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*Research Article*

# QuickStat: Empowering Statistical Understanding Through Interactive Games

Nurazmina Azman[1*], Siti Fadzilah Mat Noor[1], Hazura Mohamed[1], Abdullatif Saleh Alfaqiri[2]

[1]*Faculty of Information Science & Technology, National University of Malaysia, Selangor, Malaysia; azminaazmn@gmail.com, fadzilah@ukm.edu.my, hazura.mohamed@ukm.edu.my*
[2]*Department of Computer Science and Information Technology, Applied College, Taibah University, Saudi Arabia; afaqiri@taibahu.edu.sa*

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* *corresponding author*

**Abstract**

With the rapidly growing world of technology in this era, the gaming field has driven education to engage students with new learning approaches. Statistics is a subject that requires a high level of understanding, and there are various topics, such as hypothesis testing. Hypothesis testing is a form of statistical inference and a tool that uses data from a sample to conclude a population parameter or a population probability distribution, and can be used to test whether a hypothesis, primarily a derived hypothesis, is true or false. Nevertheless, students find statistical hypothesis testing topics very difficult to understand, and previous research shows that many students in the university experience poor performance in the statistics subject. This problem is caused by an inadequate environment, a lack of interest in calculation-related subjects, and the traditional teaching method used by the faculty. Therefore, the Application of Statistical Hypothesis Testing Learning Based Gamification (QuickStat) is developed to stimulate student interest and motivation, improve comprehension, and create an interactive learning environment among Faculty of Information Science and Technology (FIST) students at Universiti Kebangsaan Malaysia (UKM) and students from different institutions that take Statistics subject. This project aims to develop and test the application of a statistical learning-based game under a hypothesis testing topic. The development of this application will apply multimedia elements such as texts, graphics, audio, videos, and animations, which will be developed using Agile methodology. Usability testing was conducted on 30 users of FTSM students, UKM, including first-year, second-year, third-year, and fourth-year students. The test results show that many users accept the QuickStat application.

**Keywords:** educational games, gamification, hypothesis testing, multimedia, statistics.

## INTRODUCTION

Due to the rapid advancement of technology, the digital games sector is growing and experiencing widespread popularity. While game applications are viewed as entertainment, digital games with teaching and learning concepts have also seen a significant trend in this current era. Digital Game-Based Learning (DGBL) is a dynamic learning process that integrates games and student motivation, which has proven more effective than the conventional learning method (Chung & Chang, 2017; Putra & Iqbal, 2016).

DGBL is effective and used across all the education tiers, including primary school, secondary school, and university. Moreover, game applications tailored for certain academic courses are also increasingly being developed to enhance user engagement and ensure learning topic mastery (Zakaria et al., 2020).

Mathematics and Programming stand out as popular courses for digital educational games (Erickson, 2015; Byun & Joung, 2018). Mathematics, encompassing the science of numbers, shapes, and statistics, is one of Applied Mathematics' main branches. Statistics involves collecting, processing, analysing, interpreting, and presenting data. Statistics courses have commenced since school and then progressed to a higher level for writing theses and academic papers. Hypothesis testing is also one of the topics learned in the Statistics curriculum, serving as the basic concept for the Data Analysis course.

## PROBLEM STATEMENT

However, in recent times, there has been a noteworthy decline in university students' performance in the Statistics course. This problem may occur due to an inappropriate learning environment, interest factors, and less engaging instructional methods (Mahlan et al., 2022). Numerous researchers have looked into the relationship between students' performance in advanced mathematics at the university level and their grades in mathematics from the Sijil Pelajaran Malaysia (SPM). According to the findings, having a strong mathematical foundation from secondary school has a major impact on performance in higher education (Nor et al. 2019).

In addition, students also find that the Statistics course, especially the hypothesis testing topic, is quite difficult to understand and master. Conventional learning solely guided by books fails to attract students' interest and causes a stiff and boring learning experience. Many students often struggle to remember the concepts learned in class due to a lack of interest in Mathematics (Little, 2009). Unfortunately, this issue will persist if students must enrol in the Data Analysis course since hypothesis testing serves as the basic principle of the course.

