

**Detective Py: Mobile-based 2D Educational Escape Room
focused on Python Programming**

A Thesis

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ABSTRACT

This study introduces Detective Py, an educational mobile game blending entertainment with education to impart Python programming skills in an engaging and motivating manner. The objectives of this study are to gauge the current level of skill of IT and CpE students in python programming, to design and develop an escape room concept game that will incorporate python programming fundamentals, and to conduct an assessment to test the effectiveness of the game to the students. Waterfall model was the methodology that was employed by the researchers in the development process of the system. Unity Game Engine and C# programming language were the tools that was used to develop the logic and functionality of the system. The study utilized a purposive sampling technique, the research strategically selected participants primarily Information Technology and Computer Engineering students from Don Honorio Ventura State University, ensuring a targeted focus on students who took Python programming. A pre-test assessment was utilized to conduct an evaluation on the students' current knowledge of python programming, followed by a post-test assessment to measure the effectiveness of Detective Py in teaching the fundamentals of Python Programming. The results showed that there is an increase of 2.23 in the mean score of the students, a 12.14% increase in the mean score. The gamified learning strategy, as evidenced by the pre-test and post-test results, effectively addressed knowledge gaps and facilitated a comprehensive understanding of the students in Python programming.

Keywords: *Python Programming, Gamified Learning, Escape Room Concept*

CHAPTER I

Introduction

Video gameplay may provide learning, health, social benefits, review finds in American Psychologist, playing video games, including shooter games, may boost children's learning, health and social skills. Playing games is intellectually lazy, it has been shown to improve a variety of cognitive abilities, including memory, vision, reasoning, and spatial navigation. In particular, this holds true for shooter video games. According to the writers, playing video games can improve in the development of the kids' problem-solving abilities (Lisa Bowen, 2014).

As cited by the researchers in the study entitled "A systematic literature review on serious games evaluation: An application to software project management" who reported that 60% of these 53 studies examined the effectiveness of using educational games in higher education setting, compared to only 40% in primary or secondary school settings, higher education professors are more likely to include educational games with conventional teaching methods into their students' learning experiences, perhaps, embracing the new approach to enhancing their students' learning. (Calderón and Ruiz, 2015).

According to a study of Hanson et al., (2010), the researchers found that college students spend approximately 20 hours on their mobile phones per week, for example, when they are travelling and waiting. The high percentage of mobile phone users will open an opportunity to learn outside of the classroom if educational games are also available on mobile phones, instead of just on computers as individuals may use the educational game applications. One of the criteria in the

current study was the educational games that are available on mobile devices. The researchers will use this method to let the users learn a lot.

In a groundbreaking fusion of education and entertainment, researchers have recognized the compelling potential of integrating educational content into the dynamic realm of gaming platforms. Within this innovative landscape, the "Detective Py: Mobile-based 2D Educational Escape Room focused on Python Programming" emerges as a pioneering initiative. This captivating venture is meticulously crafted to immerse users in an interactive and intellectually stimulating experience, placing a spotlight on the fundamentals of Python programming.

The essence of Detective Py lies in its commitment to not just disseminate information but to actively engage users, encouraging them to delve into the intricate world of Python programming. Tailored for those with a genuine interest in honing their programming skills, the game is designed to serve as both a knowledge repository and a challenging arena for enthusiasts. By seamlessly blending education with entertainment, Detective Py aims to provide a unique avenue for users to not only acquire a foundational understanding of Python but to also test and fortify their knowledge through an engaging escape room format.

Embarking on this educational journey within the confines of Detective Py is more than just a game; it's a dynamic exploration that promises to demystify the complexities of Python programming. Through captivating challenges and interactive scenarios, users are not only educated but also empowered to navigate the intricacies of this programming language with confidence. As players progress

through the immersive escape room experience, they will find themselves organically absorbing the core principles of Python, making learning a seamless and enjoyable adventure.

In essence, Detective Py emerges as a trailblazer in the realm of educational gaming, where the fusion of play and learning becomes a potent catalyst for knowledge acquisition. For those eager to embark on a transformative journey into the world of Python programming, this mobile-based 2D escape room promises an unparalleled experience that goes beyond traditional educational methods. Get ready to unlock the doors to Python proficiency in an exhilarating and intellectually enriching gaming environment.

PROJECT CONTEXT

Detective Py is an educational mobile game designed to teach the basic concepts of Python Programming in a fun, interactive, and mysterious way. In this game, players take on the role of a detective, unlocking and solving mysteries by uncovering clues, analyzing maps, and solving puzzles.

Detective Py offers a progression system that tests players' skills while providing valuable information and knowledge about the Python programming language. It also includes hints to assist players who may face difficulty in solving mysteries. To create this unique application, developers focused on game design and storyline development.

This application covers certain lessons from the Python Course Syllabus at Don Honorio Ventura State University, ensuring a comprehensive understanding of the subject matter. Going beyond the core curriculum, Detective Py incorporates

intriguing trivia sourced from w3schools, enriching the learning experience with supplementary information about the Python programming language. This proactive approach not only deepens the lessons but also offers students a broader perspective on the practical applications of Python programming. The purpose of undertaking this project was to create an interactive and engaging learning experience for students, allowing them to explore the foundational concepts of Python in an enjoyable manner. This mobile educational game is designed to offer players more than just entertainment; it provides a platform for them to immerse themselves in the fundamental principles of the Python programming language. Participants can have fun while simultaneously acquiring a robust understanding of the core concepts that form the basis of Python programming. The aim is to make the learning process dynamic and enjoyable, fostering a deeper and more practical comprehension of Python fundamentals.

Users - Upon entering the game, users or players initiate their journey, assuming the role of the main character named Detective PY. Throughout their experience, they must accomplish specific tasks and gain knowledge of the basics of the Python programming language.

Developer - The developer possesses special access rights to specific features and controls embedded in the game. Through their account, they can avail themselves of an unrestricted abundance of resources, facilitating comprehensive testing and experimentation with the game mechanics. This empowers developers to enhance the game's content, address any emerging bugs or glitches, and optimize the overall performance. Consistent updates will be introduced to guarantee that

players enjoy the most favorable gaming experience while acquiring proficiency in Python fundamentals. Moreover, the developer privileges ensure that the game stays current, polished, and optimized, providing a top-notch learning experience for all players.

PURPOSE AND DESCRIPTION

The objective of this project was to create an interactive and engaging learning experience for students, allowing them to explore Python's foundational concepts in an enjoyable manner. This educational mobile game aims to offer players more than just entertainment; it provides a platform for them to immerse themselves in the fundamental principles of the Python programming language. Participants can have fun while simultaneously acquiring a strong understanding of Python's core concepts, fostering a dynamic and enjoyable learning process that leads to a deeper and more practical comprehension of Python fundamentals.

Users: Upon entering the game, users or players embark on their journey by assuming the role of the main character, Detective PY. Throughout their experience, they must accomplish specific tasks and acquire knowledge of the basics of the Python programming language.

Developers: The developer possesses special access rights to specific features and controls embedded in the game. Through their account, they have access to an abundance of resources, enabling comprehensive testing and experimentation with the game mechanics. This empowers developers to enhance the game's content, address any emerging bugs or glitches, and optimize overall performance. Consistent updates will be introduced to ensure that players enjoy the

best gaming experience while gaining proficiency in Python fundamentals. Moreover, the developer privileges ensure that the game remains current, polished, and optimized, providing a top-notch learning experience for all players.

STATEMENT OF THE PROBLEM

1. How to determine the current knowledge of the students in Python programming language?
2. How to develop a mobile game that incorporates escape room concept in learning basic python programming?
3. How effective is the game that incorporates entertainment and education concepts in terms of user engagement?

OBJECTIVES OF THE STUDY

The primary aim of this study is to impart fundamental knowledge of the Python programming language using an educational mobile game and to evaluate the effectiveness of an alternative learning approach.

1. To conduct pre-test examination to the participants who are aligned with Python programming language to identify their current knowledge.
2. To design and develop an educational mobile game that incorporate escape room concepts.
3. To conduct post-test examination to measure their acquired knowledge and evaluate user engagement after playing the educational mobile game.

SCOPE AND LIMITATION

The scope of this study was primarily focused on participants who took Python programming as their programming language in their “Introduction to Programming” course, particularly those pursuing computer-related studies. The primary goal was to create an immersive and interactive learning environment centered on the foundational aspects of the Python programming language. This approach aligned with key concepts outlined in the curriculum of Don Honorio Ventura State University, covering essential topics such as data types and conditional statements, ensuring a comprehensive understanding of Python programming's core concepts and skills.

The learning experience, curated by the developer, aimed to transcend traditional teaching methods by incorporating dynamic and engaging elements. Utilizing modern pedagogical techniques, the study aimed to provide participants not only with theoretical knowledge but also with practical, experiential insights into Python's fundamentals. By integrating the instructional content with the university's syllabus, the researchers aimed for seamless alignment between the study's objectives and the academic requirements of the participants.

Participants were actively involved in a before and after gaming session, a distinctive element that followed both pre-test and post-test examinations. This distinct approach allowed researchers to measure participants' comprehension levels before and after the interactive learning experience. Data collected from these assessments formed the basis for comprehensive analysis, enabling the evaluation of the study's effectiveness in enhancing participants' understanding and

proficiency in Python programming.

The analysis of gathered data played a crucial role in assessing the study's impact. By comparing participants' performance before and after engaging with the interactive learning and gaming components, researchers aimed to identify noticeable improvements in knowledge retention, problem-solving skills, and overall competency in Python programming. Additionally, user engagement was assessed to gauge the response to the developed application.

The primary participants of this study will be limited on Information Technology, and Computer Engineering students of Don Honorio Ventura State University. Focusing on students who took Python programming as their language in their Introduction to Programming course.

The system will only be limited to android devices, and will not be available to other operating system such as IOS devices. It will only be available in mobile phones and will not run in computer devices.

The language that will be used in the system will be only in English as the English language is a language that is primarily used internationally.

The programming language that will be taught in the game system will be restricted only in Python programming language. The game will focus on Python programming for the reason that it is beginner friendly and is easy to understand for students.

The genre of the game will be an escape room concept, and will incorporate gameplay mechanics that are present in an escape room concept genre.

CHAPTER II

Related Literature and Studies

This chapter contributes additional context and a deeper understanding of the various topics, terms, and concepts necessary for completing the thesis. Additionally, it encompasses the study's conceptual model, which summarizes the input, process, and output aspects, as well as delineates the diverse requirements and comparable applications used by the researchers to assess the system's functionality.

Popularity of video games and its relevance among students

Studies by Olson, Kutner, and Warner (2008) have highlighted the role of video games in fostering social connections among students. Video games provide a platform that enables students to interact, collaborate, and establish bonds with their peers. Multiplayer games, in particular, serve as avenues for teamwork, communication, and building camaraderie among students. These collaborative aspects of gaming contribute to the enhancement of social relationships and the cultivation of a sense of belonging within peer groups. Through joint participation in gaming experiences, students often form connections and shared experiences that strengthen their social connections (Olson, Kutner, & Warner, 2008).

According to the Entertainment Software Association (2020), the growing accessibility of gaming platforms due to technological advancements has significantly contributed to the popularity of video games among students. Advancements in technology have made gaming more accessible across various devices, including gaming consoles, personal computers, mobile phones, and

online platforms. This increased accessibility allows students to engage in gaming activities conveniently, irrespective of their location or device availability. The ease of access to diverse gaming platforms and options encourages continuous interest and active participation among students, contributing to the widespread popularity of video games (Entertainment Software Association, 2020).

Daniel Riha (2010) stated in Video Game Cultures and the Future of Interactive Entertainment that majority of young people in the world now regularly play video games. As a result, serious games, ranging from basic instructional Flash-based online games to extremely sophisticated 3-D social effect simulations, in the form of training simulations, they might provide more than just sporadic educational support, turning into a powerful and alluring tool for imparting general literacy via a different distribution channel. This evaluation examines the implications of video game culture on the development of interactive media, with particular interest in the cultural constructions surrounding it. The researcher's examination of the effects of the ever-evolving gaming industry on contemporary social, cultural, and economic trends is likely to be of interest to a wide range of readers. By exploring the links between technology, cinema, literature, and scholarship, the book provides readers with a holistic understanding of the diverse cultural forces that shape the industry. The suggestions for how gaming can continue to evolve and provide a rich cultural experience for customers are also likely to be of great value to game developers and enthusiasts alike.

Research findings align with the concept of a growing number of video game players worldwide and an upward trend in the release of video games over

time. In terms of quantity, the proponents observed a consistent linear growth in the average number of players per hour across the months, indicating a global pattern (Mendes, et al.,2022).

Video games provide dynamic and engaging environments that facilitate the development of crucial skills among players. (Gee, 2003) highlighted that these games immerse players in scenarios that encourage problem-solving, critical thinking, and strategic planning. Through various challenges and obstacles presented in the game, players are compelled to analyze situations, strategize, and make decisions, thereby honing their cognitive abilities. The interactive nature of video games often requires rapid adaptation to changing circumstances, fostering cognitive flexibility and the capacity for quick decision-making (Granic, Lobel, & Engels, 2014).

Moreover, the skills acquired through playing video games often have real-world applications. The problem-solving, critical thinking, and strategic planning abilities developed in games can transfer to academic settings and professional environments. Studies suggest that individuals who regularly engage with certain types of video games demonstrate improved problem-solving skills and cognitive flexibility, which can positively impact their academic performance and future careers (Granic, Lobel, & Engels, 2014). Thus, video games serve not only as entertainment but also as valuable tools for skill development with practical implications beyond the gaming realm.

Python Programming Topics That Pose a Challenge for Students

This literature review delves into the difficulties that students face when learning Python programming, with a particular emphasis on topics that prove to be formidable obstacles. This literature tends to identify and clarify the complexities surrounding these difficult Python programming topics through a thorough analysis of existing research. This review sets the stage for a deeper understanding of the difficulties encountered by students, providing a foundation for future investigations and potential academic improvements in Python programming education. (Szydłowska, Miernik, Ignasiak and Swacha, 2022) stated that every aspect of programming presents the same level of difficulty for students. This literature emphasizes specific topics like fundamentals of Python that will stand out as notably challenging, determined through a thorough examination of a large dataset.

Fundamental concepts like variable scope and understanding the execution flow can pose challenges for students (Saeed & Khan, 2016). Issues related to local vs. global scope, variable lifetimes, and the order of code execution might be difficult to grasp. Students may struggle to comprehend when and where variables are accessible within their code, leading to errors and confusion.

Basic control structures such as loops (for, while), conditionals (if, else), and logical operations can be challenging for beginners (Ahmed & McGetrick, 2014). Understanding the correct usage of conditional statements, logical operators (AND, OR, NOT), and loop constructs to control program flow might require additional clarification and practice for students.

The concept of data types and handling type conversion in Python might be challenging for students transitioning from other programming languages (Baker & Trumble, 2018). Understanding Python's dynamic typing, built-in data types (int, float, str, list, tuple, dict), and converting between different data types may present difficulties, especially in managing unexpected type-related errors.

Basic concepts related to defining functions, handling parameters, and return values can be challenging for students (Mannila & Nylén, 2015). Students might face difficulties in defining functions correctly, understanding parameter passing mechanisms (pass by value/reference), and utilizing return statements effectively.

Impact of gaming on students' learning outcome

A lot of developers have been using gaming as a platform to make informational and educational contents because it is widely used by students. It has been proven that gaming has a lot of impacts to the skills and knowledge of the user. (Agoritsa Makri, 2017) explained how simulations benefit educators and students evenly. Positive outcomes exist when instructors set achievable learning goals, interact with students promoting knowledge, support, facilitate, and motivate them to construct new game-based knowledge. This study aims to evaluate the impact of digital games and simulations as teaching tools in higher education. The researchers utilized qualitative methodology to assess their influence on students' cognitive, behavioral, and emotional learning experiences. The study found that games and simulations can have a positive impact on learning outcomes. Based on these findings, the authors propose evidence-based opportunities and strategies for

educators and practitioners to incorporate games and simulations into their teaching practices, preparing students for their future careers. Additionally, the study provides direction for further research, with the goal of determining the effectiveness of educational techniques. Overall, this study highlights the potential of digital games and simulations as effective teaching tools in higher education.

(Bowen, 2014) stated that playing video games, particularly shooter games, has been found to improve children's cognitive and problem-solving skills. Additionally, playing video games including violent ones can yield positive benefits such as improved moods, relaxation, and an increased ability to build emotional resilience. Furthermore, multiple studies have suggested that multiplayer video games help players to form virtual social communities in which they can learn to make quick decisions about whom to trust and how to lead a group.

Computer Science also benefits from the use of games to provide students a more enjoyable way to learn the fundamentals of programming (Wong, and Mohamad Yatim, 2014). Learning programming by playing games is a fun way to encourage people to improve their programming skills. Programming games broadly separate themselves into two areas: single-player games where the programming elements either make up part or the whole of a puzzle game, and multiplayer games where the player's automated program is pitted against other players' programs ("Programming Game", 2019).

Gamification has gained popularity in the field of education in recent years. Its benefits encompass a wide range of advantages, with one of them being the provision of a multi-sensory, active, and experimental learning environment for

students. By engaging in educational games, learners can actively participate in experiential learning, thereby enhancing their decision-making and problem-solving abilities within a dynamic learning setting (Adachi and Willoughby, 2013).

Another advantage of gamification is the immediate feedback and results that students receive, as opposed to the delayed feedback provided by traditional assessment methods like tests and examinations. This prompt feedback allows students to obtain answers quickly, aiding in their learning process. Furthermore, certain educational gamification approaches can help overcome limitations related to time and place. With the availability of portable devices, students can study and learn anytime and anywhere, thus reducing the constraints imposed by physical boundaries. These user-friendly tools also contribute to simplifying the understanding and memorization of complex subjects (Hanus and Fox, 2015).

According to the information presented in the paper of Cutting and Stephen (2021), it can be inferred that Python is an excellent choice for beginners as their first programming language, enabling them to model real-world entities using object-oriented principles. Python possesses several desirable attributes, including its power, portability, ease of learning, open-source nature, and availability as a free download. Additionally, its support for multiple programming paradigms attracts programmers with diverse styles and techniques to collaborate on a shared platform. The paper also highlights various recent applications, further underscoring the growing demand for Python across different domains of work.

Python as a language for beginners

The researchers decided to use Python as the programming language that will be taught in the system. It is a language that has a beginner-friendly syntax and easy to understand. (Bogdanchikov, M Zhabarou, and R Suliyev, 2013) conducted a study titled "Python as a Tool for Learning Programming", where they explored the advantages of using Python in programming education. Python was chosen for its well-organized syntax and powerful capabilities in solving various tasks. The language is known for its simplicity and user-friendly nature, making it ideal for beginners in programming. The researchers compared similar code implementations in Python, Java, and C++, and analyzed their effectiveness. Python's readability and comprehensibility proved to be beneficial for programmers, who tend to grasp programming concepts better when working with Python. Additionally, the report presents the results of a comparison between midterm marks of courses taught in Java and Python, revealing a notable 16% increase in performance for the Python-taught course.

Digital Escape Rooms as Innovative Pedagogical Tools in Education

Based on the research by (Makri et al., 2021) that the integration of Digital Educational Escape Rooms (DEERs) into virtual learning environments offers several advantages. These DEERs enhance online learning by providing interactive and captivating experiences similar to escape room games. They bring cost-saving benefits and flexibility to the learning process. Fully digital DEERs are designed to be affordable, easily accessible, and user-friendly, utilizing a mix of readily

available web-based tools to recreate interactive elements such as puzzle-solving challenges and engaging adventures.

The evaluation of students demonstrated high levels of content engagement as they attempted to solve various puzzles and overcome challenges in DEER game activities. According to the findings, the positive attitudes, motivation, and involvement of players strongly correlate with improved understanding of scientific concepts, enhanced learning outcomes, the creation of meaningful learning experiences, and the development of players' skills. Notably, a gender bias test conducted in reference to (Lopez-Pemas et al., 2019) revealed a strong inclination toward DEER gaming among male participants, while females exhibited a statistically significant reduced propensity. However, there was no evidence of gender bias in DEER-related survey items. In conclusion, the incorporation of DEER learning activities effectively engages students in both synchronous and asynchronous online learning settings.

The study also sheds light on how DEERs (Digital Educational Escape Room experiences) can enhance data collection for research studies. DEERs provide a means to collect data from participants through innovative evaluation methods, including follow-up polls, formative feedback, informal feedback, in-game comments, quiz scores, and debriefing. Additionally, DEERs are recognized as a suitable strategy for improving access to training, interaction, and communication, while fostering the adoption of innovative techniques for distance learning. Furthermore, the study offers valuable guidance for designers and

researchers, identifies specific future directions, and presents theoretical frameworks to address challenges in this field more effectively.

Applying Digital Escape Rooms for Learning Motivation, And Problem-Solving Ability

Based on (Huang, Kuo, and Chen's, 2020) research, Digital Escape Rooms (DERs) revolve around incorporating course-related tasks to enhance students' learning performance. These tasks are strategically crafted to create an exciting and immersive experience by incorporating elements like confined spaces, time constraints, and captivating narratives. This approach motivates students to successfully navigate a series of tasks and problem-solving activities. DERs utilize digital resources to address the limitations commonly associated with traditional classroom teaching methods.

The researchers acknowledge the importance of self-expression in the context of DER activities. Students collaborate in teams on DER assignments, engaging in verbal communication. Previous studies indicate that students in the second and third grades often struggle to articulate the deduction process or communicate their ideas clearly during scientific presentations. This difficulty may stem from their cognitive development not yet fully meeting the learning requirements in these areas, as observed in the study.

Escapp: A Web Platform for Conducting Educational Escape Rooms

This article discussed by (Lopez-Pernas et al.'s, 2021) Escapp, a website platform designed to simplify the creation of enjoyable and effective educational escape rooms for teachers. The platform was employed in three distinct higher

education settings, including one in-person and two remote environments. To assess Escapp's effectiveness in facilitating educational activities, researchers conducted three case studies involving a substantial number of students. The students' feedback, collected through a questionnaire, overwhelmingly favored the platform, showcasing its general utility and engagement.

