7*(5). doi:10.14569/ijacsa.2016.070508

Asor, J. R., Catedrilla, G. B., & Estrada, J. E. (2018). A study on the road accidents using data investigation and visualization in Los Baños, Laguna, Philippines. *2018 International Conference on Information and Communications Technology (ICOIACT)*. doi:10.1109/icoiact.2018.8350662

Autriz, R. A., Casitas, M. P., Enriquez, G. T., & Nocon, K. A. (2016). Larong Pinoy: An Android Game Application. *International Journal of Computer Science and Information Technology Research*, 127-141. Retrieved from https://researchpublish.com//upload/book/Larong%20Pinoy-3123.pdf

Backlund, P., Engström, H., & Johannesson, M. (2006). *Computer gaming and driving education.* Retrieved from https://www.researchgate.net/publication/228987973_Computer_gaming_and_driving_education

Backlund, P., Engström, H., Johannesson, M., & Lebram, M. (2008). Games for traffic education: An experimental study of a game-based driving simulator. *Simulation & Gaming, 41*(2), 145-169. doi:10.1177/1046878107311455

Bacoor Traffic Management Department. (2017, June 27). *Bacoor Traffic Management Department | Bacoor Government Center*. Retrieved from Bacoor Government Center: https://bacoor.gov.ph/bacoor-traffic-management-department/

Caguete, M. V., Sabela, B. C., Menis, L. P., & Garcia, A. L. (2018). *Filipino Driver's Manual 2018* (Vol. 1). Land Transportation Office. Retrieved from https://lto.gov.ph/images/Transparency/Volume_1.pdf

Center for Health Development Calabarzon. (2019, September 4). *CALABARZON RECORDS HIGHEST TRANSPORT VEHICULAR CRASH*. Retrieved from Center for Health Development Calabarzon: https://ro4a.doh.gov.ph/media-releases/140-featured-article/629-calabarzon-records-highest-transport-vehicular-crash

Chang, K.-H. (2015). Motion Analysis. *e-Design*, 391-462. doi:https://doi.org/10.1016/B978-0-12-382038-9.00008-9

CIIT Philippines School. (2020, February 26). *What is Gamification: Everything You Should Know to Get Started*. Retrieved from CIIT Philippines School: https://www.ciit.edu.ph/what-is-gamification/

Deshpande, A. (2018, August 24). *What is Rapid Application Development? Why & When Should You Use It?* Retrieved from https://www.clariontech.com/blog/what-is-rapid-application-development-why-when-should-you-use-it

Dosovitskiy, A., Ros, G., Codevilla, F., Lopez, A., & Koltun, V. (2017). *CARLA: An Open Urban Driving Simulator.* Retrieved from http://proceedings.mlr.press/v78/dosovitskiy17a.html

eCompareMo. (2020, March 27). *What is LTO's Theoretical Driving Course? Know Which Driving Schools Offer This Program*. Retrieved from eCompareMo: https://www.ecomparemo.com/info/lto-theoretical-driving-course

eFOI - Electronic Freedom of Information - Request. (2021, February 17). Retrieved from Electronic Freedom of Information: https://www.foi.gov.ph/requests/aglzfmVmb2ktcGhyHQsSB0NvbnRlbnQiEExUTy05NTE3NDkwNzcxNzAM

Epstein, A. (2020, September 16). *Everyone is playing video games during the pandemic*. Retrieved from Quartz: https://qz.com/1904276/everyone-is-playing-video-games-during-the-pandemic/

Fernandez, J., Paringit, M., Salvador, J., Lucero, P., & Galupino, J. G. (2020). Understanding of traffic signs by drivers in the city of Manila, Philippines. *Transportation Research Procedia*, 3037-3048. doi:10.1016/j.trpro.2020.08.183

Foster, G. (2019, May 25). *Games for learning and social change*. Retrieved from Rappler: https://www.rappler.com/technology/features/games-for-learning-social-change-feature

Hed, A., Schremm, A., Horne, M., & Roll, M. (2017). Training predictive L2 processing with a digital game: Prototype promotes acquisition of anticipatory use of tone-suffix associations. *Computers & Education, 114*, 206-221. doi:10.1016/j.compedu.2017.07.006

How online gaming has become a social lifeline. (2020, December 16). Retrieved from BBC Worklife: https://www.bbc.com/worklife/article/20201215-how-online-gaming-has-become-a-social-lifeline#:%7E:text=Gaming%20has%20skyrocketed%20during%20the%20pandemic%2C%20reaching%20people%20who'd,an%20American%20business%2Dresearch%20firm

Ilagan, A. (2019, April 2). *LTO chief wants standardized training program for driving schools*. Retrieved from Top Gear Philippines: https://www.topgear.com.ph/news/motoring-news/lto-standardized-driving-training-a00188-20180523?ref=article_tag

Joly, R. (2016, December 19). *Video Games: Developing a New Narrative*. Retrieved from World Literature Today: https://www.worldliteraturetoday.org/blog/words-thought/video-games-developing-new-narrative-randy-joly

Kirriemuir, J., & Mcfarlane, A. (2004, July). *Literature Review in Games and Learning*. Retrieved from https://www.researchgate.net/profile/John-Kirriemuir/publication/32231341_Literature_Review_in_Games_and_Learning/links/566fce2108aecdcd23573c69/Literature-Review-in-Games-and-Learning.pdf

Land Transportation Office. (2018). *Filipino Driver's Manual 2018 (Vol. 2)*. Retrieved from Land Transportation Office.