Furthermore, as of the first quarter of 2022, gaming apps have accounted for 13.66% of the most popular and most downloaded app category on the App Store. Meanwhile, in terms of education, this application category has contributed as much as 9.68% and is in third place (Ceci, 2022). Most learning games in mathematics education focus on algebra, numbers and operations, geometry, data analysis and probability, and measurement (Byun & Joung, 2018). Additional topics for game-based learning in Mathematics are combinatorics, probability, functions, and number systems. However, if this value is seen in more depth and detail, digital games for hypothesis testing topics in the Statistics course are not widely available in the market.

Therefore, the Application of Statistical Hypothesis Testing Learning-Based Gamification (QuickStat) was developed to create a more interesting and fun learning process. This quiz-based game application integrates rewards and motivation mechanisms for students enrolled in the Statistics course. The inspiration for this digital game has been derived from the Focus Plant. This Pomodoro application combines the concept of gamification and a timer to encourage users to be more productive, disciplined and focused on the current task. Leveraging digital games can foster students' motivation and interest in learning and improving academic performance (Alsawaier, 2018; Ghafar et al., 2023).

## RESEARCH OBJECTIVES

There are two main objectives of the study:

1. To develop a statistical learning game application that covers hypothesis testing topics.
2. To test the statistical learning game application on the topic of hypothesis testing.

## LITERATURE REVIEW

### Digital Games

Based on the Second Edition of *Dewan Bahasa Melayu* dictionary, a game is an activity or entity to play. Meanwhile, in English, games are user interactions with digital devices. Digital games are often played through digital technology, either online or stand-alone. Game applications attract students' attention successfully since they can be used on diverse platforms such as tablets, smartphones, and computers (Said et al., 2018). Digital games can be categorized into several types according to the device or platform used. Among them are arcade, computer, and mobile games.

Games are not only used as entertainment and hobbies but can also be implemented in the learning process to improve the intellectual and creative abilities of the players (Sukri & Sadimon, 2017). This aligns with the increasingly rapid technology and education development from conventional approaches to more effective digital games. Indirectly, digital educational games educate players, especially students, about problem-solving and decision-making skills through challenging and interesting methods.

### Gamification in Learning

Gamification can be defined as the application of design elements and game principles in a non-game context (Deterding et al., 2011). Education, business, and corporate training are examples of areas that use the concept of gamification. The concept of gamification also involves elements of game mechanics such as a points system, achievement badges, difficulty levels, rewards, and achievements. Learning methods that involve the gamification concept will make the process of teaching and learning (PdP) more interactive, effective, and enjoyable. Through this method, learning is not solely based on the teacher but on learning that provides an engaging and enriching experience (Zaini et al., 2020). This is because game applications have implemented game mechanics such as rewards and rules that can stimulate students' motivation and desire to continue playing (Barata et al., 2013).

In a study by Ali et al. (2021), students' responses after using gamification materials for the topic of complex numbers were at a high level. The study's findings are supported by Rambely and Sahabuddin (2014), who stated that using the gamification concept in learning can help students remember and understand the lessons better, thus increasing student achievement scores. In addition, according to Adi Syahid (2022), research also shows that students are more interested in learning and accepting the implementation of gamification in teaching and learning. Table 1 shows the elements of competition and scoring used in gamification to increase student engagement.

Implementing game elements in an online educational environment can significantly improve learning outcomes (Denny et al., 2018). With the correct integration of gamification in the learning system, a positive impact on the learning process can be achieved, such as higher satisfaction, motivation, and greater student engagement (Urh et al., 2015). Also, e-learning education systems can benefit from gamification approaches in different ways. The concept of gamification can help educators strengthen and improve the educational process and make learning more informative and instructive (Lampropoulos et al., 2022).

**Technology in Statistics and Probability Learning**

All higher institutions have a structured learning syllabus for the Mathematics course, which is taught to all students. Similarly, students at the Faculty of Information Science and Technology (FTSM) at UKM must enrol in the Statistics and Probability course, in which one of the topics is hypothesis testing. Hypothesis testing is a statistical tool that measures the truth probability of the tested hypothesis and verifies the validity of the hypothesis obtained. Statistical hypothesis testing includes four subtopics as follows:

1. Introductory subtopics that explain concepts such as hypothesis testing, rejection region and acceptance region, types of error, significance levels, statistical tests, and p-values to students.
2. The hypothesis testing subtopic of the mean (known standard deviation) introduces traditional methods/critical value methods, and p-value methods for conducting hypothesis tests.
3. The subtopic of hypothesis testing for the mean (unknown standard deviation) also introduces the same approach but uses the t-distribution.
4. The last subtopic is hypothesis testing related to proportions.

