Exploring The Potential of Virtual Reality for Araling Panlipunan Subject To The Grade 3 – Galileo Students Of Tenejero Integrated School, Balanga City, Bataan

A Capstone Project

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INFORMATION TECHNOLOGY

By:

Suarez, Corine F.

Duliente, Shaine Ann C.

Gallardo, Marc Christian V.

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APPROVAL SHEET

This Capstone Project entitled "**Exploring the Potential of Virtual Reality for Araling Panlipunan Subject to the Grade 3 – Galileo Students of Tenejero Integrated School, Balanga City, Bataan**" proposed and submitted by Corine F. Suarez, Shaine Ann C. Duliente and Marc Christian V. Gallardo in partial fulfillment of the requirements for the degree of **Bachelor of Science in Information Technology,** has been examined and found in order and is hereby recommended for acceptance and approval for **ORAL EXAMINATION.**

CAPSTONE PROJECT PROPOSAL COMMITTEE

Ms. Jenice Anne Marie B. Visperas, MITc
Chair

Mr. Nomer D. Aleviado — Member
Mrs. Sarah Jane B. Bartolome — Member

PANEL OF EXAMINERS

Passed by the PANEL OF EXAMINERS on ORAL EXAMINATION with a grade of on December 11, 2023

Mr. Percian Joseph C. Borja, MIT
Chair

Mr. Nomer D. Aleviado — Member
Mrs. Jairryl Anne L. De Guzman — Member_

Mr. Aries John G. Cayabyab
_Adviser

Accepted and approved in partial fulfillment of the requirements for the degree of Bachelor of Science in Information Technology.

_____ — Date
Ms. Charmie Lynn N. Seno, MALEDc — Proofreader

_____ — Date
Mr. Percian Joseph C. Borja, MIT — Dean, Computer Studies

ABSTRACT

Virtual Reality (VR) for Araling Panlipunan aims to revolutionize the traditional teaching methods currently employed at Tenejero Integrated School in the city of Balanga, Bataan. The conventional approach relies on tools such as PowerPoint presentations, often making it challenging for students to maintain focus and interest in a subject as diverse as Philippine history, geography, culture, and society. By integrating VR technology, students will have access to immersive learning experiences that bring the subject matter to life, allowing them to explore historical sites, cultural events, and geographic features related to Central Luzon, fostering a more engaging and memorable educational journey.

The proposed project, titled "Exploring the Potential of Virtual Reality for Araling Panlipunan Subject to the Grade 3 – Galileo Students of Tenejero Integrated School, Balanga City, Bataan," seeks to address the challenges faced by educators in creating meaningful connections between students and the subject. Utilizing web-based VR technology, students can access these virtual environments from the convenience of their devices. This approach not only promotes accessibility but also encourages engaging learning experiences, enabling students to navigate through historical reenactments, cultural showcases, and geographical landscapes.

Keywords: Virtual Reality Application; Virtual Reality Simulation; Virtual Reality for Education; Virtual Reality; and User Engagement.

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CHAPTER I

THE PROBLEM AND ITS BACKGROUND

Background of the Study

Virtual Reality is one of the most significant technologies implanted in this generation, as it continues to spread and become more widespread. People are constantly innovating and acquiring a deeper understanding of technology to enhance daily lives, making them more convenient and efficient. Virtual reality (VR) has its roots in the growth of technology and its uses in a variety of industries. The term "virtual reality" (VR) refers to a simulated experience that can be either identical to or completely dissimilar from the real world. VR is often created by computers and delivered to users through sensory apparatus, such as headsets or gloves, that enable interaction with the virtual environment.

Grade 3 - Galileo students and Mrs. Divina Dabu, the class adviser from Tenejero Integrated School in Balanga City, Bataan, have identified challenges within the traditional teaching approach at the school. The reliance on conventional methods, such as PowerPoint presentations, to teach subjects like Araling Panlipunan often falls short in engaging students, particularly in a subject that encompasses Philippine history, geography, culture, and society. The static, text-heavy content and the absence of immersive learning experiences can cause students to struggle to maintain focus and interest. This limitation poses a hurdle to their comprehension and retention of the material, making it challenging for them to connect with the subject on a personal and experiential level.

To address these challenges, the proposed project, "Exploring the Potential of Virtual Reality for Araling Panlipunan Subject to the Grade 3 – Galileo Students of Tenejero Integrated School, Balanga City, Bataan," offers an innovative solution. It

leverages web-based virtual reality technology to create immersive learning experiences aligned with the subject's curriculum, specifically focusing on Central Luzon. Students can access these virtual environments online using common devices, allowing for accessibility and reducing the need for expensive VR equipment. This approach fosters engagement, interactivity, and personalization in learning, making the subject matter more relevant and exciting. By providing multisensory experiences, the project aims to kindle students' interest in Araling Panlipunan, enabling them to better connect with the rich history, culture, and geography of their region.

Statement of the Problem

This capstone project focuses on enhancing the learning experience of Grade 3 students at Tenejero Elementary School in the subject of Araling Panlipunan, covering the country's history and culture. The conventional use of PowerPoint presentations, while effective to some extent, falls short in providing sufficient visualization for students, hindering their focus and understanding of the concepts being taught. To address this challenge, the proposed solution involves integrating Virtual Reality (VR) technology, aiming to provide an interactive and immersive learning experience. The study aims to investigate the potential of VR technology in Social Studies, evaluate its effectiveness in improving learning outcomes, and foster increased interest among students in the subject. The research underscores the significance of Araling Panlipunan in developing a comprehensive understanding of society and emphasizes the necessity for heightened attention and innovative approaches to enhance the learning process.

1. What are the functionalities to be provided in Exploring the Potential of Virtual Reality for Araling Panlipunan Subject to the Grade 3 – Galileo Students of Tenejero Integrated School, Balanga City, Bataan?
2. What are the technologies to be used in developing the Exploring the Potential of Virtual Reality for Araling Panlipunan Subject to the Grade 3 – Galileo Students of Tenejero Integrated School, Balanga City, Bataan?
3. How will the system be evaluated in terms of the following areas?
    a) Functional Stability
    b) b) Performance Efficiency
    c) c) Compatibility
    d) d) Usability
    e) Reliability
    f) Security
    g) Maintainability
    h) Portability

Objectives of the Study

The objectives of this capstone are to explore the potential of virtual reality technology in Araling Panlipunan by developing a VR-based Araling Panlipunan program and to evaluate its effectiveness in enhancing learning outcomes and promoting environmental awareness among learners. Additionally, the study aims to identify the strengths and weaknesses of VR technology in Araling Panlipunan and to provide recommendations for its future implementation in formal and informal education settings.

1. Identify the features and functionalities of Exploring the Potential of Virtual Reality for Araling Panlipunan to the Grade 3 – Galileo Students of Tenejero Integrated School, Balanga City, Bataan.
2. Identify the technologies to be used to develop Exploring the Potential of Virtual Reality for Araling Panlipunan Subject to the Grade 3 – Galileo Students of Tenejero Integrated School, Balanga City, Bataan.
3. Evaluate the system functionality using ISO 25010 Standards.

Significance of the Study

The research is found useful among the following beneficiaries:

Students – it will increase their engagement and attention. Virtual Reality technology has the potential to significantly enhance student engagement and motivation. The immersive nature of VR captures students' attention and creates a sense of excitement and curiosity. The interactive elements of VR experiences encourage active participation, making learning more enjoyable and stimulating.

Teachers – it can enhance their teaching tools. Incorporating Virtual Reality technology provides teachers with a powerful and innovative teaching tool. It allows them to create immersive and interactive lessons that go beyond traditional methods. Teachers can utilize VR simulation visualizations to bring Araling Panlipunan topics to life and make them more engaging for students.

Tenejero Elementary School – it will improve learning outcomes. Virtual Reality technology has the potential to improve learning outcomes by enhancing student engagement, comprehension, and critical thinking skills. The immersive and interactive

nature of VR experiences allows students to connect with the subject matter more deeply, leading to a better understanding and retention of Araling Panlipunan concepts.

Future Researchers – we the researcher's study may inspire future researchers to explore other potential applications of VR technology in education beyond Araling Panlipunan. They can expand on the researcher's findings and investigate the effectiveness of VR in other subjects, grade levels, or educational settings. This can lead to a more comprehensive understanding of the potential impact of VR in diverse learning contexts.

Scope and Delimitation

This capstone study will focus on exploring the potential of virtual reality technology in Araling Palipunan and its effectiveness in enhancing learning outcomes and promoting Araling Palipunan subjects among learners. The capstone will involve the development and implementation of a VR-based Araling Palipunan program and the evaluation of its effectiveness in enhancing learning outcomes. However, this capstone will not cover the development of new VR technologies or the assessment of their technical feasibility, as the focus will be on their educational effectiveness. Additionally, the study will only involve a selected group of learners and will not address broader implementation challenges in different educational contexts.

Teacher

1) The teacher will have the ability to generate a unique code to create room for a virtual reality session.
2) The teacher will have a login form.
3) The teacher can change his/her username and password.
4) The teacher has the control to accept or decline students' requests to join.

5) The teacher has the control to start the virtual reality session.
6) The teacher has control over the VR content, allowing them to change the virtual scene to suit their teaching objectives and the needs of their students
7) The teacher can end the virtual reality session for the students.

Students -

1) Students can enter their names.
2) Students can enter a unique code given by the teacher.
3) Students can request to join the room.
4) Students will have the opportunity to engage with immersive and interactive virtual reality experiences, which can enhance their understanding and make learning Araling Panlipunan more exciting and engaging.

Definition of Terms

360 Virtual Reality - By incorporating 360-degree VR experiences, the researcher's capstone will provide students with a comprehensive and panoramic view of historical and cultural settings relevant to Araling Panlipunan.

Araling Panlipunan – This is a subject covering Philippine history and culture and will be the focal point of the capstone, employing VR technology to provide a more engaging and interactive learning experience for Grade 3 students.

Engagement - This will significantly enhance student engagement by offering a dynamic and interactive approach to learning Araling Panlipunan, making the subject matter more engaging and understandable.

Simulation - Through the use of VR-based simulations, students will have the opportunity to virtually experience historical and cultural places, fostering a deeper understanding of

Araling Panlipunan concepts.

Virtual Reality (VR) - Serves as an immersive technology, providing a simulated environment for Grade 3 students to explore and engage with concepts in Araling Panlipunan.

VR-based – It will leverage VR-based methodologies to create an innovative and effective learning environment for Araling Panlipunan, surpassing traditional teaching methods.

VR Box - This is a hardware device to enhance the immersive experience, allowing students to interact with the virtual environment created for Araling Panlipunan.

Web-based Application – A platform for accessing VR content, ensuring ease of use and accessibility for students participating in the Araling Panlipunan learning simulations.

CHAPTER II

REVIEW OF RELATED LITERATURE

Literature reviews are undertaken during the system development process to better understand the concepts, research, methodologies, and technology involved with Exploring the Potential of Virtual Reality for Environmental Education. To understand the system requirements, in-depth research and comparison studies of current systems are also conducted. Secondary data was gathered from journals, publications, published theses and dissertations, and websites by the researchers.

The keywords related to the study include Virtual Reality Application, Virtual Reality Simulation, Virtual Reality for Education, Virtual Reality, and User Engagement.

Virtual Reality Application

To begin with, Cibuļska & Boločko (2022), stated that the educational landscape is undergoing rapid transformation alongside the evolution of technology. Emerging advanced technologies like artificial intelligence (AI), machine learning, cloud computing, and virtual reality (VR) are revolutionizing education systems, enabling the digitization and modernization of learning methods to cater to the needs of today's learners.

However, Jiang et al., (2021), argued that Virtual Reality (VR) is widely used in the training of using electric systems, including the teaching of the knowledge of physics. In this paper, an application program of a virtual training environment is developed to provide a training environment of assembly and maintenance for workers engaged in the transformer industry. The application is developed using the Unity3D game engine and has three modes: learning mode, training mode, and exam mode. Improve the skills of professionals by visualizing the composition of transformer equipment and the operation

of different processes. This environment allows workers to interact with virtual devices, thereby gaining experience with assembly tasks while reducing the risk of production accidents. It's safe and reliable operation is not only related to the power quality of users but also is crucial to the safety of the entire power system, so the transformer assembly and maintenance must follow strict procedures and operating specifications.

In addition, Yongheng et al., (2021), pointed out that the virtual environment (VE) is one of the applications created by computer technology. It can bring an immersive experience and provide many advantages, Cho et al. found that the virtual environment is good for the students' attention.

Moreover, Tovar et al., (2020), believed that the utilization of Virtual Reality (VR) as an educational tool is not a new concept, as it has been suggested for over twenty years. However, recent advancements in VR technology and the availability of tools to create VR applications have led to a significant rise in development and adoption. Creating VR applications offers advantages for both students and educators, as it provides increased accessibility to these devices, benefiting a larger number of students and the teaching community.

On the other hand, Nasser (2018), revealed that in recent years, virtual reality (VR) and augmented reality (AR) technologies have been extensively utilized and applied in various domains. One significant area where these technologies have made a substantial impact is in education, learning, and training. Consequently, this research paper aims to investigate the most recent advancements and scientific discoveries in the augmented software industry.

Virtual Reality Simulation

Al-Khiami et al., (2023), mentioned that educational institutions recognize the significance of innovating teaching methods and strategies, particularly in creating immersive, interactive, and engaging environments through gamification techniques. This shift towards incorporating disruptive technologies like Virtual Reality (VR) as a tool for gamified teaching has demonstrated notable advantages, including enhanced student performance and motivation.