The results revealed that students provided a highly favorable evaluation of the three instructional escape rooms facilitated by Escapp (Mean = 4.4, SD 0.7). This positive assessment was in line with expectations based on earlier successful iterations of similar escape rooms. This initial finding underscores Escapp's ability to enable teachers to implement pedagogical escape rooms with a high likelihood of acceptance by students. Additionally, students expressed a consensus that the escape rooms should be graded (Mean = 4.0, SD = 1.3), emphasizing the importance of Escapp's grading feature. Overall, students held a reasonably positive view of Escapp (Mean = 4.3, SD = 0.8), citing its ease of use (Mean = 4.4, SD = 0.8) and visually appealing user interface (Mean = 4.4, SD = 0.8). These features underscore how Escapp provides students with an enjoyable user experience, a crucial aspect while engaging in educational escape games on the platform.

Fisher yates shuffle algorithm

The Fisher-Yates Shuffle, also known as the Knuth Shuffle, is a widely used algorithm for randomizing the order of elements within a collection. Its efficient and unbiased nature has made it a cornerstone in various applications across computer science, statistics, gaming, cryptography, and more. This review explores the diverse implementations and applications of the Fisher-Yates Shuffle algorithm.

In gaming and entertainment software development, the Fisher-Yates Shuffle is employed for card shuffling, random level generation, and creating unpredictable game scenarios. Its simplicity and efficiency make it an excellent choice for ensuring fairness and randomness in various game mechanics (Salter, A., & West, J. ,2014).

Still a Man's Game: Gender Representation in Online Reviews of Video Games

This literature review embarks on an exploration of gender representation in online reviews of video games, delving into the dynamics that contribute to the perception of gaming as a predominantly male domain. By analyzing existing studies and research, this literature seeks to provide a comprehensive overview of how gender is portrayed and discussed within the context of video game reviews. The review serves as a foundation for understanding the implications of gender bias in gaming discourse, shedding light on the broader societal and cultural factors influencing these representations.

(James, 2009) stated that even though video games are becoming more popular, most of the people who play them are still mostly guys. One possible explanation is that the way characters are shown in video games is mainly designed for guys. The results suggest that women characters are not shown as much in video games, and when they are, they are often depicted in a sexualized way more often than male characters, confirming what previous research has found.

SYSTEM TECHNICAL BACKGROUND

The main tool that was used in creating this application is Unity Game engine. Unity, created by Unity Technologies, is a game engine that functions across different platforms. It was initially introduced and made available in June 2005 during the Apple Worldwide Developers Conference as a game engine for Mac OS X. Over time, it has been expanded to include support for numerous platforms such as desktop, mobile, console, and virtual reality. Unity is especially favoured for developing games for iOS and Android mobile devices, known for its user-friendly interface which makes it accessible for novice developers. Additionally, it is widely utilized in indie game development (Dealessandri, 2020). The development described gamification that provides knowledge in python language to individuals who's going to play the game. The designing of the characters as well as the other elements, and coding that will be needed to make the game functional and interactive, will takes place in the game engine that has been mentioned above. In addition, the implementation of the desired functionality has been collected by the researchers. Alpha test was initialized on the game to ensure that the application doesn't contain errors or bugs. Also, it must satisfy the requirements of the documents of the research.

Aseprite was also used in creating the application as it is tailored specifically for pixel art creation, providing a set of tools and features that are optimized for working at a pixel level. This focus ensures that the sprites were detailed and visually stunning pixel art with precision. Aseprite includes robust animation tools to easily create frame-by-frame animations. The timeline feature,

onion skinning, and the ability to export animations in various formats make it a go-to tool for animators and game developers. The application includes robust palette management tools, making it easy to create, edit, and manage color palettes. This is particularly useful for maintaining consistency across a project or adhering to a specific aesthetic.

In the dynamic realm of game development, the developer opted for the exceptional capabilities of Microsoft Visual Studio as their chosen integrated development environment (IDE). Throughout the entire journey of crafting my game, this powerful tool proved to be an indispensable companion, offering a comprehensive suite of features that not only facilitated the coding process but also significantly enhanced the overall project management. One of the standout features that played a pivotal role in my game development endeavors was Visual Studio's integrated debugging tools. The ability to identify and rectify issues in real-time, coupled with comprehensive performance analysis tools, ensured that the game's codebase remained robust and optimized throughout the development cycle. This, in turn, translated into a more polished and reliable gaming experience for end-users.

CHAPTER III

Methodology

This chapter includes the system's functionality and its intended direction. It outlines the project design strategy adopted by the system's proponents and incorporates visuals aiding in explaining the system's organizational structure. An integral aspect of the study involved pre-tests, post-tests, alpha-testing, and beta-testing. Gathering perspectives from participants was a crucial step to gain a comprehensive insight into the study. Furthermore, administering pre-tests, post-tests, and beta-tests will ensure participants' logical and analytical thinking concerning Detective Py before and after engaging with the educational game. The evaluation aims to assess Detective Py's effectiveness as gamification software.

REQUIREMENTS ANALYSIS

Creating a software system for specific projects involves tailoring considerations to the game development process. The process of devising a strategy or blueprint for how a software system or application will be structured, built, and implemented is known as software design. This phase involves making decisions about the overall architecture, components, interfaces, and actions of the software. To humanize this, think of it as planning and organizing the game's "behind-the-scenes" to make sure everything runs smoothly.

During this phase, various activities are carried out to ensure that the software system is well-thought-out and organized. In simpler terms, it's like laying the groundwork for a game's structure. In the design phase, details about the game's concept are specified, such as its genre, gameplay elements, and overarching objectives. This is akin to outlining the main ideas and goals of the game.

Additionally, it involves recognizing the game's primary components and what sets it apart, while also understanding the target audience. Choosing an appropriate game engine or architecture that suits the needs of the game is a crucial part of this process. It's like picking the right tools for the job, considering factors such as supported platforms, performance, scalability, and available development tools. This is similar to deciding on the overall framework of the game.

Finally, the design phase involves implementing the rules and logic that govern the gameplay. In more relatable terms, it's like creating the rulebook for how the game will be played and ensuring that everything functions as intended. The researchers used the waterfall model because the requirements of the system are already laid out and its development will be straightforward. Together with waterfall model, the researchers used Kanban approach allows project status and progress seen. Using this method, the researchers will keep track on the progress of the development. With five Kaban boards that was made using "ASANA", the researchers title them "Backlog", "Todo", "In progress", "Testing", and "Done".

A Kaban board was created in Asana, the goals of those tabs were to keep in touch with your teammates and with the progress getting done. The Backlog tab is used to show the prioritized task derived from the waterfall model where in each part represent each aspect of the game. While Todo tab serve as a waiting task for the researchers in which they will choose which one to do and put on the cycle. Next would be the "In progress tab" where all the ongoing development and conceptualization happens, this is the tab where you can see which part is getting work on by which teammate. On the Testing tab all of what has been developed

will undergo testing to provide better understanding before the done page where it was ready to be implemented to the game. And lastly will be the Done page where all the task that has been completed will be compile. Researchers created Detective Py, a user-centered game, using the Waterfall Model and Kanban framework. Continuous testing will be done, along with sharing project update and reviewing at the end of each phase. This strategy will improve teamwork, adaptability, and an ongoing pattern of development, ensuring a positive outcome.

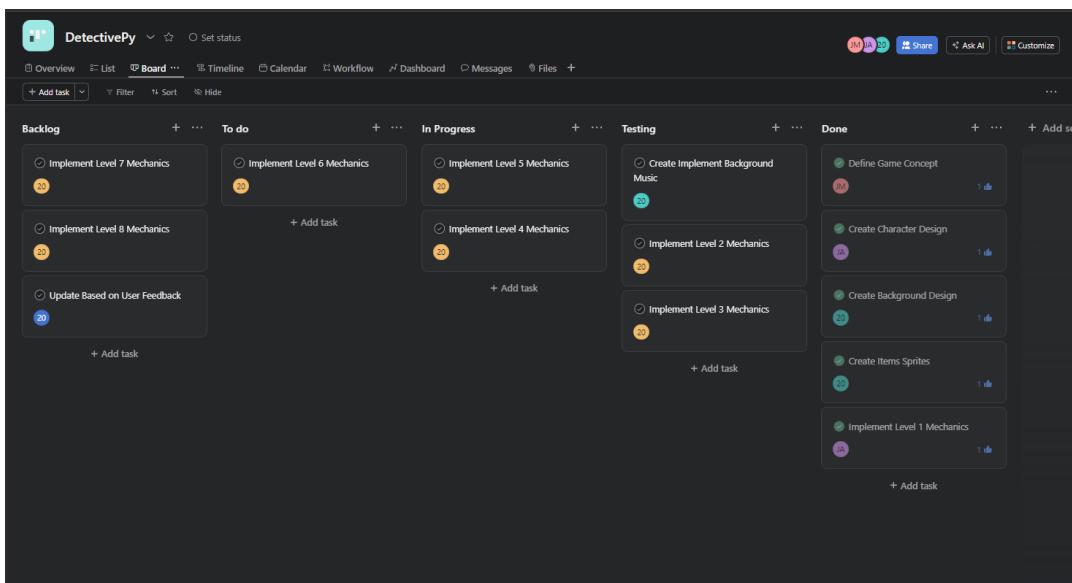


Figure 1. Kanban Board of the Application using Asana

REQUIREMENTS DOCUMENTATION

The primary objective underlying the research endeavor titled "Detective Py: Mobile-based 2D Educational Escape Room focused on Python Programming" is to intricately intertwine engagement and education, thereby fostering a dynamic and adaptable learning for students. At its core, the curriculum guide serves as an indispensable roadmap, meticulously crafted to ensure the alignment of the immersive game experience with the prescribed curriculum of the educational institution. This innovative approach not only seeks to captivate students' interest

but also endeavors to deliver educational content in a manner that seamlessly integrates with and augments the established academic framework. By synthesizing interactive gameplay with the structured curriculum, the study aspires to create a symbiotic relationship that enhances the educational journey, making it both enriching and enjoyable for the learners.

Furthermore, the investigators intend to administer both pre- and post-tests to evaluate the participants' comprehension of the foundational principles of Python programming before and after engaging with the project. This meticulous assessment ensures adherence to established standards of practice by incorporating and modifying methodologies and best practices derived from the current research. The incorporation of curriculum alignment and the assimilation of pertinent studies within the framework of the thesis project denote a novel methodology in crafting Detective Py. This approach involves an evaluation of the project using various levels of the ISO/IEC 25010 standard, commonly referred to as the Software Quality Model. This strategic alignment caters to the specific requirements of the game, ensuring its functionality as an instructional tool. The outcome of this evaluative process guarantees enhanced learning outcomes and a valuable educational experience for the participants.

THEORETICAL FRAMEWORK

The Octalysis framework, with its comprehensive breakdown of human motivation, serves as a powerful tool in guiding planning and design processes across various domains.

The Octalysis framework has proven instrumental in various fields due to its systematic breakdown of human motivation into eight core drives. Its application within planning and design processes offers significant advantages, providing a structured approach to understanding user experiences, gamification strategies, and motivational dynamics.

By incorporating the Octalysis framework into research methodologies, a comprehensive lens emerges for analyzing, designing, and optimizing initiatives. This approach ensures that not only are the initiatives engaging, but they also resonate with the intrinsic motivations of participants. Yu-kai Chou's framework delineates human motivation into specific drives such as achievement, empowerment, and social influence, allowing proponents to tailor their approaches based on a profound understanding of what truly motivates individuals.

Utilizing the Octalysis framework equips systems with a strategic toolkit. This toolkit enables the systematic integration of game mechanics and psychological principles, leading to more meaningful and compelling interactions within the system. Ultimately, leveraging this framework supports the creation of experiences that are not only engaging but also aligned with users' intrinsic motivations, fostering deeper connections and sustained engagement.

For systems incorporating gamification, Octalysis serves as a guide to optimize these strategies. It helps strike a balance between fun, motivation, and clear objectives within gamified experiences.

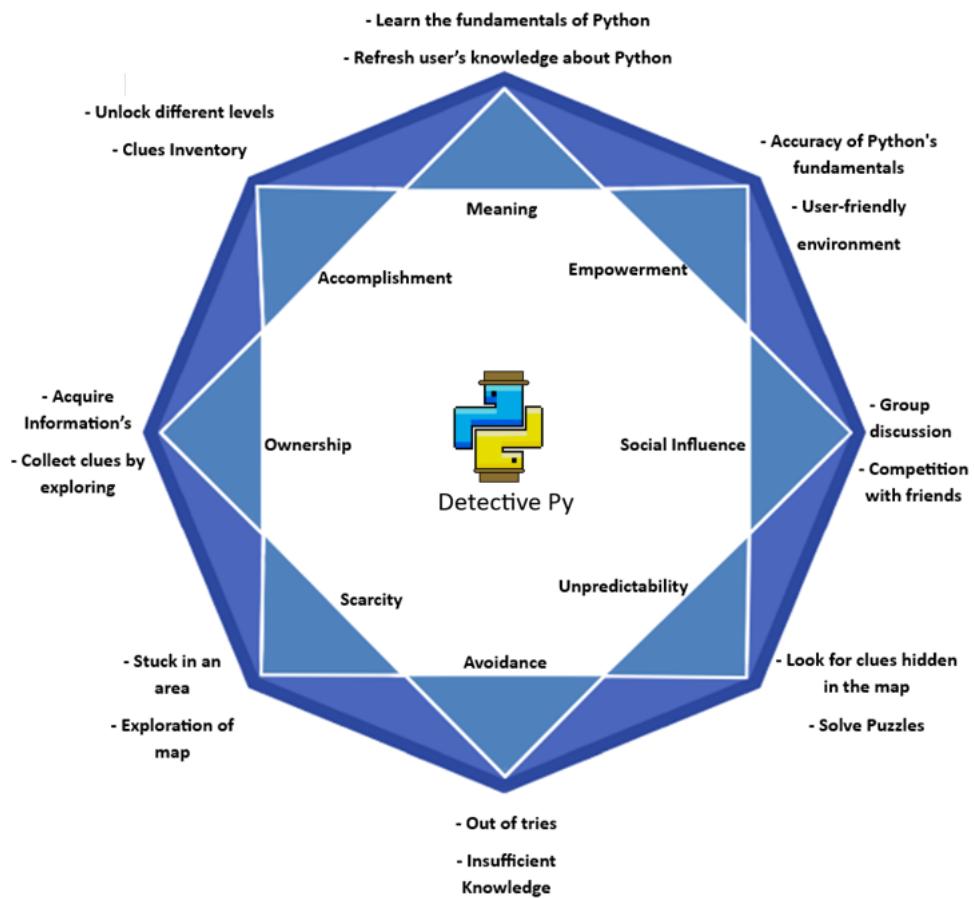


Figure 2. Octalysis Framework based on Chou Y. (2015)

WORKPLAN

This section will delve into the software and technologies utilized for coding and developing the system software. Additionally, it will explore the tools employed in designing the user interface and all game elements.

Visual Studio

Visual Studio Code, commonly known as VS Code, is a free and open-source source-code editor developed by Microsoft. It is a highly popular and versatile tool used by developers for various programming languages and

development tasks. VS Code is known for its lightweight design, extensibility, and a rich set of features that enhance the coding experience.

Pixel Art Tool

Aseprite is a pixel art and animation editor that is popular among digital artists, pixel artists, and game developers. It is a specialized tool designed for creating and editing pixel-based graphics, which are often used in retro-style games, animations, and other digital art projects.

Coding Platform

C# (pronounced "C sharp") is a modern, multi-paradigm programming language developed by Microsoft as part of its .NET initiative. C# is designed to be simple, efficient, and type-safe while providing features that facilitate robust software development. It is widely used for developing a variety of applications, including desktop applications, web applications, mobile apps, cloud-based services, and games.

Unity is a powerful and widely used cross-platform game engine and development environment for creating 2D, 3D, augmented reality (AR), and virtual reality (VR) games, as well as simulations and other interactive experiences. It was developed by Unity Technologies and was first released in 2005. Unity is known for its user-friendly interface, flexibility, and robust features, making it a popular choice among both indie developers and large game development studios.

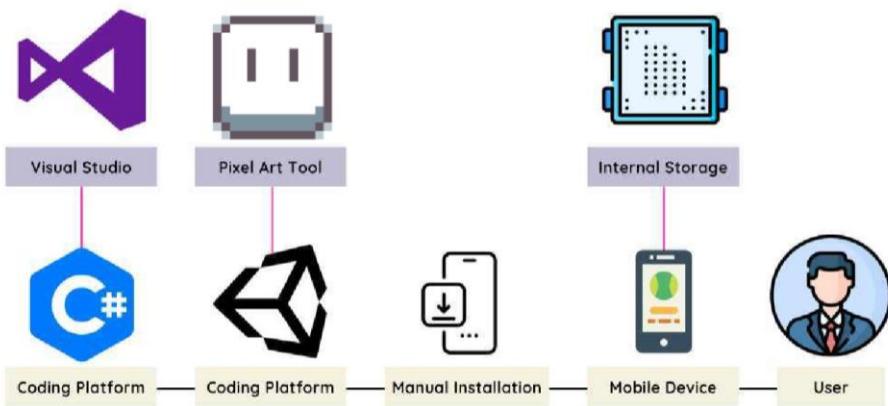


Figure 3. Workplan of Detective Py

DATA COLLECTION

In order to obtain permission to collect data for the project titled 'Detective Py: Mobile-based 2D Educational Escape Room focused on Python Programming,' the researchers drafted an approval letter for conducting interviews with the College of Engineering and Architecture, which was signed by the college dean. The pre-test and post-test were conducted in person on the university grounds on November 14th and 15th, each lasting approximately 10-15 minutes.

ETHICAL CONSIDERATION

When conducting the pre-test and post-test to the participants, the researchers made sure that the data gathered will be kept confidential, in accordance to RA 10173 or Data Privacy Act of 2012, all personal and sensitive information solicited and disclosed shall be used only for the survey alone. The respondents can withdraw their data and their participation in the pre-test and post-test, the researchers asked for permission to the dean of college of engineering and architecture to be able to conduct pre-test and post-test to the students. The

participants will be asked if they are willing to be a part of our research. The participants have the option to withdraw from the interview at any time if they choose to do so.

DESIGN OF SOFTWARE SYSTEM

The Fisher Yates Algorithm proved instrumental in achieving the goal of randomizing a set of numbers without repetition. This algorithm was employed to generate a sequence of unique numbers, which were subsequently employed as indices for arrays within a collection of objects. By leveraging these indices, the distribution of clues and puzzle pieces was systematically dispersed across every object on the map.

This approach ensures that each object contains only one attached clue or puzzle piece, effectively preventing the occurrence of duplications within a single object. The use of randomized indices not only adds an element of unpredictability to the placement of clues and puzzle pieces but also enhances the overall gaming or puzzle-solving experience by introducing a dynamic and varied arrangement throughout the map. The systematic deployment of the Fisher Yates Algorithm, coupled with the strategic use of array indices, thus contributes to a more engaging and challenging environment for users or players interacting with the objects on the map.

PRODUCT AND PROCESS

The researchers are specifically concentrating on the foundational aspects of Python programming to devise an innovative educational approach that transforms the learning experience through the implementation of gamification.

The selection of the College of Computing Studies and the College of Engineering and Architecture as the focal points is grounded in various considerations, including the relevance of their curricula, alignment with the demographic characteristics of the student body, and the conducive environment they provide for fostering creativity.

This choice is underpinned by its close alignment with the overarching objectives of the research. The curricular offerings at these institutions are well-suited for college students who have undergone instruction in the fundamentals of Python programming, precisely representing the targeted audience. The educational goals seamlessly dovetail with the existing curriculum structures in these colleges, rendering the gamified learning system a valuable augmentation to the educational milieu. In essence, the selection of respondents is driven by its compatibility with the research objectives and the supportive atmosphere these institutions provide for the implementation of novel gamified educational methodologies.

Waterfall Model

In this study, the design of the system mobile application followed the flow of the waterfall model as the software engineer paradigm. According to Pressman in (Pujaman et al., 2022), The Waterfall methodology is a traditional approach characterized by a systematic execution of each stage. It illustrates the software development process through a linear sequence, signifying that the commencement of any phase is contingent on the completion of the preceding one. The Waterfall model encompasses five stages: first is user system needs analysis, second would be system and software design, third is coding and unit testing, fourth is system

integration and testing, and lastly system operation and maintenance. The researchers used waterfall model in this application because the requirements of the system are already laid out and its development will be straightforward.

The Waterfall model is renowned for its sequential and structured approach to software development. By adhering to a linear progression of stages, it emphasizes a systematic execution wherein each phase must be completed before moving on to the next. This rigidity ensures a clear delineation of tasks and requirements, promoting a well-defined development process.

The decision to utilize the Waterfall model for the mobile game application design indicates a level of certainty and clarity in the system requirements. This model is particularly suitable when the project requirements are well-documented and unlikely to undergo significant changes during development.

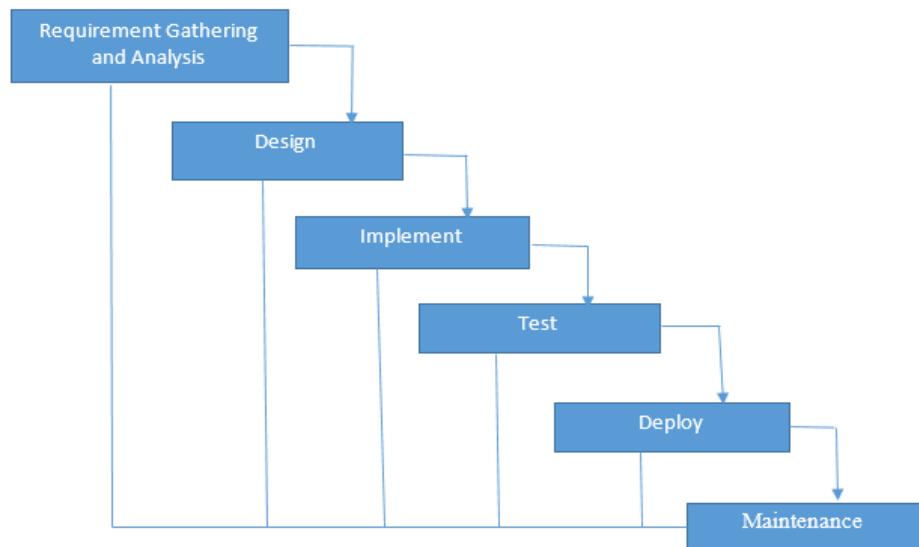


Figure 4. Waterfall Model based on Pujaman et al., (2022)

Action Diagram

The action diagram below explains the player's step by step in playing the game. Starting from the game menu to the instructions and the task that the player needs to do in order to complete a game level.

