

Gamifying Theory: The Impact of Bingo Balls of Dooms on Student Motivation and Understanding in Electronic Product Quality Control (ETN 3013) at College Vocational Kluang

Noor Azyani A.Jalil, Nurul Iman Kassim, Affandi Masturi, Sa'diah Samingan and Shawal Farizan Ma'at

Abstract – *The Bingo Balls of Dooms game is an instructional innovation inspired by the “Poisoned Box” concept, designed to support teaching and learning (PdPc) in vocational settings. At College Vocational, learning is divided into theoretical and practical components. Preliminary observations during theory sessions revealed low student engagement, with frequent classroom exits under the pretext of visiting the restroom or cooperative store. This study was conducted among 28 students enrolled in the ETN 3013 course at the Electronics Technology Workshop, College Vocational Kluang. The research employed a triangulated methodology comprising observation, interviews, and document analysis. Findings showed that 25 students were able to respond accurately to questions posed by the instructor and demonstrated active participation during theory lessons. Interview data from five students indicated that the game-based approach reduced drowsiness and increased interest and focus throughout the learning process. The results suggest that diverse teaching strategies, particularly those incorporating interactive elements, can significantly enhance student motivation and attention during theoretical instruction. The Bingo Balls of Dooms game not only fosters engagement but also supports the achievement of instructional objectives with minimal material costs. In conclusion, the integration of creative, low-cost teaching tools such as Bingo Balls of Dooms has the potential to positively transform the PdPc experience in vocational education. This approach aligns with efforts to improve student-centred learning and supports the broader goal of enhancing educational outcomes in Malaysia's vocational institutions.*

Keywords – *Bingo Balls of Dooms, Student Engagement, Vocational Education, Theoretical Learning, Student Motivation, & Student Understanding*

I. INTRODUCTION

In the increasingly complex landscape of technical and vocational education, innovative and interactive teaching approaches have emerged as critical drivers in ensuring that students not only comprehend course content but also cultivate a deep and sustained interest in their chosen field. The Electronic Product Quality Control course (ETN 3013) stands as a pivotal component within the Electronic Technology programme at College

Vocational, requiring students to master both theoretical foundations and practical industrial applications.

According to the Standard Curriculum Assessment Document (Document Pentaksiran Standard Curriculum, DPSK), ETN 3013 outlines four core learning objectives: (1) identifying the requirements for electronic product quality control, (2) preparing the necessary activities for quality control implementation, (3) executing quality control procedures, and (4) reporting inspection results to supervisors. These objectives reflect the course's emphasis on aligning academic outcomes with real-world industry standards.

Despite its importance, educators often face a recurring challenge low student engagement and difficulty in sustaining interest, particularly when dealing with theory-heavy and technically dense topics. This disengagement not only hampers knowledge retention but also affects students' motivation and overall learning experience. To address this issue, there is a pressing need to explore student-centred pedagogical strategies that are both enjoyable and effective in enhancing learning outcomes.

The Bingo Balls of Dooms method was introduced as a gamified instructional technique, leveraging game-based elements to deliver course content in a more dynamic, engaging, and interactive manner. By transforming passive learning into active participation, this approach has the potential to significantly improve students' conceptual understanding and mastery of electronic product quality control.

This study was conducted to evaluate the effectiveness of the Bingo Balls of Dooms method in enhancing student interest and knowledge acquisition in ETN 3013. The primary aim is to determine the extent to which this gamified approach contributes positively to students' comprehension, motivation, and active involvement in theoretical learning sessions. The research specifically focuses on students enrolled in the Electronic Technology programme at College Vocational Kluang, where the integration of playful pedagogy is expected to bridge the gap between technical rigor and learner engagement.

Ultimately, this study seeks to contribute to the growing body of evidence supporting gamification as a transformative tool in vocational education one that not only revitalizes classroom dynamics but also aligns with 21st-century learning paradigms that emphasize creativity, collaboration, and critical thinking.

