Probing The Teachers' and Students' Perspectives on The Role, Influence, and Challenges of Gamified Mathematics Instruction

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ABSTRACT

This study explores the perspectives of teachers and students on the role, influence, and challenges of gamified mathematics instruction at Tolotolo National High School during the school year 2024–2025, serving as the foundation for a proposed gamification-enhanced instructional plan. It aims to examine how gamification facilitates instruction, enhances learning experiences, and presents implementation challenges, while also identifying differences in viewpoints between educators and learners. A descriptive-comparative research design was employed, involving selected students from Tolotolo National High School and Mathematics teachers from three public secondary schools, namely: Garing National High School, Lanipga National High School, and Tolotolo National High School. Participants were chosen through random and purposive sampling techniques to ensure a diverse yet focused representation. Data were gathered using a structured questionnaire designed to assess perceptions across three key areas: instructional facilitation, learning influence, and encountered challenges. To analyze differences in perspectives, the Mann-Whitney U Test was applied. Findings revealed that there is a significant difference between teachers' and students' perspectives on gamified mathematics instruction. Teachers generally viewed gamification more favorably than students, particularly in terms of its instructional role and its positive impact on learning. They also reported fewer or different challenges compared to students, highlighting a disparity in how gamification is experienced across roles. Hence, the researcher recommends that the proposed gamification-enhanced instructional plan be adopted and given special attention by school administrators and interested teachers, as a proactive step toward enriching mathematics instruction through innovative and student-centered approaches.

Keywords: Teaching Mathematics, Gamified Instruction; Influence, Role, Challenges, Descriptive-comparative design, Consolacion, Cebu, Philippines

THE PROBLEM AND ITS SCOPE

Introduction

Rationale of the Study

Gamification has revolutionized math education by transforming abstract concepts into engaging and relatable learning experiences. By incorporating game-like elements, such as points, badges, and leaderboards, teachers can create a motivating and competitive atmosphere that encourages students to actively participate in and stay committed to their learning. This approach not only makes math more enjoyable but also enhances students' critical thinking and problem-solving skills through real-time feedback and personalized challenges. Interactive, gamified environments cater to diverse learning styles, allowing students to progress at their own pace and receive personalized support. As a result, learners are more likely to develop a positive attitude toward math, potentially leading to improved academic performance and a lasting interest in the subject.

Gamification has made a significant impact on math education by reshaping traditional teaching approaches with game-like features. Elements such as points, levels, and rewards infuse lessons with enjoyment and competition, making math more accessible and engaging. This strategy boosts student motivation by providing immediate feedback and clear goals, which helps sustain their interest and encourages perseverance.

Furthermore, gamification supports various learning styles, allowing students to personalize their learning journey and

progress at their own speed. Consequently, this method enhances student engagement with mathematical concepts and fosters a deeper understanding and retention of the material, ultimately contributing to improved academic outcomes and more positive perceptions of math.

Gamification has emerged as an effective approach for boosting student motivation and improving learning outcomes, especially in math education (Legaki et al., 2020). Through game-based activities, educators can tailor lessons to meet the needs of students at different skill levels, enabling them to develop unique problem-solving strategies while engaging in interactive learning.

Gamification has also been widely acknowledged as a beneficial strategy for boosting student engagement and academic performance. A relevant example is Quizizz, a media platform that allows educators to present content and administer quizzes in a game-like setting (Bromberg et al., 2019). Quizizz enables teachers to provide interactive assessments with real-time feedback, helping students monitor their learning and stay motivated.
Additionally, educational games offer a unique blend of assessment and engagement. They allow students to practice logic, critical thinking, and problem-solving skills in a fun and interactive way (Wulandari, 2022). By blending structured instruction with game-based elements, students can build essential competencies while maintaining interest in the subject matter.

Engaging students through interactive environments requires thoughtful implementation to achieve meaningful learning. Teachers generally view gamification as a promising method to boost student interest and motivation. Students tend to show enthusiasm for game-based learning, though some concerns exist regarding balancing it with traditional teaching methods. While parents are typically supportive of innovative strategies that improve learning, they may raise questions about the long-term effectiveness of these tools. Another challenge for educators is the time and effort required to design and implement gamified lessons. Additionally, the reliance on technology can create barriers for students who lack access or familiarity with digital tools.

Gamification is often seen as a creative way to make learning more enjoyable and dynamic. Students, although sometimes hesitant at first, usually find gamified lessons fun and engaging once they begin. Parents have also provided positive feedback, particularly when they see their children becoming more motivated to complete math homework because it's part of a game. While gamification has strong potential to improve math education, its adoption comes with challenges. Teachers often have mixed feelings both excited about the possibilities and cautious about implementation viewing it as a means to help students develop more positive attitudes toward math. Students generally feel more confident and less intimidated during gamified lessons, experiencing pride when they earn rewards or advance levels. Parents often support this approach, appreciating how it encourages more consistent math practice. Still, some express concerns about excessive screen time and emphasize the importance of meeting educational goals without over-reliance on digital tools.

Despite its potential benefits, implementing gamification in Philippine math classrooms poses certain challenges. Although it is widely recognized for improving student engagement and outcomes, there remains a lack of research on its long-term effectiveness and applicability across different educational settings. Teachers face several hurdles, including limited access to research-based resources, time constraints, a lack of materials, and weak infrastructure, all of which hinder the adoption of gamified teaching methods. Students, too, deal with issues such as math anxiety and a lack of engaging instructional approaches. Math anxiety refers to the feelings of fear, stress, or discomfort that students experience when working with numbers, solving problems, or learning abstract concepts. This anxiety often stems from negative past experiences, performance pressure, or struggles with understanding. Consequently, students may avoid math-related tasks, lack confidence, or show frustration when encountering math challenges. By using engaging strategies like gamification, educators can help students overcome these anxieties, promote better attitudes toward math, and enhance their overall performance.

Given these points, this study aims to examine the perspectives of teachers and students on the roles, effects, and challenges of implementing gamified instruction in mathematics across selected public high schools under the Department of Education (DepEd) in Cebu Province during the 2024–2025 academic year, to inform a gamification-enhanced instructional plan.

Theoretical Background

The ideas of constructivism, cognitive load, and behaviorism support the use of gamification in education to enhance learning. Piaget's theory posits that knowledge is actively constructed through interaction with the environment, with learners building mental structures—schemas—by assimilating and accommodating new information. In a gamified mathematics classroom, students engage with mathematical concepts through interactive and often self-directed activities that align with Piagetian principles (Lesh, 2020). Gamified math instruction, grounded in constructivist theory, presents a compelling opportunity for students to actively engage with mathematical concepts. Games can serve as rich environments where learners explore, experiment with various approaches, and develop their understanding. Teachers, in this context, act as facilitators, guiding students through these explorations and fostering opportunities for reflection and discussion.

In Piaget's view, learning occurs through the processes of assimilation and accommodation. Assimilation involves integrating new information into existing schemas, while accommodation requires altering existing schemas or creating new ones in response to new experiences. This dynamic interplay between assimilation and accommodation drives cognitive development, allowing individuals to adapt to new situations and solve increasingly complex problems. Piaget’s emphasis on the active role of learners underscores the importance of engaging in educational practices that stimulate exploration and discovery.

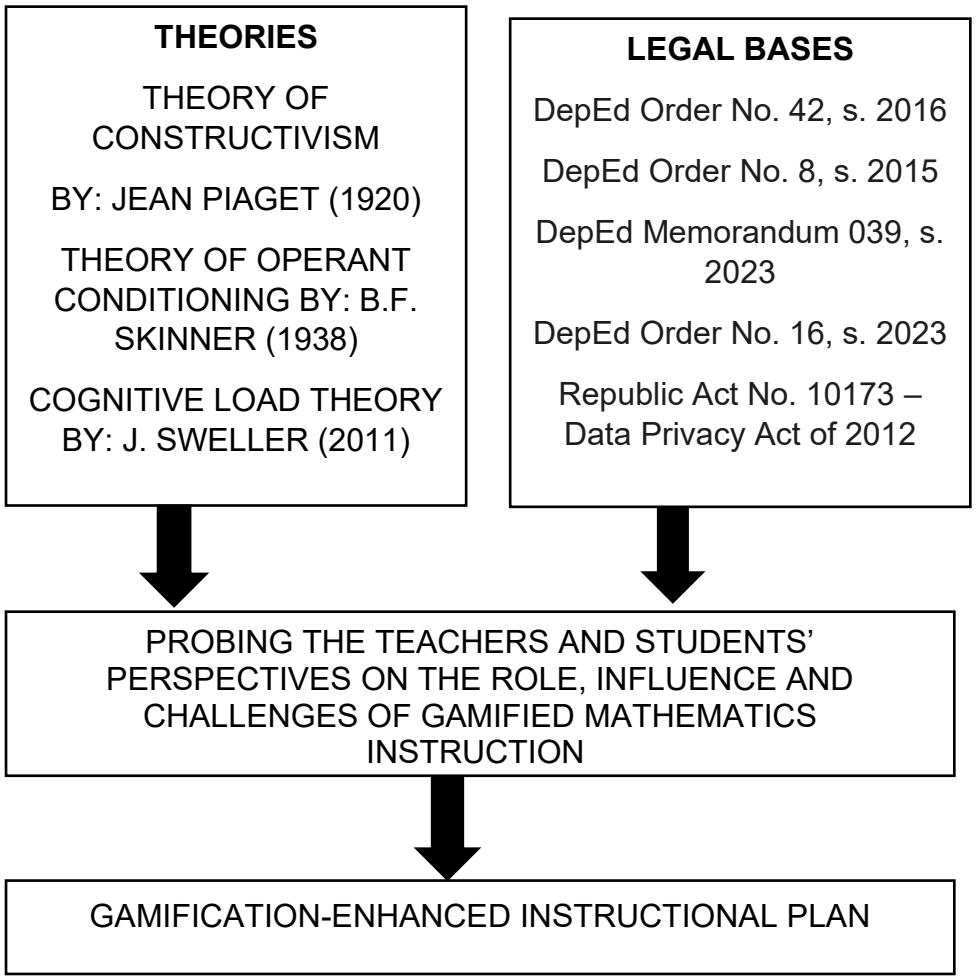

Figure 1Theoretical - Conceptual Framework of the Study

Educational practices informed by Piagetian constructivism focus on creating environments where students can engage in hands-on activities and problem-solving tasks. Teachers are encouraged to design developmentally appropriate learning experiences, aligning with students' cognitive stages (Cade 2022). For example, younger children may benefit from concrete manipulatives and interactive games, while older students may engage in abstract reasoning tasks. The role of the teacher is to facilitate rather than dictate learning, providing opportunities for students to construct their understanding through active engagement.