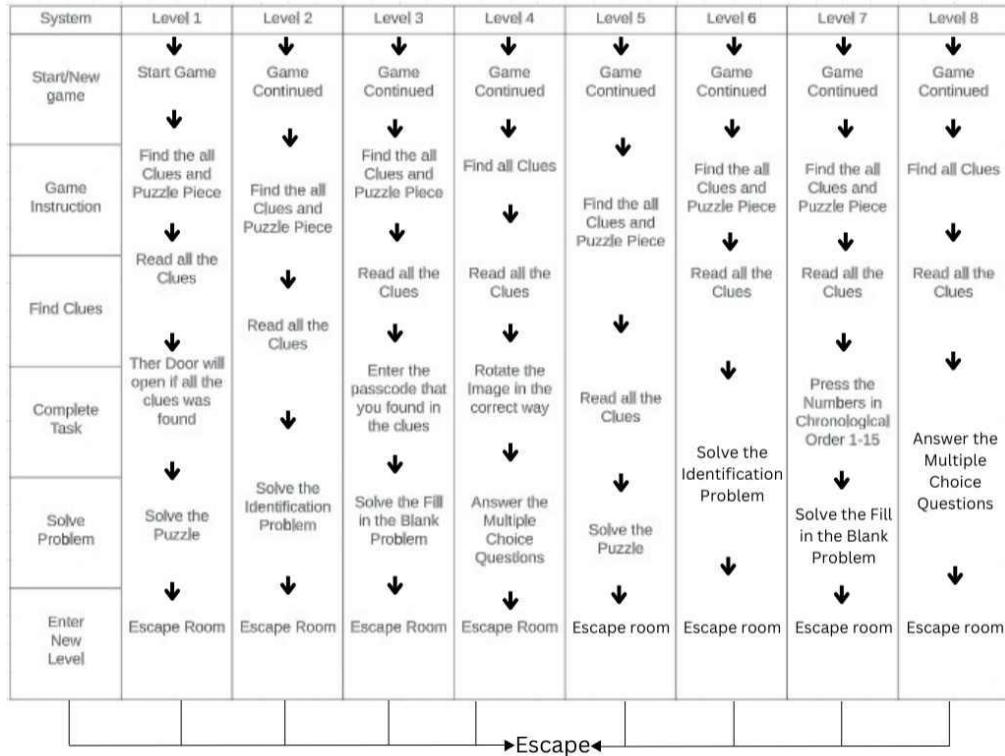


Figure 5. Action Diagram

DEVELOPMENT AND TESTING

An educational game that will be created using Unity. Unity Technologies developed the application, in addition to that, it is a game engine that functions across different platforms. Unity is especially favoured for developing games for iOS and Android mobile devices, known for its user-friendly interface which makes it accessible for novice developers. Additionally, it is widely utilized in indie game

development (Dealessandri, 2020). The designing of the characters as well as the other elements, and coding that will be needed to make the game functional and interactive, will take place in the game engine that has been mentioned above. In addition, the implementation of the desired functionality has been collected by the researchers.

The development primarily focuses on gamifying learning, ensuring that the application not only entertains users but also imparts fundamental knowledge of the Python language to players. Rigorous testing is conducted to guarantee the educational effectiveness, clarity of concepts, user engagement, and overall learning outcomes. The development adheres to established standards to create an immersive and effective learning experience within the application's context. During the testing phase, researchers and testers diligently ensure the application operates flawlessly, free from errors or bugs. In addition to content corrections, researchers ensure that all aspects meet the research document's requirements.

Alpha testing was conducted by the researchers to finalize the game testing, IT professionals, such as developers and testers were asked to evaluate the game system. A set of questionnaires was given to the IT professionals in order for them to evaluate the game. These questionnaires were based on the ISO/IEC 25010 software quality model to ensure the quality of the game software system. Beta testing was also conducted to the participants of the study, the researchers conducted interview questionnaires to get the feedback of the participants in playing the game.

IMPLEMENTATION PLAN

Table 1. Implementation Plan

| Strategy | Activities | Person Involved | Duration |
|---|---|--|-----------------|
| Approval from thesis instructor, adviser, BSCS Chairperson, CCS Dean, CpE Chairperson, and CEA Dean | The permit letter must be approved by the thesis instructor, adviser, BSCS Chairperson, CCS Dean, CpE Chairperson, and CEA Dean | Researchers, Thesis Instructor, Adviser, BSCS Chairperson, CCS Dean, CpE Chairperson, and CEA Dean | 3 Days |
| Pre-Test to determined pre-existing subject knowledge | Having a set of questionnaires that will be answered by the IT and CpE student | Researchers, IT, and CpE student | 2 Days |
| Game Application alpha testing | Alpha-testing Phase of the Detective Py | Software Engineers | 1 Day |
| Game application beta-testing | Beta-testing Phase of the Detective Py | IT, and CpE student | 1 Day |
| Post-Test to assess the students understanding of the concepts | Having a set of questionnaires that will be answered by the IT and CpE student | Researchers, IT, and CpE student | 2 Days |

The table above displays the sequence of actions undertaken to facilitate the pre-test and post-examination for IT and CpE students at DHVSU who enrolled in Python as their introduction to programming. It comprehensively outlines all

activities conducted, starting from requesting the approval sheet from the Department of Computing Studies to personally administering the actual assessments to the students.

IMPLEMENTATION RESULT

The process of game development and testing anticipates a specific outcome upon implementation. This expected outcome is aimed at guaranteeing the seamless operation of the game and addressing minor bugs and errors. The implementation result incorporates specifications for both minimum and recommended hardware and software requirements, presented in a table format for the users. This table outlines the essential and optimal criteria necessary to enhance the overall gaming experience.

Table 2. Implementation Result

| System Requirements | Minimum | Recommended |
|---------------------|-------------|-------------------|
| Device | Android 5.1 | Android 5.1 |
| Device Storage | 4GB | 8GB ROM or Higher |
| Memory | 1GB RAM | 1GB+ RAM |

The installation of the project relies on determining both the minimum and recommended requirements. Once the project is installed on mobile devices, the software requirements are assessed to evaluate memory and cache data allocations

for effectiveness. The table provided above outlines the user system requirements necessary to run the game on the device.

SOFTWARE QUALITY MODEL

The researchers implemented ISO/IEC 25010; it is a standard quality model that defines a set of characteristics for software product evaluation. Specifically, it focuses on the quality of software products and systems. The standard provides a structured framework for assessing and measuring various aspects of software quality, helping organizations and stakeholders to understand, specify, and evaluate the quality attributes of software. ISO/IEC 25010 was developed by the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) under the joint technical committee ISO/IEC JTC 1. The model was served as the guidelines of Detective Py to ensure its quality as an application.

Functional Suitability

The most important characteristic to ensure that the software seamlessly aligns with the functional requirements articulated by users. It extends beyond mere compliance, to get the user satisfaction and the overall effectiveness of the software in catering to the unique needs of its user base. By prioritizing functional suitability, developers and stakeholders can orchestrate an environment where the software not only meets but exceeds the expectations of users, fostering a positive and rewarding user experience.

Compatibility

This served as a linchpin for assessing the software's ability to seamlessly operate and coexist with an intricate web of other systems, platforms, and software components. It is interconnected and interoperable digital landscape, where collaboration and integration are imperative, evaluating compatibility becomes vital. This dimension ensures that the software functions harmoniously with disparate elements, enabling a cohesive and integrated technological ecosystem.

Usability

Set as a cornerstone in the quest for an exceptional user experience. It transcends the mere functionality of the software, emphasizing user-friendliness and accessibility. Evaluating usability is pivotal in crafting software that not only fulfills its designated functions but does so with an intuitive and user-centric design, enhancing overall user satisfaction and engagement.

Reliability

Addresses the fundamental requirement for consistent and predictable performance under diverse conditions. The reliability of software is a bedrock for preventing system failures, minimizing downtime, and cultivating trust among users. Prioritizing reliability ensures that the software functions seamlessly, delivering a dependable and stable user experience.

Maintainability

Emphasize the ease with which the software can be updated, modified, or extended. Software that boasts high maintainability is inherently adaptable to evolving requirements, positioning it as a resilient and enduring solution that can

navigate the challenges of dynamic technological landscapes. This characteristic aligns with the long-term sustainability and cost-effectiveness of the software.

Portability

The software's adaptability and versatility by assessing how easily it can be transferred or adapted to different environments or platforms. Given the diverse technological landscape, portability is instrumental in ensuring that the software remains relevant and usable across an array of devices and operating systems, catering to the evolving preferences and needs of users in an ever-changing digital environment.

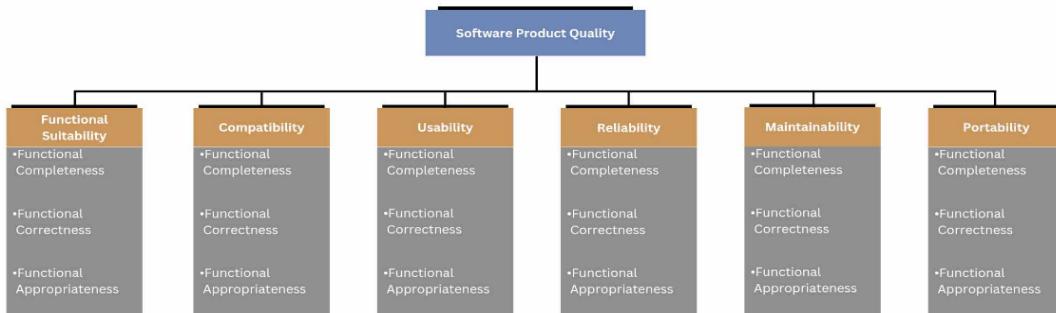


Figure 6. Software Quality Model based on ISO/IEC 25010:2011

retrieved from <https://www.iso.org/standard/35733.html>

RESPONDENTS OF THE STUDY

The study involved College students at Don Honorio Ventura State University, mainly from the Information Technology and Computer Engineering students. Given that the participants should be students who took Python programming language. Participants informed consent will be from both the

students and the school coordinator. Clarification of the study's objectives, methods, confidentiality, and their voluntary participation will be provided during the consent process. Data will be gathered through gaming observations. In order to assess their baseline knowledge and grasp of fundamentals of python programming and to determine the effectiveness of the game in expanding that knowledge, respondents will be required to submit pre-game surveys. The study's alpha and beta test are essential in determining how well Detective Py has improved. To determine student's knowledge improvement on python fundamentals using Detective Py the researchers conducted a post-test. Their response and performance information will be key in determining the game's usability and educational value in the setting of Don Honorio Ventura State University.

Purposive Sampling Technique

The purposive sampling encompasses various non-probability sampling methods, also recognized as judgmental, selective, or subjective sampling. In this approach, the researcher exercises their judgment to select units (e.g., individuals, cases/organizations, events, data pieces) for study. Typically, the sample size is relatively small compared to probability sampling techniques. It is a non-probability sampling method where the researcher makes decisions on inclusion based on criteria like specialized knowledge of the research issue or willingness to participate.

In designing Detective Py: Mobile-based 2D Educational Escape Room, a purposive sampling technique was employed to strategically select participants.

The target population for this study consisted of students from Don Honorio Ventura State University, with a specific focus on those enrolled in Information Technology (IT) and Computer Engineering (CPE) programs who took fundamentals of Python programming.

The purposive sampling approach was chosen to ensure that participants possessed the requisite background and experience in Python programming, aligning with the educational objectives of Detective Py. By specifically targeting IT and CPE students, the study aimed to gather insights from individuals with a solid foundation in the subject matter, thereby enhancing the relevance and effectiveness of the escape room as an educational tool in the context of Python programming.

RESEARCH INSTRUMENTS AND TOOLS

Based on Columbia University, a Research Instrument is a tool used to collect, measure, and analyze data related to your research interests. These tools are most commonly used in health sciences, social sciences, and education to assess patients, clients, students, teachers, staff, etc. A research instrument can include interviews, tests, surveys, or checklists. The researchers have made a pre and post-test quiz to evaluate the participant's knowledge of fundamentals and syntax of python programming before and after playing the game. These pre and post-test examination were validated by the Thesis Instructor and Thesis Adviser of the researchers.

In the execution of the Detective Py, the ISO/IEC 25010 standard was employed as the guiding framework for the integration, facilitating a

comprehensive evaluation of its quality. To conduct a thorough assessment aligned with ISO/IEC 25010, a diverse range of techniques was employed. These encompassed evaluating user engagement and aspects of the quality model. Also, for better analysis of Detective Py's quality, evaluative techniques that gives importance into various dimensions of its performance and user experience. This multifaceted approach ensures that the assessment is not only aligned with the ISO/IEC 25010 standard but also captures the intricacies of Detective Py's functionality and user interaction. The inclusion of user engagement as a key evaluative parameter acknowledges the significance of user experience and satisfaction. It involves understanding how users interact with Detective Py, providing valuable insights into the software's ability to captivate and retain user interest. To guarantee a precise evaluation aligned with ISO/IEC 25010, it is imperative that individuals with substantial knowledge regarding Detective Py and its application context are involved in the assessment process. Their expertise ensures a comprehensive and informed analysis, contributing to a more accurate and insightful understanding of Detective Py's quality across the specified dimensions.

STATISTICAL TREATMENT

The statistical procedures employed in this study is important to explain the data collected from the study participants. A precise examination of the pre-test and post-test results was undertaken, with the application of a paired samples, an analytical approach chosen for its ability to discern the potential impact of the intervention.

The paired samples were employed to examine the mean scores obtained from the pre-test ($M = [\text{mean_pre}]$) and post-test ($M = [\text{mean_post}]$) conditions. The fundamental premise of this analysis hinges on the null hypothesis, positing that there is no significant difference between the mean scores before and after the intervention, while the alternative hypothesis contends that a significant difference exists ($H_0: \mu_{\text{pre}} = \mu_{\text{post}}$ vs. $H_1: \mu_{\text{pre}} \neq \mu_{\text{post}}$).

The outcomes of the statistical analysis unfolded to reveal a noticeable and statistically significant difference between the mean scores of the pre-test and post-test conditions. This empirical evidence, denoted by a p-value less than the predetermined significance level, underscores the conclusion that the intervention exerted a tangible effect on the observed outcome. In essence, the discrepancy between the pre-test and post-test results proves the effectiveness of Detective Py's purpose, suggesting a discernible impact attributable to the intervention.

This statistical treatment serves not only to affirm the effectiveness of Detective Py's purpose but also provides a quantitative lens through which the magnitude and direction of the observed changes can be comprehensively understood. The implications of these findings extend beyond mere statistical significance, offering valuable insights into the practical implications and real-world applicability of the intervention, thus enriching the broader discourse on the effectiveness of Detective Py.

CHAPTER IV

Results and Discussion

This chapter presents the data gathered, the results of the statistical analysis done, and interpretation of findings.

1. Pre-test Examination of the Participants to Identify Current knowledge in Python Programming Language.

To assess the participants' current knowledge and skills, this pre-test examination serves as a valuable tool for researchers in evaluating their proficiency before utilizing the educational game. The examination offers valuable insights into the baseline understanding of the subject matter. The participants answered a total of 25 questions about the fundamentals of python and got a total average of 18.37. Therefore, it concludes that the students are already able to grasp the concepts of the python programming language.

Table 3. Familiarity of participants on the python programming language.

| Familiarity | Percentage |
|-------------------|------------|
| Very Familiar | 22% |
| Somewhat Familiar | 54% |
| Not Familiar | 10% |
| Prefer not to say | 14% |

The table above shows that out of 100 participants, only 22% were very familiar, 54% were somewhat familiar, and 10% were not familiar in Python programming language while others prefer not to say their familiarity about Python. Therefore, it concludes that most of the participants are somewhat familiar with the python programming language.

Table 4. Pre-test Examination

| QUESTION | n | Pre-Test(μ) |
|----------|-----|-------------------|
| Q1 | 100 | 0.7 |
| Q2 | 100 | 0.88 |
| Q3 | 100 | 0.8 |
| Q4 | 100 | 0.89 |
| Q5 | 100 | 0.82 |
| Q6 | 100 | 0.76 |
| Q7 | 100 | 0.85 |
| Q8 | 100 | 0.87 |
| Q9 | 100 | 0.86 |
| Q10 | 100 | 0.64 |
| Q11 | 100 | 0.72 |

| | | |
|-------------|-----|--------------|
| Q12 | 100 | 0.78 |
| Q13 | 100 | 0.50 |
| Q14 | 100 | 0.82 |
| Q15 | 100 | 0.60 |
| Q16 | 100 | 0.62 |
| Q17 | 100 | 0.57 |
| Q18 | 100 | 0.52 |
| Q19 | 100 | 0.65 |
| Q20 | 100 | 0.82 |
| Q21 | 100 | 0.85 |
| Q22 | 100 | 0.59 |
| Q23 | 100 | 0.83 |
| Q24 | 100 | 0.87 |
| Q25 | 100 | 0.56 |
| Mean | | 18.37 |

The table above shows that the mean score of the students out of 25 questions was 18.37, showing that their score is above 50% the total score. Showing that they already were somewhat familiar with python programming.

II. Designing and Developing an Educational Game that Incorporates Escape Room Concept.

To be able to design and develop an educational game that incorporates escape room concepts, the researchers planned all the requirements that the game will be having.

Unity Game Engine was the game engine used to develop the game paired with C# programming language as shown in the figure below, as Unity Game Engine is optimized for mobile games compared to other engines like Unreal Engine which is more utilized for desktop game applications.

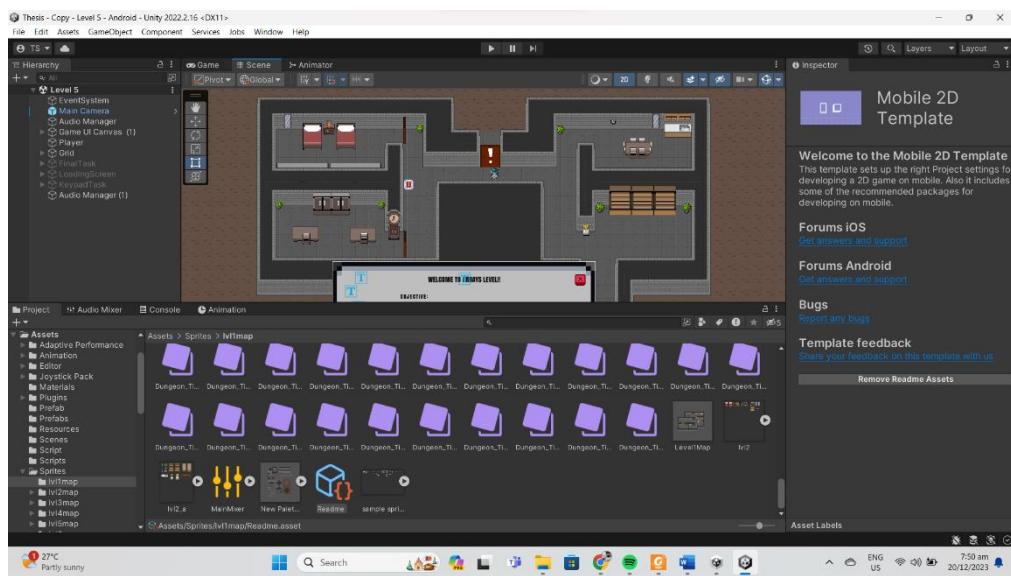


Figure 7. Development of Detective Py Using Unity Game Engine.

The researchers have ensured that all the game mechanics that will be included in the game will be an escape room concept. The researchers have employed game mechanics where clues are scattered throughout the objects in the game map, utilizing Fisher Yates Shuffle Algorithm to prevent duplication of clues in every objects.

```
Assembly-CSharp
100     //add all the numbers to randomize
101     for (int i = 0; i < outside.Count(); i++)
102     {
103         randomNumbers.Add(i);
104     }
105     System.Random random = new System.Random();
106
107     for (int i = randomNumbers.Count - 1; i > 0; i--)// loops through total value of randomNumbers then decrements each loop until it is not greater than 0
108     {
109         int j = random.Next(0); //random index from 0 to randomNumbers.Count
110
111         int temp = randomNumbers[i]; // Stores the value of current index in loop
112
113         randomNumbers[i] = randomNumbers[j]; // store the value of random index j to current index of randomNumbers
114
115         randomNumbers[j] = temp; // store the value of current index in random index
116     }
117
118     for (int i = 0; i < totalObjectives; i++)
119     {
120         totalObjectivesIndex.Add(randomNumbers[i]);
121     }
122
123
124     //generate random clues index that is not the index of code holder
125     for (int i = 0; i < totalClues; i++)
126     {
127
128         foreach (int index in totalObjectivesIndex)
129         {
130             if (randomNumbers[i] == index)
131             {
132                 randomNumbers.Remove(index);
133             }
134         }
135
136         totalCluesIndex.Add(randomNumbers[i]);
137         CluesHolder.Add(outside[randomNumbers[i]]);
138     }

```

Figure 8. Fisher Yates Algorithm for Prevention of Duplication of Clues.

The researchers also have integrated game mechanics such as solving puzzle, filling in the blanks, multiple choice quiz, and identification puzzle that the participants will solve as shown in Figure 9. We also utilized minigames inside the game which will open the doors for the player to be able to progress adding more escape room concepts to Detective Py. By integrating all these concepts Detective Py will be able to be engaging to the users and the gameplay will be more dynamic. These minigames are also aligned with Python Programming. The puzzles that were integrated also uses Python topics that will be solved by the player after finding and analyzing the clues inside the map. By using escape room concepts the players will be able to learn the fundamentals of Python Programming.