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II. PROBLEM STATEMENT

Preliminary observations conducted during the theoretical teaching and learning sessions (PdPc) of the ETN3013 course have revealed several critical issues that compromise the overall effectiveness of instructional delivery. The researcher found that students were not fully attentive, resulting in suboptimal achievement of the intended learning objectives.

One of the key contributing factors identified was the excessively long scheduling structure. For instance, the ETN3013 course is delivered over a continuous seven-hour period from 8:00 a.m. to 5:00 p.m. comprising two hours of theory and five hours of practical work. This extended duration has led to a noticeable decline in student focus, particularly during the final three hours of the PdPc session.

The peak of the problem occurs during the theory segment, where students exhibit signs of fatigue such as drowsiness, lack of attention, and frequent requests to leave the classroom for restroom or cooperative breaks. This situation directly undermines the attainment of the planned PdPc objectives and reflects a disconnect between instructional design and learner capacity.

Therefore, this issue demands immediate intervention to ensure that educators can effectively achieve learning outcomes while reigniting student interest in the course. As a strategic response, the researcher has opted to implement an action research study focused on the integration of the Bingo Balls of Dooms activity a gamified and innovative teaching approach within the PdPc framework.

This approach is not only intended to stimulate student interest and engagement but is also expected to enhance their concentration and comprehension of theoretical content. The study will evaluate the effectiveness of this activity in helping students sustain attention and achieve deeper, more meaningful learning outcomes.

III. LITERATURE REVIEW

In the increasingly complex landscape of technical and vocational education, innovative and interactive teaching approaches have emerged as critical drivers in ensuring that students not only comprehend course content but also cultivate a deep and sustained interest in their chosen field. The Electronic Product Quality Control course (ETN 3013) stands as a pivotal component within the Electronic Technology programme at College Vocational, requiring students to master both theoretical foundations and practical industrial applications.

According to the Standard Curriculum Assessment Document (Document Pentaksiran Standard Curriculum, DPSK), ETN 3013 outlines four core learning objectives: identifying the requirements for electronic product quality control, preparing the necessary activities for quality control implementation, executing quality control procedures, and reporting inspection results to supervisors. These objectives reflect the course's emphasis on aligning academic outcomes with real-world industry standards.

Despite its importance, educators often face a recurring challenge low student engagement and difficulty in sustaining interest, particularly when dealing with theory-heavy and technically dense topics. This disengagement not only hampers knowledge retention but also affects students' motivation and overall learning experience. To address this issue, there is a pressing need to explore student-centred pedagogical strategies that are both enjoyable and effective in enhancing learning outcomes.

Gamification has gained traction as a transformative pedagogical strategy in vocational and technical education, where student engagement is often challenged by abstract theoretical content. Deterding *et al.* (2011) define gamification as the use of game design elements in non-game contexts to enhance user engagement and motivation. In vocational settings, where practical application is paramount, gamified learning environments have shown promise in bridging the gap between theory and practice (Kapp, 2012). Studies by Hamari *et al.* (2014) indicate that gamification can positively influence learning outcomes, particularly when integrated with clear instructional goals and feedback mechanisms. In the context of electronics education, where learners must grasp complex technical concepts, gamification provides a playful yet structured approach to reinforce understanding.

Motivation is a key determinant of academic success, especially in vocational institutions where learners often face cognitive and emotional barriers to theoretical learning. Deci and Ryan's Self-Determination Theory (1985) highlights the importance of autonomy, competence, and relatedness in fostering intrinsic motivation. Gamified methods, such as Bingo Balls of Dooms, align with these principles by offering choice, challenge, and collaboration. Research by Dominguez *et al.* (2013) found that students exposed to gamified learning environments demonstrated higher levels of participation, persistence, and enjoyment. In Malaysian vocational colleges, similar findings have emerged, with gamified modules leading to improved attendance and reduced classroom fatigue (Zainuddin & Perera, 2018).

