The Science Quizzard Gamification: An Innovation in Grade 4 Science Education of Marian College of Baliaug, Inc.

A Thesis Presented to the Faculty of Marian College of Baliuag Inc.

In Partial Fulfillment of the Requirements for the Degree of Bachelor of Elementary Education Generalist

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A Quantitative Research: Exploring the Effects of Gamification as an Innovations in Grade 7 Science Education

CHAPTER I

The Problem and Its Background

Introduction

Studying is the need of everyone and choosing the best way or strategy to give education is the biggest responsibility of every parent to their child. It is a decision that should be carefully thought through and made, because it can have an influence on a youngster's life. Did you ever think what education is right for you, Education that can help you in the future. Or you don’t have any idea about it.

Gamification is one of the promising strategies in science education, which enhances student motivation and engagement using game-like elements. There is evidence that gamification can greatly enhance the motivation of learning science as well as be commonly accepted by both students and parents. According to Çigdem, Hürsen and C. Bas (2019) concluded that gamification in science lessons increased the interest and engagement of students. M. Kalogiannakis et al. (2021) did a systematic review that shows how gamification is becoming increasingly popular. In science education, with research exploring various content areas, educational levels, and game elements. This review underscores the versatility of gamification, noting its application across different scientific disciplines and its adaptability to various educational contexts. Gamification elements are great strategies to encourage certain behaviors and thus improve academic performance (Landers, 2014). Nah et al. (2014). This study also

emphasizes the importance of aligning game elements with educational objectives to maximize learning outcomes.

Gamification in science learning, though beneficial, is not an easy activity to implement in class. Some game elements create unhealthy competition among learners or a state of extrinsic motivation that undermines student learning. Learners also experience pedagogical and technical troubles educators face in implementing gamified activities. A study by Verjel D. Macayan et al. (2022) has identified these challenges, which call for proper teacher training and resource allocation to implement gamification strategies effectively. In addition, a meta-analysis conducted by Mengli Sun (2023) was on the influence of gamification on learning outcomes in science education. The analysis concluded that gamification moderately improves learning outcomes but that its effectiveness is contingent upon several factors, such as class size and intervention duration. The study indicates that proper evaluation of these variables is critical while designing and implementing gamified learning experiences. In practice, successful gamification in science education often takes the form of simulation and role-playing scenarios in which students are encouraged to solve real-world problems. For instance, an online high school physics course incorporated simulations and role-playing activities where students could apply theoretical concepts in practical contexts. This approach not only increased students' engagement but also opened their minds toward critical thinking and problem solving.

The goal of the study is to provide evidence on the effects of the gamified science curriculum as opposed to the traditional way of teaching, using robust methodologies. The outcome of this study will have important implications on how science subjects are taught in schools by providing concrete evidence on effective teaching practices.

Statement of the Problem

The general problem of the study is to explore the effects of gamification as an innovation in Science class.

Specifically, the study will seek answers to the following questions:

1.What is the result of the pretest of the 4th Grading period of grade 7?

2.What digital tool can be developed to enhance the academic performance of Grade 7 students in Science class?

3.What is the result of the post test of the 4th Grading period of grade 7?

4.Does gamification or innovation improve the long-term retention of Science compared to traditional teaching methods?

Significance of the study

This study, "Exploring the Effects of Gamification as Innovations in Science Education," bears potential in supporting contributions both for practice and for research. With regard to an investigation into effects brought by gamification, the evidence may then provide informed opinions about the influence innovative approaches would have on changing science education. Findings will probably include such contributions as follows:

For SDO Baliuag: The results may assist in designing science curricula that integrate gamification as a core component, ensuring alignment with educational objectives and modern pedagogical trends.

Teachers and School Administrators - It could provide practical guidance on effectively incorporating gamified elements, addressing challenges like technical difficulties or unbalanced competition. Teachers could benefit from strategies to optimize student outcomes while mitigating potential drawbacks.

Students - The study could reveal how gamification enhances engagement, motivation, and comprehension in science subjects. Improved learning experiences may lead to better academic performance and foster a deeper interest in scientific inquiry.

Parents - This study will undoubtedly make parents realize that they should be aware of their children's academic performance in order to support, inspire, and motivate them to do their best in their studies and become good students. They may realize that having their children's academic performance poorly will make it difficult for them to have a better future.

Future Researchers - This study could serve as a foundation for further exploration of innovative teaching methods, offering quantitative data on the impact of gamification in diverse educational contexts.

Scope and Delimitation of the Study

This study focuses on exploring the effects of gamification as an innovative strategy in science education. Specifically, it aims to examine how gamified elements, such as rewards, challenges, and leaderboards, influence the motivation, engagement, and learning outcomes of students. This research also seeks to identify challenges faced by educators in implementing gamification and propose solutions to optimize its effectiveness.

The respondents of this study are Grade 4 students of Marian College of Baliuag. Inc. The study is limited to their experiences and perceptions regarding gamified science lessons. It does not include other grade levels or schools, nor does it explore other subjects outside science education.

The scope of the research is further limited to the use of specific gamification strategies in classroom settings, excluding the use of advanced technologies like virtual or augmented reality. Additionally, the study focuses on short-term impacts of gamification and does not investigate its long-term effects on student learning or motivation. By narrowing its focus to Grade 4 students of Marian College of Baliuag, this study ensures a manageable scope and provides a detailed analysis of gamification's impact within a specific educational context. Data gathering will be conducted from February to March.