One challenge of applying Piagetian constructivism in the classroom is ensuring that instructional activities are appropriately matched to students' cognitive stages and individual differences. Designing tasks that are too advanced or too simplistic can impede learning and fail to support cognitive development effectively. Additionally, while Piaget's theory provides a strong framework for understanding cognitive development, it may not account for the full range of cultural and social factors that influence learning.

Overall, Jean Piaget's constructivism has significantly shaped educational theory and practice by emphasizing the active role of learners in constructing knowledge. While it provides valuable insights into cognitive development and instructional design, successful implementation requires careful consideration of developmental appropriateness and the diverse needs of learners.

B.F. Skinner's theory of operant conditioning proposes that behaviors reinforced with positive outcomes are more likely to be repeated, while those followed by punishment are less likely to persist. In the context of gamified math instruction, behaviorism suggests that incorporating game elements such as points, badges, and leaderboards can function as positive reinforcement, inspiring students to participate in mathematical activities and drills. Educators can utilize these components to influence desired behaviors and offer immediate feedback on student performance (Sanchez, 2020).

In Skinner's framework, reinforcement is categorized into positive and negative types. Positive reinforcement involves providing a reward following a desired behavior, thereby increasing the likelihood of that behavior being repeated. Negative reinforcement involves removing an unpleasant stimulus when a desired behavior occurs, also increasing the probability of the behavior being repeated. Skinner's principles have been applied extensively in educational settings to manage classroom behavior and motivate students.

In the classroom, behaviorist strategies often involve the use of reinforcement schedules and behavior modification techniques. For example, teachers may use token economies, where students earn tokens for demonstrating desired behaviors, which can later be exchanged for rewards. Immediate feedback and consistent reinforcement help reinforce correct responses and encourage engagement with learning materials. This approach aims to create a structured environment where desired behaviors are consistently rewarded and undesired behaviors are minimized.

However, behaviorism has been critiqued for its focus on external behaviors at the expense of internal cognitive processes. Critics argue that behaviorism may

overlook the complex mental processes involved in learning and the development of intrinsic motivation. While behaviorist techniques can be effective for managing and motivating behavior, they may not fully address the cognitive and emotional aspects of learning.

Overall, B.F. Skinner's behaviorism provides practical strategies for influencing behavior through the use of rewards and punishments (Sidin, 2021). While it provides valuable tools for behavior management and motivation, its application should be balanced with considerations of cognitive and motivational factors to support comprehensive learning and development.

Cognitive Load Theory (CLT) explores the limitations of working memory and how instructional design can optimize learning by minimizing cognitive overload. John Sweller's work highlights the importance of reducing the extraneous load (cognitive demands unrelated to the learning task) and maximizing germane load (cognitive effort directed towards understanding the material).

In gamified math instruction, CLT suggests that games should be designed to minimize distractions and extraneous cognitive demands (Cutting, 2022), allowing students to focus on the core mathematical concepts. Teachers can employ strategies such as providing clear instructions, breaking down complex tasks into smaller steps, and using visual aids to reduce extraneous load.

Intrinsic cognitive load is associated with the inherent complexity of the material and the learner's prior knowledge (Chen, 2023). It reflects the difficulty of the content itself and the mental effort required to understand it. Extraneous cognitive load arises from the way information is presented and can be reduced by designing instructional materials that are clear and well-organized. Germane cognitive load involves the cognitive effort dedicated to processing and integrating new information, which supports schema construction and meaningful learning.

In practical terms, applying CLT in educational settings involves designing materials and activities that manage cognitive load effectively. For example, instructional materials might be designed to reduce extraneous cognitive load by minimizing distractions and unnecessary complexity. Techniques such as chunking information, using multimedia presentations effectively, and providing worked examples can help manage intrinsic and germane cognitive load, making learning more efficient and effective.

One challenge of applying CLT is ensuring that instructional designs are tailored to the cognitive capabilities of learners, considering factors such as their prior knowledge and the complexity of the material. Designing materials that balance cognitive load without overwhelming learners requires careful consideration and ongoing adjustments based on feedback and assessment. This is particularly important in the context of flipped classrooms, where students are expected to engage with learning materials outside of traditional classroom time (Fischer, 2023).

Overall, Cognitive Load Theory offers valuable insights into optimizing instructional design by managing cognitive resources effectively. By addressing intrinsic, extraneous, and germane cognitive loads, educators can create more effective learning experiences that support better comprehension and retention of information.

Role of Gamification in Teacher Delivery of Math Instruction. Gamification, the application of game-like elements to non-game contexts, has emerged as a promising approach to enhance student engagement and learning in mathematics. By incorporating elements such as points, badges, leaderboards, and challenges, teachers can transform traditional math instruction into an interactive and motivating experience. The role of gamification in teacher delivery of math instruction is multifaceted, encompassing pedagogical strategies, classroom management, and assessment practices.

Nonetheless, it was found that there was an increase in student engagement using gamified instruction (Afrianto et al., 2022). This research suggests that gamified m-learning applications hold significant potential for enhancing mathematics learning. The study found that integrating gamification into the mathematics learning experience resulted in a notable increase in student interest (35%), motivation (33%), and comprehension (42%). These findings highlight the positive impact of gamification on student engagement and learning in mathematics. The application of gamification within an m-learning context led to a substantial improvement in student interest, motivation, and understanding of mathematical concepts. This indicates that gamified m-learning applications can serve as an effective alternative to traditional methods of mathematics instruction.

Firstly, gamification empowers teachers to create engaging and interactive learning environments. By incorporating game mechanics into their lessons, teachers can capture students' attention, foster curiosity, and motivate them to actively participate in the learning process. This shift from passive learning to active engagement is crucial for promoting deeper understanding and retention of mathematical concepts.

Brezovszky et al. (2019) investigated the pedagogical impact of the Number Navigation Game (NNG), a digital tool designed to support arithmetic development among primary learners. Their findings demonstrated that integrating game-based elements with conventional instruction led to notable improvements in students'

numerical proficiency and conceptual understanding. The study further highlighted gamification as a flexible instructional strategy that enhances engagement and accessibility, particularly in diverse classroom settings.

Secondly, gamification offers teachers a unique opportunity to assess student learning in a more engaging and authentic way. By tracking student progress through game mechanics, teachers can gain valuable insights into student understanding, identify areas where students may be struggling, and provide timely feedback and support. This data-driven approach to assessment can inform instructional decisions and ensure that all students are making progress.

In conclusion, gamification plays a transformative role in teacher delivery of math instruction. By incorporating game-like elements into their lessons, teachers can create more engaging, interactive, and personalized learning experiences that foster student motivation, enhance understanding, and promote deeper learning in mathematics.

On the other hand, Mathematics education is embracing innovative approaches like Flipped Learning, Project-Based Learning, and Gamification. A study of 73 teachers in Melilla investigated factors influencing their choice of instructional models. The research found significant positive associations between the adoption of these innovative approaches and factors related to teaching practices, teacher training, and ICT utilization. This suggests that these models are gaining traction and are positively influenced by various aspects of teaching and learning. (Hossein-Mohand et al., 2021)

Influence of Gamification on Student Mathematical Engagement.

The influence of gamification on student mathematical engagement is undeniable. By tapping into students' innate desire for challenge, competition, and reward, gamified instruction can transform the traditional classroom into a dynamic and motivating learning environment. This shift from passive learning to active engagement has profound implications for student learning outcomes. The results indicate that gamification effectively motivates users to participate in and utilize educational systems, leading to increased interactivity and engagement (Bouchrika et al., 2021).

Firstly, gamification fosters a sense of intrinsic motivation in students. By incorporating game mechanics such as points, badges, and leaderboards, teachers can create a sense of accomplishment and progress, which in turn motivates students to persist in their learning efforts. This intrinsic motivation is essential for sustained engagement and deeper learning, as it encourages students to go beyond simply completing assigned tasks and actively seek out new challenges and opportunities to learn (Xu et al., 2021).