Theoretical components of courses like ETN 3013 (Electronic Product Quality Control) require learners to internalize abstract standards, inspection protocols, and reporting procedures. Traditional lecture-based methods often fail to sustain attention or promote deep understanding. Game-based learning, however, encourages active recall, peer interaction, and contextual application. Gee (2003) argues that games create "situated learning" environments where learners engage with content meaningfully. In the Bingo Balls of Dooms method, students respond to randomized prompts, simulate inspection tasks, and reflect on quality control principles all within a playful framework. This aligns with constructivist learning theory, which emphasizes experiential and student-centred approaches.

In Malaysia, the integration of gamification into vocational pedagogy is still emerging but shows strong potential. Studies by Norazah *et al.* (2020) and Noor *et al.* (2023) highlight those gamified interventions in College Vocational settings have led to increased student confidence, better retention of technical knowledge, and

more dynamic classroom interactions. The Bingo Balls of Dooms technique, developed as a localized adaptation of the “Poison Box” concept, reflects cultural relevance and pedagogical innovation. Its low-cost implementation and adaptability to various modules make it a viable tool for enhancing PdPc across technical subjects.

In summary, the literature supports the use of gamification particularly in vocational electronics education as a means to enhance student motivation, engagement, and conceptual understanding. The Bingo Balls of Dooms method exemplifies how playful pedagogy can transform theoretical learning into an active, meaningful experience. Its application in ETN 3013 at College Vocational Kluang contributes to a growing body of evidence that gamified strategies are not only effective but essential in modern vocational teaching. As vocational education continues to evolve, gamification offers a promising pathway to foster deeper learning, greater participation, and stronger alignment with industry-relevant competencies.

IV. METHOD

Research Design

This study adopts the Spiral Model of Action Research originally introduced by Kurt Lewin and later refined by Kemmis and McTaggart (1988). The model comprises four interrelated phases: planning, action, observation, and reflection. This approach was selected for its dynamic and iterative nature, which enables the researcher to continuously evaluate, improve, and adapt instructional strategies based on feedback and research findings.

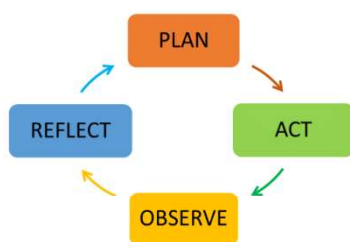


Figure 1: The Four Phases of the Kemmis & McTaggart (1988) Action Research Spiral

Each phase is interconnected within a cohesive cycle designed to systematically and effectively strengthen pedagogical practices. In the planning phase, the researcher identifies specific issues or challenges within the classroom context, formulates appropriate interventions, and prepares relevant materials and activities aligned with the learning objectives. The action phase involves implementing the intervention in a real-world setting, where students actively participate in the designed activities.

Subsequently, the observation phase is conducted to gather comprehensive data through various methods such as classroom observations, questionnaires, pre- and post-tests, and self-reflection. The data collected is then analysed during the reflection phase, which serves to

evaluate the effectiveness of the intervention, identify strengths and weaknesses of the approach, and formulate recommendations for improvement in the next research cycle.

Through this spiral methodology, the study functions not only as a tool for continuous enhancement but also as a robust foundation for elevating the quality of teaching and learning in a holistic and impactful manner.

Research Design

Upon completion of this study, it is anticipated that students enrolled in the Electronic Technology programme and undertaking the ETN 3013 course (Electronic Product Quality Control) will achieve the following objectives:

- i. To enhance students’ knowledge and understanding of key topics within the ETN 3013 course, particularly those related to electronic product quality control principles and practices.
- ii. To increase students’ interest and motivation in mastering the ETN 3013 course content, thereby fostering deeper engagement and sustained learning in the field of electronic quality assurance.

Research Sample

This study involved a total of 28 students enrolled in the ETN 3013 course, Electronic Product Quality Control. The participants were second-year students undertaking the Sijil Vocational Malaysia (SVM) programme in Electronic Technology. Overall, the academic abilities of the students in this cohort were considered satisfactory neither outstanding nor significantly weak.