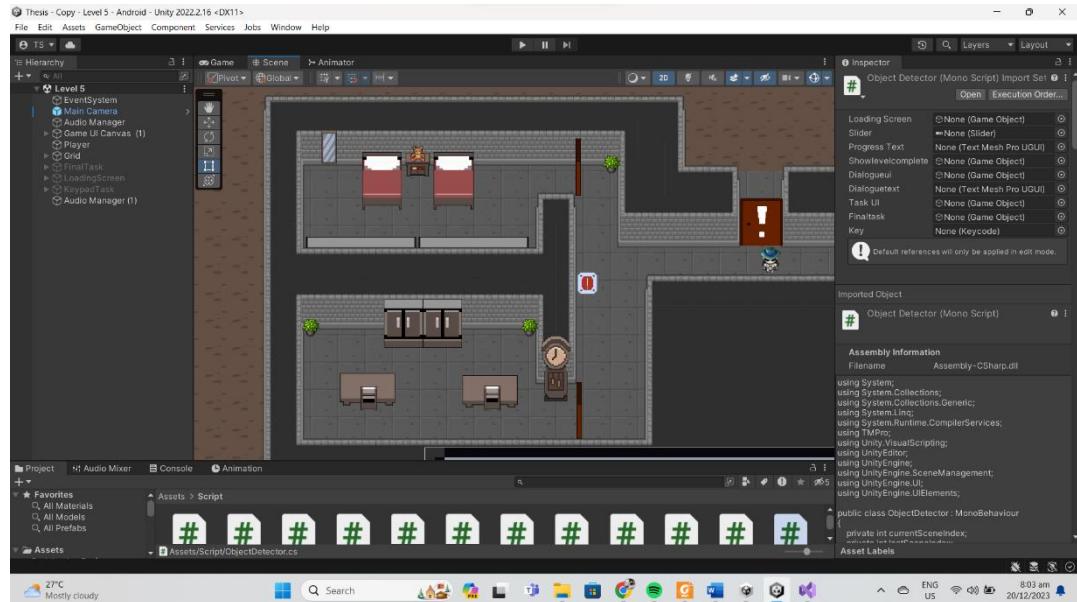


Figure 9. Utilizing Escape Room Concepts for Detective Py

III. Discussion of the Pre-Test and Post-Test Results of the Participants

To measure the acquired knowledge of the participants, the researchers have created a post-test assessment. It offers a quantitative measure of the effectiveness of the educational intervention. The examination specifically targets the outcomes of participants who underwent the post-test after engaging in the learning experience, in this case, playing the game Detective Py. Participants were given a total of 24 hours to play the game after taking the pre-test exam and will take the post-test exam afterwards. After checking the exams, the researchers got an average of 20.6 on their participants' post-test exams.

This section will provide a detailed analysis after utilizing the game. Sheding light on the insights and patterns that surfaced as a result of the gaming experience.

Table 4. Pre-test and Post-test Comparison

| QUESTION | n | Pre-Test(μ) | Post-Test(μ) | Increase(μ) |
|-----------------|----------|-----------------------------------|------------------------------------|-----------------------------------|
| Q1 | 100 | 0.7 | 0.77 | 0.07 |
| Q2 | 100 | 0.88 | 0.91 | 0.03 |
| Q3 | 100 | 0.8 | 0.94 | 0.14 |
| Q4 | 100 | 0.89 | 0.92 | 0.03 |
| Q5 | 100 | 0.82 | 0.96 | 0.14 |
| Q6 | 100 | 0.76 | 0.92 | 0.16 |
| Q7 | 100 | 0.85 | 0.95 | 0.1 |
| Q8 | 100 | 0.87 | 0.91 | 0.04 |
| Q9 | 100 | 0.86 | 0.87 | 0.01 |
| Q10 | 100 | 0.64 | 0.65 | 0.01 |
| Q11 | 100 | 0.72 | 0.89 | 0.17 |
| Q12 | 100 | 0.78 | 0.90 | 0.12 |
| Q13 | 100 | 0.50 | 0.53 | 0.03 |
| Q14 | 100 | 0.82 | 0.87 | 0.05 |

| | | | | |
|-------------|--------------|-------------|-------------|------|
| Q15 | 100 | 0.60 | 0.61 | 0.01 |
| Q16 | 100 | 0.62 | 0.69 | 0.07 |
| Q17 | 100 | 0.57 | 0.66 | 0.09 |
| Q18 | 100 | 0.52 | 0.62 | 0.1 |
| Q19 | 100 | 0.65 | 0.75 | 0.1 |
| Q20 | 100 | 0.82 | 0.89 | 0.07 |
| Q21 | 100 | 0.85 | 0.89 | 0.04 |
| Q22 | 100 | 0.59 | 0.78 | 0.19 |
| Q23 | 100 | 0.83 | 0.90 | 0.07 |
| Q24 | 100 | 0.87 | 0.92 | 0.05 |
| Q25 | 100 | 0.56 | 0.67 | 0.11 |
| Mean | 18.37 | 20.6 | 2.23 | |

In the first question “Which of the following cannot be a Python variable name?”, participants demonstrated a notable improvement from a 70% pre-test accuracy to 77% in identifying valid Python variable names. This suggests enhanced understanding, likely attributed to focused instruction on Python syntax, reinforcement through practical examples, and targeted clarification of potential

confusion points. The positive outcome indicates effective teaching methods and increased comprehension of Python variable naming conventions among participants.

There is a 3% improvement from 88% pre-test to a 91% post-test on the question "What's the difference between int and float data types in Python?" which suggests a more nuanced understanding. While the initial knowledge reflected basic distinctions (int for whole numbers, float for decimals), the higher post-test accuracy indicates a refined grasp of concepts like precision loss in float due to binary representation. This improvement signifies enhanced proficiency in Python's numeric handling, enabling more precise and effective programming.

From the question "How can you change the string variable "5" into a number?", an improvement of 80% pre-test to a 94% post-test in correctly converting the string variable "5" to a number suggests that participants gained a clearer understanding of the process. The subsequent instruction likely provided effective explanations, demystifying the conversion process and reinforcing learning, resulting in increased proficiency.

In the fifth question "What keyword is used to display data in python?" The improvement in correct answers from a pre-test score of 89% to a post-test score of 92% can be attributed to a more profound understanding of the fundamental concept in Python programming. The keyword used to display data in Python is "print." In the pre-test, participants may have been familiar with the basic syntax but might not have fully grasped its practical application. The increase in correct responses suggests that learners have enhanced their comprehension, possibly

gaining a clearer understanding of the print statement's role in outputting information to the console. This improvement signifies a deeper grasp of Python's syntax and functionality, reflecting the effectiveness of the learning process in reinforcing and solidifying knowledge.

From the question "What does the print() function do when you call it without any arguments?" The jump from 82% to 96% in test scores indicates that students gained a better understanding of what happens when you use the print() function without any words or numbers inside it. Before, some might not have been clear on this basic Python concept. The improvement likely came from clear explanations and practice. Now, they likely know that when you do print() with nothing in it, Python gives you an empty line. This boost in scores shows that the teaching approach helped students grasp this part of programming better.

The seventh question "Which of the following statements will print "Hello, World!" to the screen in Python?" The improvement of correct answers increased from 76% to 92%, can be attributed to the effectiveness of the learning intervention. The pre-test score of 76% indicates a moderate understanding of the question, while the post-test score of 92% reflects a substantial enhancement in comprehension. This improvement may be due to various factors, such as focused instruction, clarification of misconceptions, and reinforcement of key concepts. The learners likely benefited from targeted explanations and practice, enabling them to grasp the intricacies of the Python programming language and identify the correct statement that prints "Hello, World!" to the screen. The 16% increase in correct responses

suggests that the educational intervention effectively addressed areas of confusion or uncertainty, leading to a more proficient understanding among the participants.

In the question “Which operator will you use to compare two values?” The improvement in correct answers from an 85% pre-test to a 95% post-test can be attributed to the implementation of an effective intervention or learning strategy. In this context, the choice of the appropriate operator to compare two values seems to have played a pivotal role in enhancing participants' understanding. The transition from the pre-test to the post-test indicates that the selected operator, possibly one that facilitates a clearer and more intuitive comparison between values, resonated well with the learners. This improvement underscores the importance of thoughtful instructional design and the selection of pedagogical elements that resonate with learners, ultimately contributing to a more robust grasp of the underlying concept.

The observed improvement from 87% to 91% from the question “This operator is used to perform mathematical operations like addition, subtraction, multiplication.” The initial assessment indicated a solid baseline understanding of the operator used for mathematical operations, such as addition, subtraction, and multiplication. The subsequent improvement suggests that the intervention, whether it be through targeted instruction, practice exercises, or reinforcement of key concepts, successfully addressed any gaps in knowledge and enhanced the participants' grasp of the topic. This positive outcome underscores the value of tailored educational strategies in consolidating and reinforcing fundamental concepts, ultimately leading to a more robust understanding among learners.

From the question "What does the following Python code do? name = "Alice", print("Hello, " + name + "!")." The Python code provided initializes a variable named 'name' with the value "Alice" and then prints a greeting message using string concatenation. The pre-test result of 86% correct answers indicates a relatively high baseline understanding among participants before exposure to the code. The post-test improvement to 87% suggests a modest increase in comprehension. The likely reason for this improvement could be attributed to the simplicity of the code and the straightforward nature of the task. Participants may have gained a better grasp of string manipulation and concatenation concepts, as well as an understanding of how variables are used in Python to store and retrieve values. Overall, the incremental improvement in test scores reflects a successful learning outcome, with participants consolidating their knowledge of basic Python syntax and string handling.

In the question "How do you get to the first item in a Python list?" The slight improvement from a 64% pre-test correct answer rate to a 65% post-test rate in understanding how to access the first item in a Python list suggests a marginal but positive learning outcome. The question likely prompted participants to recall the appropriate syntax, which involves using square brackets and a zero-based index (e.g., my_list[0]). The increase in correct responses may be attributed to a variety of factors, such as reinforcement through repetition, clarification of the concept during instruction, or enhanced understanding from related examples. It's plausible that the small improvement indicates a partial comprehension of the

concept, but further targeted reinforcement or varied learning approaches may be beneficial to solidify this foundational Python list manipulation skill.

From the question “What does the following Python code do? myloop = [1,2,3], for i in myloop: print(i)” The given Python code utilizes a for loop to iterate through the elements of the list myloop, which contains the values [1, 2, 3]. During the pre-test, 72% of participants correctly understood that the loop iterates over each element of the list, and the correct values (1, 2, and 3) are subsequently printed. Following the instructional intervention or post-test, the correctness of participants increased to 89%. This improvement can be attributed to enhanced comprehension of basic Python syntax, particularly the structure and functionality of a for loop. The increase in correct responses indicates a positive impact of the educational intervention, potentially involving reinforced understanding of iteration and the role of the loop variable 'i' in sequentially accessing and printing each element in the list.

There is an increase of score from 78% to 90% from the question “In Python, which function should you use to put a new item at the very end of a list?” The pivotal function in this context is "append()." The pre-test might have revealed a lack of familiarity with the specific method for adding a new item at the end of a list. However, the post-test improvement suggests that learners have absorbed the information, understanding that "append()" is the apt function for this task. This positive shift reflects a successful learning process, emphasizing the effectiveness of educational interventions in reinforcing Python programming skills.

According to the question “What is the primary purpose of a while loop in Python?” The increase in correct answers from a 50% pre-test to a 53% post-test regarding the primary purpose of a while loop in Python suggests a modest improvement in understanding. A while loop in Python is a control flow statement that repeatedly executes a block of code as long as a specified condition is true. The pre-test result indicates a baseline familiarity with the concept, likely recognizing its iterative nature. The 3% improvement in the post-test may stem from enhanced comprehension of how while loops are employed for tasks requiring repetitive execution until a certain condition is met, contributing to a more nuanced grasp of their utility in programming. This improvement might reflect a deeper understanding of loop structures and their role in designing efficient and flexible algorithms, showcasing a progression in participants' comprehension of Python's fundamental programming constructs.

An increase from 82% to 87% were from the question “In a while loop, what happens if the condition provided is initially False?” The pre-test refers to the evaluation of the loop condition before entering the loop, and an 82% correct answer rate indicates that a majority of respondents correctly understood that the loop would not be entered if the initial condition is False. The post-test, with an improved 87% correct answer rate, signifies that after receiving additional information or context, more individuals grasped the concept and recognized that the loop would not be executed initially due to the False condition. This improvement may be attributed to enhanced comprehension of the control flow in

programming, emphasizing the importance of condition evaluation in loop structures.

From the question “Which of the following code snippets creates a while loop that prints numbers from 1 to 5?” There is an improvement in correct answers from the pre-test to the post-test (60% to 61%) can be attributed to enhanced understanding of while loop construction. During the pre-test, participants may have encountered challenges in grasping the syntax and logic required to create a while loop printing number from 1 to 5. However, the subsequent instructional intervention and exposure to related materials likely facilitated a clearer comprehension of loop structures, leading to a slight increase in correct responses in the post-test. The marginal improvement suggests that learners absorbed the concepts presented, refining their ability to implement while loops and produce the desired numerical output.

An increase of 7% were converted from the question “What is the primary purpose of a "for loop" in Python?” The pre-test score indicates a baseline level of knowledge, where respondents might have had varying degrees of familiarity with the concept. The subsequent increase suggests that the educational intervention, whether through additional explanations, examples, or practice exercises, effectively addressed misconceptions and provided clarity on the primary purpose of a "for loop" in Python. This improvement may reflect a better grasp of how "for loops" iterate over elements in a sequence, making it a powerful tool for automating repetitive tasks and enhancing overall code efficiency. The increased post-test score

indicates an improved understanding of Python programming concepts, showcasing the effectiveness of the learning intervention.

According to the question "In a for loop, what does the "range()" function do?" The observed improvement from a pre-test accuracy of 57% to a post-test accuracy of 66% in understanding the "range()" function within a for loop can be attributed to enhanced comprehension of fundamental programming concepts. The pre-test performance likely reflected a moderate understanding, with respondents potentially grappling with the intricacies of the range() function and its role in iterating through a sequence of numbers. The post-test improvement signifies a heightened grasp of this Python function, suggesting that participants may have gained clarity on how to manipulate and control the iteration process more effectively. This progression could be linked to increased familiarity with loop structures, enhanced problem-solving skills, or a deeper comprehension of the Python programming language as a whole. Overall, the observed advancements underscore a positive learning trajectory, showcasing a more refined understanding of loop mechanisms and the specific role played by the range() function in Python programming.

In the question "How would you write a simple for loop to print the numbers from 1 to 5 in Python?" The observed improvement from a 52% pre-test correctness to a 62% post-test correctness in writing a simple for loop to print numbers from 1 to 5 in Python suggests a notable enhancement in participants' programming comprehension. The pre-test indicates an initial lack of proficiency, possibly stemming from unfamiliarity with the syntax or structure of Python loops. The

subsequent 10% increase in correct responses on the post-test may reflect effective learning interventions, such as targeted instruction, practice opportunities, or conceptual reinforcement. It implies that learners grasped the fundamental concepts of Python's for loop, enabling them to iterate through a specified range and print sequential numbers. The improvement underscores the effectiveness of educational strategies employed between the pre-test and post-test assessments, reinforcing participants' ability to translate programming concepts into functional code.

From the question "What is the purpose of the print() function in Python?" The improvement from a 65% pre-test to a 75% post-test in understanding the purpose of the print() function in Python can be attributed to focused learning and comprehension. In the pre-test, participants may have had varying levels of familiarity with Python, leading to a lower initial success rate. However, through targeted explanations and learning resources, participants likely gained a clearer understanding of the print() function's role in displaying output in Python. The 10% improvement suggests that the participants successfully absorbed the information, grasped the concept, and applied it effectively during the post-test. This progress could be a result of reinforced learning, practice, and a better grasp of Python's fundamental concepts.

There is an increase of score from 82% to 89% in the question "Which function is used to get user input in Python?". Initially, participants might have had some uncertainty or gaps in their knowledge regarding this aspect of Python programming. However, through the learning process, whether through explicit instruction, practice, or reinforcement, they evidently refined their comprehension.

This improvement could be a result of increased familiarity with the input() function, which enables the program to accept user inputs during runtime. The learners likely gained a clearer grasp of how to incorporate this function into their code, reinforcing their ability to interact with users effectively. Overall, the progression in correct responses underscores the effectiveness of the learning intervention in consolidating and reinforcing knowledge related to user input in Python programming.

From the question “Which of the following is NOT a valid function name in Python?” The noticeable improvement in correct answers from the pre-test to the post-test, with an increase from 85% to 89%, suggests a positive impact of the learning intervention. Participants exhibited a heightened understanding of Python function naming conventions over the course of the assessment. The question's focus on identifying an invalid function name likely prompted increased attention to syntax rules and naming conventions within Python, leading to a more accurate post-test performance. This improvement could stem from enhanced comprehension of Python's specific requirements for function names, such as avoiding spaces and special characters, which contributed to the participants' ability to discern the invalid option. Overall, the rise in correct responses indicates effective learning and consolidation of knowledge on this particular aspect of Python programming.

From the question “Which of the following is a correct way to call a function in Python?” The substantial improvement in correct responses from a pre-test score of 59% to a post-test score of 78% can be attributed to the focused

learning intervention. The question regarding the correct way to call a function in Python likely prompted participants to revisit and reinforce their understanding of fundamental programming concepts. The intervention might have included targeted explanations, practical examples, or interactive exercises, enabling learners to grasp the intricacies of Python function invocation more effectively. The 19% increase in correct answers suggests that the intervention successfully addressed misconceptions or uncertainties, fostering a deeper comprehension of the syntax and conventions involved in calling functions in Python. Overall, the improvement underscores the efficacy of the instructional approach and the participants' enhanced grasp of essential programming principles.

An improvement of 83% to 90% from the question "What does the "elif" keyword in Python's if-else statements stand for?" participants understand the "elif" keyword in Python's if-else statements suggests a notable enhancement in comprehension. In the pre-test, 83% of individuals demonstrated a baseline understanding, but the subsequent increase to 90% reflects a successful intervention or educational effort. The improvement may stem from various factors, such as targeted instruction, clarification of concepts, or the reinforcement of key principles related to Python's conditional statements. The term "elif" is a contraction of "else if," and it is utilized to introduce an additional condition in the control flow structure. The leap in correct answers likely results from a combination of effective teaching methodologies, clearer explanations, and learners' active engagement with the material, showcasing a commendable advancement in mastering this aspect of Python programming.

In the question "What is the purpose of the "if" statement in Python? The significant improvement in understanding the purpose of the "if" statement in Python" reflected in the pre-test score of 87% rising to a post-test score of 92%, can be attributed to a deeper comprehension of conditional statements. The "if" statement serves a crucial role in Python programming by allowing the execution of specific code blocks based on the evaluation of a given condition. Prior to the assessment, participants might have grasped the basic concept but exhibited a heightened grasp after the intervention. The increase in correct answers indicates an enhanced understanding of how "if" statements contribute to the flow control in Python, enabling more precise and dynamic decision-making within a program. This improvement suggests that the learners have not only mastered the syntax but have also gained a more nuanced understanding of the logical constructs that underpin effective programming in Python.

From the question "In Python, how do you write an "if-else" statement to check if a variable x is greater than 10 and print "x is greater than 10" if true, and "x is not greater than 10" if false?" The improvement from a pre-test accuracy of 56% to a post-test accuracy of 67% in understanding how to write an "if-else" statement in Python to check if a variable x is greater than 10 and print corresponding messages can be attributed to increased comprehension of conditional logic. In the pre-test, a majority of individuals may have struggled with the syntax and logic required for constructing a proper "if-else" statement. The post-test improvement suggests that participants have gained a better grasp of the Python programming constructs involved. This could include a clearer understanding of

the relational operators, such as '>' for greater than, and the overall structure of control flow statements. The enhancement in accuracy indicates that learners have successfully absorbed the necessary knowledge to navigate and implement conditional statements effectively in Python.

Table 5. Interpretation of Pre-test and Post-test Data

| Exam's Result | Mean | Interpretation |
|-----------------|-------|---|
| Pre-Test Exams | 18.37 | There is an increase of 12.14 percent in their scores after playing <u>Detective Py</u> . |
| Post-Test Exams | 20.6 | |

The table above shows an increase of the participant's scores in pre-test and post-test results. The participants were given a task to answer a total of 25 questions in their pre-test exam. The pre-test results had an average of 18.37 which means that the questions were manageable by the students. Also, the scores show their familiarity about the concepts of python programming language. The post-test results had an average of 20.6 which clearly shows a slight change of the participants scores. There is an increase of 2.23 in the mean score of the students as observed in the table above, it is an increase of 12.14 percent increase in the mean score of the students. This improvement implies that participants enhanced their understanding and skills in Python programming after engaging with the educational game. In pretest-posttest, if the average score of post-tests is higher than the average of pre-test score, then it makes sense to conclude that the treatment might be responsible for the improvement (Chiang, 2015).

IV. User Engagement Assessment of the Students to the Proposed Mobile Game

Table 6. 5-point Likert Scale

| Agreement | Likert-Scale | Interval |
|----------------|--------------|-----------|
| Very disagree | 1 | 1.00-1.80 |
| Disagree | 2 | 1.81-2.60 |
| Agree | 4 | 3.41-4.20 |
| Strongly Agree | 5 | 4.21-5.00 |

The evaluation table above utilizes the Likert Scale, comprising 5-point scales, to gauge the effectiveness of Detective Py in terms of user engagement. Various characteristics were aligned with the ISO/IEC 25010 standard.

Table 16. Functionality Evaluation of the Proposed System

| FUNCTIONALITY | n | Mean | Mode | SD | Variance |
|--|----|------|------|------|----------|
| Detective Py covers the fundamentals of python programming, making it effective for learning | 25 | 4.64 | 5 | 0.57 | 0.32 |
| Detective Py provides a variety of fundamentals on python programming challenges to enhance learning | 25 | 4.44 | 4.5 | 0.58 | 0.34 |

| | | | | | |
|--|----|------|---|------|------|
| Detective Py is a valuable tool for gaining knowledge about basics of python programming | 25 | 4.56 | 5 | 0.58 | 0.34 |
|--|----|------|---|------|------|

Average Weighted Mean: 4.55 – Strongly Agree

Functional Suitability Result

The functional suitability has an average of 4.55, with that it passed the evaluation. This report presents the results of the Functional Suitability assessment for Detective Py. The assessment aimed to evaluate the software's performance against specified functional requirements. The Functional Suitability assessment indicates Detective Py performs well in certain areas but requires attention in others.