**Table 1:** Competition and scoring elements in gamification

| No | Elements | Description |
|---|---|---|
| 1 | Points | The basic elements that students acquire after completing certain tasks. |
| 2 | Levels | Used in the system to map student progress. |
| 3 | Badges | Represents student achievement. For example, successfully reaching a new level or completing a challenge. |
| 4 | Rewards | For example, students are awarded prizes, benefits, and mystery boxes for successfully completing game challenges. |
| 5 | Progress Bar | Used to describe student progress in a lesson or an entire course. |
| 6 | Leaderboards | A high score list that ranks students based on their relative achievement. |
| 7 | Avatars | Icons or images chosen by students to represent themselves in the learning environment. |
| 8 | Stories | Used in courses to create game-like scenarios. |
| 9 | Goals | Used in systems to add purpose, direction, and measurable results. |
| 10 | Rules | Instructions in the system to limit student actions. |
| 11 | Challenges | Challenges are given to students from time to time to test their knowledge and track their progress. |

Various learning approaches can be implemented during the teaching and learning (PdP) process to attract students. In a study conducted by Ali et al. (2021), the effectiveness of conventional teaching materials and gamification in education has been measured. Based on the study, students prefer mathematics teaching materials that use gamification concepts and multimedia elements over conventional methods. The study results also show that students in the treatment group agree that game applications with good functionality can improve students' understanding and achievement in the Mathematics course.

The mathematics learning process will be more interesting if computing and multimedia elements are utilized compared to passive traditional learning, which tends to bore students and diminish their interest (Rahayuningrum, 2012). Using the right approach, students can improve their way of thinking through technology (Muhamad et al., 2018). Conventional teaching combined with technology can also produce a Mathematical learning process that has a more positive and effective impact (Hanus & Fox, 2018). Therefore, the use of technology in the Mathematics learning process should be considered because this

approach can make students more proactive, improve students' understanding, and cognitive level in problem-solving, especially for Mathematics topics (Che Abd Aziz et al., 2021; Ferryka, 2018; Rahardja, 2019).

Several criteria help improve the development of the QuickStat Application. Among the aspects that can be highlighted are platforms where players can access game applications via the web using devices such as computers, mobile phones, and tablets. The interface design should also be improved by diversifying multimedia elements so that the system looks more attractive, intuitive, and easy to use. Regarding game components, this study applies the concept of avatars, badges, leaderboards, levels, and points. In addition, elements of challenges, competition, feedback, rewards, and win/lose states in the game mechanics are also used to encourage user actions further. This study has developed a hypothesis testing game that uses a reward approach. Games that apply the reward concept and awareness of endangered animals in Malaysia can stimulate a person's dopamine hormone when rewarded for certain actions, and students begin to associate learning with positive emotions (Zaini et al., 2019; Zolkipli et al., 2023). Finally, the game application (QuickStat) that was developed can provide a meaningful gamification experience to the players to improve their understanding of the hypothesis testing topic through an interactive, comfortable, and relaxing game environment.

### QuickStat Application

The QuickStat application is a statistical hypothesis testing learning application that applies the concept of gamification. This application has been developed using several software applications, including Sublime Text, phpMyAdmin, XAMPP, Adobe Photoshop, and FileZilla. The main software used to develop this application is Sublime Text, which uses HTML, CSS, JavaScript, and PHP programming languages. phpMyAdmin software serves as a database to store user data, achievements, game levels, and rewards, while XAMPP is used to test web applications developed on web servers. In addition, all the backgrounds and icons in this application have been edited using Adobe Photoshop.

## METHODOLOGY

This study includes requirements analysis, conceptual model design, application development, usability testing, and results. Methodology explains the methods to overcome the identified problems and the research process.

### Requirements Analysis

In developing an application, user needs are important to achieve the specifications as expected. Four methods are used to obtain information on user needs in this study, namely literature review, interviews with stakeholders, prototypes, and questionnaires. The first method to obtain information on user needs is based on a literature review that has been carried out. Three existing game applications have been compared, among which are the NHS Tic-Tac-Toe application, Interpreting Inferential Statistics, and Kahoot. These three systems use multimedia-based concepts, game components, game mechanics, and meaningful gamification. However, this system is not a reward-based game system and does not have the feature of watching learning videos. The developed game application uses a reward approach and adds video learning features of statistical hypothesis testing to solve the weaknesses that have been stated. In addition, this study has also improved the game interface by diversifying multimedia elements, applying game components such as characters, badges, scoreboards, game levels, and points, as well as adding elements of challenge, competition, feedback, rewards, and winning statements/loss as a game mechanic.