Of the 28 students, 27 were of Malay ethnicity, while one student was of Indian descent. This demographic composition reflects the typical student profile within the vocational education context at College Vocational Kluang.

Research Instrument

In this study, the researcher employed a combination of observation instruments, interview protocols, and data analysis techniques. One of the key advantages of the observation instrument is its ability to capture detailed, clear, and accurate insights into the research sample. This is crucial, as the researcher must observe the participants closely in order to obtain authentic and meaningful findings.

Meanwhile, the interview protocol was used to complement and support the data gathered through observation. Among its strengths is the researcher’s ability to clarify the intent of questions or research themes directly to the participants, thereby minimizing the risk of misinterpretation and enhancing the accuracy of responses.

Implementation Of The Study

This study employs the Spiral Model of Action Research, which encompasses four core phases: planning, action, observation, and reflection. Each phase is interconnected and forms a continuous cycle aimed at systematically and effectively improving teaching practices.

Planning Phase

At the initial stage, the researcher identified key issues that hindered the effectiveness of the teaching and learning process (PdPc) for the ETN3013 course, namely the students' lack of interest and their difficulty in understanding theoretical content. Based on preliminary observations and feedback, the researcher designed an innovative intervention by introducing the Bingo Balls of Doom method as an alternative gamified teaching strategy. part of the preparation, the researcher developed appropriate teaching aids, including pop quiz questions related to quality control topics and suitable background music. The activity was structured as an interactive game designed to stimulate student engagement and enhance their understanding of theoretical concepts.

Action Phase

To carry out this study, the researcher divided the implementation process into three distinct phases: the introductory phase, the process phase, and the reinforcement phase. During the introductory phase, the researcher employed explanatory methods to introduce students to the theoretical concepts that needed to be understood. This was followed by a repetition strategy to support the development of the teaching and learning process, and subsequently, a game-based approach aimed at reinforcing students' comprehension.

The game-based method was specifically designed to strengthen students' understanding of the theoretical content through interactive and engaging activities. The duration of the study was four weeks, and in each learning session, the researcher implemented all three phases to ensure consistency and effectiveness.



Figure 2: Flowchart of the Study Implementation Process

The diagram above illustrates the progression and structure of the planned intervention phases carried out throughout the study.

Explanation Method

To implement this explanation method, the teacher will begin by delivering a comprehensive theoretical overview as an introductory phase. Once the full theory

has been explained, the teacher will highlight key components of the theory particularly those frequently assessed in continuous assessments and final examinations. This activity aims to help students focus on the teaching and learning process while reinforcing their memory of essential sections. The duration allocated for this phase is one hour.



Figure 3: Students participate in a teacher-led explanatory session.

Repetition Method

Following the explanatory phase, the teacher implements the repetition method. Students are allocated a one-hour session to reinforce their understanding by memorizing and reviewing critical theoretical elements.



Figure 4: Students engage in independent or group-based revision activities.

Game-Based Method

The next phase is the reinforcement phase, during which the researcher conducts game-based activities. This approach is intended to enhance students' understanding through reinforcement. According to Mohd Ismath, Jalil & Tg Abdul Rahman (2022), the gamification approach utilizing game elements—can stimulate and motivate its practitioners, allowing teaching to be integrated in the form of play. Gamification fosters student motivation, stimulates interest, and creates engaging experiences for participants.

At the beginning of the activity, each student is asked to draw a number that represents their identity. The teacher then places an equal set of numbered slips into a box corresponding to the numbers drawn by the students. Once everyone is ready, the teacher plays music while the box is passed around among the students. When the music stops, the student holding the box must draw a number and read it aloud. The number announced corresponds to the student who must answer a question posed by the teacher.

This game follows the concept of "Poisoned Box." The student whose number is called must respond to a pop quiz question. If the student is unable to answer, their peers are allowed to assist in providing the correct response.