A study by Naseem (2021) investigated the role of quizzes in middle-grade math classes, revealing a strong positive impact on both academic performance and anxiety reduction. Students who took part in weekly quizzes demonstrated improved math skills and lower anxiety levels compared to those in a control group without quizzes. These findings suggest that regular quiz-based learning supports student confidence and achievement in math.

Likewise, Attah et al. (2024) conducted a study in Nigeria exploring the effect of gamification-based instruction on junior secondary students' performance in math. The results showed that students exposed to gamified learning methods achieved significant academic gains, affirming gamification's value in increasing engagement and enhancing learning. The study concluded that gamified instruction is an effective tool for strengthening mathematical comprehension and creating a more interactive educational experience.

Secondly, gamification can help to reduce math anxiety and increase student confidence. By providing students with a safe and supportive environment to explore mathematical concepts and practice their skills, gamified instruction can help to alleviate the fear and anxiety that many students associate with mathematics. This increased confidence can lead to greater willingness to take risks, experiment with different approaches, and persevere in the face of challenges.

In spite of that, the study found that students who participated in the edutainment game demonstrated increased engagement in mathematics and reduced anxiety towards the subject. The game's design fostered a more positive learning environment, making students feel more comfortable tackling numerical arithmetic tasks (Bouzid et al., 2021).

In conclusion, gamification has a significant influence on students' mathematical engagement. By incorporating game-like elements into their lessons, teachers can create a more motivating, interactive, and collaborative learning environment that fosters intrinsic motivation, promotes collaboration, and reduces math anxiety, ultimately leading to improved student engagement and learning outcomes.

Challenges Experienced by Teachers in Using Gamified Instruction. While gamification offers numerous benefits for enhancing math instruction, teachers may encounter challenges in implementing this approach effectively. These challenges can range from practical considerations to pedagogical complexities, requiring careful planning and adaptation to ensure the successful integration of gamified elements into the classroom.

Firstly, teachers may face challenges in finding appropriate and engaging gamified resources. The availability of high-quality, curriculum-aligned gamified resources can be limited, requiring teachers to invest time and effort in searching for, adapting, or creating their own materials. This can be particularly challenging for teachers who are unfamiliar with game design principles or lack access to technology and resources. The study revealed a knowledge gap among teachers regarding games and gamification tools for educational purposes. Participants in the study indicated a lack of information and expertise in utilizing these tools effectively in their teaching practices (Brooks et al., 2019).

Secondly, teachers may face challenges in managing classroom dynamics and ensuring equitable participation in gamified activities. Students with different learning styles, abilities, and access to technology may require different levels of support and scaffolding to ensure that all students are able to engage in and benefit from gamified instruction. Based on the research findings, the authors developed a set of practical guidelines for instructors seeking to optimize student learning outcomes. These guidelines emphasize the importance of selecting the most effective teaching methods based on course objectives and student abilities, drawing upon the strengths of non-traditional approaches such as flipped classrooms, gamification, case studies, self-learning, and social media (Safapour et al., 2019).

In conclusion, while gamification offers numerous benefits for enhancing math instruction, teachers may encounter challenges in implementing this approach effectively. Addressing these challenges requires careful planning, ongoing professional development, and a willingness to adapt and adjust instructional practices to meet the needs of all students.

Issues and Concerns Faced by Students While Engaging in Gamified Instruction. While gamification holds great promise for enhancing student engagement and learning in mathematics, students may face certain issues and concerns while engaging in this approach. These concerns can range from technical difficulties to pedagogical complexities, requiring careful consideration and adaptation to ensure a positive and effective learning experience for all students.

Firstly, gamified activities in mathematics may contain cultural biases or may not be relevant to the Philippine context. Games and activities created in other cultures may not be understood or relatable to students in the Philippines. It is important to consider cultural nuances and use local languages to ensure that gamified activities are engaging and relatable to students in the Philippines.

In addition, the potential of gamification to enhance user motivation and engagement has led many researchers and practitioners to investigate its impact in educational settings. While some studies have focused on tailoring game elements to individual user characteristics, such as demographics and behavior, few have explored the influence of cultural factors. Given the significant role of culture in shaping societies, this study proposes and evaluates a model, the Gamification for Cultural Studies Model (GamiCSM), to better understand the relationship between cultural factors and gamification in educational contexts (Toda et al., 2020).

Secondly, students may be concerned about the potential for unfair competition or social pressure within gamified learning environments. Students who are less competitive or who struggle with certain concepts may feel pressured to perform well or keep up with their peers, leading to anxiety and a negative learning experience. Teachers should create a supportive and inclusive learning environment that emphasizes collaboration, effort, and individual progress rather than competition.

Furthermore, gamification has been touted as a promising approach to address the ongoing challenge of maintaining student engagement in the classroom. It borrows elements from game design, such as points, leaderboards, and badges, to create a more entertaining and engaging learning experience. However, these digital incentives can also be seen as subtle attempts to influence student behavior and attitudes towards specific concepts. Therefore, it is crucial to subject gamification to ethical scrutiny, just like any other persuasive technique, as it may unintentionally limit student autonomy and choice. This research examines key ethical considerations related to gamification and proposes a new framework that integrates ethical tests into each stage of a pre-existing instructional design model. This framework can serve as a guide when incorporating gamification into educational practices (O'Sullivan et al., 2021).

In conclusion, while gamification offers numerous benefits for enhancing student engagement and learning in mathematics, students may face certain issues and concerns while engaging in this approach. Addressing these concerns requires careful planning, ongoing communication, and a commitment to creating a supportive and inclusive learning environment that fosters positive and effective learning experiences for all students.

DepEd Order No. 42, s. 2016 acknowledges the importance of integrating media and technology in daily lesson preparation for the K to 12 Basic Education Program. The policy encourages teachers to incorporate various instructional materials and resources, including technology-based tools, to enhance the learning experience. In the Daily Lesson Log (DLL) or Detailed Lesson Plan (DLP), teachers are expected to specify the learning resources and materials they will use, including digital content, multimedia presentations, online resources, and other technology-enabled learning tools.

The order emphasizes the need for teachers to align their use of media and technology with their lessons' learning objectives and content. It promotes the integration of 21st-century skills, which inherently involve the use of modern technology. While the policy does not provide extensive details on specific technologies, it creates a framework that allows for the flexible incorporation of various media and technological resources in lesson planning and delivery. This approach aims to prepare students for the demands of the modern world by exposing them to diverse learning experiences enhanced by appropriate use of technology (https://bitly.cx/357M).

DepEd Order No. 8, s. 2015 acknowledges the role of technology in classroom assessment for the K to 12 Basic Education Program in the Philippines. While the order does not extensively focus on technology, it recognizes that various assessment tools and methods can be employed, including those that leverage digital platforms. The policy emphasizes the importance of using a wide range of assessment strategies to gather comprehensive information about student learning, which implicitly includes the use of technology-based assessments where appropriate and available. The order encourages teachers to use diverse assessment techniques, which can include technology-enhanced methods such as online quizzes, digital portfolios, and computer-based tests. It also mentions the use of different reporting tools, which may involve digital systems for recording and analyzing student performance data. However, the policy maintains a balanced approach, recognizing that not all schools may have equal access to technology. As such, it provides flexibility for teachers to choose assessment methods that best suit their classroom context, whether traditional or technology-based, as long as they align with the learning competencies and objectives of the K to 12 curricula (https://bitly.cx/ifwP).

DepEd Memorandum 039, s. 2023 focuses on the administration and utilization of digital arts and multimedia tools in the Department of Education (DepEd) in the Philippines. The memorandum recognizes the importance of these tools in enhancing the quality of teaching and learning materials, as well as in improving communication and information dissemination within the department. It outlines guidelines for the

proper use of digital arts and multimedia tools, emphasizing their role in creating visually appealing and engaging educational content that aligns with the department's branding and communication standards.

The memorandum also addresses the need for capacity building among DepEd personnel in using these digital tools effectively. It encourages the development of skills in graphic design, video editing, and other multimedia production techniques. The policy aims to streamline the creation and distribution of digital content across various DepEd platforms, ensuring consistency and quality in visual communications. By promoting the use of digital arts and multimedia tools, DepEd seeks to modernize its approach to educational material development and enhance its overall digital presence in line with contemporary educational practices and technological advancements (https://bitly.cx/RaHvn).

DepEd Order No. 16, s. 2023 establishes updated guidelines for the Department of Education Computerization Program (DCP), aiming to equip public schools with essential technologies to enhance teaching and learning. The order provides ICT packages such as computer laboratory setups, multimedia tools, and laptops for both teachers and students, ensuring improved access to digital resources. It also defines the roles and responsibilities of DepEd offices in managing, maintaining, and sustaining these ICT resources to maximize their impact on education.

Additionally, the **Data Privacy Act of 2012 (RA 10173)** supports this study by ensuring the responsible collection, processing, and protection of personal data in educational settings. As schools integrate technology into instruction, safeguarding student and teacher information becomes a priority. The Act mandates compliance with data security measures, ensuring that digital tools used in gamified instruction adhere to privacy standards. It also emphasizes the rights of data subjects, requiring schools to implement secure systems for handling student records, online assessments, and gamification platforms. By aligning with both DepEd Order and RA 10173, this study ensures that gamification-enhanced instruction is technologically supported while maintaining ethical data practices. These policies collectively promote effective digital learning environments while protecting the privacy and security of all stakeholders involved.