Interview sessions are also conducted with stakeholders to confirm that the set of requirements of the developed game application is complete, consistent, and correct. One stakeholder is a lecturer with more than 20 years of experience teaching Statistics courses. Prototyping techniques were used to ensure that the requirements met the overall objectives of the system and all stakeholder requirements. In this validation technique, a system prototype is presented to the stakeholders. Stakeholders experiment with the presented model and check whether it meets the needs of end users. Based on the verification process, the stakeholders suggested diversifying the game quiz question format. The questions can guide students in identifying the suitability of the hypothesis test type that needs to be used.

In addition to obtaining requirements from stakeholders, a questionnaire study with 30 university students was also conducted to obtain additional requirements. The analysis results show that most respondents (100.0%) agree to use a Gamification-Based Statistical Hypothesis Testing Learning Application that contains multimedia elements and rewards. The teaching and learning (PdP) process will be more interesting if multimedia materials help students learn statistics better.

**Conceptual Model Design of QuickStat Applications**

According to Robinson et al. (2015), a conceptual model represents a system that explains how users interact with components/modules in an application. Figure 1 shows the conceptual model of applying statistical hypothesis testing to learning-based Gamification (QuickStat). Based on the conceptual model in Figure 1, the student will use the QuickStat application through web application technology as the end user.

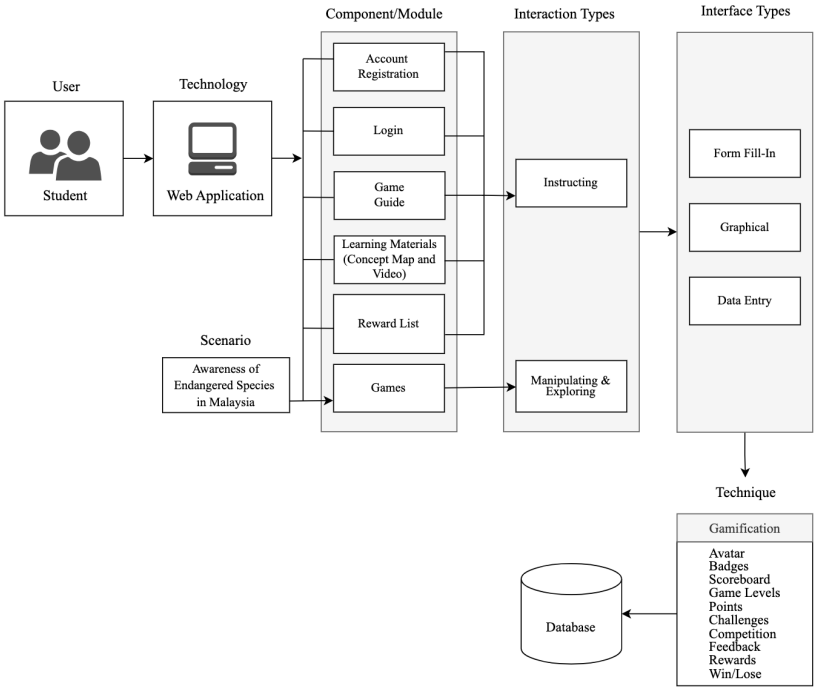


**Figure 1:** Conceptual model of QuickStat applications

This application has six components/modules: the account registration module, login, game guide, learning material, reward list, and game. This conceptual model has used the concept of a gamification environment and the theme of awareness about endangered animals in Malaysia as a reward. Each level of the game has quiz questions related to the hypothesis-testing topic and the mission to save endangered

animals. If the user successfully passes each level of the game, a reward will be given at the end of the game. The game elements applied are avatars, badges, scoreboards, game levels, points, challenges, competition, feedback, rewards, and win/loss statements. Data about users, game levels, achievements, and rewards have also been stored in the database. For the front-page interface, as depicted in Figure 2, various components are used, namely "Sign Up", "Login", and "Game Rules" buttons, and 2D images are used to create the background. As shown in Figure 3, various components are used in the interface development process. Among them are "Learning Materials", "Games", and "Rewards" buttons, and 2D images are used to create backgrounds.