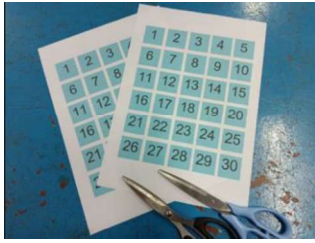


Figure 5: Distribution of Assigned Numbers to Students



Figure 6: Students Collecting Assigned Numbers from the Teacher



Figure 7: Distribution of Number Container to Students During Music Playback



Figure 8: Teacher Administering a Pop Quiz to the Student Identified by Drawn Number

Observation Phase

Throughout the implementation of the intervention, the researcher conducted a systematic observation process to collect data related to the effectiveness of the teaching methods employed. This observation aimed to provide a comprehensive overview of the intervention's impact on student engagement, level of understanding, and motivation in following the offered course. Multiple methods were utilized during the data collection process.

The research instruments included an observation checklist, through which the researcher directly assessed student engagement during the teaching sessions. Key aspects observed encompassed student-lecturer interaction, participation in learning activities, and responses to the teaching and learning materials used.

Interviews were conducted with a group of students who were directly involved in the intervention, particularly in the gamified activity "Bingo Balls of Doom." The

interview questions were designed based on the research objectives and covered areas such as students' understanding of theoretical content, the impact of the activity on their motivation and engagement, and their perceptions of the effectiveness of the teaching methods applied.

During the interview sessions, the researcher recorded participants' responses both in writing and audio format to ensure data accuracy and facilitate the analysis process. The information obtained from these interviews provided a vital qualitative dimension in evaluating the intervention's impact, complementing quantitative findings such as questionnaires and pop quizzes.

Throughout the sessions, the researcher also documented personal reflections on the implementation of the intervention as well as spontaneous responses from students. These insights offered an important qualitative perspective in understanding the real experiences of both students and lecturers during the learning process.

The entirety of the data collected through various methods formed the foundation for evaluating the effectiveness of the teaching strategies implemented. It enabled the researcher to conduct in-depth reflection and plan more impactful improvements for the subsequent phase of the action research.

Reflection Phase

Finally, the researcher conducted an analysis of the collected data to evaluate the actual impact of the intervention. This reflection process enabled the researcher to identify the strengths and weaknesses of the "Bingo Balls of Doom" approach and to formulate recommendations for improvement in the next cycle of the action research. Among the aspects refined weekly throughout the study were time management during the pop quiz activities and student attendance in the ETN 3013 class.

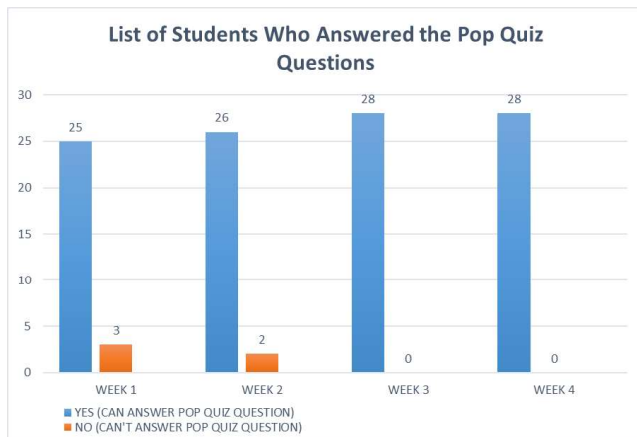
This reflection also served as a critical platform to strengthen pedagogical practices and ensure that the approach used genuinely supports the achievement of teaching and learning objectives while enhancing the students' learning experience in a holistic manner.