CHAPTER II

Theoretical Framework

This chapter presents the relevant theories, the related literature and studies, the conceptual framework, the assumption of the study, the operational definition of the variables of the study.

Relevant Theories Self-Determination Theory (SDT). The effectiveness of gamification is the integration of game features into non-gaming context to enhance the motivation, engagement, and learning outcomes has been extensively studied. Deci and Ryan's (1985) Self-Determination Theory (SDT) is one of the most vital theories for acquiring motivation in gamification. According to this theory, autonomy, competence, and relatedness are the three basic psychological demands that reinforce human motivation. By giving users choices (autonomy), offering challenges and prizes to improve abilities (competence), and encouraging a sense of community through leaderboards and teamwork (relatedness), gamification tactics frequently satisfy these demands.People are more likely to be connected and intrinsically motivated when those needs are satisfied, which makes gamification a useful strategy in applications such as healthcare, workplace training, and education. As the fulfillment of those basic psychological needs in gamified practices correlates with games' primary focus, behavioral and emotional engagement increases enjoyment and participation and enhances the students' appeal and disposition towards learning.

SDT has been extensively applied to the context of video games and has been one of the primary target theories for gamification as well. Designing a gamified environment in accordance with SDT would require elements that would be able to fulfill at least one of the three basic psychological needs, such as different levels or tasks (autonomy), social interaction (relatedness), and some type of progress bar or achievement indicator (competence).

Self-determination theory is relevant to the study because learning is not just about absorbing facts—it is about curiosity, motivation, and the inner drive to explore the unknown. In a science classroom, where discovery and experimentation fuel understanding, students need more than just information; they need engagement, autonomy, and purpose. This is where Self-Determination Theory (SDT) becomes essential in understanding how gamification can transform science education into an experience that fosters deeper learning and intrinsic motivation.

Flow Theory, first presented by Mihaly Csikszentmihalyi in 1990, is another important theory pertaining to gamification. When people are deeply engaged and enjoying an activity, they are said to be in "flow," when they are totally absorbed and lose sight of time. This flow state is facilitated by gamification features including challenges, explicit objectives, instant feedback, and increasing complexity. Users are more engaged and motivated to finish work when they are in flow, which makes gamification an effective tool for promoting learning and productivity. According to this theory, when gamified systems are properly created, they maintain users in a state of highest engagement and ongoing development, which explains why they are so successful. Although flow theory is more of a process than a theory, it is also a pervasive approach to describing digital-related studies. Flow theory describes conditions and dimensions where an optimal psychological and psychical state can maximize enjoyment and engagement. Flow emphasizes internal processes and experiences correlating closely with intrinsic motivation. There are a particular variety of conditions to achieve an optimal experience. However, according to Matallaoui et al., clear and close-related goals, a balance between challenges, skill acquisition, and emphasizing the relation between action and awareness is critical. Their importance in designing a gamified environment is also significant as some of them incorporate pre-conditions of flow and have a close relation to motivation and engagement. Designing a gamification application underflow theory would require specific and understandable goals, immediate feedback, progress indicator, and adequately balanced challenges based on the users' general skill set with perceived usefulness for completing them.

Flow Theory is relevant to the study because it describes how students can capture motivation, deep engagement, and successful learning. Teachers can make science classes more interactive and innovative by incorporating game elements, which will aid students in gaining a strong knowledge of scientific ideas. Accordingly, using flow theory to gamify education offers important insights into how creativity can boost instruction and lift student performance.

The behavioral theory, which has developed from B.F. Skinner focuses on the notion that punishments and rewards influence behavior. The theory is put into practice through gamification, which reinforces desired behaviors with points, badges rewards to intrinsic motivation in a way that is consistent with SDT.

Behavioral Theory is relevant to the study because Education is not just about the transmission of knowledge; it is about shaping behavior, fostering engagement, and creating an environment where learning becomes an intrinsic part of a student's experience. In this pursuit, the behavioral theory of B.F. Skinner, particularly his concept of operant conditioning, plays a significant role in understanding how gamification can transform science classrooms into dynamic and interactive learning spaces.

At the heart of Skinner's theory lies the idea that behavior is shaped by consequences—we repeat actions that are rewarded and avoid those that bring negative outcomes. Gamification thrives on this very principle. When students earn points, badges, or rewards for completing science-related tasks, they are experiencing positive reinforcement, which increases the likelihood that they will engage in similar learning behaviors in the future.

Fogg Behavior Model is to understand factors that affect human behavior. It suggests that three essential elements—motivation, ability, and triggers—are responsible for behavior. A person must be capable of doing a behavior, be sufficiently motivated to do so, and be inspired to act by another person in order to engage in it. In gamification, this theory is crucial because it helps designers understand how to create experiences that drive behavior change. Gamification can increase motivation through rewards, make tasks more achievable by breaking them down into smaller steps, and trigger actions with notifications, progress bars, or achievements.