In conclusion, using games in teaching math can really help students learn better. It makes lessons more fun, keeps students interested, and helps them feel more confident. This approach is supported by teaching theories and by DepEd policies like Order No. 42, s. 2016, which encourages teachers to use technology in their lessons. While there are challenges like finding the right materials, making sure all students can join in, and keeping things fair. Teachers can overcome these with good planning and training. When done well, gamified teaching can turn math class into a more exciting and effective learning experience for everyone.

THE PROBLEM

Statement of the Problem

This study aims to probe the teachers' and students' perspectives on the role, influence, and challenges of gamified mathematics instruction at Tolotolo National High School, respectively, during the school year 2024-2025 as a basis for a Gamification-enhanced Instructional Plan.

It specifically seeks to answer the following sub-problems:

1. To what extent does gamification play a role in facilitating mathematics instruction, as to the perspectives of the teachers and students?
2. To what extent does gamified mathematics instruction influence the learning experience, as perceived by teachers and students?
3. To what extent do challenges arise from gamified mathematics instruction, based on the views of teachers and students?
4. Is there a significant difference in the perspective between the teachers and students as to the following comparisons on the:

4.1 role of gamification in facilitating mathematics instruction,

4.2 influence of gamified mathematics instruction, and

4.3 challenges of gamified mathematics instruction?

5. Based on the findings of the study, what specific enhanced instructional plan shall be formulated?

Statement of hypothesis:

Ho_1: There is no significant difference in the perspectives between the teachers and students as to the role of gamification in facilitating mathematics instruction.

Ho_2: There is no significant difference in the perspectives between the teachers and students as to the influence of gamified mathematics instruction.

Ho_3: There is no significant difference in the perspectives between the teachers and students as to the challenges of gamified mathematics instruction.

Significance of the Study

This study highlights the importance of exploring both teacher and student perspectives on gamified mathematics instruction. The findings offer valuable insights for designing practical gamification strategies that boost student engagement, improve learning outcomes, and respond to existing instructional challenges. By deepening our understanding of this research, educators are better equipped to develop targeted techniques that meet the mathematical learning needs of high school students. The study's relevance extends to various stakeholders, including specific educational units, agencies, and individuals dedicated to enhancing the quality of math education.

Department of Education (DepEd)

The study provides helpful insights on how games and playful methods support student learning. These findings can guide DepEd in creating policies and teacher training programs that make math more enjoyable and accessible for students.

School Administrators

Principals and coordinators can use the results to encourage gamified teaching strategies. The findings also support better planning of teacher development and help track improvements in student performance.

Teachers

This study shows how gamified instruction boosts student interest and understanding in math. Teachers can apply these practical ideas to make lessons more fun and match students' different learning needs.

Other Stakeholders

Community members, educational tech developers, and local government officials can use the findings to support and expand gamified instruction. Their role is key in making these teaching strategies available in more schools.

Parents

With a better understanding of gamified instruction, parents can support their children's learning at home and feel more connected to how math is taught in schools.

High School Students

They are the heart of this study. Gamified instruction can help students learn math in a more engaging and

meaningful way, leading to better grades and a more positive attitude toward the subject.

Researchers

This study adds new information to the field of game-based learning in math. It helps researchers explore how these techniques affect both teachers and students.

Future Researchers

The findings give direction for future studies. They can explore other topics, improve research tools, or study how gamified instruction works in different areas or student groups.

RESEARCH METHODOLOGY

This section explains the research design used in the study. It also describes why the location was chosen, how the participants were selected, what tools were used to collect data, how the data collection was done, and how the information was analyzed and scored.

Design

This study used a descriptive-comparative quantitative research design to better understand how gamification affects both teachers and students in math education. This enables researchers to examine and assess the strength of the link between variables, which can be two or more, as well as make comments about whether the value of one variable predicts the value of another variable. (Creswell, 2019).

By comparing the perspectives of students and teachers throughout the teaching process, the study on gamified mathematical instruction aims to explore its practical effectiveness from both ends of the classroom experience. Unlike experimental designs that rely on control and treatment groups, this research focuses on gathering insights through shared observations, reflections, and feedback. This comparative approach allows for a deeper understanding of how gamification is perceived, implemented, and received in actual classroom settings, offering valuable input on its feasibility and instructional value in mathematics education.

Flow of the Study

This section provided a structured overview of the study, outlining its sequential progression from problem identification to conclusion. It encompassed the research design, data collection, and analysis methodologies.

Input.

This section identifies the key research variables and questions. It explores the role of gamification in enhancing mathematics instruction, its influence on learning outcomes, and the challenges encountered by both teachers and students. It also examines perceptual differences between these groups regarding gamification's effectiveness and implementation. These inputs serve as the foundation for data collection and analysis.

Process.

This phase outlines the procedural steps undertaken in the study. It begins with the submission of transmittal letters and the distribution of informed consent and assent forms, ensuring ethical compliance. The administration of structured questionnaires follows, targeting both teacher and student respondents. Collected data undergo statistical treatment, leading to comprehensive presentation, analysis, and interpretation. This process ensures methodological rigor and validity in addressing the research questions.

Output.

The culmination of the research is the development of a Gamification-Enhanced Instructional Plan. This output integrates empirical findings and pedagogical insights, offering a practical framework for mathematics educators to implement gamified strategies that foster engagement, motivation, and improved learning outcomes.

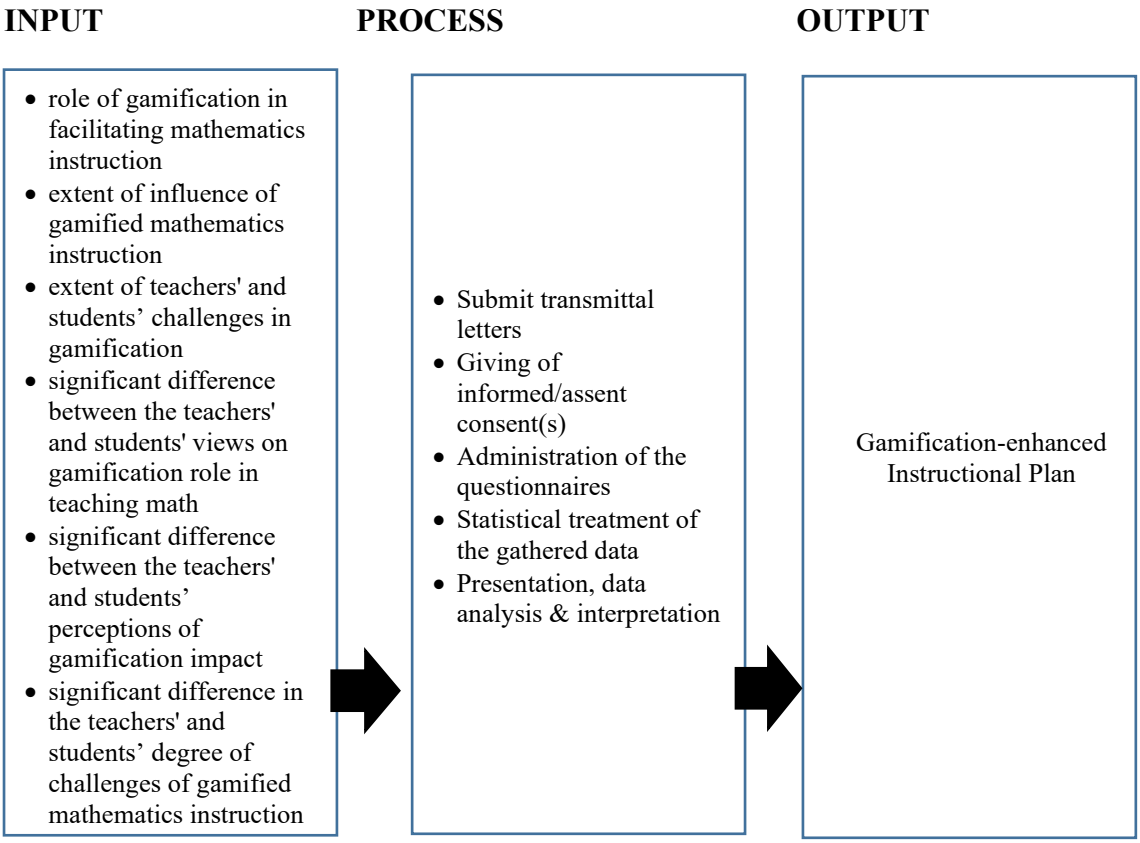

Figure 2. Flow of the Study

Environment

The research was conducted in three public secondary schools in the mountainous areas of Consolacion: School A, School B, and School C. These schools were chosen based on three key criteria: (1) their rural setting with limited access to advanced teaching tools, offering insight into gamified instruction under challenging conditions; (2) their prior experience with gamification strategies, making them relevant for examining its effectiveness; and (3) their willingness to participate, ensuring access to teachers and students familiar with gamified learning.

School A was started in 1968 in Barangay Garing, a rural, mountainous area in Consolacion, Cebu. It was first used as a simple classroom made of nipa and was originally part of Garing Elementary School. Later, it moved to Purok Nangka near the Barangay Hall and San Isidro Parish Church. Because of its location, the school faces challenges like slippery roads and landslides, but improvements have made access safer.