V. RESEARCH FINDINGS

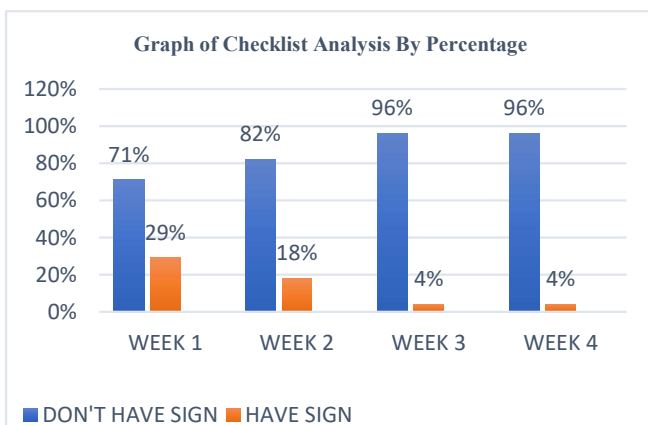
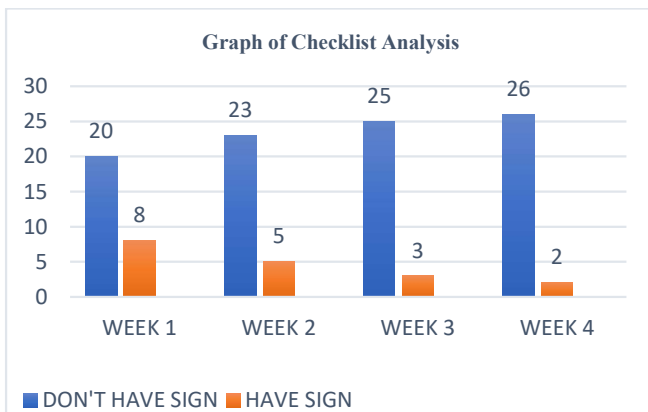
Observation Analysis

Following the implementation of the intervention, the teacher conducted a four-week observation of the students. In Week 1, 25 students successfully answered the pop quiz questions posed by the teacher, while 3 students failed to provide correct responses. In Week 2, 26 students answered accurately, whereas 2 students were unable to respond correctly. During Weeks 3 and 4, all 28 students successfully answered the pop quiz questions given by the teacher.

TABLE 1: LIST OF STUDENTS WHO ANSWERED THE POP QUIZ QUESTIONS



According to Jasmi (2012), Zamri & Nor Razah (2011), observation is the most effective method for collecting original data about the students being studied. This approach is used to identify whether the observed students exhibit the indicators outlined in the observation checklist. Based on the teacher's observations, the data obtained is presented in the graph below.



Based on the teacher's observations, approximately 71% (20 students) demonstrated 6 out of the 10 indicators outlined in the observation checklist. Meanwhile, the remaining 29% (8 students) showed only 2 or 3 indicators. Nevertheless, there has been a weekly increase in the percentage of students who demonstrated 6 out of the 10 indicators listed in the checklist.

The list of observation indicators is as follows. Furthermore, the teacher's observations revealed that students became more enthusiastic and enjoyed the teaching and learning process more. They were fully focused during lessons and showed reduced tendencies to request permission to leave the classroom for the restroom or school cooperative.

TABLE 2: OBSERVATION INSTRUMENT CHECKLIST

No.	Item	Yes	No	Notes
1	Student pays attention during the teaching and learning process.			
2	Student minimizes interruptions during the teacher's explanation.			
3	Student frequently goes to the restroom during the teacher's explanation.			
4	Student consumes sweets when feeling sleepy during lessons.			
5	Student asks questions during the teacher's explanation.			
6	Student gives brief explanations to peers when they do not understand the lesson.			
7	Student is able to answer the pop quiz questions asked by the teacher.			
8	Student appears entertained during the second round of the pop quiz.			
9	Student reviews notes before the Bingo Balls of Doom activity begins.			
10	Student shows enjoyment when music is played during the Bingo Balls of Doom activity.			

V.11 INTERVIEW ANALYSIS

According to Hua (2016), the purpose of conducting interviews is to obtain valid feedback and to record information accurately and comprehensively regarding the main instruments used. Additionally, interviews serve as a reflective data collection tool that indirectly captures the actual conditions in the field.