Table 17. Usability Evaluation of the Proposed System

| USABILITY | n | Mean | Mode | SD | Variance |
|--|----|------|------|------|----------|
| The user interface of the game is simple, intuitive, and easy to navigate for learning fundamentals of python programming. | 25 | 4.72 | 5 | 0.46 | 0.21 |
| The interactions and features of the game are designed in a user-friendly manner, enhancing the learning experiences. | 25 | 4.52 | 5 | 0.51 | 0.26 |

| | | | | | |
|---|----|------|---|------|------|
| Detective Py promotes engagement and active learning, making it enjoyable for the user. | 25 | 4.56 | 5 | 0.58 | 0.34 |
|---|----|------|---|------|------|

Average Weighted Mean: 4.6 – Strongly Agree

Usability Result: The usability evaluation yielded an average score of 4.6, indicating a successful passing grade for Detective Py. This assessment delved into user interactions and the overall user experience. The use of a Likert scale allowed for a thorough examination of factors such as learnability, efficiency, and satisfaction concerning Detective Py's usability. Generally, users found the system to be intuitive and user-friendly, reflecting a commendable level of usability. However, identified areas for improvement exist, presenting opportunities to further enhance user satisfaction and streamline interactions for a more seamless experience.

Table 18. Portability Evaluation of the Proposed System

| PORATABILITY | n | Mean | Mode | SD | Variance |
|---|----|------|------|------|----------|
| Detective Py can be easily accessed on various devices, ensuring flexibility for learning | 25 | 4.32 | 4 | 0.48 | 0.23 |
| The game is highly portable and accessible from different locations, enhancing the learning experience. | 25 | 4.52 | 5 | 0.51 | 0.26 |

Average Weighted Mean: 4.42 – Strongly Agree

Portability Result: The portability assessment yielded an average score of 4.42, indicating satisfactory performance in running across different environments and platforms. Employing a Likert scale, this evaluation identified strengths and potential challenges related to portability.

Table 19. Maintainability Evaluation of the Proposed System

| MAINTAINABILITY | n | Mean | Mode | SD | Variance |
|--|----|------|------|------|----------|
| Detective Py provides a clear guidance and instructions for players to navigate the challenges | 25 | 4.36 | 4 | 0.57 | 0.32 |
| Detective Py contents and structures can be easily update. | 25 | 4.32 | 4 | 0.56 | 0.31 |
| Average Weighted Mean: 4.34 – Strongly Agree | | | | | |

Maintainability Result: With an average score of 4.34, Detective Py exhibited a high level of maintainability. This assessment focused on evaluating how easily the software could be maintained, modified, and updated. Factors such as code readability, documentation quality, and ease of troubleshooting were considered using a Likert scale. Although Detective Py demonstrated good maintainability with well-organized code and documentation, room for improvement exists. Enhancing code modularity and providing more comprehensive documentation could streamline maintenance processes further.

Table 20. Compatibility Evaluation of the Proposed System

| COMPATIBILITY | n | Mean | Mode | SD | Variance |
|---|----------|-------------|-------------|-----------|-----------------|
| Detective Py exhibits high quality with seamless co-existence with different devices. | 25 | 4.6 | 5 | 0.5 | 0.25 |
| Average Weighted Mean: 4.6 – Strongly Agree | | | | | |

Compatibility Result

The compatibility result has an average of 4.6, with that it passed the evaluation. The Compatibility assessment examined the software's compatibility with different platforms, browsers, and external systems. Findings are based on a Likert scale, revealing strengths and potential areas for improvement in terms of cross-platform and cross-system compatibility. Detective Py exhibits commendable compatibility with various platforms, but there are specific compatibility concerns that need attention. Addressing these issues will ensure a seamless user experience across diverse environments.

Table 21. Reliability Evaluation of the Proposed System

| RELIABILITY | n | Mean | Mode | SD | Variance |
|---|----------|-------------|-------------|-----------|-----------------|
| Detective Py demonstrates a high level of maturity in its design, gameplay, and overall polish. | 25 | 4.48 | 5 | 0.59 | 0.34 |

| | | | | | |
|---|----|------|-----|------|------|
| Detective Py demonstrates robust fault tolerance, providing a smooth and uninterrupted experience even in the face of potential issues. | 25 | 4.44 | 4.5 | 0.58 | 0.34 |
| Detective Py can handle crashes and recovery of gameplay. | 25 | 4.44 | 4.5 | 0.58 | 0.34 |

Average Weighted Mean: 4.45 – Strongly Agree

Reliability Result: Detective Py achieved an average reliability score of 4.45, demonstrating its reliability under varied conditions. The reliability assessment focused on evaluating the software's consistent performance and stability. Utilizing Likert scale metrics, the evaluation assessed the system's stability and fault tolerance. While Detective Py showcased commendable reliability with minimal disruptions in normal operating conditions, there are identified scenarios where additional fault tolerance measures could be implemented to elevate the system's overall reliability further.

The beta test result was able to get an average of 4.68. The beta test results above were collected from a sample of n=25 out of the 100 participants who actively engaged with and utilized the application. This comprehensive overview indicates that the application exhibits a good set of characteristics essential for a high-quality system. The findings strongly suggest that Detective Py not only meets but surpasses the necessary criteria, affirming its effectiveness in fostering user engagement. The implications drawn from this data suggesting Detective Py as a

reliable and efficient tool for user interaction, paving the way for its seamless integration into various scenarios and applications.

Alpha Test Evaluation Result

This section presents the results obtained from the alpha testing phase of Detective Py. The alpha testing stage marks a crucial milestone in the development process, providing valuable insights into some of the characteristics of ISO 25010 for the overall effectiveness of Detective Py. The analysis encompasses a thorough examination of the software's features, user interface, and responsiveness. The results of evaluation were aim to highlight the software's capabilities, identify any encountered challenges, and discuss the implications for its future refinement. The data gathered were from IT experts and Alpha testers who have sufficient knowledge and recognition in terms of the subject matter.

Table 7. Functionality Evaluation of the proposed system

| FUNCTIONALITY | n | Mean | Mode | SD | Variance |
|---|---|------|------|------|----------|
| Detective Py covers the fundamentals of python programming, making it effective for learning. | 3 | 4.67 | 5 | 0.47 | 0.22 |
| Detective Py provides a variety of fundamentals on python programming challenges to enhance learning. | 3 | 5 | 5 | 0 | 0 |

Detective Py is a valuable tool for gaining knowledge about basics of python programming.

| | | | | |
|---|------|---|------|------|
| 3 | 4.67 | 5 | 4.67 | 4.67 |
|---|------|---|------|------|

Average Weighted Mean: 4.78 – Strongly Agree

Table 8 present the evaluation result for the proposed system functionality. The calculated average weighted mean is 4.78, with that it passed the evaluation. This report presents the results of the Functional Suitability assessment for Detective Py. The assessment aimed to evaluate the software's performance against specified functional requirements. The Functional Suitability assessment indicates Detective Py performs well in certain areas but requires attention in others.

Table 8. Usability Evaluation of the Proposed System

| USABILITY | n | Mean | Mode | SD | Variance |
|--|---|------|------|------|----------|
| The user interface of the game is simple, intuitive, and easy to navigate for learning fundamentals of python programming. | 3 | 4.67 | 5 | 0.47 | 0.22 |
| The interactions and features of the game are designed in a user-friendly manner, enhancing the learning experiences. | 3 | 4.33 | 4 | 0.47 | 0.22 |

| | | | | | |
|---|---|------|---|------|------|
| | 3 | 4.33 | 4 | 0.47 | 0.22 |
| Detective Py promotes engagement and active learning, making it enjoyable for the user. | | | | | |

Average Weighted Mean: 4.44 – Strongly Agree

Table 9 present the evaluation result for the proposed system usability. The usability evaluation yielded an average score of 4.44, indicating a successful passing grade for Detective Py. This assessment delved into user interactions and the overall user experience. The use of a Likert scale allowed for a thorough examination of factors such as learnability, efficiency, and satisfaction concerning Detective Py's usability. Generally, users found the system to be intuitive and user-friendly, reflecting a commendable level of usability. However, identified areas for improvement exist, presenting opportunities to further enhance user satisfaction and streamline interactions for a more seamless experience.

Table 9. Portability Evaluation of the Proposed System

| PORTABILITY | n | Mean | Mode | SD | Variance |
|--|---|------|------|------|----------|
| 7. Detective Py can be easily accessed on various devices, ensuring flexibility for learning. | 3 | 5 | 5 | 0 | 0 |
| 8. The game is highly portable and accessible from different locations, enhancing the learning experience. | 3 | 4.33 | 4 | 0.47 | 0.22 |

Average Weighted Mean: 4.67 – Strongly Agree

Table 10 present the evaluation result for the proposed system usability. The portability assessment yielded an average score of 4.45, indicating satisfactory performance in running across different environments and platforms. Employing a Likert scale, this evaluation identified strengths and potential challenges related to portability.

Table 10. Maintainability Evaluation of the Proposed System

| MAINTAINABILITY | n | Mean | Mode | SD | Variance |
|--|---|------|------|----|----------|
| Detective Py provides a clear guidance and instructions for players to navigate the challenges | 3 | 4 | 4 | 0 | 0 |
| Detective Py contents and structures can be easily update. | 3 | 5 | 5 | 0 | 0 |
| Average Weighted Mean: 4.5 – Strongly Agree | | | | | |

Table 11 present the evaluation result for the proposed system maintainability. With an average score of 4.5, Detective Py exhibited a high level of maintainability. This assessment focused on evaluating how easily the software could be maintained, modified, and updated. Factors such as code readability, documentation quality, and ease of troubleshooting were considered using a Likert scale. Although Detective Py demonstrated good maintainability with well-organized code and documentation, room for improvement exists. Enhancing code modularity and providing more comprehensive documentation could streamline maintenance processes further.

Table 11. Compatibility Evaluation of the Proposed System

| COMPATIBILITY | n | Mean | Mode | SD | Variance |
|---|---|------|------|------|----------|
| 11. Detective Py exhibits high quality with seamless co-existence with different devices. | 3 | 4.33 | 4 | 0.47 | 0.22 |
| Average Weighted Mean: 4.33 – Strongly Agree | | | | | |

Table 12 present the evaluation result for the proposed system compatibility. The result has an average of 4.33, with that it passed the evaluation. The Compatibility assessment examined the software's compatibility with different platforms, browsers, and external systems. Findings are based on a Likert scale, revealing strengths and potential areas for improvement in terms of cross-platform and cross-system compatibility. Detective Py exhibits commendable compatibility with various platforms, but there are specific compatibility concerns that need attention. Addressing these issues will ensure a seamless user experience across diverse environments.

Table 12. Reliability Evaluation of the Proposed System

| RELIABILITY | n | Mean | Mode | SD | Variance |
|---|---|------|------|----|----------|
| Detective Py demonstrates a high level of maturity in its design, gameplay, and overall polish. | 3 | 4 | 4 | 0 | 0 |

| | | | | | |
|---|---|------|---|------|------|
| Detective Py demonstrates robust fault tolerance, providing a smooth and uninterrupted experience even in the face of potential issues. | 3 | 4.67 | 5 | 0.47 | 0.22 |
| Detective Py can handle crashes and recovery of gameplay. | 3 | 5 | 5 | 0 | 0 |
| Average Weighted Mean: 4.56 – Strongly Agree | | | | | |

Table 13 present the evaluation result for the proposed system compatibility. Detective Py achieved an average reliability score of 4.56, demonstrating its reliability under varied conditions. The reliability assessment focused on evaluating the software's consistent performance and stability. Utilizing Likert scale metrics, the evaluation assessed the system's stability and fault tolerance. While Detective Py showcased commendable reliability with minimal disruptions in normal operating conditions, there are identified scenarios where additional fault tolerance measures could be implemented to elevate the system's overall reliability further.

The alpha test result was able to get an average of 4.57. The data above shows that the professionals suggests that the application have most of the required characteristics of a system in terms of its quality. Therefore, it concludes that the quality of Detective Py in terms of user engagement was recognized by IT Experts and Alpha testers.

CHAPTER V

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter provides a summary of the study's findings. Additionally, it covers the conclusions drawn by the researchers and their recommendations based on the study's outcomes.

SUMMARY

In summary, the gathered data indicates a positive impact of gamification. This study provides compelling evidence supporting the effectiveness of the escape room educational game in advancing Python programming learning development. The favorable outcomes and adaptability of the gamified approach highlight its potential as a valuable tool for educators aiming to employ innovative and engaging methods for improved student learning. Additionally, the game can serve as a refresher for students or its users. These results bear significant implications for educators, curriculum designers, and policymakers, emphasizing the value of integrating effective educational games as dynamic tools to enhance learning experiences and outcomes.

CONCLUSION

In conclusion, the study process outlined aimed to comprehensively assess and improve participants' understanding of Python programming. The initial pre-test served to gauge their existing knowledge, enabling targeted educational interventions. Subsequently, Detective Py, an educational mobile game integrating engaging escape room concepts, was designed and developed to offer a dynamic and interactive learning approach.

The pre-test results revealed participants' familiarity with the Python programming language. The examination focused on 25 fundamental Python-related questions, yielding an average score of 18.37, indicating a strong grasp of Python concepts among the students.

The post-test examination evaluated knowledge acquisition and user engagement, providing insights into the game's effectiveness in enhancing participants' Python proficiency. This assessment focused on participants who underwent the post-test after engaging with the game within a 24-hour window following the pre-test. The average post-test score of 20.6 indicated improvements in their learning outcomes due to the educational intervention.

The findings suggest the educational game positively impacted participants' understanding of Python programming. The increased post-test scores and improved engagement highlight the beneficial impact of gamified approaches on learning and development. This enhanced performance indicates that gamification not only enhances engagement but also fosters a deeper understanding of complex Python programming concepts.

RECOMMENDATIONS

For future researchers, this study recommends enhancing the application's cross compatibility to IOS devices, thus broadening its accessibility. Improvements in graphics and animation would enhance the game's visual appeal, making it more captivating. Incorporating a scoreboard to track players' fastest times would add an element of challenge, encouraging users to strive for better performances.

Expanding the game with additional levels and programming topics beyond Python fundamentals would heighten its complexity, offering users a more challenging experience. Introducing cutscenes and a storyline would elevate user engagement, fostering a deeper connection with the game and motivating continued playthrough to its final levels.

Aside from cross-compatibility for IOS devices, further improvements in user experience (UX) and interface design could significantly augment the application's appeal. Streamlining navigation, ensuring consistency in design elements, and optimizing user interactions would contribute to a more seamless and intuitive experience across all platforms. By conducting user testing and gathering feedback, refinements in UX/UI could be tailored to meet the preferences and expectations of a wider user base, thereby enhancing overall satisfaction and engagement.

Implementing features that encourage community engagement and social interaction could greatly enrich the application's appeal. Integrating social sharing options, leaderboards, or multiplayer functionalities would foster a sense of competition and collaboration among users. Additionally, incorporating discussion forums or interactive elements where users can exchange knowledge, seek help, or share experiences related to programming concepts could create a vibrant community around the application, adding substantial value beyond the gameplay itself.

APPENDICES

APPENDIX A.

Request Letters (Adviser)

APPENDIX B.

Request Letters (Locale)



November 8, 2023

ENGR. Jun P. Flores, PECE, MEP-EE
Dean, College of Engineering and Architecture

Dear Sir,

We are writing to ask for your permission to conduct research at Department of Computer Engineering. This study's objective is to be able to allow the users to gain knowledge about the fundamentals of Python programming language by utilizing the essence of the game, to be able to immerse the users on playing productive game and to examine the effectiveness of creative learning experience with the use of a mobile game. The purpose of this study is to provide knowledge about the Python programming language with the use of an educational mobile game.

As a proponent, we are particularly interested in immersing students on playing educational game to provide evidence of its effectiveness on learning. The data and insights obtained from this study will contribute to the body of knowledge in the field and may be used to improve the way of learning and insights of students about game-based learning.

In order to conduct this study, we request the following permission:

- Access relevant information or documents within the organization.
- Observe and interact with employees or participants, if necessary.
- Conduct interviews or surveys with employees or participants, with their voluntary participation.
- Maintain the confidentiality of all participants, ensuring that no sensitive information will be disclosed.

We assured that the information collected during the study will be handled with the utmost care and confidentiality, and any data obtained will be used for the purpose of the study.

Thank you for your kind consideration and approval regarding this matter.

Very truly yours,

Aloof, John Lorenz D.
Batul, Shanie Carly B.

Armas, John Vincent N.
Manuyag, Jeremy D.

Singian, Christian Lee L.

Bulyar, Mark Joseph S.
Santos, Tristan S.

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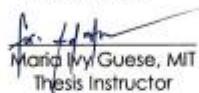
Subject: Letter of Consent for Conducting Study



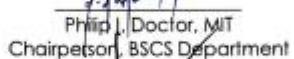
Noted by:



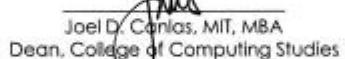
Aldreyn W. Pineda
Thesis Adviser



Maria Ivy Gueze, MIT
Thesis Instructor

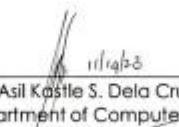


Philip J. Doctor, MIT
Chairperson, BSCS Department



Joel D. Canlas, MIT, MBA
Dean, College of Computing Studies

Recommending Approval:



11/14/13
ENGR. Asil Kastle S. Dela Cruz
Chairperson, Department of Computer Engineering

Approved by:



ENGR. Jun P. Flores, PECE, MPEE
Dean, College of Engineering and Architecture

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Email: ccc@dhvsu.edu.ph

APPENDIX C.

Plagiarism Checker Certificate

APPENDIX D.

Grammar Check Certificate



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College of Computing Studies
Bacolor, Pampanga



GRAMMARIAN'S CERTIFICATE

This is to certify that the thesis titled, "**DETECTIVE PY: MOBILE-BASED 2D EDUCATIONAL ESCAPE ROOM FOCUSED ON PYTHON PROGRAMMING**", prepared and submitted in partial fulfillment of the requirements for the degree, Bachelor of Science in Computer Studies, has been reviewed and proofread, aligned with the set of structural rules that govern grammar, composition of sentences, and correct choice of words in the English language.

Given this day 11th day of December, 2023.

Certified by:

A handwritten signature in black ink, appearing to read "Francis R. Bayani".

Francis R. Bayani, LPT
Grammarian

APPENDIX E.

Pre-Survey Questionnaire



"Detective Py: Mobile-based 2d Educational Escape Room focused on Python Programming"

We are the researchers from Bachelor of Science in Computer Science and as part of our thesis, we'll be conducting a survey that investigates and assess effectiveness of game-based learning application called "*Detective Py: Mobile-based 2d Educational Escape Room focused on Python Programming*". Your honest and thoughtful responses will contribute to our study and assist in making informed decisions. This survey should take only a few minutes of your time, and your feedback is completely confidential. We encourage you to answer to the best of your knowledge and experience. Your input is highly valuable to us, and we thank you for taking the time to share your thoughts and perspectives

Research Title: Detective Py: Mobile-based 2d Educational Escape Room focused on Python Programming

Instructions:

1. Please read each question carefully and provide honest and truthful response with the extent of your knowledge.
2. Your responses are completely confidential, and your personal information will not be shared.
3. If you feel uncomfortable or don't know the answer to the question, you may choose to skip it.

I. Participant Demographics:

Name (Optional): _____

Age: _____

Gender: _____

How familiar are you with python programming?

- [] Very Familiar.
 [] Somewhat Familiar.
 [] Not Familiar.
 [] Prefer not to say.



II. Interview Questions

Kindly encircle the most appropriate answer for each question.

1. Which of the following cannot be a Python variable name?
 - A. Int_1
 - B. true
 - C. var-2
 - D. name3

2. What's the difference between int and float data types in Python?
 - A. Int represents whole numbers, and float represents numbers with decimals.
 - B. Int represents numbers with decimals, and float represents whole numbers.
 - C. Int represents positive numbers, and float represents negative numbers.
 - D. Int represents numbers with decimals, and float represents complex numbers.

3. How can you change the string variable "5" into a number?
 - A. Use the int() function.
 - B. You can't turn a string into a number.
 - C. Use the float() function.
 - D. Use the integer() function.

4. What keyword is used to display data in python?
 - A. display
 - B. output
 - C. print
 - D. show

5. What does the print() function do when you call it without any arguments?
 - A. It will exit.
 - B. It prints None.
 - C. It raises a TypeError.
 - D. It prints().



6. Which of the following statements will print "Hello, World!" to the screen in Python?
 - A. print("Hello, World!")
 - B. play("Hello, World!")
 - C. output("Hello, World!")
 - D. show("Hello, World!")

7. Which operator will you use to compare two values?
 - A. +
 - B. -
 - C. ==
 - D. /

8. This operator is used to perform mathematical operations like addition, subtraction, multiplication.
 - A. Logical Operators
 - B. Assignment Operators
 - C. Arithmetic Operators
 - D. Comparison Operators

9. What does the following Python code do?

```
name = "Alice"
print("Hello, " + name + "!")
```

 - A. It multiplies two numbers.
 - B. It displays Hello +Alice+
 - C. It displays Hello, Alice!
 - D. It generates an error.

10. How do you get to the first item in a Python list?
 - A. By using the index 0: my_list[0]
 - B. By using the index 1: my_list[1]
 - C. By using the index -1: my_list[-1]
 - D. By using the index -0: my_list[-0]



11. What does the following Python code do?

```
myloop = [1,2,3]
```

```
for i in myloop:  
    print(i)
```

A. 1 C. 1,2,3

2

3

B. 1 2 3

D. It will display an
error

12. In Python, which function should you use to put a new item at the very end of a list?

- C. add_element()
- D. append()
- E. insert()
- F. extend()

13. What is the primary purpose of a while loop in Python?

- A. To execute a block of code a specific number of times.
- B. To execute a block of code repeatedly as long as a condition is true.
- C. To execute a block of code exactly once.
- D. To exit the program.

14. In a while loop, what happens if the condition provided is initially False?

- A. The loop will not execute at all.
- B. The loop will execute exactly once.
- C. The loop will execute indefinitely.
- D. Python raises an error.