The Fogg Behavior Model is relevant to the study because It clearly shows how gamification can effectively foster learning and student engagement. Science education becomes more engaging, fun, and productive by producing active, enhancing skills, and offering catalysts for action through gamification. Teachers can create tactics that boost comprehension, promote student involvement, and ultimately improve science learning outcomes using this model in gamified learning.

Furthermore, flow theory emphasizes intrinsic motivation, where individuals engage in activities because they find them enjoyable and meaningful. Gamification supports this by creating an interactive and goal-oriented learning environment. Features like leaderboards, achievements, and storytelling elements in educational games can make science learning more exciting and relevant to students. This intrinsic motivation leads to better concentration, deeper understanding, and improved retention of scientific concepts.

Another important factor is that flow theory helps in reducing negative emotions associated with learning, such as anxiety and boredom. Many students struggle with science because they find it difficult or uninteresting. However, when science lessons are gamified, they become more engaging and less intimidating. By keeping students in a state of flow, gamification can help build confidence and encourage continuous learning.

Social Comparison Theory, according to Leon Festinger's which was proposed in 1954, people evaluate their own social and personal value by comparing themselves to others. It's normal to want to know how we stack up, and gamification frequently takes advantage of this curiosity by using social sharing tools, leaderboards, and competitions.

Social Comparison Theory is relevant to the study because gamification fosters students' motivation and engagement by introducing peer interaction, competition, and collaborative learning. Gamified science education is likely to encourage active engagement, self-improvement, and knowledge acquisition by the ability of learners to establish goals, compare their improvement, and challenge themselves. However, a fruitful study environment depends on flipping a healthy imbalance between competition and personal growth. Social comparison theory provides significant insights into how gamification can enhance the effectiveness, participation, and incentives of science education through motivation and teamwork.

Related Literature

A Quantitative Research: Exploring the Effects of Gamification as an Innovations in Grade 7 Science Education

Gamification:

Gamification was introduced in the last decade and has focused on many different fields, including education. Gamification, according to Kapp (2021), is defined as "the use of game design elements, game-play mechanics, aesthetics, and game thinking for non-game applications to motivate students." Although there has not been a universal term for gamification, most of them share some standard features. Lately, though, gamification has focused on digitally engaging students, utilizing platforms or applications with the use of digital devices like tablets, smartphones, or computers All gamification applications have two sets of goals, the learning goals that correspond to the content and the playful goals related to the user experiences they trigger, such as enjoyment and satisfaction. The gamification content defines the learning goals, whereas the playful goals are linked with the game design elements implemented in the gamification application, their motivational power, type, and the psychological needs they correspond to. According to Huang and Soman (2022), learning goals and playful goals are not distinct. Gamification's primary goal is to affect factors, such as motivation, to influence a learning-related behavior, like engagement with the educational content, and achieve a learning outcome. Therefore, gamification's role is to "affect psychological factors that mediate the learning outcomes".

However, the way the instructional content is presented is equally important in learning outcomes as it can lead to a decline in performance or knowledge and skills acquisition despite the increase in participation and effort. A gamified learning environment needs to be carefully designed, especially around the gaming elements it utilizes and has explicit and clear instructions. Otherwise, the students could get distracted from the learning goals.

Gamification is all about bringing game-like elements into real-world settings to make activities more engaging, motivating, and effective (Deterding et al., 2020). This concept is grounded in behavioral psychology, particularly reinforcement theories, which highlight the importance of rewards, feedback, and competition in shaping behavior (Deci & Ryan, 2021).

Gamification has found its way into different areas, including education, business, and healthcare. In schools, techniques like leaderboards, badges, and points help boost student motivation and keep them engaged in learning (Hamari, Koivisto, & Sarsa, 2014). Businesses use gamification to improve employee productivity and involvement (Zichermann & Cunningham, 2020). Meanwhile, in healthcare, gamified approaches encourage people to adopt healthier habits, such as increasing physical activity and following medical treatments more consistently (King et al., 2021). A systematic review by Kalogiannakis et al. (2021) analyzed 24 empirical studies on gamification in science education. The review found that gamification positively influences student motivation and engagement, though its impact on learning outcomes varies. The authors emphasize the need for well-designed gamified interventions tailored to specific educational contexts to maximize effectiveness.

Many studies have shown that gamification is an effective way to increase engagement. Werbach and Hunter (2020) suggest that it works by tapping into both intrinsic and extrinsic motivation, offering a sense of autonomy, mastery, and purpose. However, some researchers warn that if gamification is not well-designed, it can have the opposite effect, leading to a drop in motivation over time (Nicholson, 2021).

Educational Website

A website is a group of interconnected, publicly accessible Web pages with a common domain name. A website can be developed and maintained to serve a variety of objectives by an individual, group, company, or organization. There are countless different types of websites. As e-commerce sites, news sites, forums, educational websites. A website's pages. Typically contains both text and other types of media. Yet, the design of a website is not constrained by any rules (Techopedia, 2020). Websites have become a necessary part of our society and our daily lives in today's world. The website is international and has no borders. A website allows an institution to share all its programs and activities with the rest of the world, and everyone can learn about it. In education, websites are simply mediums through which we can learn anywhere and at any time that suits us.

Educational websites can teach and explain concepts using visuals and animations, making education more memorable and interesting. These educational websites help us understand the concept of a specific topic rather than simply memorize the content provided in textbooks (Khandelwa, 2019). Websites are the most important medium today. It helps us a lot and gives us more time to do it. Acquire, learn, and create more things. In any aspect of life, we can use websites to make our lives easier.

