

TECHNOLOGICAL UNIVERSITY OF THE PHILIPPINES  
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Gamification of Education  
using Multi-Armed Bandit Algorithm

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## INTRODUCTION

This research is driven by the goal of enhancing the educational experience through integration of the Decision Tree Thompson Sampling (DTTS) algorithm into gamified content. Gamified education emerges as a promising avenue to reshape the way we approach teaching and learning. The study focuses on evaluating the algorithm's effectiveness in personalized learning, understanding student satisfaction, and enjoyment, and exploring its adaptability across diverse subjects. The research aims to provide valuable insights into the various impacts of DTTS on students' educational journeys. This research on gamification in education, specifically employing the Decision Tree Thompson Sampling (DTTS) algorithm, holds significance in several key dimensions. This approach helps in transforming traditional teaching methodologies, increasing student participation and interest. Traditional lectures often fail to sustain student interest, making it crucial to explore alternative approaches that can enhance learning experiences. This shift towards a more engaging, personalized, and inclusive environment marks a positive step forward in overcoming the complex challenges faced by educational institutions and educators. The study is purposefully limited in scope to ensure clarity and coherence in its objectives.

## **METHOD**

The study aims to assess the effectiveness and adaptability of the ALGE-BRUH webgame in providing personalized educational content. The study will use the Multi-Armed Bandit (MAB) and the DTTS (Dynamic Time-Triggered Switching) Algorithm to enhance learning experience. The data collection approach for this study will be divided into two phases, each of which is intended to capture both user information and evaluations comprehensively. The project design, development, operating and testing, and evaluation process of the system methods will be discussed. The ALGE-BRUH webgame leverages real-time user data to inform the DTTS algorithm, which personalizes the learning experience. The MAB Algorithm optimizes the selection of learning content and activities based on students' performance metrics. The study focuses on evaluating the algorithm's effectiveness in personalized learning, understanding student satisfaction, and enjoyment, and exploring its adaptability across diverse subjects. The research will move into the second phase, which involves collecting user data and developing a blueprint for the new system. The Multi-Armed Bandit Algorithm centers on efficient user data collection and analysis. It utilized gamification in education to enhance learning experiences. This combined approach fosters efficient and interactive learning environments, particularly beneficial for complex educational systems and real-time applications. The selection of the new system's concept and performance will be predicated upon the insights derived from this research endeavor. The development of the system's concepts will be based on the insights from the research. The system will be available for download in the next few months.

## RESULTS

The ALGE-BRUH webgame demonstrates strong performance, effective design, robust functionality, and positive user experience. The ability to manage extensive data and offer real-time analytics further enhances the functionality, making the webgame a comprehensive tool for monitoring and assessment. The system has the following limitations: By providing continuous feedback, the system aims to foster academic excellence and support student success. It is highly dependent on a steady internet connection, which could be a limitation in areas with inadequate internet infrastructure. The ALGE-BRUH webgame is designed to enhance learning outcomes and support academic achievement in Grade 10 algebra. The system allows students to track their progress through detailed statistics, including the number of correct and incorrect answers, time taken to answer questions, and more. Firebase is utilized for database management and webhosting, ensuring the web game is accessible online. While not explicitly mentioned, teachers can potentially use the data to tailor their instruction strategies. The majority of students reported that the game helped improve their grades. The personalized approach is expected to significantly enhance students' understanding and performance in algebra. This method aims to eliminate bias and enhance the representativeness of the sample. The detailed statistics and adaptive learning paths aim to improve their understanding and retention of algebra concepts. The system offers tools for students to monitor their individual progress. The engagement and enjoyment derived from the game likely contribute to higher motivation and sustained interest in learning. The ability to offer real-time analytics further enhances its performance by allowing continuous monitoring and adaptive responses.

## DISCUSSION

60% of the students strongly agreed that the game could be valuable for their learning. 62.22% strongly believed that playing the game would help improve their problem-solving abilities. A noteworthy 64.44% would be willing to play the game again because of its educational value. The game was perceived as valuable and useful for learning, particularly in enhancing math skills, problem-solving abilities, and overall academic performance. The results suggest that the gamification approach, using the Multi-Armed Bandit Vulnerability Algorithm, was effective in creating an engaging, enjoyable, and educational experience. % of the respondents 53.33% 28.89% 11.11% 4.44% 2.22% 2.44% 4.44%. 51.11% felt they did well compared to other students, and 55.56% felt competent after playing the game for a while. 51.11%. 51.11% felt that they did better than other students compared to others in the class. 55.55% felt more competent than others after playing for a long time.