15. Which of the following code snippets creates a while loop that prints numbers from 1 to 5?

- A.
while i <= 5:
 print(i)i += 1
- B.
while i < 6:
 print(i)i += 1
- C.
while i != 6:
 print(i)i += 1
- D.
while i == 5:
 print(i)i += 1



16. What is the primary purpose of a "for loop" in Python?
- A. To define functions
 - B. To perform a specific action a certain number of times
 - C. To display a message to the user
 - D. To check if a condition is true
17. In a for loop, what does the "range()" function do?
- A. It generates a sequence of numbers
 - B. It pauses the loop for a given duration
 - C. It performs arithmetic calculations
 - D. It checks for errors in the code
18. How would you write a simple for loop to print the numbers from 1 to 5 in Python?
- A. for i in range(1, 5)
 - B. for i in range(5, 1)
 - C. for i in [1, 2, 3, 4, 5]:
 - D. for i in (1, 5):
19. What is the purpose of the print() function in Python?
- A. To add two numbers
 - B. To display text on the screen
 - C. To create a new variable
 - D. To save data to a file
20. Which function is used to get user input in Python?
- A. get_input()
 - B. read_input()
 - C. input()
 - D. user_prompt()
21. Which of the following is NOT a valid function name in Python?
- A. my_function
 - B. 123function
 - C. function_two
 - D. user_input_function



22. Which of the following is a correct way to call a function in Python?
- A) call myFunction()
 - B) myFunction call
 - C) myFunction()
 - D) function(myFunction)
23. What does the "elif" keyword in Python's if-else statements stand for?
- A. Element List If
 - B. Else If
 - C. Exclusive List If
 - D. Execute List If
24. What is the purpose of the "if" statement in Python?
- A. To execute a block of code when a condition is true
 - B. To execute a block of code unconditionally
 - C. To define a function
 - D. To perform a loop
25. In Python, how do you write an "if-else" statement to check if a variable *x* is greater than 10 and print "*x* is greater than 10" if true, and "*x* is not greater than 10" if false?
- A. A.

```
if x > 10: print("x is greater than 10")
else: print("x is not greater than 10")
```
 - B. B.

```
if x > 10 print("x is greater than 10")
else print("x is not greater than 10")
```
 - C. C.

```
if x > 10 print("x is greater than 10")
elif x <= 10: print("x is not greater than 10")
```
 - D. D.

```
if x > 10: print("x is not greater than 10")
else: print("x is greater than 10")
```

APPENDIX F.

Alpha Test Questionnaire

**Alpha Testing**

Name:

Mobile Device Used:

Operating System Version:

Introducing "Detective Py: Mobile-Based 2D Educational Escape Room" – a pioneering educational experience meticulously designed to immerse learners in the wonders of fundamentals in Python programming. This innovative mobile application combines the thrill of an escape room adventure with the educational rigor of Python Language, catering the novice to experience enjoyment while learning. Aspiring programmers will find themselves captivated by a gamified journey where problem-solving, critical thinking, and Python proficiency converge to unlock a series of intellectually stimulating challenges.

Please take a few moments to fill out the form, sharing your experiences, suggestions, and say areas you believe we can improve upon. As we strive for continuous improvement and excellence on our game, we highly value your feedback, your insights are crucial in helping us understand what's working well and where we can make enhancements. We assure you that we will treat your response with care and your feedback and information's are for research purposes only and confidential.

Level of Agreement:

- 5 - Strongly Agree
- 4 - Agree
- 3 - Neutral
- 2 - Disagree
- 1 - Strongly Disagree

Instructions:

- ✓ Play through the Detective Pygame on your mobile device.
- ✓ For each aspect mentioned below, rate your experience using the Likert scale.
- ✓ Provide detailed comments or suggestions where necessary.
- ✓ Report any bugs or technical issues encountered.

| | (1) Strongly Disagree | (2) Disagree | (3) Neutral | (4) Agree | (5) Strongly Agree |
|--|-----------------------------|-----------------|----------------|--------------|--------------------------|
|--|-----------------------------|-----------------|----------------|--------------|--------------------------|

FUNCTIONAL STABILITY

| | | | | | |
|---|--|--|--|--|--|
| 1. Detective Py covers the fundamentals of python programming, making it effective for learning | | | | | |
| 2. Detective Py provides a variety of fundamentals on | | | | | |



| | | | | | |
|---|--|--|--|--|--|
| python programming challenges to enhance learning | | | | | |
| 3. Detective Py is a valuable tool for gaining knowledge about basics of python programming | | | | | |

USABILITY

| | | | | | |
|---|--|--|--|--|--|
| 4. The user interface of the game is simple, intuitive, and easy to navigate for learning fundamentals of python programming. | | | | | |
| 5. The interactions and features of the game are designed in a user-friendly manner, enhancing the learning experiences. | | | | | |
| 6. Detective Py promotes engagement and active learning, making it enjoyable for the user. | | | | | |

PORATABILITY

| | | | | | |
|--|--|--|--|--|--|
| 7. Detective Py can be easily accessed on various devices, ensuring flexibility for learning | | | | | |
| 8. The game is highly portable and accessible from different locations, enhancing the learning experience. | | | | | |

MAINTAINABILITY

| | | | | | |
|---|--|--|--|--|--|
| 9. Detective Py provides a clear guidance and instructions for players to navigate the challenges | | | | | |
| 10. Detective Py contents and structures can be easily update. | | | | | |

COMPATIBILITY

| | | | | | |
|--|--|--|--|--|--|
| 11. Detective Py exhibits high quality with seamless co-existence with different devices | | | | | |
|--|--|--|--|--|--|



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RELIABILITY

| | | | | | |
|---|--|--|--|--|--|
| 12. Detective Py demonstrates a high level of maturity in its design, gameplay, and overall polish. | | | | | |
| 13. Detective Py demonstrates robust fault tolerance, providing a smooth and uninterrupted experience even in the face of potential issues. | | | | | |
| 14. Detective Py can handle crashes and recovery of gameplay | | | | | |

APPENDIX G.

Beta Test Questionnaire



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 ☎ <http://dhvsu.edu.ph>



COLLEGE OF COMPUTING STUDIES

Beta Testing

| |
|---------------------------|
| Name: |
| Mobile Device Used: |
| Operating System Version: |

Introducing "Detective Py: Mobile-Based 2D Educational Escape Room" – a pioneering educational experience meticulously designed to immerse learners in the wonders of fundamentals in Python programming. This innovative mobile application combines the thrill of an escape room adventure with the educational rigor of Python Language, catering the novice to experience enjoyment while learning. Aspiring programmers will find themselves captivated by a gamified journey where problem-solving, critical thinking, and Python proficiency converge to unlock a series of intellectually stimulating challenges.

Please take a few moments to fill out the form, sharing your experiences, suggestions, and say areas you believe we can improve upon. As we strive for continuous improvement and excellence on our game, we highly value your feedback, your insights are crucial in helping us understand what's working well and where we can make enhancements. We assure you that we will treat your response with care and your feedback and information's are for research purposes only and confidential.

Level of Agreement:

5 – Strongly Agree

4 - Agree

3 - Neutral

2 - Disagree

1 – Strongly Disagree

Instructions:

- ✓ Play through the Detective Py game on your mobile device.
- ✓ For each aspect mentioned below, rate your experience using the Likert scale.
- ✓ Provide detailed comments or suggestions where necessary.
- ✓ Report any bugs or technical issues encountered.

| | (1) Strongly Disagree | (2) Disagree | (3) Neutral | (4) Agree | (5) Strongly Agree |
|--|-----------------------------|-----------------|----------------|--------------|--------------------------|
|--|-----------------------------|-----------------|----------------|--------------|--------------------------|

FUNCTIONAL STABILITY

| | | | | | |
|---|--|--|--|--|--|
| 1. Detective Py covers the fundamentals of python programming, making it effective for learning | | | | | |
| 2. Detective Py provides a variety of fundamentals on | | | | | |



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| | | | | | |
|---|--|--|--|--|--|
| python programming challenges to enhance learning | | | | | |
| 3. Detective Py is a valuable tool for gaining knowledge about basics of python programming | | | | | |

USABILITY

| | | | | | |
|---|--|--|--|--|--|
| 4. The user interface of the game is simple, intuitive, and easy to navigate for learning fundamentals of python programming. | | | | | |
| 5. The interactions and features of the game are designed in a user-friendly manner, enhancing the learning experiences. | | | | | |
| 6. Detective Py promotes engagement and active learning, making it enjoyable for the user. | | | | | |

PORATABILITY

| | | | | | |
|--|--|--|--|--|--|
| 7. DetectivePy can be easily accessed on various devices, ensuring flexibility for learning | | | | | |
| 8. The game is highly portable and accessible from different locations, enhancing the learning experience. | | | | | |

MAINTAINABILITY

| | | | | | |
|---|--|--|--|--|--|
| 9. Detective Py provides a clear guidance and instructions for players to navigate the challenges | | | | | |
| 10. Detective Py contents and structures can be easily update. | | | | | |

COMPATIBILITY

| | | | | | |
|--|--|--|--|--|--|
| 11. Detective Py exhibits high quality with seamless co-existence with different devices | | | | | |
|--|--|--|--|--|--|



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RELIABILITY

| | | | | | |
|---|--|--|--|--|--|
| 12. Detective Py demonstrates a high level of maturity in its design, gameplay, and overall polish. | | | | | |
| 13. Detective Py demonstrates robust fault tolerance, providing a smooth and uninterrupted experience even in the face of potential issues. | | | | | |
| 14. Detective Py can handle crashes and recovery of gameplay | | | | | |

APPENDIX H.

Alpha Test Results Summary

| Questions | Number of Response | Mean | Mode | SD | Variance |
|---|--------------------|------|------|------|----------|
| Functional Stability | | | | | |
| 1. Detective Py covers the fundamentals of python programming, making it effective for learning | 3 | 4.67 | 5 | 0.47 | 0.22 |
| 2. Detective Py provides a variety of fundamentals on python programming challenges to enhance learning | 3 | 5 | 5 | 0 | 0 |
| 3. Detective Py is a valuable tool for gaining knowledge about basics of python programming | 3 | 4.67 | 5 | 4.67 | 4.67 |
| Usability | | | | | |
| 4. The user interface of the game is simple, intuitive, and easy to navigate for learning fundamentals of python programming. | 3 | 4.67 | 5 | 0.47 | 0.22 |
| 5. The interactions and features of the game are designed in a user-friendly manner, enhancing the learning experiences. | 3 | 4.33 | 4 | 0.47 | 0.22 |
| 6. Detective Py promotes engagement and active learning, making it enjoyable for the user. | 3 | 4.33 | 4 | 0.47 | 0.22 |

| Portability | | | | | |
|---|---|------|---|------|------|
| 7. Detective Py can be easily accessed on various devices, ensuring flexibility for learning | 3 | 5 | 5 | 0 | 0 |
| 8. The game is highly portable and accessible from different locations, enhancing the learning experience. | 3 | 4.33 | 4 | 0.47 | 0.22 |
| Maintainability | | | | | |
| 9. Detective Py provides a clear guidance and instructions for players to navigate the challenges | 3 | 4 | 4 | 0 | 0 |
| 10. Detective Py contents and structures can be easily update. | 3 | 5 | 5 | 0 | 0 |
| Compatibility | | | | | |
| 11. Detective Py exhibits high quality with seamless co-existence with different devices. | 3 | 4.33 | 4 | 0.47 | 0.22 |
| Reliability | | | | | |
| 12. Detective Py demonstrates a high level of maturity in its design, gameplay, and overall polish. | 3 | 4 | 4 | 0 | 0 |
| 13. Detective Py demonstrates robust fault tolerance, providing a smooth and uninterrupted experience even in the face of potential issues. | 3 | 4.67 | 5 | 0.47 | 0.22 |
| 14. Detective Py can handle crashes and recovery of gameplay | 3 | 5 | 5 | 0 | 0 |
| The average mean is 4.57 which is equivalent to the description of Agree. | | | | | |

APPENDIX I.

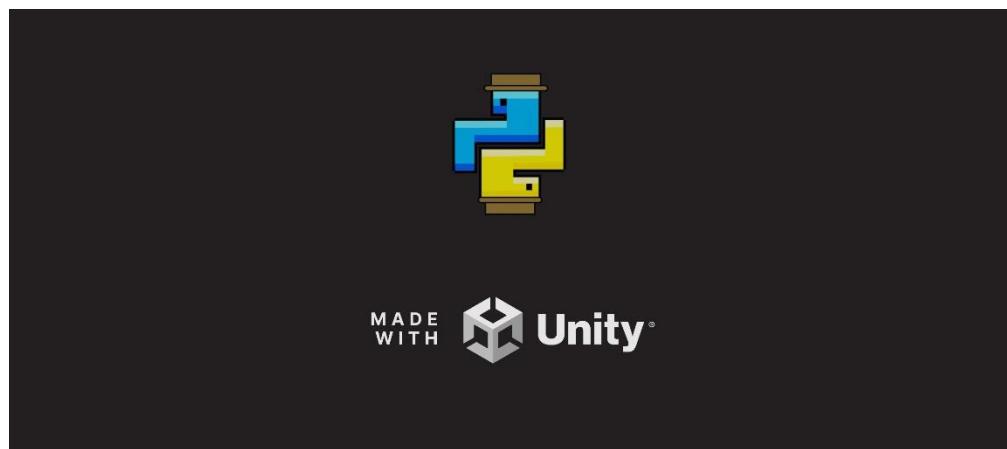
Beta Test Results Summary

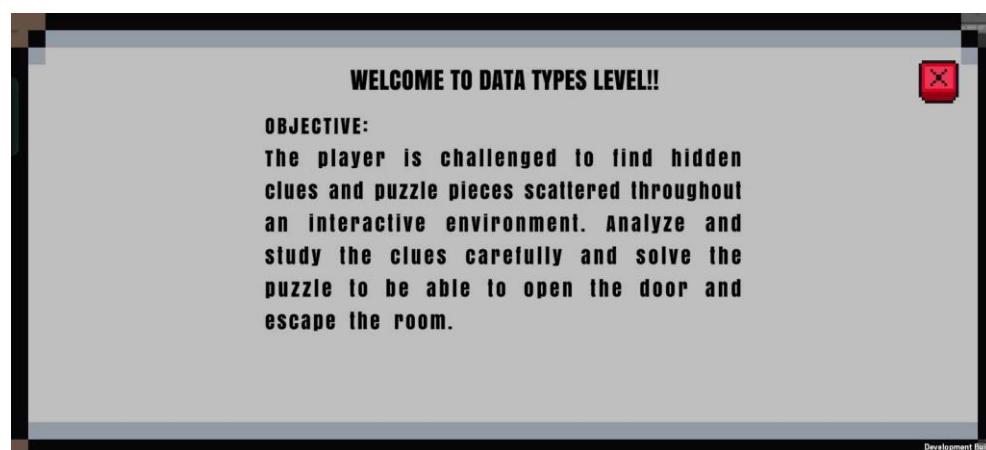
| Questions | Number of Response | Mean | Mode | SD | Variance |
|---|--------------------|------|------|------|----------|
| Functional Stability | | | | | |
| 1. Detective Py covers the fundamentals of python programming, making it effective for learning | 25 | 4.64 | 5 | 0.57 | 0.32 |
| 2. Detective Py provides a variety of fundamentals on python programming challenges to enhance learning | 25 | 4.44 | 4.5 | 0.58 | 0.34 |
| 3. Detective Py is a valuable tool for gaining knowledge about basics of python programming | 25 | 4.56 | 5 | 0.58 | 0.34 |
| Usability | | | | | |
| 4. The user interface of the game is simple, intuitive, and easy to navigate for learning fundamentals of python programming. | 25 | 4.72 | 5 | 0.46 | 0.21 |
| 5. The interactions and features of the game are designed in a user-friendly manner, enhancing the learning experiences. | 25 | 4.52 | 5 | 0.51 | 0.26 |
| 6. Detective Py promotes engagement and active learning, making it enjoyable for the user. | 25 | 4.56 | 5 | 0.58 | 0.34 |

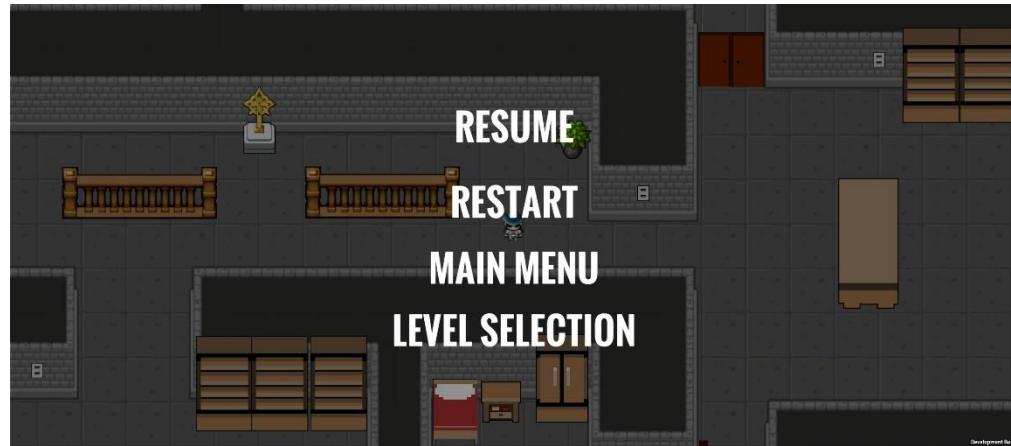
| Portability | | | | | |
|---|----|------|-----|------|------|
| 7. Detective Py can be easily accessed on various devices, ensuring flexibility for learning | 25 | 4.32 | 4 | 0.48 | 0.23 |
| 8. The game is highly portable and accessible from different locations, enhancing the learning experience. | 25 | 4.52 | 5 | 0.51 | 0.26 |
| Maintainability | | | | | |
| 9. Detective Py provides a clear guidance and instructions for players to navigate the challenges | 25 | 4.36 | 4 | 0.57 | 0.32 |
| 10. Detective Py contents and structures can be easily update. | 25 | 4.32 | 4 | 0.56 | 0.31 |
| Compatibility | | | | | |
| 11. Detective Py exhibits high quality with seamless co-existence with different devices. | 25 | 4.6 | 5 | 0.5 | 0.25 |
| Reliability | | | | | |
| 12. Detective Py demonstrates a high level of maturity in its design, gameplay, and overall polish. | 25 | 4.48 | 5 | 0.59 | 0.34 |
| 13. Detective Py demonstrates robust fault tolerance, providing a smooth and uninterrupted experience even in the face of potential issues. | 25 | 4.44 | 4.5 | 0.58 | 0.34 |
| 14. Detective Py can handle crashes and recovery of gameplay | 25 | 4.44 | 4.5 | 0.58 | 0.34 |
| The average mean is 4.49 which is equivalent to the description of Agree. | | | | | |

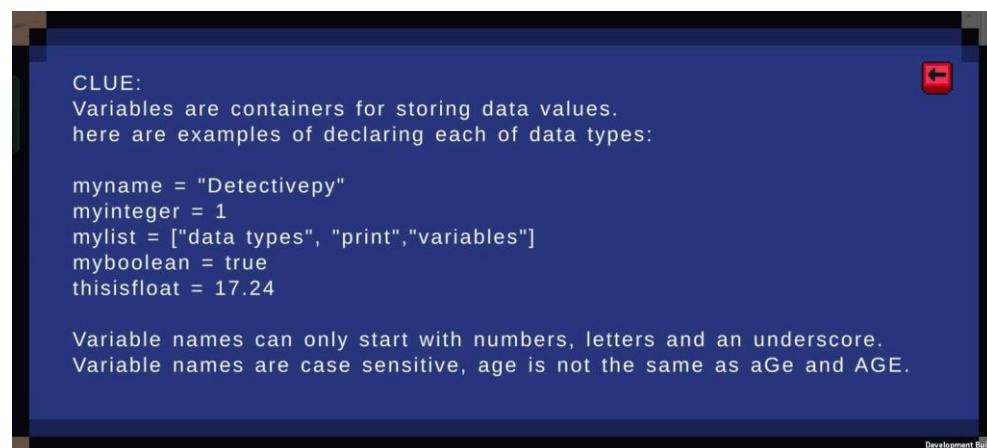
APPENDIX J.

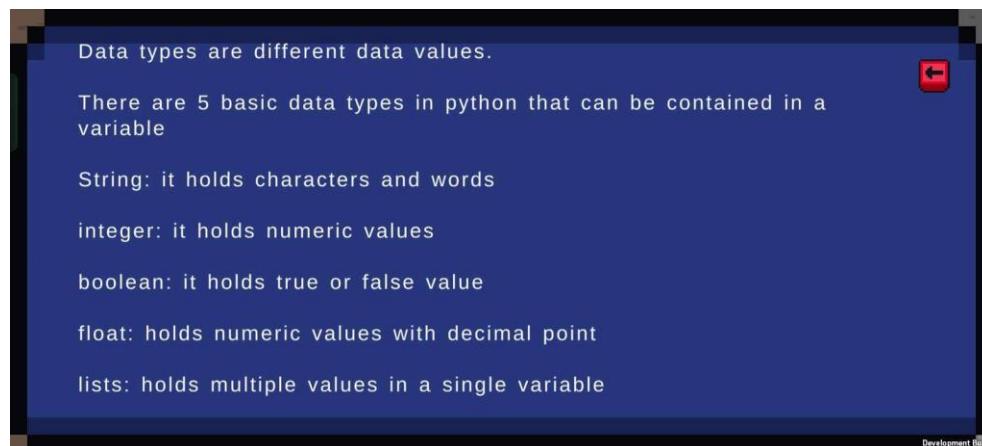
System Screenshots



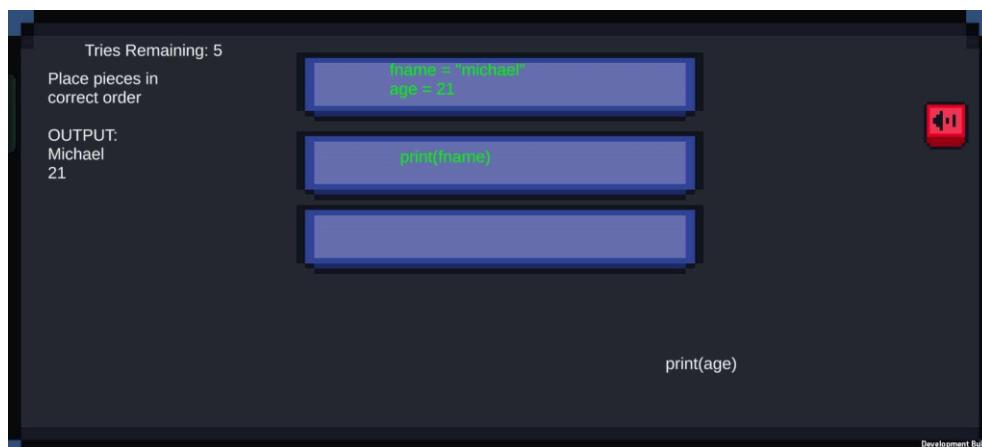








Development Build



Development Build



Development Build

APPENDIX K.