Educational Websites can include websites that have games, videos, or topic-related resources that act as tools to enhance learning and supplement classroom teaching. These websites help make the process of learning entertaining and attractive to the student, especially in today's age. Educational websites help students be active and find learning more enjoyable, which is crucial today. Using educational websites is essential since every student can be sure that the information is accurate. When a pandemic strikes, information technology can be used to access a variety of instructional resources. Learning management system (LMS) systems like Google Classroom, Edmodo, Schoology, and others have gained popularity among teachers (Okmawati, 2020). There are several knowledge-sharing websites where you can find detailed information about various educational topics, be it science, history, language, etc. These websites offer easy access to the content at any time and any place. Educational websites are a huge chamber of tremendous information.

In the modern world, educational software and websites are growing in popularity. Websites for education provide a fresh platform for learning. Making the most of instructional Students can benefit greatly from websites. With an appropriate understanding of how technology Works in education, we can provide fresh approaches and resources to advance and improve the Abilities of the pupils. We can innovate student learning using this kind of technology.

Hence, as stated by Morgil (2021), Web technology is only one of several media options for assisting individuals in their learning. It's a tool for student engagement that's becoming more common in educational settings. Due to these substantial developments in communication and information technology over the last decade, education has experienced several important changes. As a result, the move from old educational techniques to contemporary ones centered on e-learning programs was followed by true reform of the traditional model of education, transforming it into a more modernized manner including sophisticated educational technology.

Engagement of the Learners in Academic Learning using Websites To make learning more effective and to encourage students to participate actively in their education, online learning necessitates the use of learning media (Edwita et al., 2020). Education must adapt to the times to establish a learning environment that meets those needs. To do this, you need a classroom that integrates technology (Göçen et al., 2020).

For example, many fundamental concepts in learning can be delivered effectively through teaching and learning activities using multimedia technology. In addition, implementing learning supported by appropriate learning media will provide stimuli that motivate students (Alfurgan et al., 2019; Sastradika et al., 2021).

Moreover, education cannot exist without e-learning (Beladiya, 2022). E-learning is another form of education that uses technologies to facilitate effective and efficient learning anywhere and at any time. E-learning can also be defined as any learning system, which uses electronic resources for formalized teaching. Selecting suitable learning media to increase genitive interest in the academic performances of the learners is necessary. Electronic media is one type of technological development used as a learning medium. Many types of electronic media can support online learning more effectively, such as Google Classroom, WhatsApp, Quizizz, and YouTube (Dita et al., 2021).

The learning materials provided can be in text, images, and videos so that educators can vary them (Hidayat et al., 2021; Thomas et al., 2022). Through teacher creativity, Google Sites can be more integrated. With the features offered by Google Sites, it is possible to influence the effectiveness of online learning, student learning motivation, and student interest in education.

Related Studies

Gamification has become a widely explored and innovative approach in various fields, including education, business, and healthcare. Studies have shown that incorporating game elements like points, badges, leaderboards, and challenges can significantly boost user engagement, motivation, and overall experience. Deterding et al. (2021) laid the groundwork for understanding gamification, emphasizing its psychological effects on motivation and engagement. They suggest that gamification taps into both intrinsic and extrinsic motivation, encouraging user participation and behavior change.

In education, Hamari et al. (2014) conducted a meta-analysis on gamification's impact in learning environments. Their findings indicate that gamified systems can enhance student engagement, retention, and performance. However, the effectiveness of these systems depends on the type of game elements used and individual learner preferences.Similarly, Sailer et al. (2017) explored how different game design elements affect motivation and engagement in the workplace. Their research found that leaderboards and achievement badges help boost employee motivation, while storytelling and meaningful feedback improve learning outcomes and task commitment.

Gamification has also found a place in healthcare. Cugelman (2013) discovered that gamified health and wellness programs, like fitness tracking apps and rehabilitation tools, can encourage healthy behaviors and improve adherence to treatment plans. Despite its benefits, some studies highlight challenges in implementing gamification. Mekler et al. (2017) caution that while gamification can enhance motivation, over-reliance on external rewards might eventually reduce intrinsic motivation. Also, game-based learning may help in bridging the gap between theory and practice by allowing students to apply their knowledge in an actual situation (Barz et al., 2023). Students can learn fundamental programming concepts through engaging activities while also playing games and earning points for cooperation and competitiveness. The use of game narratives, point systems, and instant feedback boosts student engagement in these applications.

According to Barradas et al. (2020), these platforms are an excellent opportunity for students to build creativity, critical thinking, and problem-solving skills as well as a viable choice for early computational thinking development.

Overall, research suggests that well-designed gamification strategies can be a powerful tool across different domains. However, their success depends on factors like context, user characteristics, and striking the right balance between game elements to keep users engaged and motivated.

Conceptual Framework

As supported by recent literature and studies, the researchers were reassured by Marian College of Baliuag. Elementary School effective exploration and management of the educational website as a support for learning and they utilized an Independent Variable (IV), and Dependent Variable (DV).