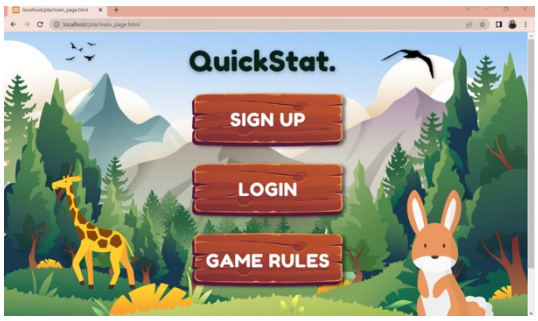


**Figure 2:** Front-page interface

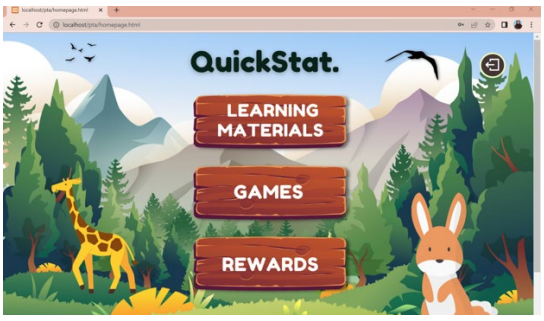


**Figure 3:** Homepage interface

The main components used for the learning material interface shown in Figure 4 are concept maps and learning material videos.

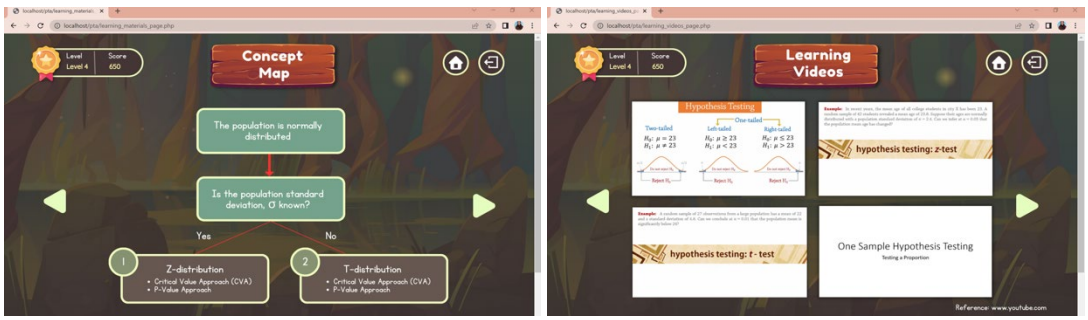


**Figure 4:** Learning materials interface

As shown in Figure 5, four game levels use various components in the development process of this interface.

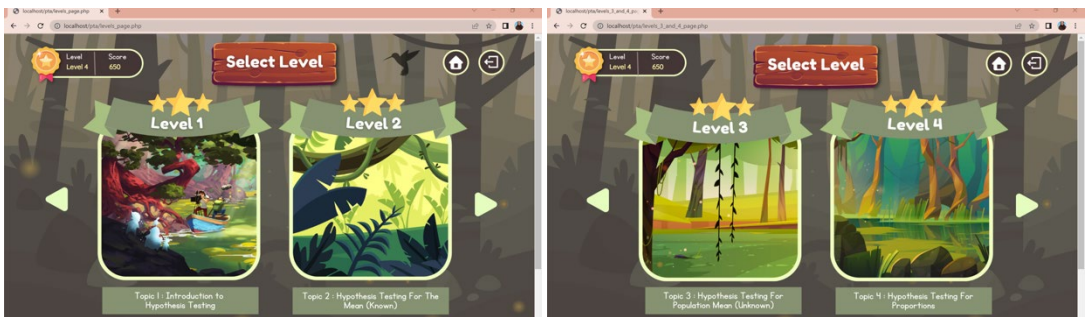


**Figure 5:** Game levels interface

For the first level, shown in Figure 6, an objective question format or Multiple-Choice Question (MCQ) and a button component have allowed users to choose the correct answer according to the given answer options. For the second, third, and fourth levels shown in Figure 7, the question format is subjective, and the text field component allows users to fill in the answers.