The school was built through the efforts of local leaders to help students grow into responsible and skilled members of the community. It started with two teachers and 32 students, offering only first-year secondary education. By 1971, it provided a full secondary program. School A is known for its achievements in academics and extracurricular activities. As Consolacion's first national high school, it has won many contests inside and outside the district. Students and teachers have excelled in quizzes, sports, cultural events, and more. The school also proudly takes part in community activities like the Sarok Festival, celebrating local traditions and unity.

School B was **f**ounded in 1991 and was born from a shared vision to provide accessible, quality education in the remote barangay of Lanipga, Consolacion. Situated 20 kilometers from the town proper, the school began

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with one class, three teachers, and fewer than 30 students, operating temporarily at the local elementary school. It was initially a Consolacion National High School extension under Mrs. Mercedita Pitogo and Principal Elisa Escutin. With generous land donations totaling 8,995 sq. meters, permanent classrooms were gradually built. By 1994–1995, the school held its first graduation and transitioned to School A. As enrollment grew, more facilities and teachers were added, supported by the Department of Education. Technology and sustainability became key to its advancement, and in 2016, the K-12 curriculum was fully adopted. Senior High School began with the General Academic Strand, but in 2023, the HUMSS strand replaced it—bringing joy and wider college and career options for students. Today, it thrives despite challenges, thanks to the dedication of its staff and strong community support. It remains committed to shaping a future of excellence, resilience, and inclusive education.

School C was founded in 1995 to provide accessible education for the residents of Barangay Tolotolo, a mountainous area in Consolacion, Cebu. Before its establishment, many students had to travel long distances to attend school in urban areas. The school was created to bring education closer to home, helping improve the community's knowledge and livelihood.

Originally an extension of Consolacion National High School – Day Class, it started on June 1, 1995, with borrowed classrooms from Tolotolo Elementary School. It began with one full-time and one part-time teacher, with only 26 students enrolled, some of whom were over age and married. Over time, enrollment grew, and more teachers were added. The school's first graduation was in 1999, and by 2022, Tolotolo NHS became independent, joining Consolacion District 2. Today, it has 25 teachers and five non-teaching staff. In 2015, it started offering Senior High School under the K to 12 Curriculum, with HUMMS and GAS tracks. Despite being in a remote area, the school has been competitive in district and provincial contests, producing professionals who have improved their lives through education. It remains active in academic and extracurricular activities, proving that location does not limit success.

A map is shown in Figure 2 for a better view of the place where the study is conducted.

Figure 2. Map of the Research Environment

Respondents

The study included both students and teachers as respondents. Using Slovin's formula, 173 Junior High School (JHS) students from the morning session at Tolotolo National High School were randomly chosen through random sampling. This school was selected due to its accessibility, relevance to the research topic, and location, making data collection more practical and focused. Selecting students from only one school ensured consistency in data gathering while still providing meaningful insights into gamified Math instruction.

Since there were only a limited number of Math teachers at a single school, the researcher selected 30 Math teachers from three different schools: School A, School B, and School C. These teachers were chosen based on the following criteria:

1. Currently teaching Mathematics,
2. Employed in the identified schools, and
3. Willing to participate in the study

Including teachers from multiple schools helped ensure enough participants and provided a broader perspective on Math instruction across different educational settings.

This approach of choosing teachers from different schools while selecting students from just one was a strategic decision. It allowed the study to cover a wide range of perspectives from educators while focusing deeply on students' experiences. Additionally, understanding how gamified instruction works in rural schools with fewer resources is crucial, as it shapes perceptions, influences learning, and presents unique challenges.

For selecting teachers, purposive sampling was used to ensure a diverse and representative group of educators. For students, random sampling was employed to ensure the selection was unbiased. Purposive sampling also enabled the researchers to include a subgroup of participants with diverse learning needs, thereby enriching the quality of the collected data (Palinkas et al., 2020).

Table 1. **Distribution of Student Respondents**

Junior High School Students	Population	Sample Size of Students	
	N	n	%
Grade 7	65	25	25
Grade 8	45	25	25
Grade 9	48	25	25
Grade 10	46	25	25
Sub-total	173	100	100

Table 2. **Distribution of Respondents (Math Teachers)**

Schools	Population	Sample Size of Teachers	
	N	n	%
School A	12	11	36.67

School B	9	9	30
School C	12	10	33.33
Sub-total	32	30	100

Note: Sample size was determined using purposive sampling based on inclusion criteria, not through statistical computation.

Instrument

The main tool used for data collection in this study was a structured questionnaire developed by the researcher to gather both teachers' and students' views on gamification in mathematics education. The questionnaire includes three separate sections that assess their perspectives on the role, influence, and challenges of using gamified instruction in math. These include the following sections: (A) The extent to which gamification plays a role in facilitating mathematics instruction, (B) The extent to which gamified mathematics instruction influences the learning experience, and (C) The extent to which challenges arise from gamified mathematics instruction. These scales utilize a 4-point Likert scale for assessment. The first part measures its role in teaching (4 - Strongly Agree, 3 - Agree, 2 - Disagree, 1 - Strongly Disagree). The second part examines its impact on learning (4 - Very Influential, 3 - Influential, 2 - Fairly Influential, 1 - Not Influential). The third part identifies challenges (4 - Very Challenging, 3 - Challenging, 2 - Fairly Challenging, 1 - Not Challenging).

To ensure reliability, a pilot test of the research instrument was conducted for each scale. The results were statistically analyzed and showed strong internal consistency across all areas measured. The instrument proved to be appropriate for evaluating teachers' and students' perspectives on the role, influence, and challenges of gamified mathematics instruction. Based on these results, the survey questionnaire was deemed reliable and suitable for full administration. Furthermore, the validity of the instrument was affirmed through expert evaluation, as it was signed by mathematics education specialists. The detailed results are presented in the Appendices.

Data Gathering Procedure

The quality of a research study relies on how well the information is collected. In this study, the process started by asking permission from the school administration. This step helped make sure the research followed rules and respected the school's policies. With that in place, the study could move forward with confidence and care.

Preliminary Stage

Before collecting any data, the researcher wrote a formal letter to seek permission from the Schools Division Superintendent of DepEd Cebu Province Division. This letter also asked for the school head's approval to survey students and teachers. Before answering the questionnaire, all participants were given clear information about the study, their rights, and the confidentiality of their responses, ensuring that their participation was both voluntary and well-informed.

Data-Gathering Stage

Once all necessary permissions were secured, the researcher met with the respondents to explain how to properly fill out the questionnaire. This was done face-to-face to ensure clarity and address any questions. After the briefing, the questionnaires were distributed to both teachers and students. When everyone had completed them, the researcher immediately collected the responses to maintain organization and protect the integrity of the data.

Post-Gathering Stage

Once all the questionnaires had been gathered, the researchers carefully reviewed and recorded the responses. The data were sorted and grouped to help clarify patterns and insights. To ensure accurate analysis, a statistician was invited to assist using suitable statistical methods. The findings were then documented and used to address the research questions. By following each step with care and collaborating with a data expert, the researchers ensured the study's accuracy, clarity, and trustworthiness.

Statistical Treatment of Data

In the inference of the collected data and even the validation of results, the frequency count, simple percentage, Likert scale, weighted mean, and the statistical tools such as the Mann-Whitney U-test were utilized for the articulated intents.

Simple Percentage. This was utilized to determine the proportion of responses regarding students' and teachers' perspectives on gamified instruction in Mathematics, ensuring a clear understanding of how they perceive and engage with this approach.

Weighted Mean. To acquire the average responses to a particular survey question using the 4-point Likert scale, this tool was employed to assess students' and teachers' perspectives on the effectiveness of gamified instruction in Mathematics.

Mann-Whitney U Test. This non-parametric test was used to compare two independent groups—students and teachers—to determine whether their perspectives on gamified instruction in Mathematics significantly differed. Since the data may not follow a normal distribution, this test allowed for a more reliable analysis of differences in responses based on ordinal data from the Likert scale.

A Likert scale was utilized for data collection, assigning numerical values to response options. Data was analyzed using descriptive and inferential statistics to determine the frequency, distribution, and significance of responses.

PART 1. Extent does gamification play a role in facilitating mathematics instruction As to the perspectives of the teachers and students

Scale	Numerical Rating	Descriptive Rating	Verbal Interpretation
4	3.25 - 4.00	Very High	The teachers and students are fully convinced that gamification significantly enhances mathematics instruction and supports effective teaching and learning.
3	2.50 - 3.24	High	The teachers and students believe that gamification contributes positively to mathematics instruction and helps improve teaching and learning experiences.
2	1.75 – 2.49	Low	The teachers and students feel that gamification has a minimal impact on mathematics instruction and does not notably support teaching and learning.
1	1.00 -1.74	Very Low	The teachers and students are firm with their opinion that gamification does not facilitate mathematics instruction and does not support effective teaching and learning.

Extent does gamified mathematics instruction influence the learning experience, as perceived between teachers and students

Scale	Numerical Rating	Descriptive Rating	Verbal Interpretation
4	3.25 - 4.00	Very Influential	Gamified instruction has a strong positive impact on learning, significantly improving engagement, understanding, and overall experience.
3	2.50 - 3.24	Influential	Gamified instruction has a noticeable positive effect, making learning more engaging and enhancing comprehension.
2	1.75 - 249	Fairly Influential	Gamified instruction has some positive impact, adding interest but not significantly changing the learning experience.
1	1.00 -1.74	Not Influential	Gamified instruction has little to no impact, making a minimal difference in learning or student engagement.