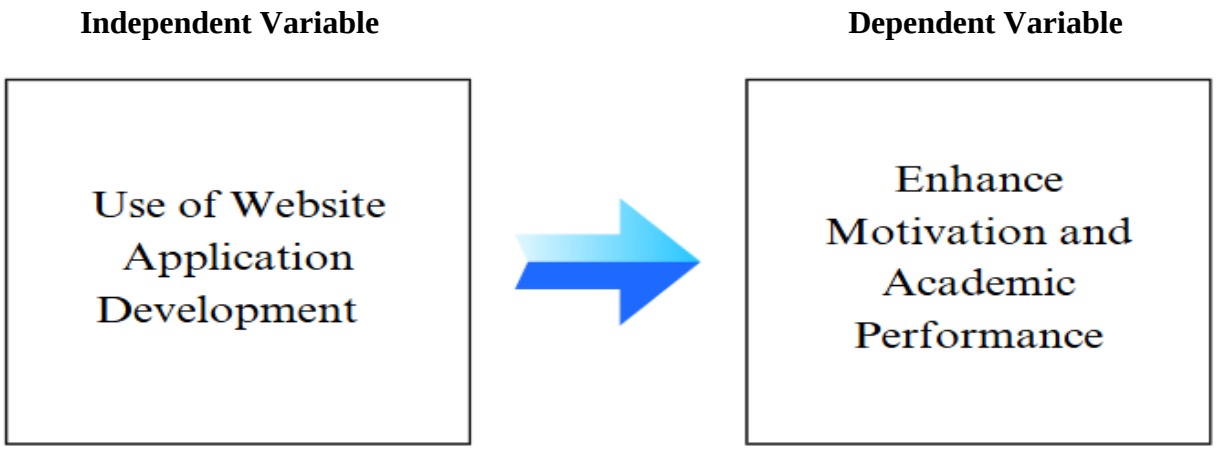

Figure 1: Paradigm of the Study

In conducting the study, the researchers used the present framework as reference. Using the IV (Independent Variable) and DV (Dependent Variable), this indicates the study's conceptual paradigm. The independent variable would be the use of the developed educational website and the dependent variable or the focus or the outcome of the study would be the enhanced the motivation and academic performance of the Grade 4 learners that can also help the educational system improve especially in the results in the Science exam in PISA (Programme for International Student Assessment).

Assumption of the Study

The implementation of game-based strategies in teaching science is not held to be significant and effective in enhancing student's engagement, motivation and also academic performance, which will serve as a key foundation to improve the current educational system in both public and private schools.

Definition of Terms

Engagement: The level of attention, participation, and emotional involvement of students in science-related educational activities.

Extrinsic Motivation: Motivation driven by external rewards, such as points, badges, or grades, rather than intrinsic interest in the subject matter.

Game Elements: Components used in gamification, such as rewards, points, challenges, leaderboards, avatars, and progress tracking, designed to foster an interactive learning environment.

Gamification: The application of game design elements (e.g., points, badges, leaderboards) in non-game contexts, such as education, to enhance engagement and motivation.

Innovative Teaching Strategies: Modern and creative methods, like gamification, aimed at enhancing the teaching and learning process.

Learning Outcomes: Measurable knowledge, skills, attitudes, and values that students achieve as a result of educational activities and instruction.

Motivation: The psychological processes that stimulate students' interest, effort, and persistence in learning activities, particularly in science subjects.

Pedagogical Challenges: Difficulties faced by educators in designing, implementing, and managing gamified learning activities that align with educational objectives.

Pre-Test: is an assessment measure given to participants before they have undergone some type of treatment as part of a research study.

Post Test: is an assessment measure given to participants after they have received treatment as part of a research study.

Science Education: The field of study concerned with teaching and learning science concepts, including biology, chemistry, physics, and earth sciences, at various educational levels.

Technical Difficulties: Issues related to the use of technology in gamification, such as inadequate resources, lack of technical skills, or malfunctioning digital tools.

Technical quality: The third criterion used by the researchers for the evaluation of the educational website is to assess the quality of the website based on its technicality, navigation and manipulation of the educational website.

Website: Typically contained both text and other types of media including voiceover and interactive videos. Moreover, the design of a website is not contained by any rules. Collection of files accessed through a web address, covering a particular theme or subject, and managed by a particular person or organization and was used by the research to make the learning engaging and fun to enhance the level of motivation and academic performance of the learners.

CHAPTER III

A Quantitative Research: Exploring the Effects of Gamification as an Innovations in Grade 7 Science Education

RESEARCH METHODOLOGY

This chapter deals with the methods and tools of the study, the population and sample of the study, the researchers instrument and validation, the data gathering procedure and the processing, the statistical treatment of the data, and the ethical consideration.

Methods and Techniques of the Study

The purpose of coming up with this study is to enrich the knowledge on the effects of gamification as an innovation in Science Grade 4 at Marian College of Baliuag. Inc. The researchers make use of developmental research methods which are associated with a variety of teaching and learning activities, including the design and development of a specific instrument, based on both practice and theory, to address a problem in a particular context (Richey & Klein, 2005). The researchers utilized the quasi-experimental research design, which is used to estimate causal relationships without random assignment. Four sections of Grade 7 students at Virgen DeLas Flores High School participated in the study with a total of 80 students. The study employed a pre-test and post-test. The two sections served as the experimental group, and the other two served as a control group. Four sections were given a pretest in Science at the onset of the study.