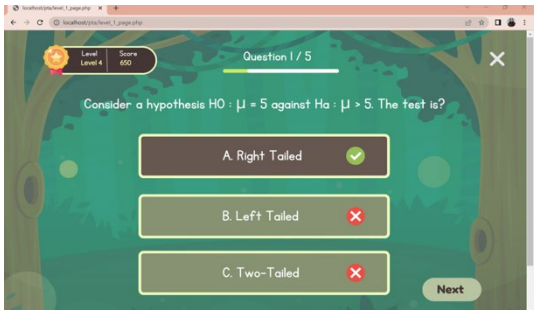


**Figure 6:** Level 1 question interface

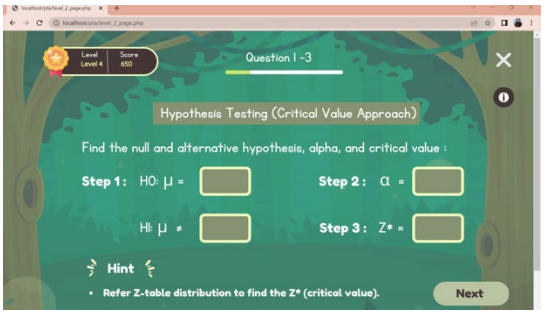


**Figure 7:** Level 2 question interface

At the end of the game, the user can also view the score feedback and victory status, as shown in Figure 8. If the user presses the "Result" button in Figure 9, the system will display the podium for the three best players. Figure 9 is the podium interface design.


**Figure 8:** Quiz Feedback Interface

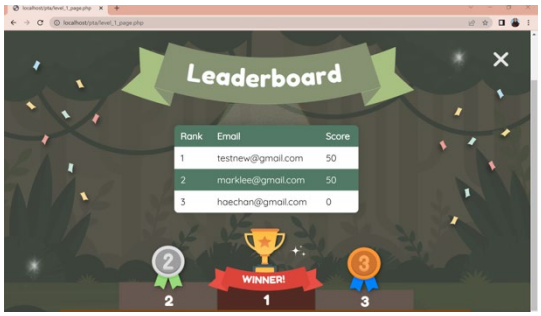


**Figure 9:** Podium Interface

For the development process of the reward module, 2D graphics of endangered animals are used to produce the reward interface, as shown in Figure 10. To get all the rewards, users need to answer the game quiz from the first level to the fourth level.


**Figure 10:** Rewards Module Interface

## USABILITY TESTING

Usability testing is a final process carried out by the user within a set time to ensure that the developed application can function properly according to the user's needs. This testing method is important to ensure development objectives are achieved and user criteria are met. This usability testing was conducted online, and a questionnaire was distributed to 30 university students. The questionnaire has seven sections, including respondents' demographics, usability level, ease of understanding level, satisfaction level, usage level, aesthetics level, and opinion about the developed application. The questions in this questionnaire were adapted from Lund (2001). This testing process was also conducted to get user feedback and identify the QuickStat Application's weaknesses.

Respondents' responses are based on their level of agreement with all items following a five-point Likert scale as follows: 1 - Strongly Disagree, 2 – Disagree, 3 – Somewhat Agree, 4 – Agree and 5 – Strongly Agree. Then, the data obtained was analysed through descriptive statistics using the mean score from the entire data. Table 2 explains the mean score interpretation scale table (Jamil, 2002).

**Table 2:** Means score and its interpretation

| Mean Score | Interpretation |
|---|---|
| 1.00 – 2.32 | Low |
| 2.33 – 3.65 | Moderate |
| 3.66 – 5.00 | High |

Table 3 explains the findings based on the respondents' evaluation of the usability of the developed learning application. The overall mean of the items shows a high score level (mean = 4.54). Out of five items representing aspects of usability, only the item "This application can give me a good understanding" reached a mean score of 4.37. This shows that this QuickStat Application meets the usability characteristics based on the outlined items.

**Table 3:** Usability

| No | Item | Mean |
|---|---|---|
| 1 | This learning application is very useful in the learning process of hypothesis testing. | 4.47 |
| 2 | This application can give me a good understanding. | 4.37 |
| 3 | Quizzes in this application help in checking the level of learning. | 4.60 |
| 4 | I feel confident using this app. | 4.63 |
| 5 | I found the various functions in this application to be well integrated. | 4.63 |
| | Overall mean | 4.54 |

Table 4 explains the findings based on the respondents' evaluation of the ease of understanding level of the developed learning application. The mean shows a high score level (mean = 4.57). Likewise, the mean of each item from the easy-to-understand aspect shows a high score level (Mean > 3.66). The analysis results agree that this application is easy to understand based on the outlined items.