Actually, Gyetvai et al., (2022), observed that ecological exchanges and dynamics occur at the science-strategy interface. Even though academic literature is well-known about this, students often struggle to understand how environmental studies. Students can learn this through experimentation using simulations.

In fact, Yang (2021), described that the COVID-19 pandemic has highlighted the importance of online learning, but current online education methods only address the issue of long-distance communication and fail to fully utilize computer technology. This results in a lack of interaction and practical experience, limiting the effectiveness of online education (referred to as the 1.0 version). However, the introduction of virtual simulation technology (referred to as the 2.0 version) can bridge this gap by creating virtual reality and establishing an education system based on virtual scenarios, offering significant advantages to students. Furthermore, Virtual Reality is open-source and designed to be compatible with most devices, making it accessible to a wide range of students, including those with limited access to high-quality resources, at an affordable cost.

In addition, Geng & Wu (2021), revealed that technology and approaches exist that can create an artificial virtual environment in real-time, providing three-dimensional

information and enabling natural interaction. Once users enter this environment, they can experience complete immersion and a sense of reality. By utilizing various sensing devices, individuals can examine and interact with objects within the virtual environment, just as they would in the physical world, allowing for real-time manipulation and communication with the virtual surroundings.

As well as, Kucera et al., (2018), proposed that the utilization of virtual and mixed realities in education offers students a transformative learning experience that surpasses traditional methods. By immersing students in simulated environments, these technologies enable them to gain deeper insights and a better understanding of the subjects they study. This immersive approach has the potential to revolutionize education by fostering engagement, interactivity, and experiential learning.

Virtual Reality for Education

To commence, Yula & Zhu (2022), asserted that the educational landscape is undergoing rapid transformations, along with the technologies employed for educational endeavors. Cutting-edge advancements like artificial intelligence (AI), machine learning, cloud computing, and virtual reality (VR) are revolutionizing education systems, introducing innovative approaches to digitize and contemporize learning for the upcoming generation of students.

Contrarily, Fang et al., (2021), highlighted that a virtual reality simulation experiment based on head tracking VR is used to display the investigation results, allowing users to investigate the subjects given by a variety of NPCs and apply them to the design to improve the design education of the investigation and research courses. The virtual system, research information collection, and user virtual realistic control are the main

components. Despite the simulation's extremely basic substance, the investigation team gathers the result of the huge benefits of virtual reality to education.

Furthermore, ÖZDEMİR et al., (2020), pointed out that developments in technology allow the use of different tools and methods for educational purposes. New technologies affect learning outcomes quickly and provide convenience in many applications.

Nevertheless, Jiugen et al., (2020), emphasized that the advancement of information technology and its use in the classroom will bring about significant changes to the structure, content, form, and method of education. Integrating several disciplines has improved education on a qualitative level. A significant portion of the physics curriculum for students is the physics experiment. In actuality, though, a lot of middle schools struggle to accommodate every student's learning needs because of their limited experimental settings. Virtual reality (VR) is a technology that allows for a great deal of creative freedom. It can create and create physical phenomena that are hard to see in real life. This article aims to investigate the usefulness of virtual reality (VR) in physics experiments and tries to apply VR to experiments to increase the teaching effect.

Additionally, Zhang et al., (2020), reported that Zhihai Yuntian created and introduced the VR multi-dimensional classroom, a comprehensive VR immersive course learning system. Instructors can oversee the course process from their end, while students can don helmets and engage in an immersive learning environment.

Virtual Reality

Putilova et al., (2022), stated that specifically, the integration of 3D modeling and virtual reality (VR) technologies, along with the overall gamification of the process, has demonstrated favorable outcomes. This combination has been found to enhance learning effectiveness, streamline and expedite the comprehension of content, and enhance its memorability.

Furthermore, Muravevskaia & Gardner-McCune (2022), claimed that a social constructivist learning approach in the design of virtual reality (VR) games promotes empathy in children. Research on early childhood development (ECD) has focused on engaging children in empathic development activities (i.e., learning through interaction, reflective activities, role sharing, and dialogic inquiry) based on social constructivist learning theory. We provide guidelines for getting people involved. VR researchers have suggested the benefits of VR technology in creating immersive learning experiences for the development of empathy in children, but this research is still in its early stages.

Additionally, Schier et al., (2022), discovered that some virtual reality can be called TeachInVR, a virtual reality (VR) classroom for remote and co-located group teaching. It supports a range of teaching activities from lectures and student presentations to guided tours, group work, and private study. It allows the rapid creation of classes through the re-use of traditional teaching materials, reducing the barriers for time-constrained teachers. It is also intended as a sandbox environment for exploring teaching concepts that are well supported by, or even unique to, VR. In particular, it provides tools for the spatial arrangement of teaching material and leveraging the spatial properties of VR for learning and recall.

Aside from that, Zhang & Bowman (2021), believed that VR leverages the strengths of immersive learning and interactivity in virtual reality (VR) to facilitate student understanding of specific knowledge concepts and increase learning motivation and engagement.

Moreover, Jiugen (2020), pointed out that all facets of society have seen quick advancements and development since the dawn of the information era. Information technology has been progressively incorporated into the educational sector in this trend, and when paired with diverse disciplines, has improved education on a qualitative level. Front-line teachers and educational scholars are now interested in research themes. The physics experiment in the physics class is a crucial component of the student's understanding of physics. However, due to the limited experimental conditions and inability to address the individual learning demands of each student, many middle schools have poor teaching effects. Virtual reality VR technology may create and recreate physical phenomena that are challenging to observe in reality since it has a broad imagination space function.

User Engagement

Zhang (2020), concluded that Virtual reality-based virtual environments can facilitate deep learning experiences for learners. This allows learners to immerse themselves in exploring and interacting with real-world environments. This way, students receive a personalized learning experience and continuous feedback. Virtual reality, which creates an immersive and interactive environment, leads to a better educational model that changes the traditional learning patterns of students. At present, virtual reality technology

is becoming more and more mature, and research on the application of virtual reality in education has received more and more attention from educational stakeholders.

On the other hand, Abusamhadana et al., (2019), pointed out that the term "user engagement" refers to both user participation and user involvement. These two user engagement facets are crucial for the effective development of information systems. There is currently an absence of theoretical and empirical data on the factors that promote successful user engagement, which necessitates a review of the pertinent literature to identify these factors. There are a total of 12 potential success factors, including User-Developer Communication, Identifying Users for Engagement, User Ability in IT Projects, Type of Participation, Top Management Support, Organisational Culture, User Motivation, User Attitude toward System, User-Developer Attitude, Conflict Resolution, Involvement Congruence, and Project Complexity. The success criteria for user engagement are covered in this study. 83 items were initially found. Three specialists in the field of information system development first tested these items; as a result, two new items were added and 15 were removed. The content validity ratio and reliability test were then used to validate each item. According to the findings, 67 of the questionnaire's items are trustworthy. By the end of this study, a viable user engagement success instrument had been suggested.

However, Banowosari et al., (2019), stated that user engagement is the part of the user experience (UX) that emphasizes the advantages of the interaction, especially when it relates to the occurrence of being drawn to a web application and being urged to use it. Successful web apps are actively used as well as being used. In this study, a variety of variables are employed to measure user engagement in the Standardization and Conformity Assessment of e-learning. These variables, which can be measured both subjectively and

objectively, include task success, novelty, aesthetics, happiness, and endurance. The evaluation results demonstrated that both of these metrics yield distinct results. Only variable task success has a good engagement from an objective evaluation, even though all factors were evaluated subjectively to show that e-learning Standardization and Conformity Assessment have a good engagement. The other factor is quite engaged.

Moreover, Gao et al., (2018), theorized that the connection between student involvement and learning outcomes has drawn increasing attention in recent years. According to research, when students utilize educational games for learning, their motivation and engagement are key factors in enhancing learning results. As a result, a common objective of instructional games is to encourage player participation. Virtual reality technology, in particular, has the potential to significantly increase the sensation of presence and interaction that are lacking in educational games, pique students' interest, and heighten engagement. Even though it has been demonstrated that virtual reality-based educational games can significantly increase student engagement, there is currently no clear direction on how to create these games. This article uses a literature study to methodically assess ways to improve game participation to address this issue.

Last but not least, Antelmi et al., (2018), assured that a crucial problem for technology developers, educators, corporations, TV networks, and marketing firms is user engagement in digital encounters. Engagement, which has cognitive, emotional, and behavioral dimensions and is influenced by a wide range of interrelated technical and human factors, is still a difficult term. Through an analysis of a Twitter dataset compiled over six months from HBO Game of Thrones (GoT) viewers, this study advances our understanding of User Engagement at a behavioral level. Users are most active in

discussions about the TV show, and predictably most specifically the season premiere and finale, on the day after it airs, utilizing mobile devices to publish their status updates, according to this analysis throughout the GoT universe: literary, screen, and media extensions.

CHAPTER III

RESEARCH DESIGN AND METHODOLOGY

Research design in the thesis refers to the overall plan outlining how we will conduct the study, while methodology refers to the specific methods and techniques employed to gather and analyze data about the effects of Virtual Reality on Araling Panlipunan.

Research Methods

In the study, the researchers utilized both quantitative and qualitative methods. The quantitative method involved collecting numerical data through surveys or assessments to measure variables such as students' engagement levels, learning outcomes, and physiological responses. This allowed the researchers to analyze the data statistically and identify any significant trends or correlations. On the other hand, the qualitative method involved gathering subjective and descriptive data through interviews or observations to explore students' experiences, perceptions, and attitudes toward Virtual Reality in Araling Panlipunan. This provided a deeper understanding of the students' perspectives and allowed for the exploration of rich, contextual information. The combination of quantitative and qualitative methods allowed for a comprehensive analysis of the impact of Virtual Reality on Araling Panlipunan, incorporating both numerical evidence and qualitative insights.

Research Locale

The primary beneficiary of the study is Grade 3 - Galileo of Tenejero Elementary School as the benefactor because they represent the target demographic for the study,

allowing the researchers to directly assess the impact of Virtual Reality on their learning experiences in Araling Panlipunan.

Respondents of the Study

The respondents of the study are the Grade 3 - Galileo of Tenejero Elementary School. The researchers came up with 43 respondents from Grade 3 - Galileo including 10 IT experts.

Software Development Methodology

According to Riemann et al., (2020), The surveys are based on the Kano model to classify requirements. Must-be quality requirements are implemented in a minimum viable product (MVP). The MVP allows fast learning by testing and experimenting. Based on the agile manifesto, further requirements can be implemented agile in the virtual environment.

Agile Development is a method of software development that allows researchers to manage a project by breaking it down into segments. Instead of providing everything at once after the project, it is a step-by-step approach for reviewing the system and document.

Plan, Design, Develop, Test, Release, and Feedback are the six phases of Agile Development, as represented in Figure 1.

Figure 1 Graphical Model of Agile Methodology

Development Process for an Agile Project

Planning Phase

In this stage, the designers, and the researchers define the scope and objectives of implementing Virtual Reality in Araling Panlipunan. It involves setting clear goals, identifying the target audience, and determining the expected outcomes of the project.

Designing Phase

In this stage, the designers will carry out their duties. Prototypes and an initial model make up the system. In a meeting with the software development team, the program owner goes over the first step's requirements with them.

Development Phase

This phase will be managed by developers. Everything related to coding and testing occurs. After obtaining an agreement with the client, the team begins to construct the product on the schedule. The service is delivered in stages, with each sprint aiming to enhance the present product iteration. There will likely be numerous changes made to the initial release to add new features and improve functionality

Testing Phase

This stage is to evaluate the functionality, usability, and effectiveness of the Virtual Reality implementation. This includes conducting user testing, identifying and fixing any issues or bugs, and ensuring that the Virtual Reality experiences meet the desired standards.

Releasing Phase

This is the time when control shifts from the researcher to the user. The product release process will come after a successful testing phase. Now that the program has been fully distributed, users can access it. He now finds himself in the maintenance stage. The

software development team provides ongoing support throughout this phase to guarantee that the system keeps functioning properly and that any new flaws are fixed. Over time, more iterations to improve a current product or incorporate new features are possible.

Feedback

Feedback is necessary for the developers to understand how the project's output impacts the users. At this time, the Agile development cycle is complete. After completing all prior stages of development, the development team delivers to the owner the outcome reached in satisfying the requirements. The steps of Agile software development then begin again either by starting a new iteration or by moving on to the next stage and developing Agile.

Research Instruments

Interview - a one-on-one conversation that is typically carried out to gather information. Additionally, it is widely recognized as one of the most effective research tools. It is a conversation between two people across a medium wherein the questioner poses inquiries to evoke data from the interviewee. The purpose of conducting an interview is to gather the information that will support the study's development.

Online Research – the digital tools and procedures utilized in online research techniques are used to compile information on a subject from an internet search. Both factual data and expert views may be included in the information acquired.

Survey Form - a survey is a questionnaire comprising questions aimed at collecting data about the experiences of people, preferences, wants, and needs

System Development Tools

The various strategies, procedures, and tools that researchers use to build the system are referred to as system development tools. These were utilized to better and improve the necessities of the framework.

Use Case Diagram

A use case is a methodology used by the advocate to draw down the system flow and requirements. Utilize case charts are utilized in UML (Unified Modelling Language), a consistent representation for the displaying of genuine articles and systems.

Data Flow Diagram (DFD)

The DFD was utilized to portray the change of contributions to yields. This is utilized to graphically describe the stream of information and rationale inside the system.

Mockups

It does not feature any style and instead focuses on the project's content. It is used to outline a project's capabilities and content.