In this study, interviews were conducted with five students who participated directly in the intervention. The findings revealed that all five students agreed that the "Bingo Balls of Doom" method helped them stay focused and increased their interest in the ETN 3013 course. Below are excerpts from the interview analysis:

Student 1:

"I no longer feel sleepy during class, and I can concentrate on what the teacher is explaining."

Student 2:

"I feel excited when I manage to answer the pop quiz questions correctly."

Student 3:

"I like it when the teacher uses music while the number box is moving, because we all get nervous when the music stops and the box is in our hands."

Student 4:

"Previously, if class was held in the afternoon, my friends and I would usually go to the restroom or the school"

cooperative. But when the teacher uses this game, I feel it's a waste to leave the class."

Student 5:

"I understand what the teacher teaches, especially when the Bingo Balls of Doom activity is used."

VI. DISCUSSION

The implementation of the "Bingo Balls of Doom" approach in teaching and learning has shown highly encouraging results in terms of student achievement and capability. Although some students initially demonstrated low interest and limited understanding, these challenges were successfully addressed through this method. This indicates that students became more appreciative and satisfied with their learning outcomes. More importantly, the students' progress and performance in the ETN 3013 course were significantly enhanced.

This method not only helped overcome issues related to student focus during lessons but also increased their interest in the course. Findings from the four-week intervention revealed that all 28 students were able to answer the pop quiz questions posed by the teacher. Additionally, 23 students exhibited observable indicators from the observation checklist, with most showing at least 6 out of the 10 listed traits. These results suggest that the "Bingo Balls of Doom" technique is a viable and effective teaching strategy for both educators and learners.

Moreover, the application of this method is not limited to the ETN 3013 course alone. Teachers are encouraged to be more innovative and creative in adapting this approach across various subjects. The method is cost-effective and easy to implement, making it accessible to educators. It is hoped that this strategy will make classroom teaching and learning more engaging and manageable. This is especially relevant to the current and future generation of students, who require simplified yet impactful teaching methods that do not compromise core learning objectives.

In conclusion, the "Bingo Balls of Doom" method has successfully introduced a new way for students to stay focused and increase their interest, particularly in the ETN 3013 course. Therefore, this approach can be applied across other theory-based courses. With this method, teaching and learning in the classroom can become more dynamic, enjoyable, and effective.

VII. CONCLUSION

The integration of the Bingo Balls of Doom method into the ETN 3013 course has demonstrated significant potential in improving students' comprehension and motivation. ETN 3013, which encompasses both theoretical and practical components, allocates 3 hours for theory and 5 hours for hands-on learning. The method itself is rooted in game-based learning principles, offering a dynamic and interactive approach to classroom instruction.

As highlighted by Mohamad (2023), game-based learning is a highly effective pedagogical strategy. It not

only boosts student motivation but also cultivates an engaging and enjoyable learning environment. This approach accelerates the learning process, fosters positive peer interaction, and enhances problem-solving skills and task engagement.

The four-week implementation of the Bingo Balls of Doom method yielded promising results. All 28 students successfully answered the pop quiz questions administered during the intervention. Furthermore, 23 students exhibited observable indicators from the structured observation checklist, with most demonstrating at least 6 out of the 10 targeted behaviours. These findings affirm the method's effectiveness in promoting active participation and cognitive engagement.

Importantly, the method's simplicity and low-cost nature make it highly accessible to educators. It requires minimal materials, swift preparation, and can be adapted creatively across various subjects. While the current study focused on ETN 3013 (Quality Control of Electronic Products), the method holds potential for broader application in other theory-based courses.

In conclusion, the Bingo Balls of Doom method offers a refreshing and impactful alternative to traditional teaching strategies. It empowers students to focus, engage, and enjoy the learning process transforming classroom dynamics and aligning with the evolving needs of today's learners. With thoughtful adaptation, this method can serve as a valuable tool for educators seeking to elevate instructional quality and student outcomes.

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