User Manual

Detective Py User Manual

Detective Py is a game designed as an educational escape room focused on python programming as its concept.

Table of Contents:

- Installation
- Main Menu
- Inside Detective Py game

Installation:

1. Download the Detective application that is provided by the developers.
2. Install the game application.
3. Open the game after installing.

Main Menu:

In the "Main Menu" screen, there are four buttons:

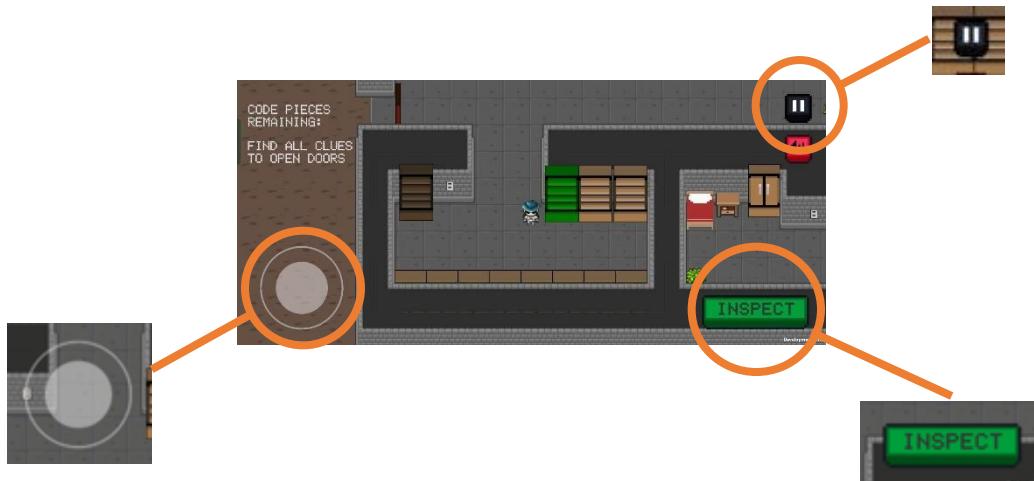
- NEW GAME button — to start a game.
- OPTIONS button — to configure the sound volume of the game.
- QUIT — to exit the game.



Inside Detective Py game:

After pressing the "Play", the user can now play the Detective Py.

There are controllers to move the character, "INSPECT" button that enabled the character to interact with in-game furniture. The Pause button, pause the game and open a panel that consists of three buttons: Resume, Menu, Music, and SFX button.



APPENDIX L.

Sample Source Code

```
using System;
using System.Collections;
using System.Collections.Generic;
using System.Linq;
using System.Runtime.CompilerServices;
using TMPro;
using Unity.VisualScripting;
using UnityEditor;
using UnityEngine;
using UnityEngine.SceneManagement;
using UnityEngine.UI;
using UnityEngine.UIElements;

public class ObjectDetector : MonoBehaviour
{
    private int currentSceneIndex;
    private int lastSceneIndex;
    public GameObject LoadingScreen;
    public UnityEngine.UI.Slider slider;
    public TextMeshProUGUI progressText;
    public GameObject showlevelcomplete;

    private bool allcluesinteracted;
    private bool checktaskonce = false;

    public DoorAnimate[] doorAnimate;
    private bool isInRange = false;
    private bool isclicked = false;

    public GameObject dialogueui;

    public TextMeshProUGUI dialoguetext;
    public List<TextMeshProUGUI> gameObjectivesText = new List<TextMeshProUGUI>();

    private int objectives = 0;
    public int totalObjectives;
    public int totalClues;

    private GameObject nearestobj;

    private List<GameObject> objectList = new List<GameObject>();
    private List<GameObject> interactedObjects = new List<GameObject>();
```

```
private List<GameObject> interactedClues = new List<GameObject>();
public List<GameObject> Clues = new List<GameObject>();
public List<GameObject> CodePieces = new List<GameObject>();

private GameObject[] objectsBottomRoom;
private GameObject[] objectsUpperRoom;
private GameObject[] outside;

public List<GameObject> MenuUI = new List<GameObject>();
public GameObject TaskUI;
public GameObject finaltask;

private int upperObjRandomIndex;
private int outsideObjRandomIndex;
private int bottomObjRandomIndex;

private List<GameObject> CluesHolder = new List<GameObject>();

List<int> randomNumbers = new List<int>();

private List<int> totalCluesIndex = new List<int>();
private List<int> totalObjectivesIndex = new List<int>();

private int totalIndexRemaining;
Color objcolor;

private bool[] isalreadyinteracted;
// Start is called before the first frame update
void Start()
{
    currentSceneIndex = SceneManager.GetActiveScene().buildIndex;
    lastSceneIndex = SceneManager.sceneCountInBuildSettings - 1;

    Debug.Log(lastSceneIndex);

    isalreadyinteracted = new bool[totalClues];

    totalIndexRemaining = totalObjectivesIndex.Count;
    objectsUpperRoom = GameObject.FindGameObjectsWithTag("upper room");
    outside = GameObject.FindGameObjectsWithTag("outside");
    objectsBottomRoom = GameObject.FindGameObjectsWithTag("bottom room");

    upperObjRandomIndex = UnityEngine.Random.Range(0, objectsUpperRoom.Count
    (0-1));
    bottomObjRandomIndex = UnityEngine.Random.Range(0, objectsBottomRoom.Count
    (0-1));

    //add all the numbers to randomize
    for (int i = 0; i < outside.Count(); i++)
```

```
{  
    randomNumbers.Add(i);  
}  
System.Random random = new System.Random();  
  
for (int i = randomNumbers.Count - 1; i > 0; i--)// loops through total value of  
randomNumbers then decrements each loop until it is not greater than 0  
{  
    int j = random.Next(i);//random index from 0 to randomNumbers.Count  
  
    int temp = randomNumbers[i];// Stores the value of current index in loop  
  
    randomNumbers[i] = randomNumbers[j];// store the value of  
random index j to current index of randomNumbers  
  
    randomNumbers[j] = temp;// store the value of current index in random index  
}  
for (int i = 0; i < totalObjectives; i++)  
{  
    totalObjectivesIndex.Add(randomNumbers[i]);\  
}  
//generate random clues index that is not the index of code holder  
for (int i = 0; i < totalClues; i++)  
{  
    foreach (int index in totalObjectivesIndex)  
    {  
        if (randomNumbers[i] == index)  
        {  
            randomNumbers.Remove(index);  
        }  
    }  
    totalCluesIndex.Add(randomNumbers[i]);  
    CluesHolder.Add(outside[randomNumbers[i]]);  
}  
}  
  
// Update is called once per frame  
void Update()  
{  
    GetNearestObject();  
    nearestobj = GetNearestObject();  
  
}  
  
private void FixedUpdate()  
{  
}  
//checks if character collided with object then adds it to list of object  
private void OnTriggerEnter2D(Collider2D collision)
```

```

{
if (collision.name == "teleporter")
{
    FindAnyObjectByType<AudioManager>().Play("LevelPass");
    loadlevel();

}
if (collision.gameObject.transform.parent.name == "Object Holder" &&
!interactedObjects.Contains(collision.gameObject) || collision.name == "Task")
{
    objectList.Add(collision.gameObject);
}
else
{
    return;
}

}

private void OnTriggerExit2D(Collider2D collision)
{
    if (collision.gameObject.transform.parent.name == "Object Holder" || collision.name ==
"Task")
    {
        if (collision.gameObject.GetComponent<Renderer>().material.color != objcolor)
        {
            collision.gameObject.GetComponent<Renderer>().material.SetColor("_Color",
Color.white);
        }

        objectList.Remove(collision.gameObject);
        isInRange = false;
    }
}
//checks if objects are collided with player and calculates the object nearest to the player
private GameObject GetNearestObject()
{
    GameObject nearestobj = null;

    foreach (GameObject obj in objectList)
    {
        if (nearestobj is not null)
        {
            if (Vector2.Distance(obj.transform.position, transform.position) <
Vector2.Distance(nearestobj.transform.position, transform.position))
            {
                nearestobj = obj;
            }
        }
        else
        {

```

```

        GameObject notnearest = obj;
        if (notnearest.gameObject.GetComponent<Renderer>().material.color != objcolor)
        {
            notnearest.GetComponent<Renderer>().material.SetColor("_Color", Color.white);
        }
    }
    else
    {
        nearestobj = obj;
        if (nearestobj.gameObject.GetComponent<Renderer>().material.color != objcolor)
        {
            nearestobj.GetComponent<Renderer>().material.SetColor("_Color", Color.white);
        }
    }
}

if (nearestobj is not null &&
nearestobj.gameObject.GetComponent<Renderer>().material.color != objcolor)
{
    nearestobj.GetComponent<Renderer>().material.SetColor("_Color", Color.green);
}
isInRange = true;
return nearestobj;
}
public void OnObjectClick()
{
    if (nearestobj == null) { return; }
    Debug.Log(nearestobj.name);

    if (isInRange && !interactedObjects.Contains(nearestobj) && !isclicked)
    {
        FindObjectOfType<AudioManager>().Play("Interact");

        interactedObjects.Add(nearestobj);

        //Debug.Log("nearest object: " + nearestobj.name);
        nearestobj.GetComponent<Renderer>().material.SetColor("_Color", Color.gray);
        objcolor = nearestobj.GetComponent<Renderer>().material.color;

        if (nearestobj.name == "Task")
        {
            TaskUI.SetActive(true);
            nearestobj.SetActive(false);
            hideUI(false);
            interactedObjects.Remove(nearestobj);
            nearestobj.GetComponent<Renderer>().material.SetColor("_Color", Color.white);
        }
    }
}

```

APPENDIX M.

Experts/Alpha Tester Profile

Carmela O. Pineda

Contact information

Paltan, Arayat, Pampanga

0929-855-9764

carmelapineda2017@gmail.com

Education

Bachelor of Science in Electronics and Communications Engineering

Holy Angel University, Angeles City, Pampanga

2015-2020

Skills

- Problem Solving and Debugging
- Strong Analytical and Critical Thinking Skills
- Excellent Communication and Team Collaboration
- Programming Languages: Python, Javascript
- Web Technologies: HTML, CSS
- Frameworks: React, Node, Vue
- Database Management: MySQL, MongoDB
- Version Control: Git
- CI/CD: Jenkins
- Software Development Methodologies: Agile, Scrum, Waterfall

Work Experience

Custom Software Engineering Analyst | Accenture Inc.,
Mandaluyong City | June 2021- Present

- Collaborated with cross-functional teams to design, develop, and deploy high-quality software solutions.
- Implemented new features and enhancements, meeting project deadlines and ensuring code quality.
- Conducted code reviews and provided constructive feedback to team members.
- Participated in daily stand-up meetings and sprint planning sessions.
- Collaborated with developers to troubleshoot and debug issues, improving overall system stability.

Certifications

- Cloud Practitioner, Amazon Web Services, December 2021

**Elaine Sabado** (She/Her)

IT Security Manager | CyberSecurity Consultant at Datacom

Wellington, Wellington Region, New Zealand · [Contact info](#)

500+ connections

[Connect](#)[Message](#)[More](#)

Experience

**IT Security Manager**

Datacom · Full-time

Jul 2022 - Present · 1 yr 5 mos

**Virtual Security Manager**

Spark New Zealand · Full-time

Apr 2021 - Jun 2022 · 1 yr 3 mos

Wellington Region, New Zealand

**Security Consultant**

Planit Testing

Feb 2018 - Mar 2021 · 3 yrs 2 mos

New Zealand

**Macquarie Group**

4 yrs 10 mos

**Cyber Security Test - Manager**

May 2014 - Dec 2017 · 3 yrs 8 mos

**Software Test Automation**

Mar 2013 - May 2014 · 1 yr 3 mos

NCR - National Capital Region, Philippines

**Software Quality Assurance Engineer**

Verifone

Apr 2010 - Mar 2013 · 3 yrs

NCR - National Capital Region, Philippines



Licenses & certifications



eWPTX - Web Application Penetration Tester eXtreme

INE Security (FKA eLearnSecurity)

Issued May 2019



Certified Agile Essentials (CAE)

iSQI Group



Certified Ethical Hacker (CEH)

EC-Council



ISTQB - CTFL

ISTQB® - International Software Testing Qualifications Board



Security +

CompTIA



Skills

AllIndustry KnowledgeTools & Technologies

Testing



Endorsed by Roscea Pamela A. Sacdalan and 1 other who is highly skilled at this



Endorsed by 10 colleagues at Macquarie Group



24 endorsements

Information Security



Endorsed by 9 colleagues at Macquarie Group



18 endorsements

Networking



Endorsed by Ramel Montalban who is highly skilled at this



Endorsed by 5 colleagues at Macquarie Group



14 endorsements

Security Testing



15 endorsements

Web Application Security



15 endorsements

Test Automation

 19 endorsements

CEH

 10 endorsements

Project Management

 16 endorsements

Embedded Systems

 15 endorsements

Test Planning

 15 endorsements

Software Development

 8 endorsements

Cyber-security

 8 endorsements

JIRA

 5 endorsements

Manual Testing

 1 endorsement



Kaye Javier (She/Her)
Software Test Analyst at Z Energy NZ
Wellington, Wellington Region, New Zealand · [Contact info](#)

262 connections

[Connect](#) [Message](#) [More](#)

Experience

 **Software Test Analyst**
Z Energy NZ · Full-time
May 2023 - Present · 7 mos
Wellington Region, New Zealand · Hybrid

Skills: API Testing · Agile Testing · Test Planning · Functional Testing · Test Automation

 **Software Test Analyst**
Qual IT · Full-time
Mar 2022 - May 2023 · 1 yr 3 mos
Wellington, Wellington Region, New Zealand

 **Spark Representative**
Spark New Zealand · Full-time
Jul 2021 - Feb 2022 · 8 mos
Wellington, Wellington Region, New Zealand

 **Kitchen Manager**
Dumpling'd · Full-time
Mar 2018 - Jun 2021 · 3 yrs 4 mos
Wellington Region, New Zealand

 **Associate Software Engineer**
Accenture · Full-time
May 2017 - Dec 2017 · 8 mos
NCR - National Capital Region, Philippines

 **IT Support Intern**
SPI CRM
Dec 2016 - Mar 2017 · 4 mos
Makati City, Philippines

Education

 **Systems Technology Institute (Ortigas)**
Bachelor's degree, Information Technology
Apr 2017

Skills

| | |
|------------------------|--|
| Quality Assurance |  1 endorsement |
| Software Development |  1 endorsement |
| Software Documentation |  3 endorsements |
| Information Technology |  2 endorsements |
| Software Testing |  3 endorsements |
| ETL Testing |  1 endorsement |
| Mobile Applications | |
| Mobile Testing | |
| Functional Testing | |
| Z Energy NZ |  3 endorsements |
| Manual Testing |  3 endorsements |
| Test Automation |  2 endorsements |
| SQL | |
| C# | |
| Microsoft Office | |

COLLEGE OF COMPUTING STUDIES
MAIN CAMPUS

APPENDIX N.

Researchers Curriculum Vitae

John Lorenz D. Alolor**Skill Highlights**

- Microsoft Office
- Innovative
- Bilingual in
- Service-focused
- Filipino and
- Computer
- English
- Related Skills

Personal Information's

- Age: 21 Years Old
- Date of Birth: September 18, 2001
- Sex: Male
- Nationality: Filipino
- Status: Single

Education

Primary Education:

Sasmuan Elementary School (2008 – 2014)

Secondary Education:

- Junior High: Santa Lucia Academy (2014-2015)
- Bagumbayan National High School (2015-2017)
- Lubao National High School (2017-2018)
- Senior High: Lubao National High School (2018 -2020)

Tertiary Education:

- Third Year: Don Honorio Ventura State University (2020 – Present)

Contact

Address:
060 Sampaguita Street, Santa Monica, Sasmuan, Pampanga

Phone:
+63 (0)9052346026

Email:
cs.johnlorenzalolor@gmail.com

Languages

Filipino
English
Kapampangan

Social Media**Facebook**

[Facebook.com/JohnLorenzAlolor/](https://www.facebook.com/JohnLorenzAlolor/)

John Vincent Armas

Skill Highlights

- Microsoft Office
- Bilingual in Filipino and English
- Innovative
- Creative design
- Service-focused
- Computer Related Skills



Personal Information's

- Age: 20 Years Old
- Date of Birth: December 13, 2002
- Sex: Male
- Nationality: Filipino
- Status: Single

Education

Primary Education:

Lubao Elementary School (2008 – 2014)

Secondary Education:

- Junior High: Lubao National High School (2014-2018)
- Senior High: Lubao National High School (2018 - 2020)

Tertiary Education:

- Third Year: Don Honorio Ventura State University (2020 – Present)

Contact

Address:
San Nicolas 1st, Lubao, Pampanga

Phone:
+63 (0) 9557517556

Email:
2020102747@dhvsu.edu.ph

Languages

Filipino
English

Social Media

Facebook

<https://www.facebook.com/Shaggckra/>

Mark Joseph Baluya



Skill Highlights

- Microsoft Office
- Bilingual in Filipino and English
- Creative design
- Innovative
- Service-focused
- Computer Related Skills

Personal Information's

- Age: 21 Years Old
- Date of Birth: October 10 2002
- Sex: Male
- Nationality: Filipino
- Status: Single

Contact

Address:
Purok 9B Concepcion Lubao,
Pampanga

Phone:
+63 (0) 9708045120

Email:
cs.markjosephbaluya@gmail.com

Languages

Filipino
English
Kapampangan

Social Media

Facebook

[Facebook.com/MarkJosephBaluya](https://www.facebook.com/MarkJosephBaluya)

Education

Primary Education:

Luba Elementary School (2008 - 2014)

Secondary Education:

- Junior High: Lubao National High School (2014-2018)
- Senior High: Lubao National High School (2018 -2020)

Tertiary Education:

- Third Year: Don Honorio Ventura State University (2020 - Present)

Shane Carly B. Batul



Skill Highlights

- Microsoft Office
- Service-focused
- Bilingual in Computer Related
- Tagalog and Skills
- English

Personal Information's

- Age: 22 Years Old
- Date of Birth: October 26, 2001
- Sex: Male
- Nationality: Filipino
- Status: Single

Contact

Address:
#465, Purok 3, San Miguel, Betis,
Guagua, Pampanga

Phone:
09491152041
09922065097

Email:
2020102750@dhwsu.edu.ph

Education

Primary Education:

- Dagat-Dagatan Elementary School (2008 – 2013) and Betis Elementary School (2013 – 2014)

Secondary Education:

- Junior High: Betis National High School (2014-2018)
- Senior High: Mary The Queen College Pampanga Inc., (2018 -2020)

Tertiary Education:

- Third Year: Don Honorio Ventura State University (2020 – Present)

Languages

Tagalog
English

Social Media

Facebook

facebook.com/shanecarlybatul26

Jeremy Manuyag



Skill Highlights

- Driving Skills
- Microsoft Office
- Bilingual in Tagalog and English
- Creative design
- Innovative
- Service-focused
- Computer Related Skills

Personal Information's

- Age: 21 Years Old
- Date of Birth: July 31 2001
- Sex: Male
- Nationality: Filipino
- Status: Single

Contact

Address:
Purok 6 Lurang Street, Sta.
Theresa, Lubao, Pampanga

Phone:
+63 (0) 9519667199

Email:
cs.jeremymanuyag@gmail.com

Languages

Tagalog
English
Kapampangan

Education

Primary Education:

Sta Cruz Elementary School (2008 - 2014)

Secondary Education:

- Junior High: Sta. Cruz High Integrated School (2014-2018)
- Senior High: Lubao National High School (2018-2020)

Tertiary Education:

- Third Year: Don Honorio Ventura State University (2020 - Present)

Social Media

Facebook

[Facebook.com/JeremyDManuyag](https://www.facebook.com/JeremyDManuyag)

Tristan S. Santos**Skill Highlights**

- Adaptable
- Microsoft Office
- Bilingual in Tagalog and English
- C#, JavaScript, HTML, CSS, React, Tailwind, Unity Engine
- Innovative
- Leadership skills
- Computer Related Skills

Personal Information's

- Age: 22 Years Old
- Date of Birth: January 22, 2002
- Sex: Male
- Nationality: Filipino
- Status: Single

Contact

Address:
Blk 10 Lot 5 Mangga St. Phase 6,
Villa Isabel, Calulut, CSFP

Phone:

Email:
2020102778@dhvsu.edu.ph

Languages

Tagalog
English
Kapampangan

Social Media**Facebook**

<https://www.facebook.com/TristanJasperS.Santos/>

Education**Primary Education:**

- Dominican School of Mexico Inc. (2008 - 2014)

Secondary Education:

- Junior High: Pampanga High School (2014-2018)
- Senior High: Pampanga High School (2018-2020)

Tertiary Education:

- Third Year: Don Honorio Ventura State University (2020 - Present)

Christian Lee L. Singian

Skill Highlights

- Microsoft Office
- Bilingual in Tagalog and English
- Service-focused
- Computer Related Skills



Contact

Address:
Banlic Cabalantian Bacolor Pampanga

Phone:
09983446136
09558462351

Email:
Christianingram31@gmail.com
cs.chistiansingian@gmail.com

Personal Information's

- Age: 22 Years Old
- Date of Birth: August 10, 2001
- Sex: Male
- Nationality: Filipino
- Status: Single

Education

Primary Education:

- San Fernando Elementary School (2007 - 2013)

Secondary Education:

- Junior High: Pampanga High School (2013-2017)
- Senior High: Our Lady of Fatima University (2017-2019)

Tertiary Education:

- Third Year: Don Honorio Ventura State University (2019 - Present)

Languages

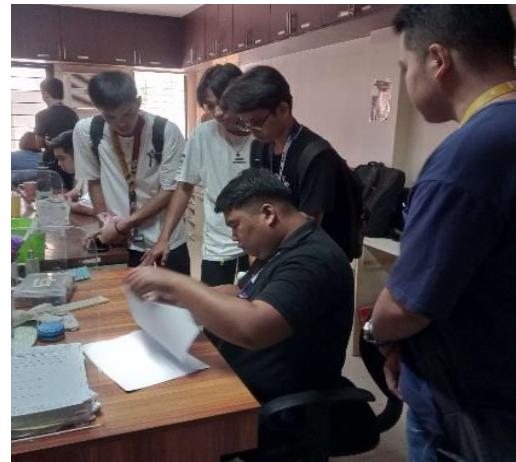
Tagalog
English
Kapampangan

Social Media

Facebook
facebook.com/Chanleesingian

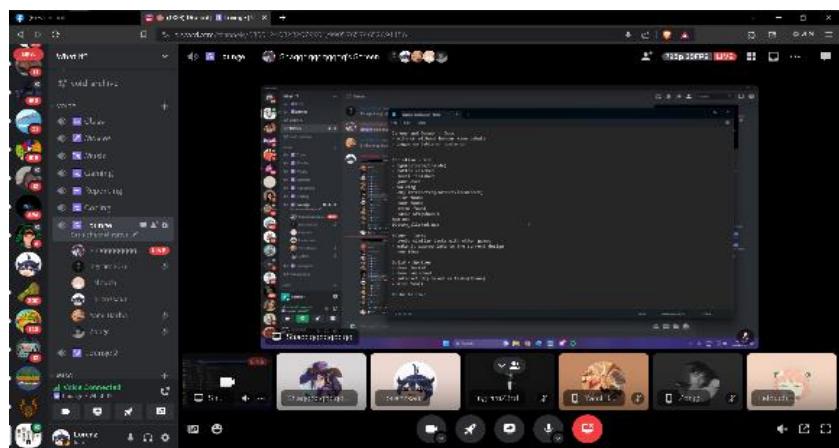
APPENDIX O.