Technologies to be Used

1. **HTML** - a common method of labeling text files with attributes like font, color, and size effects of graphics and hyperlinks on websites.
2. **CSS** - used to define styles for your web pages, including the design, layout, and variations in display for different devices and screen sizes.
3. **JavaScript** - The dynamic programming language can be utilized for web design, web apps, game design, and many other things.
4. **Node.js** - Node.js is a cross-platform, open-source JavaScript runtime environment that can run on Windows, Linux, Unix, macOS, and more.

5. **Socket.io** - Socket.IO allows bi-directional communication between client and server.

6. **Express –** set common web application settings like the port to use for connecting.

7. **Bootstrap** - A front-end programming framework that can be used for both web pages and mobile applications. JavaScript (JS), CSS, and HTML The goal of Bootstrap's foundation is to make it simpler to create delicate mobile-first websites and applications.

8. **Three.js** - a JavaScript-based WebGL engine that can run GPU-powered games and other graphics-powered apps straight from the browser.

9. **Figma** - is a collaborative web application for interface design, with additional offline features enabled by desktop applications for macOS and Windows.

Software Evaluation

The system was based on and evaluated using the ISO 25010 software quality standards. The functionality of a system was characterized based on criteria such as Functional Suitability, Performance Efficiency, Usability, Compatibility, Reliability, Maintenance, Security, and Portability.

CHAPTER IV

PRESENTATION, ANALYSIS, AND INTERPRETATION OF DATA

This chapter presents the methods of the researchers for acquiring information regarding how the system responded to the stated difficulties. It covers the development of the system and the experiences of the beneficiaries with it. Also highlighted are the findings of the assessments made in response to the survey. Based on the product quality model described in ISO/IEC 25010, it assesses the Functional Suitability, Performance Efficiency, Compatibility, Usability, Reliability, Security, Maintainability, and Portability of the produced Exploring the Potential of Virtual Reality for Araling Panlipunan Subject to the Grade 3 – Galileo Students of Tenejero Integrated School, Balanga City, Bataan.

The Traditional Way of Teaching

The traditional way of Mrs. Divina Dabu, the Grade 3 - Galileo class adviser teaching is covered in this section. The traditional process of how Grade 3 - Galileo learn from their teacher's teaching by using a PowerPoint presentation is shown in Figure 2.

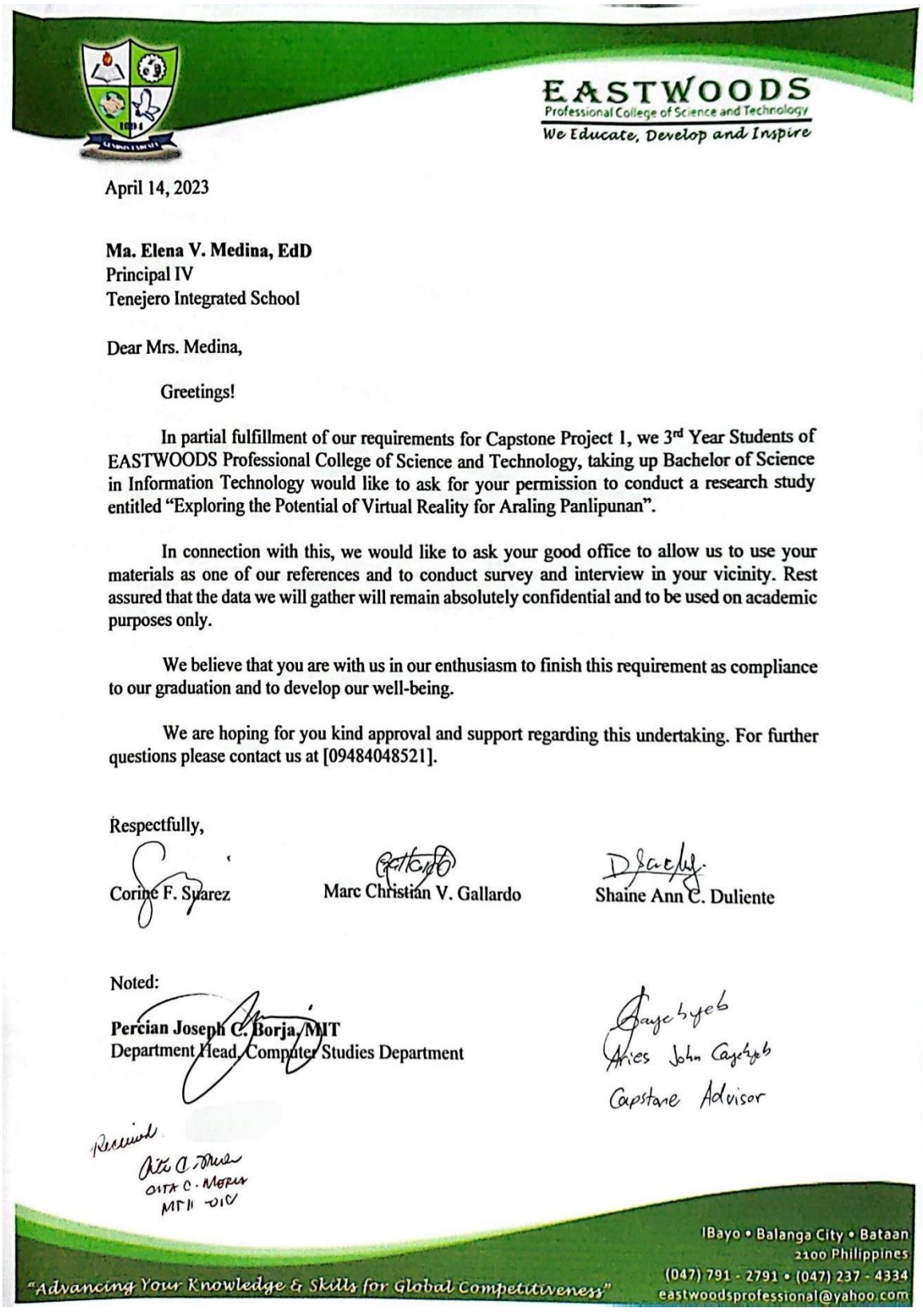
Figure 2 *Traditional Way of Teaching and Learning*

Development of the System

The system was created by the researchers using Agile Development. The team employs the iterative Agile Development process for software development. Cross-functional, self-organized teams routinely adjust projects by analyzing the environment and user requirements.

Planning Phase

The produced system of the study was remarked upon by the researchers in several areas. In April 2023, the researchers visited the beneficiaries to deliver a letter to conduct a study, as illustrated in Figure 3.



EASTWOODS
Professional College of Science and Technology
We Educate, Develop and Inspire

April 14, 2023

Ma. Elena V. Medina, EdD
Principal IV
Tenejero Integrated School

Dear Mrs. Medina,

Greetings!

In partial fulfillment of our requirements for Capstone Project 1, we 3rd Year Students of EASTWOODS Professional College of Science and Technology, taking up Bachelor of Science in Information Technology would like to ask for your permission to conduct a research study entitled "Exploring the Potential of Virtual Reality for Araling Panlipunan".

In connection with this, we would like to ask your good office to allow us to use your materials as one of our references and to conduct survey and interview in your vicinity. Rest assured that the data we will gather will remain absolutely confidential and to be used on academic purposes only.

We believe that you are with us in our enthusiasm to finish this requirement as compliance to our graduation and to develop our well-being.

We are hoping for you kind approval and support regarding this undertaking. For further questions please contact us at [09484048521].

Respectfully,

Corine F. Suarez | Marc Christian V. Gallardo | Shaine Ann C. Duliente

Noted:

Percian Joseph C. Borja, MIT
Department Head, Computer Studies Department

Aries John Cayetyeb
Capstone Advisor

Received
Rita C. Morin
MTII-DIC

IBayo • Balanga City • Bataan
2100 Philippines
(047) 791 - 2791 • (047) 237 - 4334
eastwoodsprofessional@yahoo.com

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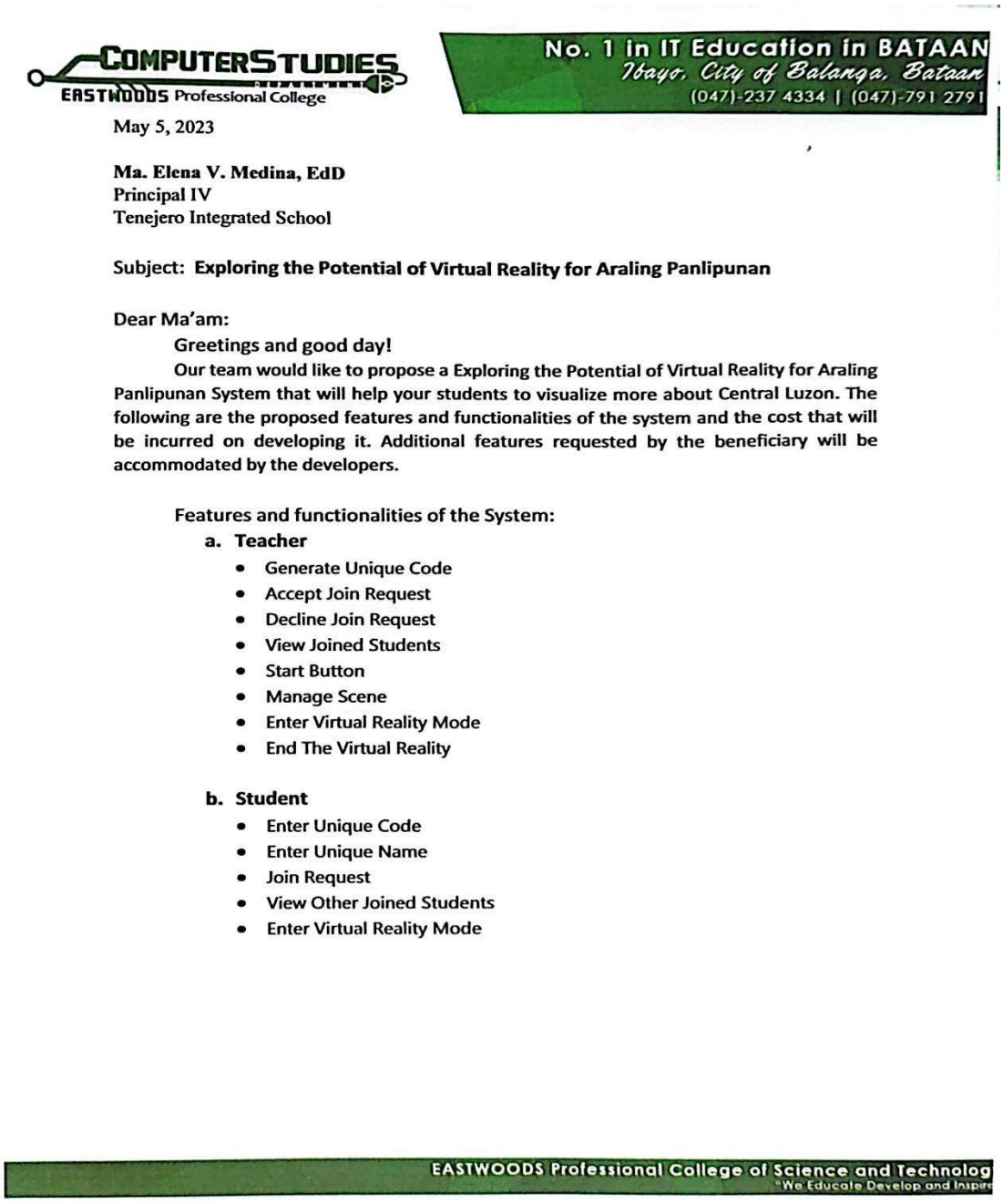
Figure 3 *Signed Letter to Conduct Study*

The researchers conducted an interview with Mrs. Divina Dabu about the basic information about how students how is the way of his teaching. Especially in the historic places included in the lesson of his subject as shown in Figure 4. They found out that they just use a PowerPoint presentation for it. According to Mrs. Divina Dabu, they only use images from online and put them on their PowerPoint.

Figure 4 *Conducting an Interview*

In terms of the functions that the system would support, this study gave a comprehensive specification of the system requirements. In May 2023, the researchers revisited the beneficiaries to deliver a proposal letter outlining the features and functions of the suggested project, as depicted in Figures 5, Figure 6, and Figure 7.



COMPUTER STUDIES
EASTWOODS Professional College

No. 1 in IT Education in BATAAN
Ibayo, City of Balanga, Bataan
(047)-237 4334 | (047)-791 2791

May 5, 2023

Ma. Elena V. Medina, EdD
Principal IV
Tenejero Integrated School

Subject: **Exploring the Potential of Virtual Reality for Araling Panlipunan**

Dear Ma'am:

Greetings and good day!

Our team would like to propose a Exploring the Potential of Virtual Reality for Araling Panlipunan System that will help your students to visualize more about Central Luzon. The following are the proposed features and functionalities of the system and the cost that will be incurred on developing it. Additional features requested by the beneficiary will be accommodated by the developers.