During the fourth quarter of the school year, the researchers utilized the educational website in Science (treatment) in teaching the Grade 7 learners identified as the experimental group, whereas the Grade 7 learners in the controlled group did not use the said website. To gauge the practice performance of both groups a posttest was administered. Data gathered from these assessments were compared and analyzed to determine the effect of the use of the researchers 'educational website on the students' performance in Science. The outcomes offer strong proof that the data are regularly delivered, and after the treatment on the experimental group it shows that there was a significant difference between the post- test scores of the two groups. Similarly, the connection of this study is it also wants to test the alternative treatment whether it will enhance the level of motivation and academic performance of the Grade 7.

As indicated by Bhadari (2020), quantitative research is the process of collecting and analyzing numerical data. It can be used to find patterns and average, make predictions, test, casual-relationship, and generalize results to wider populations. The study employed a survey questionnaire with descriptive quantitative problems to explore and to serve as techniques in data collection.

In descriptive quantitative research, the study accessed the perception of the learners in exploring the effects of gamification as an innovation and how it became effective to enhance and improve the academic performance of Grade 7 science class.

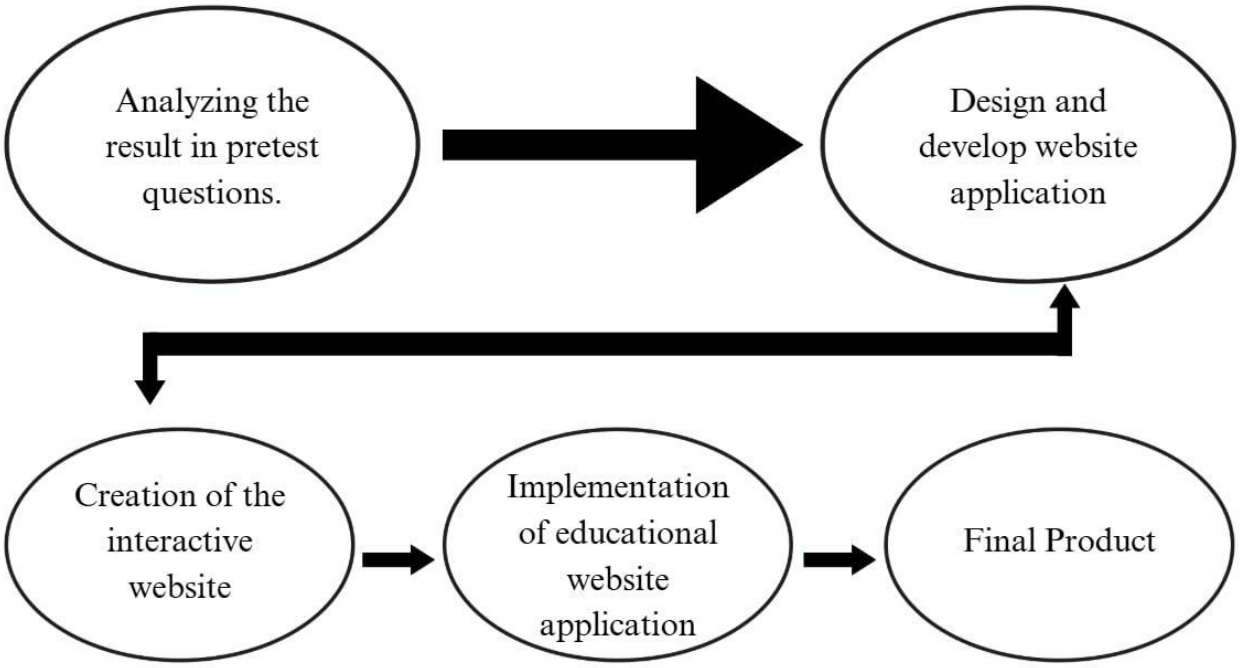

Figure 2: Designing and Development of Educational Website

Provided by the framework that is aligned in ADDIE Model (Analyze, Design, Develop, Implementation, and Evaluation) this research study intended to make a systematic framework for assessing, designing, developing, implementing, and evaluating a solution in a digital way to inscribe the specific needs of Grade 7 students in Science.

This model consists of 5 phases which includes, phase 1 analyzing the results in the pre-test questions in terms of motivation and academic performance of the respondents, phase 2 stating the design and development of website application. Phase 3 has something to do with the creation of interactive websites. Moreover, phase 4 talks about the implementation of the educational website and for phase 5 are the evaluation of the final product which is the educational website that will be used by the learners and for the last phase is the finished and final product of the study which is the educational website.

To guide future revisions and additions of the website, data gathered during the evaluation phase is reviewed to identify strengths, shortcomings, and opportunities for improvement. The goal of this was to guarantee the ongoing relevance and effectiveness of the digital solution in assisting students in Grade 7 with their Science education through thorough evaluation.

Phase 1 includes the analysis of the respondent's answers to the pre-test questions on Science subject. This phase includes a meticulous analysis of the participant's responses acquired from Grade 7 learners. This analysis seeks to know the level of motivation and the academic performance among learners. The insights into the results that were obtained served as the base of the website that was crafted that served as a guide in the interventions to properly handle issues that have been identified immediately.