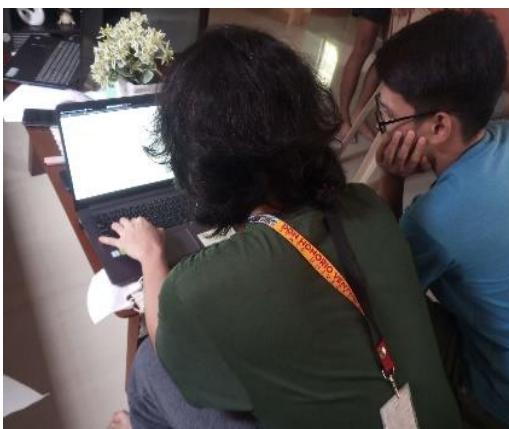
Research Documentation Pictures











Syllabus of Introduction to Python of Information Technology

| | | | | | | | | | | | | | | |
|--|---|---|---|---------------|---------------------|---|---------------------------|---|--|--|-------------------------------|---|--------------------------|---|
|  DON HONORIO VENTURA STATE UNIVERSITY Cabunagan, Villa de Bacolor 2001 - Pampanga, Philippines Tel. No. (6345) 458 0021; Fax (6345) 458 0021 Local 211 URL: http://dhvsu.edu.ph |  ISO 9001:2015  OHS-Certified | COLLEGE OF COMPUTER STUDIES DHVSU Main Campus, Villa de Bacolor, Pampanga E-Mail Address: coeddhvsu@gmail.com  | | | | | | | | | | | | |
| OUTCOMES-BASED TEACHING AND LEARNING COURSE PLAN (Bachelor of Science in Information Technology) | | | | | | | | | | | | | | |
| Institutional Vision, Mission, and Core Values | | | | | | | | | | | | | | |
| <p>University Vision A lead university in producing quality individuals with competent capacities to generate knowledge and technology and enhance professional practices for sustainable national and global competitiveness through continuous innovation</p> <p>University Mission DHVSU commits itself to provide an environment conducive to continuous creation of knowledge and technology towards the transformation of students into globally competitive professionals through the synergy of appropriate teaching, research, service and productivity functions.</p> <p>Core Values</p> <ul style="list-style-type: none"> • Professionalism • Excellence • Good Governance • Gender Sensitivity and Responsiveness • Disaster Resiliency | | | | | | | | | | | | | | |
| Course Information | | | | | | | | | | | | | | |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">Course Code</td> <td style="width: 25%;">CC313F</td> <td style="width: 25%;">Course Title</td> <td>Application Development and Emerging Technologies</td> </tr> <tr> <td>Course Description</td> <td colspan="3">This course focuses on the development of software application using PyCharm as its Integrated Development Environment (IDE) and Python as its Programming Language and emerging technologies. Emphasis is on the requirements management, interface design, usability, deployment including ethical and legal considerations. Topics include file-handling, event-driven programming, and data manipulation.</td> </tr> <tr> <td>Course Credits / Units</td> <td>2 units lecture / 1-unit laboratory (2 hrs. lecture, 3 hrs. laboratory)</td> <td>No. of Hours/week</td> <td>1 ½ Face-to-Face 1 ½ Virtual / Online (Chat Schedule TBA)</td> </tr> </table> | | | Course Code | CC313F | Course Title | Application Development and Emerging Technologies | Course Description | This course focuses on the development of software application using PyCharm as its Integrated Development Environment (IDE) and Python as its Programming Language and emerging technologies. Emphasis is on the requirements management, interface design, usability, deployment including ethical and legal considerations. Topics include file-handling, event-driven programming, and data manipulation. | | | Course Credits / Units | 2 units lecture / 1-unit laboratory (2 hrs. lecture, 3 hrs. laboratory) | No. of Hours/week | 1 ½ Face-to-Face 1 ½ Virtual / Online (Chat Schedule TBA) |
| Course Code | CC313F | Course Title | Application Development and Emerging Technologies | | | | | | | | | | | |
| Course Description | This course focuses on the development of software application using PyCharm as its Integrated Development Environment (IDE) and Python as its Programming Language and emerging technologies. Emphasis is on the requirements management, interface design, usability, deployment including ethical and legal considerations. Topics include file-handling, event-driven programming, and data manipulation. | | | | | | | | | | | | | |
| Course Credits / Units | 2 units lecture / 1-unit laboratory (2 hrs. lecture, 3 hrs. laboratory) | No. of Hours/week | 1 ½ Face-to-Face 1 ½ Virtual / Online (Chat Schedule TBA) | | | | | | | | | | | |
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|  DON HONORIO VENTURA STATE UNIVERSITY Cabunagan, Villa de Bacolor 2001 - Pampanga, Philippines Tel. No. (6345) 458 0021; Fax (6345) 458 0021 Local 211 URL: http://dhvsu.edu.ph |  ISO 9001:2015  OHS-Certified | COLLEGE OF COMPUTER STUDIES DHVSU Main Campus, Villa de Bacolor, Pampanga E-Mail Address: coeddhvsu@gmail.com  | | | | | | | | | | | | | | | | | | | | | |
|--|--|---|---|------------------------------|------------------------|---|------------------------------|---|-------------|---|-----------------------------|-------------|---|---|---|--|-------------|---|-------------|--|--------------------------|-------------|---|
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">Pre-requisite/s</td> <td style="width: 25%;">CC 123(C), CPC 223(A)</td> <td style="width: 25%;">Co-requisite/s</td> <td>None</td> </tr> <tr> <td>Course Classification</td> <td colspan="3">Curriculum Basis</td> </tr> <tr> <td>No. of Times Revised</td> <td>1</td> <td>Date of Revision</td> <td>CMO 27, series of 2015 September, 2021</td> </tr> </table> | | | Pre-requisite/s | CC 123(C), CPC 223(A) | Co-requisite/s | None | Course Classification | Curriculum Basis | | | No. of Times Revised | 1 | Date of Revision | CMO 27, series of 2015 September, 2021 | | | | | | | | | |
| Pre-requisite/s | CC 123(C), CPC 223(A) | Co-requisite/s | None | | | | | | | | | | | | | | | | | | | | |
| Course Classification | Curriculum Basis | | | | | | | | | | | | | | | | | | | | | | |
| No. of Times Revised | 1 | Date of Revision | CMO 27, series of 2015 September, 2021 | | | | | | | | | | | | | | | | | | | | |
| Course Structure | | | | | | | | | | | | | | | | | | | | | | | |
| <p>This course will adapt the Blended Learning Approach, which means that Face-to-Face and Distance Education/ Learning modalities will compose the course structure. Students should participate through varied online strategies and media. Students completing this course should be able to quickly learn to effectively use any Java IDE. In particular, after taking this course student should be able to do the following:</p> | | | | | | | | | | | | | | | | | | | | | | | |
| Program Outcomes | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Specific to the major (Information Technology)</i> | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">Program Attitude</th> <th style="width: 25%;">Program Outcome Code</th> <th style="width: 50%;">Program Outcome</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Knowledge for Solving Computing Problems</td> <td>IT01</td> <td>Apply knowledge of computing, science, and mathematics appropriate to the discipline.</td> </tr> <tr> <td>IT02</td> <td>Understand best practices and standards and their applications.</td> </tr> <tr> <td rowspan="2">Problem Analysis</td> <td>IT03</td> <td>Analyze complex problems, then identify and define the computing requirements needed to design an appropriate solution.</td> </tr> <tr> <td>IT04</td> <td>Identify and analyze the user needs and take them into account in the selection, creation, evaluation and administration of computer-based systems.</td> </tr> <tr> <td rowspan="2">Design/Development of Solutions</td> <td>IT05</td> <td>Design, implement, and evaluate computer-based systems, processes, components, and programs to meet desired needs and requirements under various constraints.</td> </tr> <tr> <td>IT06</td> <td>Integrate IT-based solutions into the user environment effectively</td> </tr> <tr> <td>Modern Tool Usage</td> <td>IT07</td> <td>Apply knowledge through the use of current techniques, skills, tools and practices necessary for the IT profession.</td> </tr> </tbody> </table> | | | Program Attitude | Program Outcome Code | Program Outcome | Knowledge for Solving Computing Problems | IT01 | Apply knowledge of computing, science, and mathematics appropriate to the discipline. | IT02 | Understand best practices and standards and their applications. | Problem Analysis | IT03 | Analyze complex problems, then identify and define the computing requirements needed to design an appropriate solution. | IT04 | Identify and analyze the user needs and take them into account in the selection, creation, evaluation and administration of computer-based systems. | Design/Development of Solutions | IT05 | Design, implement, and evaluate computer-based systems, processes, components, and programs to meet desired needs and requirements under various constraints. | IT06 | Integrate IT-based solutions into the user environment effectively | Modern Tool Usage | IT07 | Apply knowledge through the use of current techniques, skills, tools and practices necessary for the IT profession. |
| Program Attitude | Program Outcome Code | Program Outcome | | | | | | | | | | | | | | | | | | | | | |
| Knowledge for Solving Computing Problems | IT01 | Apply knowledge of computing, science, and mathematics appropriate to the discipline. | | | | | | | | | | | | | | | | | | | | | |
| | IT02 | Understand best practices and standards and their applications. | | | | | | | | | | | | | | | | | | | | | |
| Problem Analysis | IT03 | Analyze complex problems, then identify and define the computing requirements needed to design an appropriate solution. | | | | | | | | | | | | | | | | | | | | | |
| | IT04 | Identify and analyze the user needs and take them into account in the selection, creation, evaluation and administration of computer-based systems. | | | | | | | | | | | | | | | | | | | | | |
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| | IT06 | Integrate IT-based solutions into the user environment effectively | | | | | | | | | | | | | | | | | | | | | |
| Modern Tool Usage | IT07 | Apply knowledge through the use of current techniques, skills, tools and practices necessary for the IT profession. | | | | | | | | | | | | | | | | | | | | | |
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|--|--|--|---|---|--|---|---|---|--|
| OUTCOMES (ILO) | | | Face-to-Face | Distance Education/ Learning | OUTCOMES (ALO) | SENSITIVENESS (GAD) | | TIME TABLE | |
| MIDTERM EXAMINATION | | | | | | | | | |
| <input type="checkbox"/> Define Class and Constructors, apply them in actual android programming | i) j) k) Constructor Arguments | Online 3, 4 & 5 | Teacher elaborates class and constructors | Teacher elaborates class and constructors | RUBRICS MAY BE CONSIDERED FOR THE ALO | During the discussion and other aspects of the instruction, the following will be observed: <ul style="list-style-type: none">- Case Study- Research- Offline/ Online quiz, activity or seatwork.- Programming | Academic Integrity and Honesty Responsible Patience Hardworking | Week 10-11 | |
| <input type="checkbox"/> Comprehend SQL and database | VII. Content Providers a) SQLite b) SQL | Online 3, 4 & 5 | Teacher explains SQL and database connection in android | Teacher explains SQL and database connection in android | RUBRICS MAY BE CONSIDERED FOR THE ALO | During the discussion and other aspects of the instruction, the following will be observed: <ul style="list-style-type: none">- Case Study | Academic Integrity and Honesty Responsible Patience Hardworking | Week 12-14 | |

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|  | | DON HONORIO VENTURA STATE UNIVERSITY Cabanbanan, Villa de Bacolor 2001, Pampanga, Philippines Tel. No. (6345) 458 0021; Fax (6345) 458 0021 Local 211 URL: http://dhvsu.edu.ph | |  | | COLLEGE OF COMPUTER STUDIES DHVSU Main Campus, Villa de Bacolor, Pampanga E-Mail Address: coedhvsu@gmail.com | |  | |
|---|--|--|---|---|--|---|---|---|--|
| INTENDED LEARNING | COURSE CONTENT/ SUBJECT MATTER | REFERENCES | INSTRUCTIONAL DELIVERY DESIGN | ASSESSMENT OF LEARNING | GENDER | VALUES INTEGRATION | | | |
| <input type="checkbox"/> Define topics in creating application project . | VI. Python Data types d) Variables e) Loops f) Conditions g) Procedures | Online 3, 4 & 5 | The teacher explains the fundamental topics in creating application project. Student comprehends the fundamental topics in creating application project. | The teacher explains the fundamental topics in creating application project. Student comprehends the fundamental topics in creating application project. | RUBRICS MAY BE CONSIDERED FOR THE ALO | During the discussion and other aspects of the instruction, the following will be observed: <ul style="list-style-type: none">- Case Study- Research- Offline/ Online quiz, activity or seatwork.- Programming | Academic Integrity and Honesty Responsible Patience Hardworking | Week 6 | |
| <input type="checkbox"/> Apply functions and objects | g) Working with Functions h) Objects | Online 3, 4 & 5 | Teacher elaborates functions and objects. Students practice functions and objects in different ways. | Teacher elaborates functions and objects. Students practice functions and objects in different ways. | RUBRICS MAY BE CONSIDERED FOR THE ALO | During the discussion and other aspects of the instruction, the following will be observed: <ul style="list-style-type: none">- Case Study- Research- Offline/ Online quiz, activity or seatwork.- Programming | Academic Integrity and Honesty Responsible Patience Hardworking | Week 7 – 8 | |

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REFERENCES

Sayaf, A. M., Alamri, M. M., Alqahtani, M. A., & Al-Rahmi, W. M. (2021).

Information

and Communications Technology Used in Higher Education: An Empirical Study on Digital Learning as Sustainability. *Sustainability*, 13(13), 7074.

<https://www.mdpi.com/2071-1050/13/13/7074>

Kalogiannakis, M., Papadakis, S., & Zourmpakis, A. (2021). Gamification in Science

Education. A Systematic Review of the literature. *Education Sciences*, 11(1), 22.

<https://www.mdpi.com/2227-7102/11/1/22>

Polytechnic, M., & Yun, H. (2014). The role of gamification in education—a literature

review. *Contemporary Engineering Sciences*, 7, 1609–1616.

[https://www.researchgate.net/publication/287480678_The_role_of_gamification_in_education_- a_literature_review](https://www.researchgate.net/publication/287480678_The_role_of_gamification_in_education_-_a_literature_review)

Palaniappan, K. & Md Noor, N. (2022) Gamification Strategy to Support Self Directed

Learning in an Online Learning Environment

<https://www.learntechlib.org/p/220515/>

Garcia, M. B., & Revano, T. F. (2021). Assessing the Role of Python Programming

Gamified Course on students' knowledge, skills performance, attitude, and Self-Efficacy. 2021 IEEE 13th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM).

[https://www.researchgate.net/publication/356836068_Assessing_the_Role
of Python Programming Gamified Course on Students' Knowledge
Skills Performance Attitude and Self-Efficacy](https://www.researchgate.net/publication/356836068_Assessing_the_Role_of_Python_Programming_Gamified_Course_on_Students'_Knowledge_Skills_Performance_Attitude_and_Self-Efficacy)

Paiva, J. C., Leal, J. P., & Queirós, R. (2020). Fostering Programming Practice through

Games. *Information*, 11(11), 498

[https://www.researchgate.net/publication/346405193_Fostering_Program
ming Practice through Games](https://www.researchgate.net/publication/346405193_Fostering_Programming_Practice_through_Games)

Priyaadharshini, M., N, N. M., Dakshina, R., Sandhya, S., & R, B. S. (2020). Learning

Analytics: Game-based learning for programming course in higher education. *Procedia Computer Science*, 172, 468–472.

<https://www.sciencedirect.com/science/article/pii/S1877050920314733>

Schnieder, M, Williams, S (2023) Educational Mobile Apps for Schnieder, M., & Williams, S. B. (2023). Educational Mobile apps for programming in Python: Review and analysis. *Education Sciences*, 13(1), 66.

<https://www.mdpi.com/2227-7102/13/1/66>

Fabic, G. V. F., Mitrović, A., & Neshatian, K. (2018). Investigating the effects of learning

activities in a mobile Python tutor for targeting multiple coding skills.

Research and Practice in Technology Enhanced Learning, 13(1).

<https://telrp.springeropen.com/articles/10.1186/s41039-018-0092-x>

Theodoropoulos. A., & Lepouras, G. (2020). Digital Game-Based Learning and Computational Thinking in P-12 education. In Advances in early childhood and K-12 education (pp. 159–183).

https://www.researchgate.net/publication/344098907_Digital_Game-Based_Learning_and_Computational_Thinking_in_P-12_Education_A_Systematic_Literature_Review_on_Playing_Games_for_Learning_Programming

Yadav, A. K., & Oyelere, S. S. (2020). Contextualized mobile game-based learning

application for computing education. Education and Information Technologies, 26(3), 2539–2562.

<https://link.springer.com/article/10.1007/s10639-020-10373-3>

Zhan, Z., He, L., Tong, Y., Liang, X., Guo, S., & Lan, X. (2022). The effectiveness of

gamification in programming education: Evidence from a meta-analysis. Computers & Education: Artificial Intelligence, 3, 100096.

<https://www.sciencedirect.com/science/article/pii/S2666920X22000510>

Mubin. S, We Ann Poh. M, Jantan. A (2020) Gamification Programming Language

Learning: A Review and Pathway

https://iaeme.com/MasterAdmin/Journal_uploads/IJARET/VOLUME_11_ISSUE_12/IJARET_11_12_111.pdf

Dallas, O., & Gogoulou, A. (2022). Learning programming using Python: the case of the

DigiWorld educational game. European Journal of Engineering and Technology Research, 1–8.

<https://www.ej-eng.org/index.php/ejeng/article/view/2750>

Pechenkina, E., Laurence, D., Oates, G., Eldridge, D. S., & Hunter, D. (2017). Using a

gamified mobile app to increase student engagement, retention and academic achievement. International Journal of Educational Technology in Higher Education, 14(1).

<https://educationaltechnologyjournal.springeropen.com/articles/10.1186/s41239-017-0069-7>

Rugelj, J., & Lapina, M. (2019). Game design-based learning of Programming. ResearchGate.

https://www.researchgate.net/publication/337828112_Game_Design_Based_Learning_of_Programming

Maciejewski, M. L. (2018). Quasi-experimental design. Biostatistics & Epidemiology, 4(1), 38–47.

<https://www.tandfonline.com/doi/full/10.1080/24709360.2018.1477468>

Makri, A., Vlachopoulos, D., & Martina, R. (2021). Digital Escape rooms as Innovative

Pedagogical Tools in Education: A Systematic Literature review. Sustainability, 13(8), 4587.

<https://www.mdpi.com/2071-1050/13/8/4587>

Huang. S, Kuo Y, Chen. H (2020) Applying Digital Escape Rooms for Learning Motivation, And Problem-Solving Ability

<https://www.sciencedirect.com/science/article/abs/pii/S187118712030153>

Huraj. L, Hrmo. R, Hudáková. M (2020) The Impact of a Digital Escape Room Focused

on HTML and Computer Networks on Vocational High School Students

<https://www.mdpi.com/22277102/12/10/682#:~:text=Although%20the%20experiment%20did%20not,focusing%20on%20technical%20vocational%20subjects.>

Escapp: a web platform for conducting educational escape rooms. (2021). IEEE Journals

& Magazine | IEEE Xplore.

<https://ieeexplore.ieee.org/document/9369393>

Rohmah, W. A., Asriyanik, A., & Apriyandari, W. (2020). Implementation of the algorithm Fisher Yates Shuffle on game quiz environment. JITE (Journal of Informatics and Telecommunication Engineering), 4(1), 161–172.

<https://mail.ojs.uma.ac.id/index.php/jite/article/view/3863>

Ivory, J. (2006). Still a man's game: Gender representation in online reviews of video

games. *Mass Communication and Society*, 9(1), 103–114.

https://www.tandfonline.com/doi/abs/10.1207/s15327825mcs0901_6

W3Schools online web tutorials. (n.d.).

<https://www.w3schools.com/>

Unity Game Development Blueprints | PACKT. (n.d.). Packt.

<https://www.packtpub.com/product/unity-game-development-blueprints/9781783553655>

Granic, I., Lobel, A., & Engels, R. C. (2014). The benefits of playing video games.

American Psychologist, 69(1), 66-78.

<https://psycnet.apa.org/record/2013-42122-001>

Olson, C. K., Kutner, L. A., & Warner, D. E. (2008). The role of violent video game

content in adolescent development: Boys' perspectives. *Journal of Adolescent Research*, 23(1), 55–75.

<https://journals.sagepub.com/doi/10.1177/0743558407310713>

Entertainment Software Association. (2020). Essential facts about the computer and video

game industry.

<https://www.theesa.com/resource/2020-essential-facts/>

Ahmed, M., & McGetrick, A. (2014). The role of scaffolding in learning programming.

- ACM Transactions on Computing Education (TOCE), 14(4), 1-20.
- Mannila, L., & Nylén, A. (2015). Learning to program: Difficulty and support.
- Proceedings of the ACM Conference on Global Computing Education (GCE), 1-7.
- Baker, E., & Trumble, J. (2018). Making sense of types and data in Python.
- Proceedings
of the ACM Conference on Global Computing Education (GCE), 1-6.
- Saeed, S., & Khan, S. (2016). A comprehensive study on scope and lifetime of variables in Python. Journal of Software Engineering and Applications, 9(4), 149-156.