Extent do challenges arise from gamified mathematics instruction, based on the views of teachers and students

Scale	Numerical Rating	Descriptive Rating	Verbal Interpretation
4	3.25 - 4.00	Very Challenging	Gamified instruction presents significant difficulties, making the learning or teaching process much harder and requiring considerable effort to overcome obstacles.
3	2.50 - 3.24	Challenging	Gamified instruction creates noticeable difficulties that require effort and adaptation, though they are manageable with some adjustments.
2	1.75 - 249	Fairly Challenging	Gamified instruction introduces some challenges, but they are relatively minor and do not significantly hinder the learning or teaching experience.
1	1.00 -1.74	Not Challenging	Gamified instruction presents little to no challenges, making it easy to implement and adapt without significant difficulties.

Definition of Terms

Including this section is essential to promote clarity and accuracy throughout the study. By defining key terms, the researcher ensures a shared understanding of core concepts and guides the reader toward interpreting them as intended. This step strengthens the study's overall coherence and supports the validity of the findings. Therefore, the following terms are defined operationally.

Degree of Challenges of Gamified Mathematics Instruction: Refers to the extent of difficulties encountered when applying gamification strategies to mathematics instruction. These challenges may include technological constraints, alignment with the existing curriculum, and the adaptability of students.

Extent of Influence of Gamified Mathematics Instruction: Describes the impact of gamified instructional strategies on student engagement, learning outcomes, and attitudes toward mathematics, based on the perceptions of both teachers and students.

Gamification: The integration of game elements such as points, levels, rewards, and competition into non-game contexts, particularly education. In this study, gamification is employed as a motivational tool to enhance engagement and enjoyment in mathematics learning.

Gamification-enhanced instructional plan: A structured framework outlining targeted steps and interventions designed to address identified challenges in gamified mathematics instruction and to improve teaching practices and student learning outcomes.

Gamified Mathematics Instruction: The application of gamification techniques specifically within mathematics teaching. This includes the use of digital platforms or structured games aimed at fostering student interaction, motivation, and comprehension of mathematical concepts.

Probing: In the context of this study, probing refers to the systematic process of exploring and investigating the perceptions, insights, and experiences of teachers and students regarding gamified mathematics instruction. It aims to gain a deeper understanding of their views on its role, influence, and challenges in the learning environment.

Role of Gamified Mathematics Instruction: The specific functions and contributions of using game-based strategies in mathematics instruction, particularly in fostering student engagement and supporting educational objectives.

Teachers and Students' Perspective: The collective viewpoints and experiences of both educators and learners concerning the effectiveness, appeal, and practical implications of gamified instruction, including its benefits and limitations.

Presentation, Data Analysis, and Interpretation

This section presents the results of the statistically computed data of the administered survey in tabular form. The analyses and interpretations effectively support the tables, helping readers fully understand the purposes and results of this empirical study. Each table is explained to highlight the significant trends, allowing for a more comprehensive understanding of the study's objectives and results.

Extent of the Role of Gamification in Facilitating Mathematics Instruction as to the Perspectives between Teachers and Students

Table 3 presents the mean responses of teachers and students on the Role of Gamification in Facilitating Mathematics Instruction. The data highlights various indicators related to engagement, motivation, enjoyment, and performance, offering a comparative view of how each group experiences gamified learning. It helps explain how game-based strategies support teaching and learning in math. It also shows which areas are most affected by gamification, based on the scores given by the respondents.

Table 3. Extent of The Role of Gamification In Facilitating Mathematics Instruction as to The Perspectives Between Teachers and Students

No	Group	Indicators	$\bar{x}$	VD
1	Teacher	Gamified mathematics activities are more engaging than traditional methods.	3.80	SA
	Student		3.35	SA
2	Teacher	Gamified elements increase my motivation to participate in mathematics lessons.	3.73	SA
	Student		3.33	SA

3	Teacher	Gamification is effective in improving my understanding of mathematical concepts.	3.53	SA
	Student		3.42	SA
4	Teacher	I find gamified mathematics instruction more enjoyable than traditional methods.	3.77	SA
	Student		3.35	SA
5	Teacher	The feedback provided through gamified activities helps improve my performance.	3.67	SA
	Student		3.44	SA
6	Teacher	Gamification helps in developing my mathematical skills and problem-solving abilities.	3.53	SA
	Student		3.35	SA
7	Teacher	I retain mathematical concepts learned through gamified instruction better than those learned through traditional methods.	3.43	SA
	Student		3.01	A
8	Teacher	Gamification positively affects the interaction between teachers and students during mathematics instruction.	3.53	SA
	Student		3.36	SA
9	Teacher	It is easy to integrate gamification into the existing mathematics curriculum.	3.37	SA
	Student		2.99	A
10	Teacher	Gamification is effective in enhancing mathematics instruction.	3.67	SA
	Student		3.39	SA
	Teacher	**OVERALL WEIGHTED MEAN**	**3.60**	**SA**
	Student		**3.30**	**SA**

Note: 3.26-4.00- Strongly Agree, 2.51-3.25-Agree, 1.76-2.50- Disagree**,** 1.00-1.75-Strongly Disagree

The overall weighted mean for teachers is 3.60, while for students it is 3.30, both interpreted as Strongly Agree (SA). This indicates a highly positive perception of gamification from both groups. Teachers consistently rated the indicators higher, with the highest mean score (3.80) on the statement that gamified mathematics activities are more engaging than traditional methods. Similarly, students agreed, though with a lower mean of 3.35. Notably, the lowest mean for students (2.99) was observed in the ease of integrating gamification into the curriculum, which falls under the Agree (A) category. Likewise, in retaining mathematical concepts, students rated it 3.01 (A), while teachers rated it 3.43 (SA).

Apparently, both groups strongly agree that gamification is effective in enhancing mathematics instruction, improving motivation, participation, and problem-solving skills, though students displayed slightly more reserved responses than teachers. This supports the findings of Attah et al. (2024), whose study in Nigeria revealed that gamified teaching led to significant academic gains and increased engagement among junior secondary students.

Similarly, Lomibao et al. (2024) found through a Philippine-based literature review that gamified instruction boosts student performance, engagement, and higher-order thinking. They emphasized that elements like competition, collaboration, and rewards contribute to its success. These studies reinforce the present findings, confirming that gamification is a valuable strategy for making mathematics more interactive, effective, and learner-centered.

Extent of the Influence of Gamified Mathematics Instruction as Perceived Between Teachers and Students

Table 4 reflects a shared belief among teachers and students that gamified mathematics instruction genuinely makes a difference in the learning experience. It shows that most respondents believe gamification helps

improve student engagement, motivation, and understanding of math concepts. The results also suggest that gamified lessons reduce students' fear of math and support the development of their skills. These positive responses reflect a shared belief that using games in teaching makes math more effective and enjoyable.

Table 4. Extent of The Influence of Gamified Mathematics Instruction as Perceived Between Teachers and Students

No	Group	Indicators	$\bar{x}$	VD
1	Teacher	Gamified mathematics instruction significantly enhances student engagement compared to traditional methods	3.67	VI
	Student		3.27	VI
2	Teacher	Gamified elements greatly increase student motivation to participate in mathematics lessons.	3.73	VI
	Student		3.48	VI
3	Teacher	Gamification significantly improves students' understanding of mathematical concepts.	3.43	VI
	Student		3.41	VI
4	Teacher	Gamified mathematics instruction is much more enjoyable for students than traditional methods.	3.63	VI
	Student		3.22	I
5	Teacher	Gamified mathematics instruction helps reduce students' anxiety or fear towards learning math compared to traditional methods.	3.50	VI
	Student		3.27	VI
6	Teacher	Gamification greatly aids in the development of students' mathematical skills and problem-solving abilities.	3.40	VI
	Student		3.32	VI
7	Teacher	Students retain mathematical concepts learned through gamified instruction better than those learned through traditional methods.	3.50	VI
	Student		3.12	I
8	Teacher	Gamification positively enhances the interaction between teachers and students during mathematics instruction.	3.53	VI
	Student		3.38	VI
9	Teacher	Gamification is relatively easy for teachers to integrate into their existing mathematics curriculum.	3.43	VI
	Student		3.19	I
10	Teacher	Gamified mathematics instruction is highly effective in improving the overall learning experience for students.	3.50	VI
	Student		3.31	VI
	Teacher	**OVERALL WEIGHTED MEAN**	**3.53**	**VI**
	Student		**3.30**	**VI**

Note: 3.26-4.00-Very Influential, 2.51-3.25-Influential, 1.76-2.50-Fairly Influential, 1.00-1.75-Not Influential

With overall weighted means of 3.53 for teachers and 3.30 for students, both fall within the Very Influential category, indicating that gamification isn't just well-received, it's considered a meaningful tool that enhances classroom dynamics, comprehension, and learner engagement.

Teachers expressed strong confidence across almost all indicators, particularly in how gamified strategies improve motivation (3.73), enjoyment (3.63), and interaction (3.53). Students also agreed, rating motivation (3.48) and teacher-student interaction (3.38) highly. While students rated a few items slightly lower—such as enjoyment (3.22) and concept retention (3.12)- these still fall within positive descriptors, showing that learners find gamified instruction engaging, even if their enthusiasm is a bit more reserved than that of their teachers. Overall, the data paints a picture of enthusiasm and alignment. Teachers view gamification as a transformative method that strengthens not just math skills but also classroom relationships and confidence levels. Students, while more cautious, also recognize its value, especially in reducing anxiety and making learning more enjoyable.