Phase 2 is the design and development of the educational website. The product advanced to the design and development stage following the analysis phase, where an extensive website is conceived and designed. In this phase, the website's structure, content, and functionality are outlined, with an emphasis on incorporating interactive aspects and focusing on the website's content to effectively engage learners. The researchers collaborated to make sure the website was customized to meet the unique needs of Grade 7 learners while still being in line with the established objectives and goals of the study. The goal of the design and development phase is to create a learning platform that is impactful and engaging via careful planning and implementation of the said website.

The third phase involves providing interactive websites. After establishing the website's foundation, the researchers proceeded with developing several interactive websites and an engaging set of different games designed to reinforce the level of motivation and academic performance of the learners. To meet the varied learning requirements of children in Grade 7, these are made to cover a variety of subjects specifically in the Science area. Researchers wanted to increase student motivation and engagement while offering opportunities for meaningful practice and application using the educational website in the learning process of Grade 7 students.

Proceeding with phase 4, which entails putting the website into operation. The researchers moved into the implementation phase after the website, interactive videos, and engaging stories were finished, at which point the website was launched and incorporated into Marian College of Baliuag Inc.'s learning environment specifically in elementary school. The website was deployed at this phase on suitable platforms and devices that guaranteed accessibility and usability for both instructors and students. To help teachers seamlessly integrate the website into their teaching practices and maximize its influence on student learning outcomes, training sessions, and support materials are offered.

The website evaluation for the final product is in the final stage. The ultimate stage of this educational website centers on assessing the website's efficacy and influence on augmenting learning results in Science subjects for seventh-grade pupils. Researchers systematically evaluate the usability, engagement, and learning results of the website. Teachers are asked about their experiences with the website through surveys and forms. To guide future revisions and additions to the website, data gathered during the evaluation phase is reviewed to identify strengths, shortcomings, and opportunities for improvement. The goal of this was to guarantee the ongoing relevance and effectiveness of the digital solution in assisting students in Grade 7 with their Science education through thorough evaluation.

Population of Sample of The Study

In this study, the participants are the (4) sections of Grade 7 of Virgen DeLas Flores High School S.Y. 2024-2025 with a total of 80 learners that stand as the chosen participants. The school where the research was conducted was initially picked by the researchers. The researchers purposely selected the High School of Virgen DeLas Flores which consist of (4) sections. Here, the researchers distributed a pretest containing a different question about Science to enhance their level of motivation and improve their academic performance.

The participation of the learners is with the acknowledgement of their parents in their learning process. Learners, being the active participants, raised their perspective and their voices. For the evaluation of the educational website, the researchers initially picked the evaluators specially Science and IT teachers since the focus of the subject is Science and it has something to do with technology.

Research Instruments

The research instrument for this study consists of four parts: (1) Designing and Developing the Educational Website and (2) Evaluation sheet for the developed educational website. (3) Pre-test for the assessment of Grade 7 learners in Science subject (4) post-test for the assessment of the level of motivation and academic performance of Grade 7 learners in Science subject whether it improved or not using the developed educational website.

The first part of the study dealt with the researchers using a thirty-item pretest consisting of different Science topics associated with guide questions about assessing the effects of gamification as an innovation in Science at the Grade 7 level.

The second part of the research instrument is the DepEd evaluation sheet for non-print materials from ISO DO which employs a 4-point Likert Scale consisting of four factors: Content Quality, Instructional Quality, Technical Quality, and Other Findings. This is intended to assess the effectiveness of the non-print materials used in the mediation focusing on numerous aspects such as content quality, instructional quality, technical quality, and other findings. Ratings for factors 1 to 4 range from (4) Very Satisfactory to (1) Not Satisfactory with ratings of Very Satisfactory, Satisfactory, Poor, or Not Satisfactory and were independently rated on the same scale. The Likert Scale was used in this research study as a tool to assess the perceptions and opinions of the EUCATE 13 participants in a specific study. This scale gives an organized framework to analyze individuals' perceptions, allowing researchers to compare the responses of different individuals to perform interventions. Eventually, this provides a range of responses allowing each respondent to give voice to express their opinions.

The third part of the study dealt with the researchers using a thirty-item pre-test consisting of different sets of topics provided by the ProProfs associated with guide questions about assessing the learners' academic performance at the Grade 7 level.

On the other hand, researchers employed a post-test using the developed educational website to know whether the incorporated educational website improved the motivation and academic performance by implementing gamification as an innovation in Grade 7 learners in the subject Science. Followed by the usage of a t-test to know the significant difference of the pre-test and post-test of the two groups using independent samples.

Data Gathering Procedure

To collect the data required for the study, the researchers obtained authorization from the VDF Principal and school administrators, schoolteachers, and the principal of Virgen DeLas Flores High School as well as directions for conducting the study. After attaining the needed permission, consent forms were provided to their parents or guardians. This form served as consent from their respective families to take part in this study.

To start collecting the data for this study, an ethical consideration was tackled in this study. The first step is the distribution of pretests to a total of 80 grade 7 learners. The pretests were given directly to the 80 learners and served as a tangible research instrument for the collection of their responses.

In addition, the researchers developed an educational website to know the effects of gamification as an innovation to increase their performance in Science subjects.