**Table 4:** Ease of understanding

| No | Item | Mean |
|---|---|---|
| 1 | I can use this app easily without any written guide. | 4.63 |
| 2 | The content on the application is clear and easy to read. | 4.60 |
| 3 | I find this app easy to use. | 4.57 |
| 4 | It doesn't take many steps to achieve what I want to do with it. | 4.47 |
| 5 | I can easily interpret or understand the displayed information and output. | 4.57 |
| | Overall mean | 4.57 |

Table 5 shows the findings obtained based on the evaluation of user satisfaction with the developed learning application. The overall average for the aspect of user satisfaction shows a high score level (mean = 4.53). The mean of each item's level of user satisfaction also shows a high score level (Mean > 3.66). The analysis results agree that the respondents are satisfied with the learning application built based on the outlined user needs.

**Table 5:** Satisfaction

| No | Item | Mean |
|---|---|---|
| 1 | I am satisfied with this application. | 4.30 |
| 2 | The app works as I expected. | 4.63 |
| 3 | I feel this app is interactive. | 4.57 |
| 4 | I feel great while using this app. | 4.57 |
| 5 | I will recommend this app to friends. | 4.60 |
| | Overall mean | 4.53 |

Table 6 explains the findings based on the respondents' evaluation of the usage level of the developed learning application. The overall mean of the items indicates a high score level (mean = 4.55). This explains that the respondents agree with the use of the QuickStat Application based on the items that have been outlined.

**Table 6:** Usage

| No | Item | Mean |
|---|---|---|
| 1 | I can improve my learning performance by using this application. | 4.57 |
| 2 | I can improve the effectiveness of the learning process by using this application. | 4.47 |
| 3 | I can improve productivity when using this app. | 4.57 |
| 4 | I find it easy to learn when using this application. | 4.53 |
| 5 | I feel this application is very useful in learning statistics. | 4.60 |
| | Overall mean | 4.55 |

Table 7 explains the findings based on the respondent's evaluation of the aesthetic level of the developed learning application. The mean shows a high score level (mean = 4.64). Likewise, the mean of each item from the aesthetic aspect shows a high score level (mean > 3.66). The analysis results agree that this application has a user-friendly interface based on the outlined items.

**Table 7:** Aesthetics

| No | Item | Mean |
|---|---|---|
| 1 | The face design of this application looks attractive. | 4.70 |
| 2 | The colours used in this application are appropriate. | 4.53 |
| 3 | I am satisfied with the icons and images used in this application. | 4.70 |
| 4 | I can read the application text clearly and easily. | 4.63 |
| 5 | I like the 2D graphics shown in this app. | 4.63 |
| | Overall mean | 4.64 |

Based on the analysis of the mean score for all five aspects and the interpretation of the mean score at a high level, the QuickStat application has good usability characteristics. However, respondents still suggested that this learning application needs to be improved in several ways. Figure 11 is a screenshot of improvement suggestions obtained from the users. Several suggestions for improvement have been made, including adding a dashboard feature for the past score sub-module, a live quiz feature, more quiz questions and notes, and quizzes for other topics.