Features and functionalities of the System:

a. **Teacher**
- Generate Unique Code
- Accept Join Request
- Decline Join Request
- View Joined Students
- Start Button
- Manage Scene
- Enter Virtual Reality Mode
- End The Virtual Reality

b. **Student**
- Enter Unique Code
- Enter Unique Name
- Join Request
- View Other Joined Students
- Enter Virtual Reality Mode

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Figure 5 *Copy of Proposal Letter Page 1*

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The estimated cost of the system development:

Fees and ➢ Virtual Reality Box ➢ Hosting ➢ Domain	 4,500.00 1,500.00 90.00
TOTAL COST OF THE PROJECT	**6,090.00**

Below are the details (Gant Chart) of the design, development, and implementation plan:

	April 2nd week – 3rd Week 2023	April – May 2023	May - October week 2018	October – November 2023	January 2024
Requirements and Planning					
Design					
Development and Testing					
Implementation and Revision					
Formal Turn- over of the System					

The following will be working on this project:

a. Corine F. Suarez(Researcher)
b. Marc Christian V. Gallardo(Researcher)
c. Shaine Ann C. Duliente(Researcher)

EASTWOODS Professional College of Science and Technology

Figure 6 *Copy of Proposal Letter Page 2*

COMPUTER STUDIES DEPARTMENT
EASTWOODS Professional College

No. 1 in IT Education in BATAAN
Ibayo, City of Balanga, Bataan
(047)-237 4334 | (047)-791 2791

We hope that this project will merit your positive response and approval.
Thank you very much.

Very truly yours,

Corine F. Suarez
System Developer

Marc Christian V. Gallardo
System Developer

Shaine Ann C. Duliente
System Developer

Ma. Elena V. Medina, EdD
Principal IV
Tenejero Integrated School

Aries John Cayabyab
Capstone Adviser

Figure 7 *Copy of Proposal Letter Page 3*

Mrs. Ma. Elena V. Medina, EdD, the Principal of Tenejero Integrated School, signed the proposal letter, and the researchers also signed it to indicate collaboration on the project, as shown in Figure 8.

Figure 8 *Proposal Letter Signed*

The researchers started investigating and getting acquainted with the web applications and technologies they would be using. They have the determination to find the best technology, especially that can be used for Virtual Reality features that will be implemented in the web-based VR. The researchers found out that Three.js might be the best option for Virtual Reality features. The research was conducted online as shown in Figure 9.

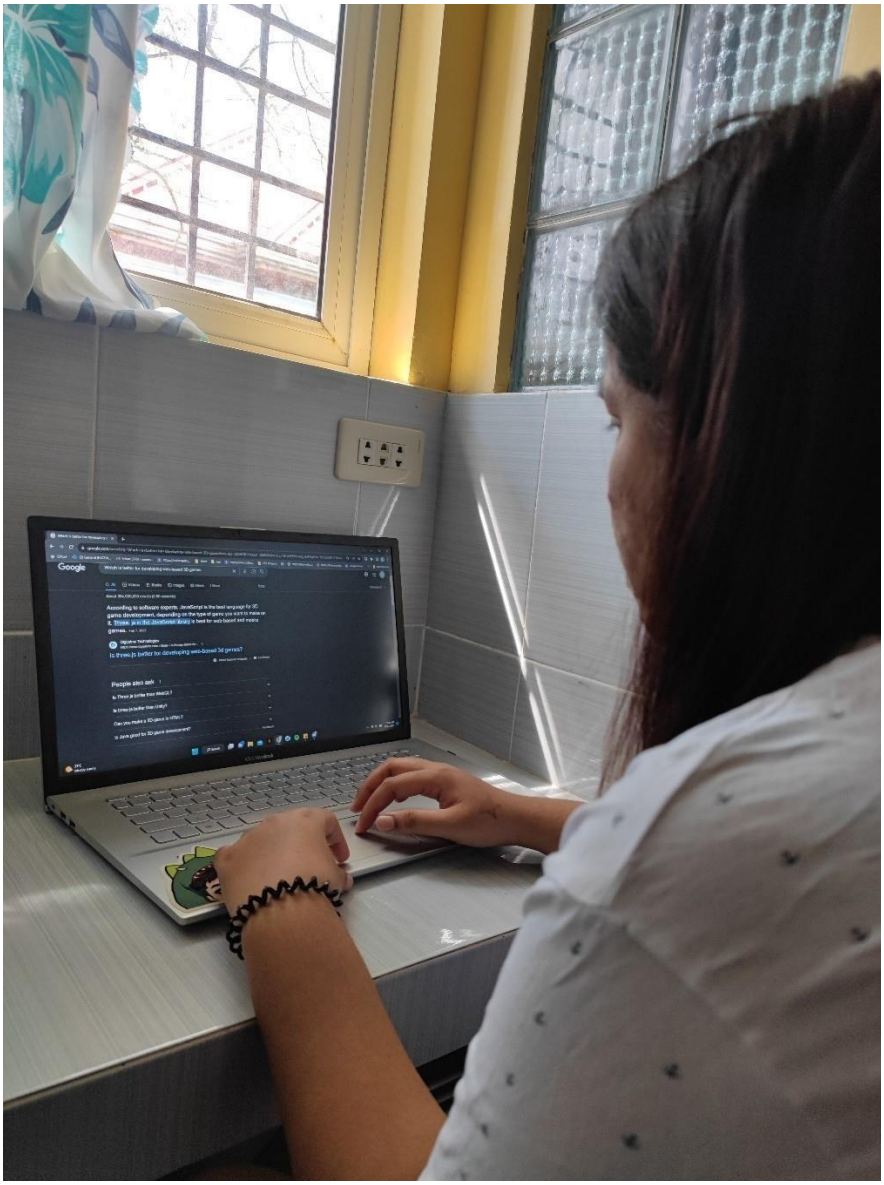

Figure 9 *Online Research for Better VR Features*

Designing Phase

The production, usability, functionality, and services of the present system were all assessed by the researchers. To illustrate how the entities of the system interact with its operations, the researchers created the Use Case Diagram, Data Flow Diagrams (DFD), Entity Relationship Diagram (ERD), and Mockups in this section.

Use Case Diagram

The researchers conducted a thorough examination of the system-related transaction. It demonstrates the roles played by the four (2) entities—the teacher, and students, seen in Figure 10.

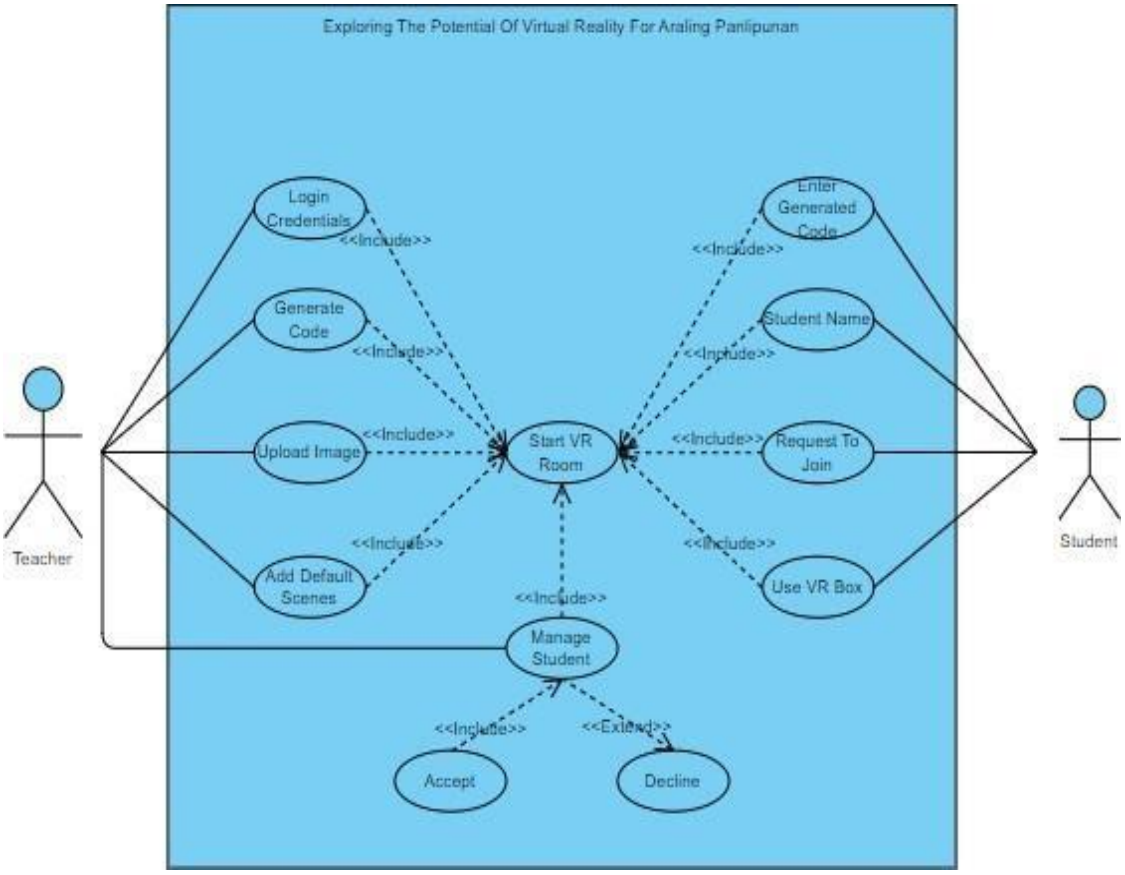

Figure 10 *Use Case Diagram*

Context Level Diagram Level 0

Context Level Data Flow Diagrams display how a system interacts with other actors (external factors) that it is intended to communicate with. Diagrams showing the system context might be useful in understanding the setting in which the system will operate. Two (2) entities that are engaged in the process of the system are illustrated in the context-level diagram, along with the various data flows indicated in Figure 11.

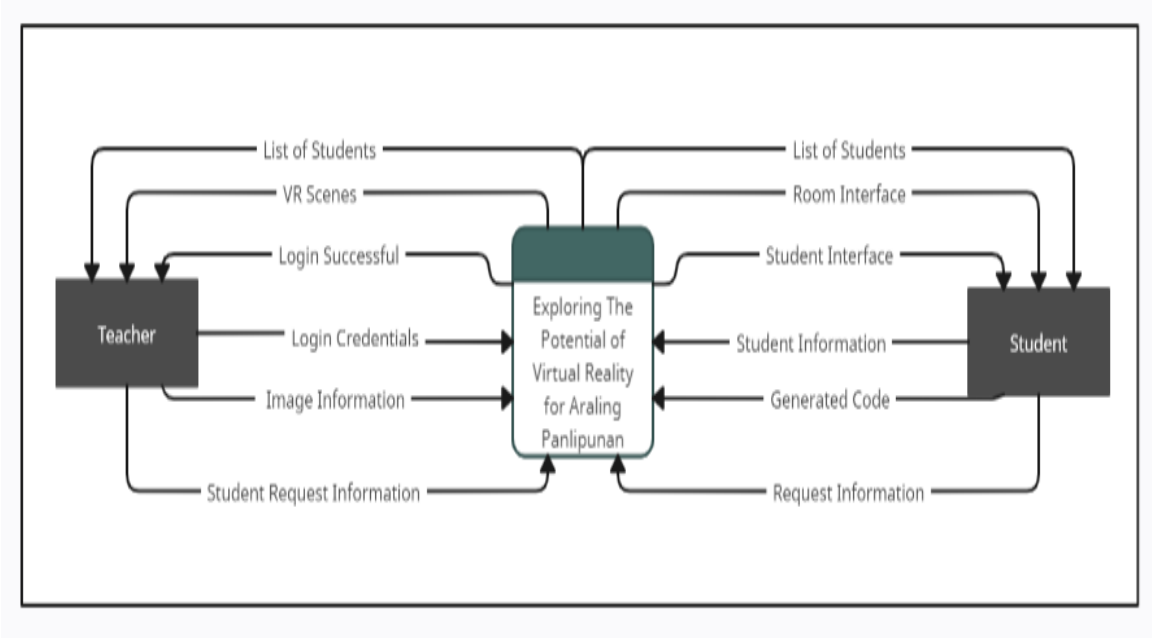

Figure 11 *Context Level Diagram Level 0*

Data Flow Diagram Level 1 not only offers a complete explanation of the operation of the system, but it also shows how the system is used by the two (2) entities that have access to it: the teacher, and the students. It divides the main process into smaller ones. Data Flow Diagram Level 1 also includes the data storage utilized by the primary process as seen in Figure 12.