The instructional website was evaluated by IT professionals who were given a consent form to examine the project. With the experts' approval, the researchers seek permission to incorporate game quiz tasks onto the instructional website. Finally, the researchers gave the participants a post-test to see if their performance had improved.

Data Processing and Statistical Treatment

The data were arranged, systematized, and examined. The data collected were statistically shown by the statement of the problem. The responses will be organized and collated manually by the researchers to identify the effect of gamification. There is an equivalent point to their answers to the questions provided and higher scores or level would mean that they are considered to have low reading skills and comprehension.

Descriptive statistics is a set of brief descriptive coefficients that summarize a given data set representative of an entire or sample population. It was adopted as the basis for the interpretation for computing the result of descriptive statistics about the results of the pretests in the assessment of the learners. On the contrary, to explain the result of the survey questionnaire on assessing the website by the teachers. The scale indicated below with numerical rating range and verbal interpretation was utilized by the researchers. Engaging activities inside the website were added so that the user finds it enjoyable to read. The researchers also added different Science topics with engaging quizzes.

In conclusion, the website was developed and named The Science Quizzard. To ensure that the website was ready to administer to the Grade 7 students, the researchers immediately provided an evaluation form to have an expert examine the website, and the researchers administered the final website right after the evaluation.

In the next step, researchers provided a DepEd evaluation sheet for the experts and Science teachers to evaluate whether the educational website was applicable or not in the grade 7 level. To assess that, researchers used a 4-Likert scale with four being the highest score and one being the lowest.

Numerical Rating	Range	Verbal Interpretation
4	3.25-4.00	Very Satisfactory
3	2.50-3.24	Satisfactory
2	1.75-2.49	Poor
1	1.00-1.74	Not Satisfactory

To present and support the interpretation of numerical findings of the result of the survey questionnaire regarding the effectiveness of developing an educational website application for grade 7 learners at Virgen DeLas Flores High School in the assessment of the effects of gamification as an innovation in Science education, it is the process utilized by the researcher.

Descriptive discussions will be posted to show the distribution of survey respondents based on the results gathered. Findings in this study were explored and recommendations towards the development of an educational website were proposed.

After the evaluation of the educational website and the results showing that it is applicable for the learners to use the website, the researchers employed a post-test paralleled to the pretest using the website to know whether the results of their responses will increase with the usage of the said website. To compute the results, to know whether there is a significant difference on the result scores of the two groups in post-test, the researchers employed a formula that is adopted to t-test independent samples to compute whether it increases or not the overall mean of the two groups using the said instrument.

Ethical Consideration

To maintain data integrity and ethical standards, all responses will be confidential and anonymous. Students will be informed that participation is voluntary and that their responses will be used solely for research purposes. To ensure anonymity, and confidentiality, anonymous identification numbers will be used, and access to the collected data will be restricted to the researchers and authorized personnel only. Despite signing the permission form, participants retain the freedom to withdraw at any point and for any reason.

The handling of responses will adhere to the provision of the Data Privacy Act (DPA) 2012 and its associated regulations, maintaining anonymity. Participants will be explicitly informed that there are no associated hazards with their participation in this study.

CHAPTER 4

PRESENTATION, ANALYSIS, AND INTERPRETATION OF DATA

This chapter provides a thorough description of the comprehensive findings derived from the data collected, analyzed, and interpreted. The quantitative method results focus on the level of motivation and academic performance of the Grade 4 Learners. Outcomes are presented based on the arrangement of specific problems posed in chapter 1 as follow:

Part I presents the level of motivation, engagement, and academic performance of the respondents.

Part II pertains to what digital tool can be developed and how using the website will enhance the motivation, engagement, and academic performance of the respondents through design and development.

Part III presents the effectiveness of the website development in assessing the academics performance of the respondents.

Part IV pertains to how the gamification or website improves the academic performance of the students and improves the long-term retention of Science compared to traditional teaching methods.

Part I: The level motivation and academic performance of Grade 4 using the pre-test scores

Education is the most powerful weapon of every student, education that helps us to have a brighter future. In this time of digital age, traditional methods of learning are evolving rapidly, influenced by advancements in technology. By integrating game design elements into educational contexts, these tools can foster engagement, motivation, and a deeper understanding of subjects among students. This is due to low results of the Programme for International Student Assessment (PISA) in terms of comprehension in Science subjects for every educator to enable every learner to enhance the level of motivation and academic performance of the learners. The researchers employed a post-test to know the knowledge and academic performance based on their results. In addition to the findings of research that was carried out by Kanuha, H. (2020), pre-tests had a positive impact on learning outcomes among those who took pre-tests. Moreover, in another study conducted by Pan, S.C et.al (2023), pretesting is beneficial to learning provided there is a chance to review the right answer later.

Table 1

Table 1 shows the result of the pre-test scores of the respondents. This table answers the research problem "What is the result of the pretest of the 4th Grading period of Grade 7?"

Result of the Pre-test

Pre-test	N	Mean	Minimum Scores	Maximum Scores	Standard Deviation

Part II: Digital tools can be developed and how using the website will enhance the motivation, engagement, and academic performance of the respondents through design and development.

Part III: The effectiveness of the website development in assessing the academics performance of the respondents.

Post-test provides

Result of the Post test

Post-test					