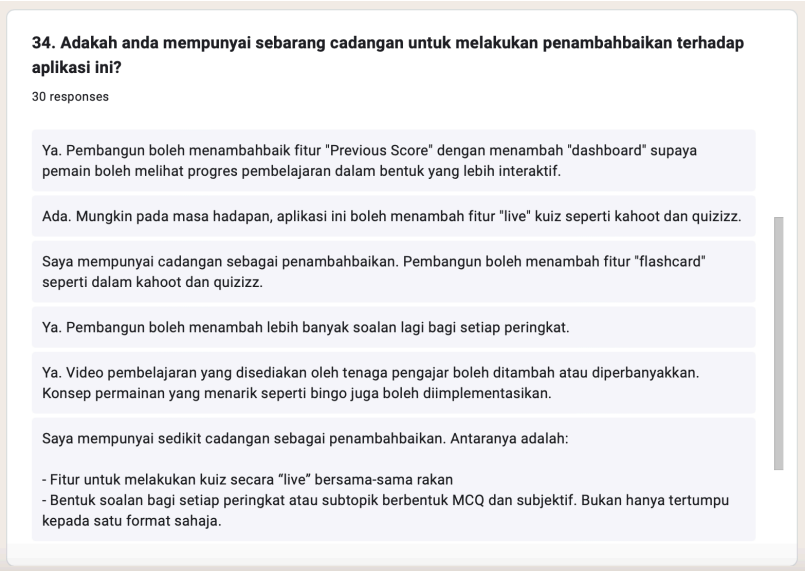


**Figure 11:** Suggested improvements

## DISCUSSION

The comprehensive analysis obtained from the questionnaire for the usability test shows a positive acceptance of the Application of Statistical Hypothesis Testing Learning Based Gamification (QuickStat) among most respondents. The study's findings indicated that the level of usability, ease of understanding, satisfaction, usage, and aesthetics of the developed application was at a high score level (mean > 3.66). Usability is a pivotal part of the research as it observes how easily users can interact with the learning application. According to the results, the items' overall mean (mean = 4.54) demonstrates a high score level and satisfies the usability requirements based on the listed items.

Meanwhile, the ease of understanding was evaluated to observe how quickly users could learn to use the application without prior instruction. The results showed that the mean has a high score level (mean =

4.57), and the analysis results agree that this application is easy to understand based on the outlined items. The aspect of user satisfaction was also measured through a questionnaire. The analysis results agree that the respondents are satisfied with the learning application built based on the outlined user needs with a high score level (mean = 4.53).

In terms of usage, this aspect was analysed to understand user engagement with the developed application. The overall mean of the items indicated a high score level (mean = 4.55), and the majority of the respondents agreed with the use of the QuickStat Application based on the items that have been outlined. The final aspect, aesthetics, plays a significant role in balancing the application interfaces' visual simplicity. Results indicated that this application has a user-friendly interface based on the outlined items with a high score level (mean = 4.64).
This shows how the QuickStat application can improve students' interest in a hypothesis-testing topic. Tangkui and Keong (2020) state that a game-based learning strategy can encourage students to participate in their learning and expand their knowledge actively. Prior research by Siong and Osman (2018) confirms the findings of this study, indicating that educational games motivate students to improve their academic performance while creating healthy competition in the learning process and assisting students in reaching their full potential.

In addition, the study by Yang (2015) proves that digital games frequently emphasize collaborative, active learning. Most designs are based on social constructivism, encouraging complex and critical thinking to find meaningful solutions. As a result, implementing constructivism theory into the teaching and learning process, particularly in Mathematics, is crucial for increasing students' interest in learning, stimulating critical thinking, and promoting lifelong learning.

## CONCLUSION

In summary, the study results show that the developed learning application can have a positive impact, especially on university students, compared to the conventional learning methods. Hence, with the developed application, the system features met the user needs to attract students' interest and improve their understanding of the hypothesis testing concept.

Two objectives were achieved: to develop and test the application of statistics learning games in the hypothesis testing topic. Through these objectives, this learning application was developed to allow the students to improve understanding through an interactive gamification approach and relaxed learning. The second objective, which is to test the Statistics learning games application in the hypothesis testing topic and usability testing, is conducted to assess the demographics of the respondents, the level of usability, ease of understanding, satisfaction, usage, aesthetics, and respondents' opinion about the developed application. Based on the tests conducted, students prefer using electronic learning because it is more fun, easier, and has flexibility in terms of place and time. In addition, this learning application is also effective because it helps students to improve their understanding of statistical hypothesis testing topics. Therefore, this Application of Statistical Hypothesis Testing Learning-Based Gamification (QuickStat) can positively affect university students and achieve the research objectives.

## ACKNOWLEDGMENTS

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## CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

## AUTHOR CONTRIBUTIONS

**Nurazmina Azman**: Conceptualization, Data curation, Original draft preparation, Visualisation, Investigation. **Siti Fadzilah Mat Noor**: Supervision, Writing- Reviewing and Editing. **Hazura Mohamed**: Writing- Reviewing and Editing. **Abdullatif Saleh Alfaqiri**: Writing- Reviewing and Editing.

## DECLARATION OF GENERATIVE AI

During the preparation of this work, the authors used ChatGPT to enhance the clarity of the writing. After using ChatGPT, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

## DATA AVAILABILITY STATEMENT

Data available on request from the authors.

## REFERENCES


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