Land Transportation Office. (2020, July 13). *MEMORANDUM CIRCULAR NO.2020-2134: GUIDELINES RELATIVE TO THE FULL IMPLEMENTATION OF THE LTO AUTOMATED CERTIFICATION AND EDUCATION OF STUDENT-DRIVERS (ACES) - UPLOADING FACILITY*. Retrieved from Land Transportation Office: https://lto.gov.ph/latest-issuance/522-memorandum-circular-no-2020-2134-guidelines-relative-to-the-full-implementation-of-the-lto

Logarta, M. (2014, June 11). *The gamification of education: Why playing is the future of learning*. Retrieved from GMA News Online: https://www.gmanetwork.com/news/scitech/technology/365281/the-gamification-of-education-why-playing-is-the-future-of-learning/story/

Microsoft. (2016, April 14). *Why Visual Studio Code?* Retrieved from Visual Studio Code: https://code.visualstudio.com/docs/editor/whyvscode

Microsoft. (2021, January 28). *A tour of the C# language*. Retrieved from Microsoft: https://docs.microsoft.com/en-us/dotnet/csharp/tour-of-csharp/

Ming, L. C. (2020, September 16). *Mobile Health Apps on COVID-19 Launched in the Early Days of the Pandemic: Content Analysis and Review*. Retrieved from JMIR mHealth and uHealth: https://mhealth.jmir.org/2020/9/e19796/

Mobile games thrive, even as Covid-19 pandemic keeps players home. (2020, October 13). Retrieved from The Straits Times: https://www.straitstimes.com/tech/tech-news/mobile-games-thrive-even-as-pandemic-keeps-players-home

Nisperos, S., Miguel, Z., & Salvador, R. (2014). HiStorya: A Mobile Game for Araling Panlipunan. *International Journal on Open and Distance e-Learning*. doi:10.13140/RG.2.1.2759.4000

Noh, N., Yasin, A., Ismail, I., Othman, Z., Zain, N., & Affandi, S. (2020). An educational game on the theories of driver education curriculum: An evaluation. *International Journal of Evaluation and Research in Education (IJERE), 9*(4), 1088. doi:10.11591/ijere.v9i4.20659

Novian, D., Dwinanto, A., & Mulyanto, A. (2019). The Application Of Cooperative Learning Methods In The Developing And Analyzing The Quality Of An Educational Game. *Journal of Physics: Conference Series, 1387*, 012122. doi:10.1088/1742-6596/1387/1/012122

PhilAtlas. (n.d.). *Bacoor City, Cavite Profile – PhilAtlas*. Retrieved from PhilAtlas: https://www.philatlas.com/luzon/r04a/cavite/bacoor.html#sectionBrgys

Philippine Statistics Authority. (2016, June 2). *Population of Region IV-A - CALABARZON (Based on the 2015 Census of Population)*. Retrieved from Philippine Statistics Authority: https://psa.gov.ph/population-and-housing/title/Population%20of%20Region%20IV-A%20-%20CALABARZON%20%28Based%20on%20the%202015%20Census%20of%20Population%29

Pino, G. (2019, August 29). *DOH Calabarzon kicks off 'road safety' training for LGUs*. Retrieved from Philippine News Agency: https://www.pna.gov.ph/articles/1079065

Quito, B., & Quebral, V. (2016). *Road Safety and Traffic Education (RoSTed): The Institutionalization, Certification, and Standardization of Road Safety and Traffic Education in the Philippines.* Retrieved from https://www.researchgate.net/profile/Benjamin-Quito/publication/297715282_Road_Safety_and_Traffic_Education_RoSTed_The_Institutionalization_Certification_and_Standardization_of_Road_Safety_and_Traffic_Education_in_the_Philippines/links/56e1349108ae9b93f79

Republic Act No. 4136 | GOVPH. (1964, June 20). Retrieved from The Official Gazette: https://www.officialgazette.gov.ph/1964/06/20/republic-act-no-4136/

Rungta, K. (2021, April 13). *What is RAD Model? Phases, Advantages and Disadvantages*. Retrieved from guru99: https://www.guru99.com/what-is-rad-rapid-software-development-model-advantages-disadvantages.html

Runing, S., Hallman, M., Anderson, N., Andersson, S., Toft, F., & Nilsson, R. (2009). *3D Racing Car Game.* Chalmers. Retrieved from http://www.cse.chalmers.se/~uffe/bachelor/kandidatarbetestartpaket/3D%20Racing%20Car%20Game%20-%20Project%20Lloyd.pdf

Safe driving essays. (n.d.). Retrieved from MegaEssays: https://www.megaessays.com/viewpaper/5255.html