Supporting this, Bouzid et al. (2021) found that students who engaged with an educational game showed greater involvement in math activities and felt less anxious about the subject. The game's structure helped create a more welcoming learning space, allowing students to approach arithmetic tasks with increased comfort and confidence. Mendoza et al. (2024) likewise observed that gamified methods led to stronger engagement, improved performance, and more active

participation. This collective support signals that gamified instruction is not just a creative add-on; it's evolving into a core strategy that could reframe how mathematics is taught and experienced.

Extent of Challenges of Gamified Mathematics Instruction Based on the Views of Teachers and Students

Table 5 highlights the shared awareness among teachers and students of the challenges in implementing gamified mathematics instruction. While gamified mathematics instruction brings many benefits, it also comes with several challenges, as seen in Table 5. Teachers shared that technical problems often happen during lessons, and there aren't always enough resources to support gamified activities. Many teachers also said they need more training to use gamification well. Students, on the other hand, mentioned that some games can distract them from the main lesson. Teachers also pointed out that not all students have access to the needed technology, and some tools used in gamification are hard to understand. These issues make it difficult to apply gamified instruction smoothly in the classroom. Without proper support, both teachers and students may struggle to get the full benefits of this teaching method**.**

Table 5. Extent of Challenges of Gamified Mathematics Instruction Based on The Views of Teachers and Students

No	Group	Indicators	$\bar{x}$	VD
1	Teacher	Technical issues frequently arise during gamified mathematics instruction, causing disruptions.	3.13	C
	Student		2.77	C
2	Teacher	There is a lack of adequate resources for implementing gamified mathematics instruction effectively.	3.33	VC
	Student		2.84	C
3	Teacher	Teachers require extensive training to effectively use gamification in mathematics instruction.	3.30	VC
	Student		2.90	C
4	Teacher	Gamified activities often distract students from the primary learning objectives.	3.00	C
	Student		2.56	C
5	Teacher	The complexity of gamification tools can make them challenging for both teachers and students to use.	3.17	C
	Student		2.94	C
6	Teacher	Not all students have equal access to the necessary technology for gamified mathematics instruction.	3.40	VC
	Student		3.08	C
7	Teacher	Assessing student performance in gamified mathematics instruction presents significant challenges.	3.23	C
	Student		2.97	C
8	Teacher	Implementing gamification in mathematics instruction requires more time than traditional methods.	3.17	C
	Student		2.85	C

9	Teacher	Students may become overly reliant on gamified elements, impacting their ability to learn independently.	3.33	VC
	Student		3.03	C
10	Teacher	The costs associated with gamified mathematics instruction are a significant challenge.	3.27	VC
	Student		2.90	C
	Teacher	**OVERALL WEIGHTED MEAN**	**3.23**	**C**
	Student		**2.88**	**C**

Note: 3.26-4.00-Very Challenging, 2.51-3.25-Challenging, 1.76-2.50-Fairly Challenging**,** 1.00-1.75-Not Challenging

Though both groups recognize the potential benefits of gamification, their overall ratings, 3.23 for teachers and 2.88 for students, suggest that meaningful hurdles still exist in practice. These values, both falling within the *Challenging* category, reflect an acknowledgment that turning engaging tools into effective instruction requires more than just enthusiasm.

For teachers, the challenges appear to be more deeply rooted in structural and institutional concerns. They rated issues like unequal access to technology, lack of resources, and cost-related constraints as *Very Challenging*. Additional problems, such as the need for professional training and difficulty in evaluating student performance, reinforce the idea that sustainable gamification needs strategic support, funding, and capacity-building, especially in settings with limited infrastructure.

Students, while slightly less critical in their ratings, raised practical concerns that revolved around the classroom experience. Their feedback focused on the complexity of gamified tools, distractions from core learning objectives, and the time-consuming nature of certain activities. These responses signal the importance of thoughtful instructional design, ensuring that gamified methods not only capture attention but also stay focused on meaningful learning outcomes.

Nob et al. (2024) support this view, emphasizing that gamification can enhance engagement, motivation, and performance when interactive features are carefully aligned with instructional goals. On the other hand, Bouzid et al. (2021) caution that without proper integration, gamified activities may become confusing or distracting, potentially weakening students' grasp of key concepts. Together, both groups paint a nuanced picture: gamification is promising, but navigating its

challenges requires alignment between resources, pedagogy, and learner needs.

Test of Significance of Difference in the Perspective Between the Teachers and Students as to the Role, Influence, and Challenges of Gamified

Mathematics Instruction

Table 6 presents the statistical analysis conducted to determine whether there are significant differences between teachers' and students' perspectives on gamified instruction in mathematics, specifically in terms of its role, influence, and associated challenges. This comparison is essential for understanding how each group experiences and interprets gamification in the classroom.

By including all three indicators, particularly the latter two, the researcher provides a broader lens through which readers can examine the issue under study. The results of this test serve as a basis for taking informed and appropriate action, ensuring that instructional strategies are responsive to both pedagogical goals and learner realities.

Table 6. Test of Significance of Difference in The Perspective Between The Teachers and Students as to The Role, Influence, and Challenges of Gamified Mathematics Instruction

	Indicator	Group	Mean Rank	U	p-value	Interpretation	Effect Size *r*
1.	Role of gamification in facilitating mathematics instruction	Teachers	88.62	807	0.001	There is a significant difference	0.462
		Students	58.57				
2.	Influence of gamified mathematics instruction	Teachers	82.63	986	0.004	There is a significant difference	0.343
		Students	60.36				
3.	Challenges of gamified mathematics instruction	Teachers	83.75	953	0.002	There is a significant difference	0.365
		Students	60.03				

Note. Effect sizes are based on rank biserial correlation. Interpretation follows Cohen's (1988) guidelines: 0.10–0.29 = small, 0.30–0.49 = medium, ≥ 0.50 = large.

The Mann-Whitney U test revealed a statistically significant difference between teachers and students in their perceptions of the role of gamification in mathematics instruction (U = 807, p < .001). This indicates that the observed difference is unlikely to have occurred by chance and is considered meaningful. Teachers had a higher mean rank (88.62) compared to students (58.57), suggesting that they viewed gamification more positively in terms of its instructional value. The computed effect size (r = 0.462) falls within the medium to large range, pointing to a practically important difference. Given a significance level of 0.05 and

a computed p-value of 0.001, the null hypothesis is rejected. This confirms that the difference between the two groups is not only statistically significant but also relevant in practice, highlighting distinct perspectives on the role of gamified instruction in the teaching and learning process.

Tan et al. (2023) investigated the impact of game-aided instruction on students' mathematical problem-solving and motivation. Their findings suggest that teachers are proactive in adopting diverse pedagogical strategies, including gamification, to enhance learning outcomes. This supports the notion that educators may hold more favorable views toward gamified instruction due to its perceived instructional value. Similarly, Smith (2020) conducted a qualitative exploratory case study on the integration of gamification in mathematics classrooms. The study revealed that teachers regard gamification as a means to boost student engagement and foster deeper conceptual understanding, particularly when it complements curricular objectives.

Indicator 2

There was also a statistically significant difference between teachers and students in how they perceived the influence of gamification on learning, as shown by the Mann-Whitney U test (U = 986, p = .004). This result indicates that the difference in their responses is unlikely to have occurred by chance and reflects a genuine divergence in opinion. Teachers had a higher mean rank (82.63) than students (60.36), suggesting that teachers were more inclined to believe in the positive impact of gamified instruction on student learning. The effect size was

calculated at 0.343, which falls within the medium range, indicating a moderate but meaningful difference in perception. When compared to the set significance level of 0.05, the computed p-value of 0.004 is notably lower, leading to the rejection of the null hypothesis. This confirms that the observed difference is statistically

significant and practically relevant, highlighting distinct views on how gamification supports learning outcomes.

Nob et al. (2024), in their literature review conducted within the Philippine educational context, observed that students often associate gamified learning with increased enjoyment and motivation. In contrast, teachers tend to emphasize its strategic utility in enhancing academic performance and knowledge retention. This contrast underscores the nuanced ways in which each group values gamification in instruction. Similarly, Tah Jutin et al. (2024) found that gamification contributes to a dynamic and engaging mathematics learning environment. Their findings revealed that while students appreciated the motivational boost, teachers recognized its pedagogical potential highlighting how both groups perceive gamification through distinct yet complementary lenses.

Indicator 3

For the perceived challenges related to gamified mathematics instruction, the Mann-Whitney U test revealed a statistically significant difference between teachers and students ($U = 953$, $p = .002$). This indicates that the variation in their responses is unlikely to be due to chance and reflects a meaningful difference in perception. Teachers had a higher mean rank (83.75) compared to students

(60.03), suggesting that they may have encountered or interpreted the challenges

of gamification differently, potentially to a lesser extent. The calculated effect size ($r = 0.365$) falls within the medium range, signifying a noticeable and practically relevant difference. When compared to the set significance level of 0.05, the computed p-value of 0.002 is clearly lower, leading to the rejection of the null hypothesis. This confirms that teachers and students hold distinct views regarding the challenges associated with gamified instruction, underscoring the need for differentiated support and thoughtful implementation strategies.