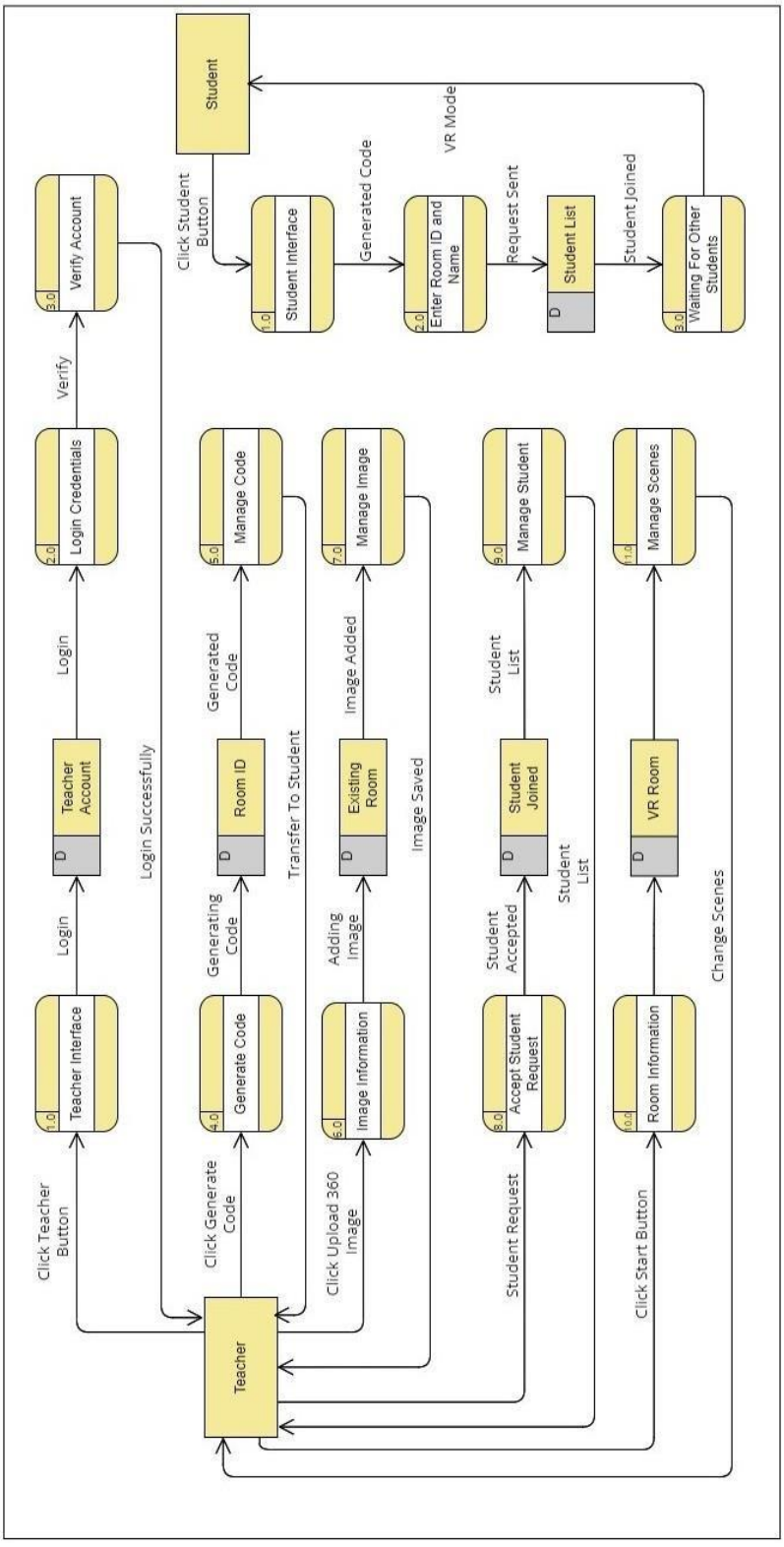

Figure 12 *Data Flow Diagram Level 1*

Mockup Design for Exploring the Potential of Virtual Reality for Araling Panlipunan

In this section, the researchers decided to create mockups, which are seen in Figures 13 to 15.

Once the users access the system, they will be redirected to the homepage where the users can choose their role as shown in Figure 13.

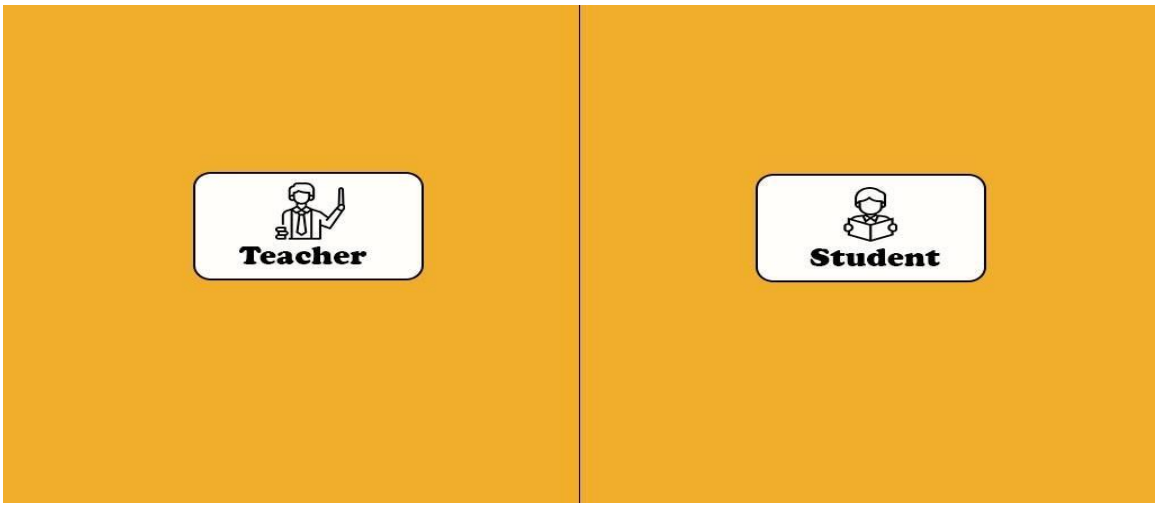

Figure 13 *User Role Selection Page*

The Teacher Page where the teacher can generate unique code and manage joining students is shown in Figure 14.

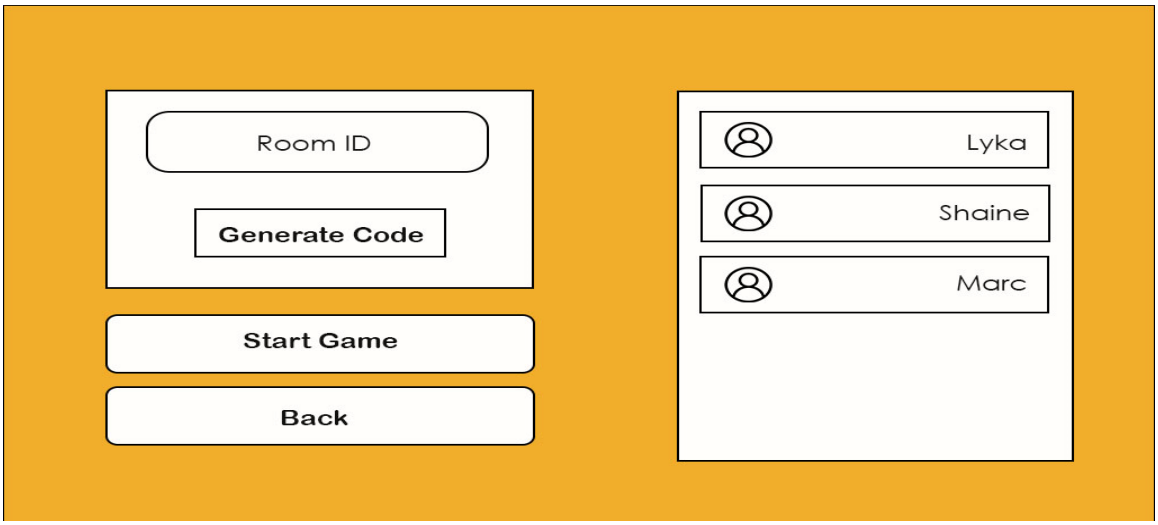

Figure 14 *Teacher Page*

The Student Page where the students can enter their teacher's code and their name is shown in Figure 15.

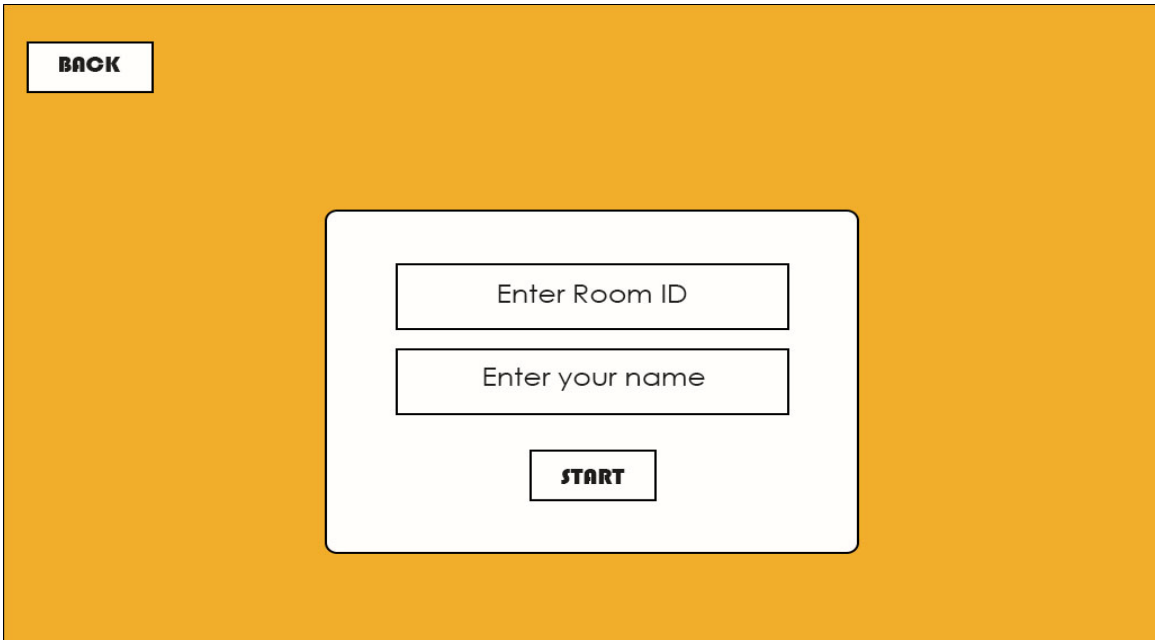

Figure 15 *Student Page*

Development Phase

The system was put into development after the designing stage. They complete the required design of the system as well as the features, functions, and flow.

The researchers began constructing the design based on the scope of the system. The Exploring the Potential of Virtual Reality for Araling Panlipunan Subject to the Grade 3 – Galileo Students of Tenejero Integrated School, Balanga City, Bataan was created to build a solution to the following problems.

1. **What are the technologies to develop the Exploring the Potential of Virtual Reality for Araling Panlipunan Subject to the Grade 3 – Galileo Students of Tenejero Integrated School, Balanga City, Bataan?**

The following technologies have been used and applied to help the developer construct the system listed below:

1. HTML - HTML is used to create the layout including the buttons, links, images, titles, and paragraphs of the System.

2. CSS - Used to provide design for the whole system including the page background, font styles, orientation, and responsiveness of the system.

3. JavaScript – Used to make the system interactive and dynamic, adding functionality and responsiveness to the user interface.

4. Node.js - Used to handle requests and ensure smooth communication between the teacher and student sides of the system.

5. Socket.io – Used to enable real-time communication between users in the system, ensuring instant sharing of updates and changes.

6. Express – Used to build and structure the project on the server side for efficient operation.

7. Bootstrap – Used to ensure the project is user-friendly and easy to use on different devices.

8. Three.js: Used to incorporate three-dimensional graphics and visual elements into the researcher's system, enhancing the overall user experience by creating immersive and visually captivating virtual reality environments.

9. Figma – Used to create and iterate on the mockup design for the system.

2. What features and functionalities to be provided by the Exploring the Potential of Virtual Reality for Araling Panlipunan Subject to the Grade 3 –

Galileo Students of Tenejero Integrated School, Balanga City, Bataan are useful for the system user?

Figure 16 shows the Teacher Page when the VR is started. The teacher can enter VR mode, change the scene, and exit the VR for the students.

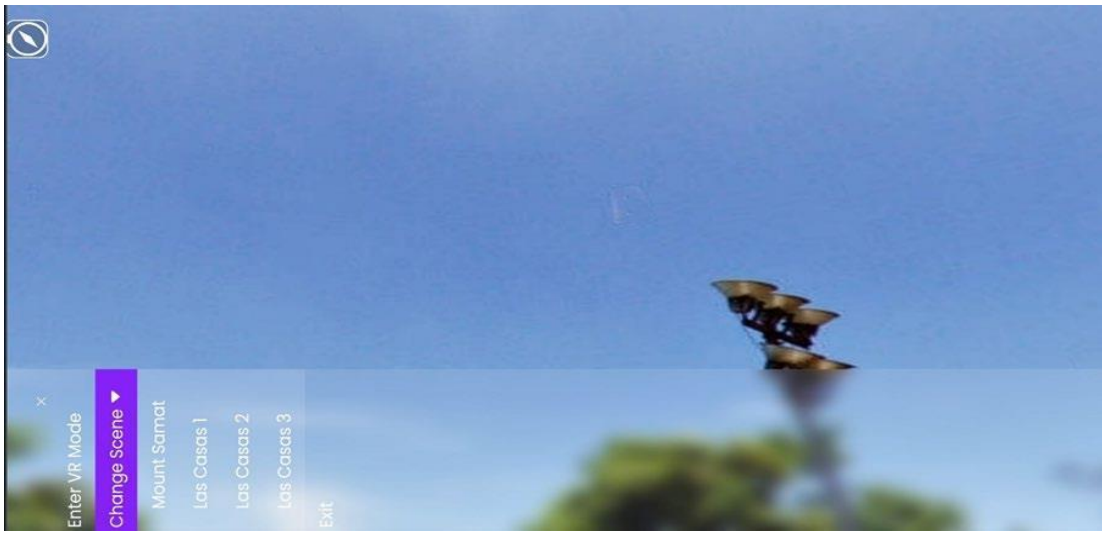

Figure 16 *Teacher Page When the Teacher Started the VR*

Figure 17 shows the Student Page when the VR is started. The student can only access Enter VR Mode.

Figure 17 *Student Page When the Teacher Started the VR*

Testing Phase

During this phase, the researchers sought the assistance of the researcher's capstone adviser and benefactors to test the system, during which they found that the system functions well. However, a few bugs on joining the room and glitches were identified that need fixing. Additionally, to enhance security for authorized users, they suggested implementing more changes on UI, which took action. These adjustments include little tweaks and enhancements in terms of system operation. As shown in Figure 18.