Salman, A., & Antoniu, C. (2017). Interactive educational game, an android mobile app for children learning alphabets. *Library Hi Tech News, 34*(5), 20-22. doi:10.1108/lhtn-04-2017-0021

Seva, R. R., Flores, G. T., Gotohio, M. T., & Paras, N. C. (2013). LOGIT MODEL OF MOTORCYCLE ACCIDENTS IN THE PHILIPPINES CONSIDERING PERSONAL AND ENVIRONMENTAL FACTORS. *International Journal for Traffic and Transport Engineering*, 173-184. doi:10.7708/ijtte.2013.3(2).06

Sigua, R. G. (2000). *The State of Road Safety in the Philippines.* Retrieved from https://cids.up.edu.ph/wp-content/uploads/The-State-of-Road-Safety-in-the-Philippines-vol.4-no.2-July-Dec-2000-5.pdf

Sinicki, A. (2021, March 23). *What is Unity? Everything you need to know*. Retrieved from Android Authority: https://www.androidauthority.com/what-is-unity-1131558/

Sue, D., Ray, P., Talaei-Khoei, A., & Jonnagaddala, J. (2014, August). *Assessing Video Games to Improve Driving Skills: A Literature Review and Observational Study*. Retrieved from https://www.researchgate.net/publication/272080351_Assessing_Video_Games_to_Improve_Driving_Skills_A_Literature_Review_and_Observational_Study

Sunindya, B. R., & Purwani, N. H. (2017). Educational Game Application Development on Classification of Diseases and Related Health Problems Treatment in Android Platform. *International Journal of Advanced Computer Science and Applications, 8*(9). doi:10.14569/ijacsa.2017.080919

Tamayo, A. M. (2009). Occurrence of Traffic Accidents in the Philippines: An Application of Poisson Regression Analysis. *SSRN Electronic Journal*. doi:10.2139/ssrn.1438478

Tan, D. T., Reyes, E. P., Ricasio, J. P., Uy, J. Y., & Pineda, V. G. (2013). *CREATING A COMMUNITY BASED DISASTER RISK MANAGEMENT SYSTEM THAT HIGHLIGHTS RESPONSE METHODS AND RESOURCE ALLOCATION.* De La Salle University Manila. Retrieved from https://www.dlsu.edu.ph/wp-content/uploads/pdf/conferences/research-congress-proceedings/2013/SEE/SEE-I-001.pdf

Techopedia. (2017, February 1). *Adobe Photoshop*. Retrieved from Techopedia: https://www.techopedia.com/definition/32364/adobe-photoshop

Techopedia. (2018, September 5). *Android OS*. Retrieved from Techopedia: https://www.techopedia.com/definition/14873/android-os

The Economic Times. (n.d.). *What is Rapid Application Development? Definition of Rapid Application Development, Rapid Application Development Meaning*.

Retrieved from The Economic Times: https://economictimes.indiatimes.com/definition/rapid-application-development

Umboh, D., Tarusu, D., Marini, A., & Sumantri, M. (2021). Improvement of student mathematics learning outcomes through Kahoot learning games application at elementary school. *Journal of Physics: Conference Series, 1869*(1), 012124. doi:10.1088/1742-6596/1869/1/012124

University of the Philippines Open University. (2021, April 15). *UPOU Features Gamification in Teaching in the Third OPEN Talk Episode*. Retrieved from University of the Philippines Open University: https://www.upou.edu.ph/news/upou-features-gamification-in-teaching-in-the-third-open-talk-episode/

Vaishnavi, M. (2019, November 27). *Android SDK Tutorial For Beginners*. Retrieved from Edureka: https://www.edureka.co/blog/android-sdk-tutorial/

Vlachopoulos, D. (2017, July 10). *The effect of games and simulations on higher education: a systematic literature review*. Retrieved from International Journal of Educational Technology in Higher Education: https://educationaltechnologyjournal.springeropen.com/articles/10.1186/s41239-017-0062-1

von der Heiden, J. M., Braun, B., Müller, K. W., & Egloff, B. (2019, July 16). *The Association Between Video Gaming and Psychological Functioning*. Retrieved from Frontiers: https://www.frontiersin.org/articles/10.3389/fpsyg.2019.01731/full

World Health Organization. (2018, December 17). *10 Facts about road safety*. Retrieved from World Health Organization: https://www.who.int/news-room/facts-in-pictures/detail/road-safety

Yee, J. (2016, May 15). *Makati schools thank 'gamified' online lessons for higher test scores*. Retrieved from Inquirer News: https://newsinfo-inquirer-

net.cdn.ampproject.org/v/s/newsinfo.inquirer.net/785627/makati-schools-thank-gamified-online-lessons-for-higher-test-scores/amp?amp_js_v=a6&amp_gsa=1&usqp=mq331AQFUAKwASA%3D#amp_ct=1621432025757

Zoleta, V. (2021, April 1). *Why You Should Take Driving Lessons and Top Driving School Philippines*. Retrieved from Moneymax: https://www.moneymax.ph/car-insurance/articles/driving-school-philippines