Maryana et al. (2024) found that students usually enjoy gamified learning, but they don't always notice the challenges teachers face—like not having enough time, limited resources, or needing to match games with the lesson plan. Teachers are more aware of these issues, which is why they may be more careful or thoughtful when using gamification. Similarly, Tamondong et al. (2025) noted that teachers view gamification as a good idea, but also find it challenging to balance the use of technology with their teaching goals.

SUMMARY, FINDINGS, CONCLUSION, AND RECOMMENDATIONS

This chapter summarizes the data gathered from the survey conducted among the respondents. Through careful analysis and interpretation, significant findings were identified, providing a basis for the conclusions drawn in this empirical investigation.

Summary

The research aimed to probe the teachers' and students' perspectives on the role, influence, and challenges of gamified mathematics instruction at School C, respectively, during the school year 2024-2025 as a basis for the Gamification-Enhanced Instructional Plan. It was the objective of this study to measure to what extent does gamification plays a role in facilitating mathematics instruction, influences the learning experience, and challenges that arise from gamified mathematics instruction from the perspectives of the teachers and students. Moreover, it was one of the aims of this empirical work to infer whether there is a significant difference in the perspective between the teachers and students as to the following comparisons on the role of gamification in facilitating mathematics instruction, the extent of influence of gamified mathematics instruction, and the degree of challenges of gamified mathematics instruction.

Findings

In response to the stated research problems and based on the statistically analyzed data, the following findings were obtained:

Extent to which Gamification plays a Role in Facilitating Mathematics Instruction. Teachers and students alike hold a highly positive view of gamified mathematics instruction, with overall responses interpreted as Strongly Agree. Teachers consistently rated its role more favorably, especially in terms of engagement and instructional enhancement, while students also agreed but with slightly more reserved ratings. Although most indicators were rated positively, students expressed moderate agreement on the ease of integrating gamification into the curriculum and on concept retention.

Extent of Influence of Gamified Mathematics Instruction. Teachers and students view gamified mathematics instruction as highly influential across various learning dimensions. Teachers rated its impact more favorably, especially in enhancing motivation, enjoyment, interaction, and engagement, while students gave slightly lower ratings, particularly in concept retention and curriculum integration. Overall, both groups share the perception that gamification enriches mathematics instruction, making it more dynamic, accessible, and effective.

Degree of Challenges of Gamified Instruction. Both teachers and students recognize the challenges of using gamified instruction in mathematics, showing that it remains difficult to apply effectively in real classroom settings. Teachers mentioned problems such as limited access to technology, expensive materials, and the need for proper training. Meanwhile, students expressed concerns about confusing tools, distractions during activities, and how much time some games take. These insights suggest that although gamification has promise, it requires careful planning, strong support, and enough resources to work well in practice.

Test of Significant Difference in the perspective between the teachers and students as to the role of gamification in facilitating mathematics instruction. There was a statistically significant difference between teachers' and students' perspectives on the role of gamification in facilitating mathematics instruction, with the computed $U = 807$, $p < .001$. Teachers had a higher mean rank than students**,** indicating that teachers perceived the role of gamification in instruction more favorably.

Test of significant difference in the perspective between the teachers and students on the extent of influence of gamified mathematics instruction. There was a statistically significant difference between teachers' and students' views on how gamification supports mathematics instruction. Teachers were found to have a more favorable perception of their role in teaching, suggesting they see greater value in using gamified strategies to enhance learning.

Test of significant difference in the perspective between the teachers and students' degree of challenges of gamified mathematics instruction. The test found a significant gap between teachers and students. Teachers and students don't face the same issues with gamification. Teachers seem to find it easier or face different kinds of challenges.

Conclusion

The study shows that both teachers and students view gamified mathematics instruction positively. They strongly agree that it enhances teaching and learning and recognize its influence on student engagement. However, both groups also find it challenging to implement, with students reporting slightly more difficulty than teachers. Statistical tests revealed significant differences in perspectives, with teachers showing more favorable views and fewer challenges. Overall, gamification is seen as a beneficial but demanding approach in mathematics instruction.

Recommendations

This study aimed to understand how teachers and students view the use of gamification in teaching mathematics, including its role, benefits, and challenges. Based on the findings, the following recommendations are made:

1. Teachers are encouraged to use gamified teaching strategies in their math lessons, as results show it can help improve student engagement and learning.

2. Math Teachers and Instructors should attend training or workshops on how to effectively apply gamification in the classroom to overcome challenges and make the most of its benefits.

3. Future Researchers are encouraged to explore other factors, like student learning styles, access to technology, or motivation, that might affect how gamification works in teaching math, and to study its long-term impact on learning.

Output of The Study

Gamification-Enhanced Instructional Plan

Rationale

Gamification has emerged as an innovative approach to improving teaching and learning in the classroom. By incorporating game elements such as points, badges, levels, and challenges into instructional delivery, educators can foster a more engaging and motivating learning environment. This approach is particularly beneficial in teaching mathematics, where students often face anxiety and low motivation.

In response to the challenges and opportunities identified in this study, this plan aims to support teachers and students in effectively integrating gamified strategies into mathematics instruction. The plan seeks to promote active participation, deepen understanding, and enhance performance by making learning more interactive and enjoyable.

Just as technology has transformed educational practices, gamification represents a pedagogical shift that aligns with the preferences and learning styles of Generation Z learners. However, successful implementation requires clear objectives, collaborative planning, and continuous evaluation. The active involvement of school leaders, teachers, and other stakeholders is essential for the sustained use of gamification in instruction.

Hence, the following instructional framework is proposed for consideration and use by interested educators.

Objectives of Gamification-Enhanced Instruction

Based on the results of the study, the researcher identified key areas where gamification can positively impact mathematics instruction. These objectives aim to address both instructional and logistical challenges while enhancing student engagement and teacher effectiveness:

- To increase student motivation and participation using gamified strategies
- To train teachers in effective gamification techniques
- To provide students with reliable internet access for gamified learning
- To use gamified strategies to manage the classroom and make learning more enjoyable and organized
- To find affordable ways to use gamified tools and platforms in schools with limited budgets
- To continuously apply gamification in lessons and evaluate its effectiveness

Scheme of Implementation

Before execution, formal approval from the DepEd Division Officials and School Heads must be secured. Implementation of this output in the identified school(s) must not proceed without the explicit approval of the relevant officials or authorities. Once approved, implementation will involve coordination with key stakeholders, including teachers, academic coordinators, and PTA representatives, to integrate gamification smoothly into existing schedules.

Monitoring and evaluation must be conducted regularly to assess the effectiveness of the activities and make necessary adjustments. Proper documentation and reporting will also be essential for sustainability and future research.

Matrix of the Output of the Study

The researcher developed this guide to support the effective use of gamification in Mathematics instruction. The Gamification-Enhanced Instruction Plan outlines key areas of concern, objectives, strategies, and expected outcomes to improve student engagement and teacher readiness. By providing a structured framework, this matrix helps educators implement gamified learning techniques smoothly and effectively in the classroom.**amification-Enhanced Instructional Plan**

Areas of Concern	Objectives	Strategies	Persons Involved	Budget	Source of Budget	Time Frame	Expected Outcome	Actual Accomplishment	Remarks
1. Role of Gamification a. Low engagement in mathematics classes	To increase student motivation and participation using gamified strategies	Integrate classroom games (e.g., point systems, leaderboards, badges) - Use platforms like Kahoot! Quizizz and Blooket	General Math Teachers Gamification Coordinators	₱2,000 per teacher for materials and subscriptions	School MOOE LGU support (if applicable)	Whole School Year	Students actively participate and show improved attitudes toward math	Whole School Year	
b. Limited teacher exposure to gamified instruction	To train teachers in effective gamification techniques	- Conduct workshop/seminar on gamified lesson planning - Share best practices from pilot teachers	School Head Math Coordinator DepEd Trainers	₱3,000 per training session	Division In-Service Training Fund School MOOE	Before the Opening of Classes (INSET Period)	Teachers gain skills and confidence in using gamification		
2. Influence of Gamified Mathematics Instruction a. Limited student internet access for gamification activities	To provide students with reliable internet access for gamified learning	-Set up designated school Wi-Fi zones for educational use -Use offline gamification resources as a backup	School IT Personnel -School Administrators	₱2,000 for internet setup and maintenance	LGU Support -Local Donations	Whole School Year	Students gain access to gamification tools and platforms for interactive learning		
b. The learning environment	To use gamified strategies to	Apply gamified techniques like	Math Teachers				Increased student engageme		

may shift from structured to chaotic.	manage the classroom and make learning more enjoyable and organized.	point systems, badges, and team-based rewards to encourage positive behavior				Whole School Year	nt and improved classroom behavior		
3. Challenges of Gamified Mathematics Instruction a. Financial Cost of Gamified Tools and Platforms	To find affordable ways to use gamified tools and platforms in schools with limited budgets.	- Prioritize use of free tools - Seek external support (PTA, LGU, NGOs)	Math Teachers School Head	prioritize free/low-cost tools	School MOOE Brigada Eskwela donations	Start of implementation and as needed	Teachers can access to cost-effective gamified tools without overspending		
Sustaining gamification practice	To continuously apply gamification in lessons and evaluate its effectiveness	- Monthly review of implementation progress - Use student and teacher feedback forms	Teachers Academic Coordinator PTA Reps	₱500 for printing evaluation tools	School MOOE	Monthly	Gamified instruction becomes part of regular classroom practice		

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To **God** be all the glory!

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