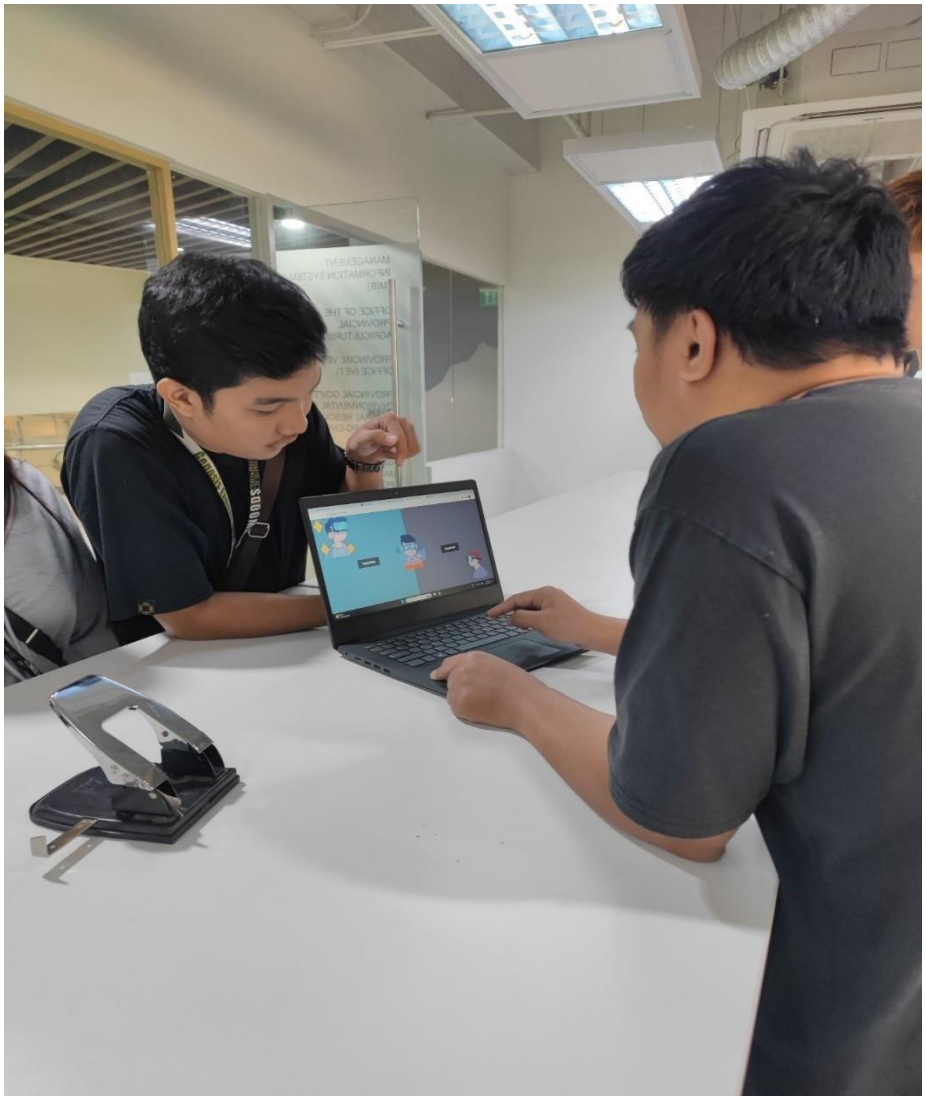

Figure 18 *IT Professionals Testing and Evaluating the System*

Releasing Phase

During this phase, the students and class adviser of Grade 3 - Galileo, Mrs. Divina Dabu from Tenejero Integrated School tested the newly built system. The system was deployed on, the 25th day of October 2023, and the operation of the system its and capabilities are demonstrated by the researchers, including how the system works, how the teacher generates the code and manages the joining students, and how the students will join in the room. Discussions as shown in Figure 19.

Figure 19 *Demonstration and Testing to Grade 3 - Galileo*

Feedback

The researchers produced and printed survey questionnaires during this phase, which they then distributed to their participants and IT specialists. The program was put to the test using the software quality criteria of ISO Standard 25010. The functionality of the

system was described using the terms functional suitability, performance efficiency, usability, compatibility, reliability, maintainability, security, and portability.

Profile of the Respondents According to Age

The frequency and percentage distribution of respondent's profiles by age are shown in Table 1 below. As shown in the table, among the 43 respondents. 41.86% were 8 years old, 27.90% were 9 years old, 4.65% were 10 years old, 25.58% were 20+ years old.

These age ranges of the respondents regarding evaluation of the system. Profile of the Respondents According to Age.

Table 1 *Profile of the Respondents According to Age*

Age	Frequency	Percentage
8	18	41.86%
9	12	27.90%
10	2	4.65%
20+	11	25.58%
Total	43	100%

Likert Scale

A Likert scale is a psychometric scale commonly involved in research that employs questionnaires. It is the most widely used approach to scaling responses in survey research, such that the term is often used interchangeably with rating scale down in Table 2.

Table 2 *The Likert Scale Conversion Table*

Description	Value	Conversion
Very Satisfied	5	4.51 - 5
Satisfied	4	3.51 - 4.50
Average	3	2.51 – 3.50
Poor	2	1.51 – 2.50
Very Poor	1	0.51 – 1.50

Functionality

The functionality of a system was specified using ISO 25010 software quality standards, which include the following characteristics: Functional Suitability, Performance Efficiency, Compatibility, Usability, Reliability, Security, Maintainability, and Portability.

Statistical Tool Used

To analyze the results of this study, the following statistical methods were applied.

Frequency - based on several factors, this was used to determine how many people took part in a statistical survey.

Percentage - this was used to figure out how many people responded. P = F * 100 / N is the formula that is utilized.

Where: P = Percentage, F = Frequency, N = Total number of populations

Weighted Mean - mean describes how each questionnaire item was answered by the respondents. It makes sense after analyzing the responses of the respondents.

The majority of respondents assessed the functionality of the system as adequate for all the factors included in the table below. It was also said that the participants gave the

functional sustainability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability compliance of the system all satisfactory ratings. The overall functionality of the system was found to be adequate with a general weighted mean of 4.66.

Table 3 *Overall System Evaluation*

CRITERIA	RATING = 43										MEAN
	5	%	4	%	3	%	2	%	1	%	
FUNCTIONAL STABILITY											
Functional Completeness	38	88.37%	4	9.30%	1	2.33%	0	0%	0	0%	4.86
Functional Correctness	25	58.14%	18	41.86%	0	0%	0	0%	0	0%	4.58
Functional Appropriateness	38	88.37%	5	11.63%	0	0%	0	0%	0	0%	4.88
General Weighted Mean Based on Functional Stability											4.77
PERFORMANCE EFFICIENCY											
Time Behavior	23	53.49%	19	44.19%	1	2.33%	0	0%	0	0%	4.51
Resource Utilization	37	86.05%	6	13.95%	0	0%	0	0%	0	0%	4.86
Capacity	23	53.49%	19	44.19%	1	2.33%	0	0%	0	0%	4.51
General Weighted Mean Based on Performance Efficiency											4.63
COMPATIBILITY											
Co-existence	28	65.12%	13	30.23%	2	4.65%	0	0%	0	0%	4.60
Interoperability	28	65.12%	13	30.23%	2	4.65%	0	0%	0	0%	4.60
General Weighted Mean Based on Compatibility											4.60
USABILITY											
Appropriateness Recognizability	36	83.72%	5	11.63%	2	4.65%	0	0%	0	0%	4.79
Learnability	32	74.42%	10	23.26%	1	2.33%	0	0%	0	0%	4.72
Operability	27	62.79%	14	32.56%	2	4.65%	0	0%	0	0%	4.58
User Error Protection	12	27.91%	28	65.12%	3	6.98%	0	0%	0	0%	4.21
User Interface Aesthetics	36	83.72%	6	13.95%	1	2.33	0	0%	0	0%	4.81
Accessibility	35	81.40%	6	13.95%	2	4.65%	0	0%	0	0%	4.77
General Weighted Mean Based on Usability											4.65
RELIABILITY											
Maturity	32	74.42%	9	20.93%	2	4.65%	0	0%	0	0%	4.70
Availability	35	81.40%	8	18.60%	0	0%	0	0%	0	0%	4.81
Fault Tolerance	30	69.77%	13	30.23%	0	0%	0	0%	0	0%	4.70
Recoverability	22	51.16%	20	46.51%	1	2.33%	0	0%	0	0%	4.49
General Weighted Mean Based on Reliability											4.68
SECURITY											
Confidentiality	28	65.12%	13	30.23%	2	4.65%	0	0%	0	0%	4.60
Integrity	29	67.44%	11	25.58%	3	6.98%	0	0%	0	0%	4.60
General Weighted Mean Based on Security											4.60
MAINTAINABILITY											
Modularity	27	62.79%	14	32.56%	2	4.65%	0	0%	0	0%	4.58
Reusability	30	69.77%	12	27.91%	1	2.33%	0	0%	0	0%	4.67
Analyzability	28	65.12%	12	27.91%	3	6.98%	0	0%	0	0%	4.58
Modifiability	27	62.79%	13	30.23%	3	6.98%	0	0%	0	0%	4.56
Testability	28	65.12%	12	27.91%	3	6.98%	0	0%	0	0%	4.58
General Weighted Mean Based on Maintainability											4.59
PORTABILITY											
Adaptability	34	79.07%	7	16.28%	2	4.65%	0	0%	0	0%	4.74
Installability	33	76.74%	10	23.26%	0	0%	0	0%	0	0%	4.77
Replaceability	30	69.77%	13	30.23%	0	0%	0	0%	0	0%	4.70
General Weighted Mean Based on Portability											4.74
GENERAL WEIGHTED MEAN											**4.66**

In Tenejero Integrated School, 43 respondents, including Grade 3 – Galileo students and advisers, and IT professionals, participated in this survey. Table 4 displays their ratings of the Functional Suitability of the system. With an average mean score of 4.77, users saw that all necessary system capabilities were operating correctly.

Table 4 *System Evaluation: Functional Stability*

Functional Suitability	Average Mean	Descriptive Interpretation
Functional Completeness	4.86	Very Satisfactory
Functional Correctness	4.58	Very Satisfactory
Functional Appropriateness	4.88	Very Satisfactory
Mean	4.77	Very Satisfactory

In Tenejero Integrated School, 43 respondents, including Grade 3 – Galileo students and advisers, and IT professionals, participated in this survey. Table 5 displays their ratings of the Performance Efficiency of the system. With an average mean score of 4.63, users saw that system performs well.

Table 5 *System Evaluation: Performance Efficiency*

Performance Efficiency	Average Mean	Descriptive Interpretation
Time Behaviour	4.51	Very Satisfactory
Resource Utilization	4.86	Very Satisfactory
Capacity	4.51	Very Satisfactory
Mean	4.63	Very Satisfactory

In Tenejero Integrated School, 43 respondents, including Grade 3 – Galileo students and advisers, and IT professionals, participated in this survey. Table 6 displays their ratings of the Compatibility of the system. With an average mean score of 4.60, users saw that the system can be accessed from a browser.

Table 6 *System Evaluation: Compatibility*

Compatibility	Average Mean	Descriptive Interpretation
Co-existence	4.60	Very Satisfactory
Interoperability	4.60	Very Satisfactory
Mean	4.60	Very Satisfactory

In Tenejero Integrated School, 43 respondents, including Grade 3 – Galileo students and advisers, and IT professionals, participated in this survey. Table 7 displays their ratings of the Usability of the system. With an average mean score of 4.65, users understand well the system concept.

Table 7 *System Evaluation: Usability*

Usability	Average Mean	Descriptive Interpretation
Appropriateness Recognizability	4.79	Very Satisfactory
Learnability	4.72	Very Satisfactory
Operability	4.58	Very Satisfactory
User Error Protection	4.21	Satisfactory
User Interface Aesthetics	4.81	Very Satisfactory
Accessibility	4.77	Very Satisfactory
Mean	4.65	Very Satisfactory

In Tenejero Integrated School, 43 respondents, including Grade 3 – Galileo students and advisers, and IT professionals, participated in this survey. Table 8 displays their ratings of the Reliability of the system. With an average mean score of 4.68, users have observed that the system shows off its aptitude for alerting users when an entry is necessary.

Table 8 *System Evaluation: Reliability*

Reliability	Average Mean	Descriptive Interpretation
Maturity	4.70	Very Satisfactory
Availability	4.81	Very Satisfactory
Fault Tolerance	4.70	Very Satisfactory
Recoverability	4.49	Satisfactory
Mean	4.68	Very Satisfactory

In Tenejero Integrated School, 43 respondents, including Grade 3 – Galileo students and advisers, and IT professionals, participated in this survey. Table 9 displays their ratings of the Security of the system. With an average mean score of 4.60, users found that the system is secured with a teacher login and unique generated code.

Table 9 *System Evaluation: Security*

Security	Average Mean	Descriptive Interpretation
Confidentiality	4.60	Very Satisfactory
Integrity	4.60	Very Satisfactory
Mean	4.60	Very Satisfactory

In Tenejero Integrated School, 43 respondents, including Grade 3 – Galileo students and advisers, and IT professionals, participated in this survey. Table 10 displays their ratings of the Maintainability of the system. With an average mean score of 4.59, users noticed that the system can be tested easily.

Table 10 *System Evaluation: Maintainability*

Maintainability	Average Mean	Descriptive Interpretation
Modularity	4.58	Very Satisfactory
Reusability	4.67	Very Satisfactory
Analyzability	4.58	Very Satisfactory
Modifiability	4.56	Satisfactory
Testability	4.58	Very Satisfactory
Mean	4.59	Very Satisfactory

In Tenejero Integrated School, 43 respondents, including Grade 3 – Galileo students and advisers, and IT professionals, participated in this survey. Table 11 displays their ratings of the Portability of the system. With an average mean score of 4.74, users noticed that it can be accessed on any device.

Table 11 *System Evaluation: Portability*

Portability	Average Mean	Descriptive Interpretation
Adaptability	4.74	Very Satisfactory
Installability	4.77	Very Satisfactory
Replaceability	4.70	Very Satisfactory
Mean	4.74	Very Satisfactory

CHAPTER V

SUMMARY, CONCLUSION, AND RECOMMENDATION

The major purpose of this chapter is to review the study that was done. The goal of the study, a restatement of the research questions, the methodology, a summary of the findings, conclusions, and a discussion are all included in this overview. This chapter offers suggestions for the next research projects and potential modifications. This chapter provides a summary of the findings of the study, the inferences drawn from them, and the suggestions made by the researchers in light of the findings.

Summary

The capstone aims to investigate the feasibility and effectiveness of integrating VR experiences into the teaching and learning of Araling Panlipunan, with a focus on enhancing students' engagement, comprehension, and overall educational experience. By leveraging the immersive nature of VR, the research explores how this technology can create dynamic and interactive environments that bring historical and cultural lessons to life, providing students with a more vivid and memorable learning experience.

Through a combination of theoretical frameworks, technological evaluations, and practical implementation, the capstone seeks to shed light on the potential benefits and challenges of incorporating VR in Araling Panlipunan education. The findings may contribute valuable insights to educators, curriculum developers, and policymakers interested in harnessing the power of emerging technologies to enrich the educational landscape and foster a deeper understanding of social studies among students.

Research Methodology

The researchers utilized a mix of descriptive study and survey methods to collect data from the Tenejero Integrated School. To ascertain what they observed in the system, the survey replies of the respondents were analyzed. The researchers used Agile Methodology. The six phases of Agile Methodology are Plan, Design, Develop, Test, Release, and Feedback.

Summary of Agile Methodology

1. **Planning Phase**

   In April 2023, the researchers visited Tenejero Integrated School to deliver a letter to conduct a study and interview Mrs. Ma. Elena V. Medina, the Principal of Tenejero Integrated School. Unfortunately, Mrs. Medina was unavailable on that day. In her absence, the researchers approached Mrs. Cita C. Merla, the Head Teacher of Tenejero Integrated School, to request her signature for permission to conduct research. Mrs. Cita C. Merla agreed to sign on behalf of the school, facilitating the research process for the intended beneficiaries. And, in May 2023, the researchers revisited the beneficiaries to deliver a proposal letter outlining the features and functions that the system is expected to support.

2. **Designing Phase**

   The researchers assessed the functionality, usability, and performance of the present system. A Use Case Diagram and Data Flow Diagrams are created to illustrate the link between the entity and system operations, respectively, to complete the study.

3. Development Phase

The proponent finished the design and construction of the system during this phase. The following technologies were used by the researchers to evaluate the software implementation and fine-tune the requirements: HTML, CSS, JavaScript, Node js, Socket.io, Express, and Three, js. HTML or Hypertext Markup Language is the foundation of the system. CSS or Cascading Sheet is used to design the system. The system is dynamic and interactive thanks to Hypertext Preprocessor and JavaScript. Node.js is for package management. Express and socket.io are used for a web server that allows communication between server and client devices. Three.js is used for Virtual Reality features that run on browsers.

4. Testing Phase

To ensure that the system is fully functional, the researchers together with the researcher's capstone adviser, beneficiaries, and IT experts, did a variety of tests. If any potential flaws or vulnerabilities are found, the developers will immediately fix them. At this time, the researchers also received feedback from the IT professionals who did the testing.

5. Releasing Phase

The researchers now relinquished control to the beneficiary. The product release procedure comes after a successful testing phase. Now that the program has been fully distributed, users may access it. The software development team provides ongoing assistance throughout this phase to guarantee that the system keeps functioning properly and that any new flaws are fixed. It is possible to do further iterations in the future to improve a current product or add new features.

6. Feedback

The researchers created and printed survey questionnaires that were delivered to their 33 participants from Grade 3 – Galileo and 10 IT professionals. Software quality criteria specified in ISO Standard 25010 were used to test the program. Functional Suitability, Performance Efficiency, Usability, Compatibility, Reliability, Maintainability, Security, and Portability were used to describe the functionality of the system. Many of them said the system may be helpful to them, but they also said it needed further revisions to make it more user-friendly, particularly in terms of design and small tweaks and improvements to system speed.

Conclusion

The findings of the study showed a positive perception with a satisfactory rating by 43 respondents. The functions of the system were characterized using the following qualities, which were based on ISO 25010 software quality standards: Functional Sustainability, Performance Efficiency, Compatibility, Usability, Reliability, Security, Maintainability, and Portability.

With the help of IT professionals, the researcher's capstone adviser, Grade 3 – Galileo students, and their class adviser, the researchers carried out the real demonstration and final testing. Many of them said the system may be helpful to them, but they also said it required further revisions to make it more secure, particularly in terms of small tweaks and improvements to system security.

Recommendations

The following recommendations are given to improve the project based on the study and analysis of survey results as well as physically discovering specific difficulties with the help of professionals.

1. Create an Offline Mode
2. Another mode of learning. Example: quiz.
3. Interactive learning. Example: using a VR controller to click something.

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APPENDIX A

INTERVIEW TRANSCRIPT

(Summary Transcript)

Interview Transcript

Marc: So, Ma'am yung idedevelop po naming, familiar po ba kayo sa VR?

Ma'am Divina: VR?

Marc: Opo.

Ma'am Divina: Ano ibig sabihin ng VR?

Marc: Yung Virtual Reality po, yung kumbaga may parang sinusuot.

Ma'am Divina: VR? Oh.

Marc: Alam niyo po yung sinusuot.

Ma'am Divina: Ah oo.

Marc: Tapos may mga object na nakikita, parang iyun po.

Ma'm Divina: Oo.

Marc: So, yung plano po naming is parang Virtual Education po kumbaga iyun yung gagamitin ng mga estudyante parang may mga specific na topic po kayo na iyun ung contents sa ginagawa naming.

Ma'am Divina: Imbis na aklat? Ah.

Corine: Yung may gusto po kayong ipa-visual pero through Virtual Reality po.

Marc: Para mas maappreaciate po ng mga estudyante.

Ma'am Divina: Ah halimbawa, ang hawak ko kasi sa grade 3 Araling Panlipunan. Halimbawa, gusto ko ipakita sa kanila yung gitnang Luzon.

Marc & Corine: Opo ganun po.

Ma'am Divina: Yung mga likas na yaman ng gitnang Luzon.

Marc & Corine: Opo.

Ma'am Divina: Ah ganon.

Marc: Tapos parang image yung makikita nila sa pamamagitan ng VR.

Ma'am Divina: Hmmm.

Marc: So, parang ganun po yun

Ma'am Divina: Edi maganda, parang... parang mararating nila yung bawat lugar ng halimbawa gitnang Luzon parang mararating talaga nila kasi kung gagamit ng VR technology.

Corine: Opo tama po.

Marc: So yung ano po may mga cellphone na po ba ang mga bata.

Ma'am Divina: Karamihan lalo nap ag SPED at section 1.

Marc: Sa inyo po?

Ma'am Divina: Sa akin siguro 80%.

Marc & Corine: Pwede na po.

Ma'am Divina: Oo.

Marc: Paano po yung traditional way niyo ng pagtuturo?

Ma'am Divina: So, sa ngayon yung strategy naming gumagamit kami ng TV, gumagamit kami ng 'yun pa rin chalk, black board tapos ah mga chart. Ang nadagdag lang sa amin ngayon may TV na bawat ah room. Kasi nga ang kailangan talaga nila yung nakikita talaga nila ng malinaw yung mga tinuturo namin.

Marc: So, yung anong subject po yung parang gusto niyo pong magfocus sa mga topic? Ayun po Aralin Panlipunan?

Ma'am Divina: Ako kasi ngayon naka... ang hawak ko talaga ngayon Araling Panlipunan, dati Math ako eh. Nunng nalipat ako ng grade 3 ah yung Araling Panlipunan yung walang bakanteng nao kaya doon ako napunta. Pero ang hawak ko talaga, Math.

Marc & Corine: Ah.

Shaine: Sa ganoong way niyo po nang pagtuturo ano po yung mga na-encounter niyo na problema?

Ma'am Divina: Sa Araling Panlipunan? Ayun nga kadalasan kasi nga sa Araling Panlipunan kailangan maipakita ko nga sa kanila yung halimbawa yung... yung... kultura ng gitnang Luzon. Kasi naka sentro kami sa gitnang Luzon eh. Kasi gitnang Luzon tayo, kasi gusto kong maipakita sa kanila yung talagang kultura, yung mga paniniwala, yung... yung logo ng bawat lalawigan. Madalas ahmm nakakakuha lang ako nun sa aklat. Ipiprint mong anon para makita nila. Ang gusto ko bam akita nilang ng ano 'yun malinaw kasi minsan nakikita lang nila sa drawing ganyan ahh... mas maiintindihan kasi ng bata. Noon nga gusto ko yung maigagala ko sila ganoon. Kaya noong nagkaroon ng ano yung supervisor natin sa AP, nagkaroon ng trip dito yung ilalabas mo yung mga bata within Balanga yung mga historical, gustong gusto ko siya. Kasi iyun actual na nakikita ng bata "ay ganito pala nangyari noon, ay ito pala ang ibig sabihin ng death march" nakikita nilang yung actual, hindi unlike yung makikita lang nila sa aklat yung drawing parang titignan nila "ay iyun pala". Nakita ko kasi yung reaksiyon ng mga bata noong Nakita nila yung actual na dayorama, yung parang kitang kita mo na andoon ka.

Corine: Iba yung kesa nakikita lang nila kaysa sa picture.

Ma'am Divina: Sa AP kasi dapat talaga may tripping tapos yung mga... yung mga malilinaw na yung kagaya ng sa sinasabi niyo yung talagang mga VR VR na ganiyan mas malaking tulong 'yun pag ganun ang nakikita nila.

Corine: Possible po kayang makakuha ng topic sa lesson niyo para sa kung saan po kami magfofocus sa gagawin namin?

Ma'am Divina: Pwede naman.

Corine: Sa ngayon po kasi scratch pa lang po talaga kami kumbaga idedevelop po naming yan sa next school year pa namin.

Marc: So, bali next year po babalik kami sa inyo parang sa actual demo na po.

Marc & Corine: 'Yun lang po salamat po.

Corine F. Suarez Marc Christian V. Gallardo Shaine Ann C. Duliente

Divina C. Dabu
Grade 3 Araling Panlipunan Teacher
Tenejero Elementary School

APPENDIX B

EVALUATION TOOL

(Evaluation Tool for User Acceptability)

Evaluation Tool for User Acceptability

(Adapted from ISO 25010)

Exploring the Potential of Virtual Reality for Araling Panlipunan Subject to the Grade 3 –

Galileo Students of Tenejero Integrated School, Balanga City, Bataan

Respondent's Profile:

Name: _____

Position / Profession: _____

Age: _____

QUESTIONNAIRE

Please indicate a check mark (√) under the column that best describes your responses for each item about the **Exploring the Potential of Virtual Reality for Araling Panlipunan.**

Please use the rating below:

5 – Very Satisfactory

4 – Satisfactory

3 – Average

2 – Poor

1 – Very Poor

Please start answering here:

Criteria	Ratings				
	5	4	3	2	1
FUNCTIONAL SUITABILITY					
Functional Completeness - Functionality covers the required tasks					
Functional Correctness - System provides the appropriate results with accuracy					
Functional Appropriateness – System functions accomplishes the desired tasks and objectives					
PERFORMANCE EFFICIENCY					
Time Behavior - Response and processing time is at acceptable rate when performing specific functionality					
Resource Utilization - Amounts and types of resources used by the system, when performing its functions, meet requirements of the user					
Capacity – Limitations like internet speed, size of database and processing time do not affect the overall performance of the system					
COMPATIBILITY					
Co-existence – The system works well with different platforms like different operating system and web browser					
Interoperability – System works well when exchanging information with different units of the organization					
USABILITY					
Appropriateness Recognizability – Manuals, tutorials, demonstration and other documentation for the use of the system are appropriately provided.					
Learnability – Use of the system is easily learned by the intended users					
Operability – Functions of system are designed to be easily adaptable for users					
User Error Protection - System protects users against making errors					

User Interface Aesthetics – User interface like its colors and icons enables pleasing and satisfying interaction for the users					
Accessibility – System can be easily accessed by intended users either by internet or intranet.					

Criteria	Ratings				
	5	4	3	2	1
RELIABILITY					
Maturity – System component meet the needs for reliability under normal operation					
Availability – System component is operational and accessible when required for use					
Fault Tolerance – System component operates as intended despite the presence of hardware or software faults					
Recoverability - In the event of an interruption or a failure, the system can recover the data directly affected and re-establish its normal state					
SECURITY					
Confidentiality – System ensures that data are accessible only to those authorized users					
Integrity – System prevents unauthorized access to, or modification of, computer programs or data					
MAINTAINABILITY					
Modularity – System failure of one component has minimal impact to another parts of the computer program					
Reusability – Data from another parts of the system are easily shared with other units or entities					
Analyzability – Errors or failures of the system is easily diagnosed and mechanism to determine cause of failures are easily identified.					
Modifiability – System can be effectively and efficiently modified without introducing defects or degrading existing quality					

Testability – Effectiveness and efficiency with which test criteria can be established for the system and tests can be performed to determine whether those criteria have been met					

Criteria	Ratings				
	5	4	3	2	1
PORTABILITY					
Adaptability – System can effectively and efficiently be adapted for different or evolving hardware, software or other operational or usage environments					
Installability – Effectiveness and efficiency with which the system can be successfully installed and/or uninstalled in a specified environment					
Replaceability – System can replace another software for the same purpose in the same environment					

_____
Signature over printed name of Respondent

_____
Date

Evaluation Tool for User Acceptability

(Adapted from ISO 25010)

Exploring the Potential of Virtual Reality for Araling Panlipunan Subject to the Grade 3 – Galileo Students of Tenejero Integrated School, Balanga City, Bataan

Respondent's Profile:

Name: _____

Position / Profession: _____

Age: _____

QUESTIONNAIRE

Mangyaring ilagay ang isang tsek (√) sa ilalim ng kolum na pinakamaganda ang iyong sagot para sa bawat bagay tungkol sa Exploring the Potential of Virtual Reality for Araling Panlipunan. Gamitin ang pagmamarka sa ibaba::

5 – Lubos na Sumasang-ayon

4 – Sumasang-ayon

3 – Neutral

2 – Hindi sumasang-ayon

1 – Lubos na Hindi Sumasang-ayon

Please start answering here:

Criteria	Ratings				
	5	4	3	2	1
FUNCTIONAL SUITABILITY					
Functional Completeness - Lahat ng kailangang gawin ng system ay nagagampanan nito.					
Functional Correctness - Ang system ay nagbibigay ng tamang mga resulta nang tama.					
Functional Appropriateness – Ang system ay nagagampanan ang mga ninanais na gawain at layunin.					
PERFORMANCE EFFICIENCY					
Time Behavior - Tama at mabilis ba ang sagot ng system?					
Resource Utilization - Tama ba ang dami at klase ng gamit ng system?					
Capacity – Hindi ba naaapektohan ng bagay tulad ng bilis ng internet, at oras ng pagproseso ang performance ng system?					
COMPATIBILITY					
Co-existence – Gumagana ba nang maayos ang system sa iba't ibang platforms?					
Interoperability – Gumagana ba nang maayos ang system kapag nagpapalitan ng impormasyon sa iba't ibang bahagi ng organisasyon?					
USABILITY					
Appropriateness Recognizability – May tamang pagsasaayos ba ng system gaya ng mga manual at tutorial?					
Learnability – Madaling matutunan ba ng mga gagamit ang system?					
Operability – Madali ba itong gamitin?					
User Error Protection - Pinoprotektahan ba ng system ang mga gumagamit laban sa pagkakamali?					
User Interface Aesthetics – Maganda ba ang itsura ng system para sa mga gumagamit?					

Accessibility – Madali bang ma-access ng mga gagamit ang system, kahit sa internet o intranet?					

Criteria	Ratings				
	5	4	3	2	1
RELIABILITY					
Maturity – Tumatagal ba ang system sa pang-araw-araw na paggamit?					
Availability – Laging handa ba ang system kapag kailangan ito?					
Fault Tolerance – Gumagana pa rin ba ang system kahit may sira?					
Recoverability - Maari bang maibalik sa normal ang system pagkatapos ng aberya?					
SECURITY					
Confidentiality – Siguradong hindi pwedeng makita ng iba ang mga data maliban sa mga pinapayagan.					
Integrity – Pinipigilan ba ng system ang mga hindi awtorisadong pag-access o pagbabago sa data?					
MAINTAINABILITY					
Modularity – Kapag may sira, hindi ba naaapektohan ang ibang bahagi ng system?					
Reusability – Madaling magamit ulit ang data sa ibang bahagi ng system?					
Analyzability – Madaling malaman kung may sira ba ang system at kung anong dahilan ng sira.					
Modifiability – Madaling baguhin ang system nang walang sira o pagbaba ng kalidad.					
Testability – Madaling itest kung tama ang system at kung natutugma ba ito sa mga kriterya.					

Criteria	Ratings				
	5	4	3	2	1
PORTABILITY					
Adaptability – Madaling baguhin ang system para sa iba't ibang gamit o lugar.					
Installability – Madaling i-install o alisin ang system sa iba't ibang lugar.					
Replaceability – Pwedeng palitan ng system ang ibang software na ginagamit para sa parehong bagay sa parehong lugar.					

_____
Signature over printed name of Respondent

_____
Date

APPENDIX C

DEPLOYMENT CERTIFICATE

Republic of the Philippines
Department of Education
Region III – Central Luzon
SCHOOLS DIVISION OF CITY OF BALANGA
TENEJERO INTEGRATED SCHOOL

December 1, 2023

CERTIFICATE OF DEPLOYMENT

This is to certify that the "Exploring the Potential of Virtual Reality in Araling Panlipunan" Capstone Project, developed by the BSIT 4th-year students namely Corine F. Suarez, Marc Christian V. Gallarado, and Shane Ann C. Duliente of Eastwoods Professional College of Science and Technology, has been successfully deployed to Grade 3-Galileo students of Tenejero Integrated School.

The implementation of the virtual reality program took place from October 25, 2023 to November 30, 2023.

This project represents the culmination of the students' dedication and innovative efforts to enhance the educational experience of Grade 3 students through the integration of virtual reality technology into the Araling Panlipunan curriculum. The successful deployment of this project reflects their commitment to the advancement of education and technology.

MA. ELENA V. MEDINA, EdD
Principal IV

Address:Brgy. Tenejero City of Balanga, Bataan
E-mail:tenejeroes.balangacity@deped.gov.ph
Telephone No. 240-5552

APPENDIX D

ROUTING FORM

EASTWOODS
Professional College of Science and Technology
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ROUTING FORM 2

Capstone Project / Thesis Writing / Design Project Final Defense

Name: Corine F. Suarez
Section: BSIT-402
Title: EXPLORING THE POTENTIAL OF VIRTUAL REALITY FOR ARALING PANLIPUNAN

PROCESS	OFFICE/PERSON-IN-CHARGE	NAME AND SIGNATURE
1. Orientation for Final Defense with accomplished Routing Form 1	Subject Instructor / Adviser	PERLIAN JOSEPH [illegible]
2. Submission of Data for Statistical Analysis	School Statistician	
3. Submission of manuscript for proofreading and language editing		Charmie Lynn N. Sero
4. Submission of manuscript to the Adviser for evaluation and endorsement for Final Defense (Soft Copy)	Adviser	
5. Submission of manuscript to Final Defense Panels (1 week before the date of defense)	Head Panel	
	Panel 1	
	Panel 2	
6. Defense Fee payment	Cashier	
7. Endorsement for Final Defense	Registrar	
After Final Defense		
8. Submission/Acceptance of Revised Manuscript to Defense Panel	Head Panel	
	Panel 1	
	Panel 2	Jairyl Anne L. De Guzman
9. Acceptance of Revised Project / Prototype	Head Panel	
	Panel 1	
	Panel 2	Jairyl Anne L. De Guzman
10. Submission of accomplished manuscript for Proofreading and Plagiarism Checking	School Proofreader	
11. Submission of Hard Bound Manuscript to the Department Coordinator / Dean (2 copies)	Department Coordinator / Dean	

Student Signature: _____

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ROUTING FORM 2

Capstone Project / Thesis Writing / Design Project Final Defense

Name: Marc Christian V. Gallardo
Section: BSIT – 402
Title: EXPLORING THE POTENTIAL OF VIRTUAL REALITY FOR ARALING PANLIPUNAN

PROCESS	OFFICE/PERSON-IN-CHARGE	NAME AND SIGNATURE
1. Orientation for Final Defense with accomplished Routing Form 1	Subject Instructor / Adviser	
2. Submission of Data for Statistical Analysis	School Statistician	
3. Submission of manuscript for proofreading and language editing		Charmie Lynn N. Seno
4. Submission of manuscript to the Adviser for evaluation and endorsement for Final Defense (Soft Copy)	Adviser	
5. Submission of manuscript to Final Defense Panels (1 week before the date of defense)	Head Panel	
	Panel 1	
	Panel 2	
6. Defense Fee payment	Cashier	
7. Endorsement for Final Defense	Registrar	
After Final Defense		
8. Submission/Acceptance of Revised Manuscript to Defense Panel	Head Panel	
	Panel 1	
	Panel 2	
9. Acceptance of Revised Project / Prototype	Head Panel	
	Panel 1	
	Panel 2	Jaira Anne L. De Guzman
10. Submission of accomplished manuscript for Proofreading and Plagiarism Checking	School Proofreader	Charmie Lynn N. Seno
11. Submission of Hard Bound Manuscript to the Department Coordinator / Dean (2 copies)	Department Coordinator / Dean	

Student Signature: _____

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ROUTING FORM 2

Capstone Project / Thesis Writing / Design Project Final Defense

Name: SHAING ANN C. PULIENTE
Section: BSIT - 402
Title: EXPLORING THE POTENTIAL OF VIRTUAL REALITY FOR ARALING PANLIPUNAN

PROCESS	OFFICE/PERSON-IN-CHARGE	NAME AND SIGNATURE
1. Orientation for Final Defense with accomplished Routing Form 1	Subject Instructor / Adviser	
2. Submission of Data for Statistical Analysis	School Statistician	
3. Submission of manuscript for proofreading and language editing		Charmie Lynn N. Seno
4. Submission of manuscript to the Adviser for evaluation and endorsement for Final Defense (Soft Copy)	Adviser	
5. Submission of manuscript to Final Defense Panels (1 week before the date of defense)	Head Panel	
	Panel 1	
	Panel 2	
6. Defense Fee payment	Cashier	
7. Endorsement for Final Defense	Registrar	Maria Dess Ventura
After Final Defense		
8. Submission/Acceptance of Revised Manuscript to Defense Panel	Head Panel	
	Panel 1	
	Panel 2	Jairryl Anne L. De Guzman
9. Acceptance of Revised Project / Prototype	Head Panel	
	Panel 1	
	Panel 2	Jairryl Anne L. De Guzman
10. Submission of accomplished manuscript for Proofreading and Plagiarism Checking	School Proofreader	Charmie Lynn N. Seno
11. Submission of Hard Bound Manuscript to the Department Coordinator / Dean (2 copies)	Department Coordinator / Dean	

Student Signature:

IBayo • Balanga City • Bataan
2100 Philippines
(047) 791 - 2791 • (047) 237 - 4334
eastwoodsprofessional@yahoo.com

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Corine Suarez

INFORMATION TECHNOLOGY

PROFILE

I am a talented, ambitious and hardworking individual, with broad skills and experience in various fields. Constantly evolving and growing.

EDUCATION

Balanga, Bataan (2020-Present)
Eastwoods Professional College of Science and Technology
Bachelor of Science in Information Technology

Mariveles, Bataan (2018-2020)
Softnet Information Technology
Information and Communication Technology

SKILLS

- Trello
- Microsoft Office
- Slack
- Manifestly
- Zoho
- Virtual Assistance
- Computer Literate

CERTIFICATIONS

- Microsoft Office Specialist

CONTACT

+639484048521

suarezcorine@yahoo.com

live:suarezlc22

WORK EXPERIENCE

Freelance (March 2023 - Present)
Junior Web Developer

- Support of existing secure websites and web applications

Freelance (July 2022 - Present)
Virtual Assistant

- Onboard contractors
- Content writing
- Bookkeeping
- Project Management

Freelance (July 2022 - June 2023)
Social Media Manager

- Managed 3 Social Media accounts Content writing
- Strategist

Freelance (May 2021 - April 2022)
Social Media Manager

- Managed Social Media Accounts
- Graphic design
- Content writer

(June 2020- June 2021)
Customer Service Representative

- Cold calling
- Prepare balance sheets and invoices

Shaine Ann C. Duliente

INFORMATION TECHNOLOGY

PROFILE

As an IT student I will do my best to help and share my knowledge in the field of my course. I will focus on expanding my experience and I will persevere so that I can bring out my studies and above all so that I can teach other IT students what I have learned that I am really passionate about the course that I have become

EDUCATION

Orion Elementary School (Elementary)

2007/2013

Bataan School of Fisheries (Highschool)

2013/2017

Bataan School of Fisheries (Senior Highschool)

Information and Communication Technologies
2017/2020

Eastwoods Professional College of Science and Technology

BS Information Technology
2020/2024

LANGUAGES

Tagalog
English

CONTACT

09669071761

dulienteshaineann100600@gmail.com

PERSONAL SKILLS

Highly organized and efficient
Problem Solving
Creativity
Excellent written and verbal communication skills

TECHNICAL SKILLS

Computer Programming
Troubleshooting (Hardware/Network)
Adobe Creative Suite
Microsoft Office

Marc Christian V. Gallardo

INFORMATION TECHNOLOGY

PROFILE

As a dedicated and driven college student with a strong academic foundation and a passion for technology, I'm eager to effectively contribute my skills and knowledge in a professional IT environment.

EDUCATION

Eastwoods Professional College of Science and Technology
BS Information Technology
2021/2024

Bataan National High School (Senior High School
Computer System Servicing
2019/2020

Bataan National High School (High School
2014/2018

Tenejero Integrated School (Elementary)
2008/2014

LANGUAGES

Tagalog
English

CONTACT

09615099722

marcgallardo098@gmail.com

PERSONAL SKILLS

Communication
Problem Solving
Creativity
Adaptability

TECHNICAL SKILLS

Computer Programming
Microsoft Office
Hardware Troubleshooting
Network Troubleshooting