**South East Asian Institute of Technology, Inc**
College of Information and Communication Technology
Crossing Rubber, Tupi, South Cotabato

A Research Project on

# QuizFi: A Quiz–Based Internet Access Vending Reward System to Develop Internet Accessibility and Academic Engagement at South East Asian Institute of Technology Inc.

As partial requirement for the Subject

**IT ELEC 4**

**Advanced Human Computer Interaction 2**

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# 1.0 INTRODUCTION

## 1.1 Background and Context

Human–Computer Interaction, is a field of research and development between the humanities and computer science that attempts to comprehend the ways in which people use computers. Usability science and technology incorporates concepts from design, psychology, cognitive science, and computer science to create our technology as helpful and usable as possible. All these HCI developments have made technology much more intuitive and accessible to users, particularly in education where effective feedback is important for the learning process (Sarma & Bhuyan, 2021). As a dynamic and HCI is a multidisciplinary field that has developed from early command-line interfaces to contemporary Touch-based interactions and graphical user interfaces (GUIs) have an impact on how people Experience mobile devices, computers, and new technologies. This research explores how QuizFi's gamification features improve student's attitudes and involvement in the learning process. It focuses on creating an engaging interactive interface and figuring out Features of gamification that boost student satisfaction include feedback and rewards.

## 1.2 Research Problem

This study looks at how to effectively add gamification features to QuizFi to improve student attitudes and participation in learning. Although gamification can boost motivation and engagement in education, many students still feel disengaged and unmotivated because traditional learning methods can be boring and lack interactive feedback. Adding gamification elements like leaderboards, rewards, and interactive design, this research aims to find ways to make learning more enjoyable, encourage student attitudes, and increase participation and learning outcomes.

## 1.3 Research Questions and Objectives

### Research Questions:

- How does student’s attitude toward gamification features affect their motivation in learning?
- How does the user–interface design of a gamified learning platform affect student engagement and learning outcomes?
- How do gamification elements affect student satisfaction and overall experience in learning?

### Research Objectives:

- To develop gamification features in QuizFi to improve student attitudes, and participation in learning.
- To design an interactive interface for QuizFi to enhance student’s engagement, for learning results.
- To develop gamification elements, such as leaderboards, rewards and feedbacks to improve student’s satisfaction.

### 1.4 Justification and Significance

This study addresses Human–Computer Interaction (HCI) challenges in gamified learning environments, focused on enhancing student's attitude, engagement, and satisfactions in QuizFi, a web–based platform where first–year Information Tecnology students can answer quizzes to earn free Wi–Fi vouchers. It aims to improve digital learning experiences ensuring the usability and accessibility of the system, encourage students to explore and actively participate in the platform. Since QuizFi is mobile–responsive, it allows students to access the system anytime and anywhere, further increasing their engagement and motivation. This research in HCI knowledge by identifying design principles that improve usability, accessibility, and engagement in educational technology. The results will contribute to the development of more user–centered learning systems, benefiting students.

## 2.0 LITERATURE REVIEW

### 2.1 Overview of HCI Theories and Models

Human-Computer Interaction (HCI) is increasingly relevant, yet students often find the subject uninteresting and overly theoretical. To address this, a gamified learning resource called the "work simulation" was developed for a second-year HCI module, informed by a literature review on educational requirements, dialogic feedback, simulations, and gamification features. The resource was evaluated through a two-cohort comparison, revealing a statistically significant improvement in lecture attendance and exam performance for the cohort using the simulation. Further interviews indicated that dialogic feedback and the game narrative were particularly beneficial for student engagement (Carmichael, D.D., MacEachen, C., 2022).

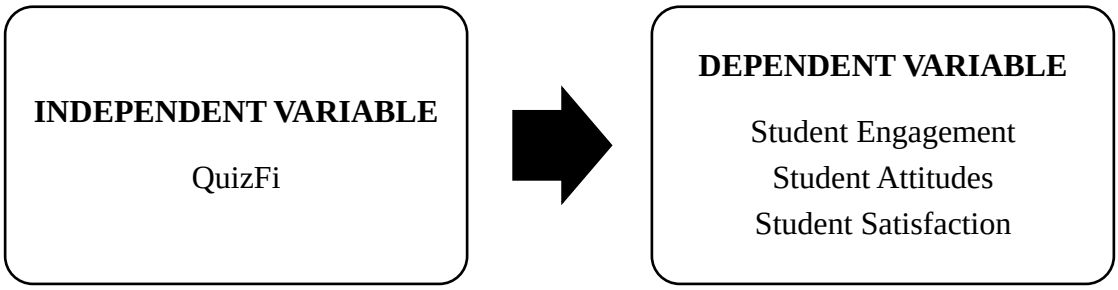
### 2.2 Review recent studies, papers, and advancements in HCI

Recent advances in Human-Computer Interaction (HCI) have increasingly used gamification as a strategy for improving user engagement and learning. However, research in this field continues to face significant hurdles. Studies tend to focus on short-term user interactions rather than long-term benefits, which limits our understanding of gamification's long-term impact. Furthermore, there has been limited progress in improving gamification design methodologies, and existing research frequently ignores unintended outcomes (Juan Manuel, 2022), investigated the efficacy of an automated, card-based gamification technique for teaching Jakob Nielsen's usability principles. While no statistically significant changes were discovered between traditional and gamified learning approaches, students who used gamification had somewhat better retention and assessed the application as simple to use and advantageous to learning. This shows that, while gamification has potential, it may need to be supplemented with additional aspects such as rankings, difficulty levels, and game modes to fully effect motivation and performance. Emerging trends in HCI are centered on improving gamification approaches and overcoming existing limits in order to build more effective and engaging digital experiences.

### 2.3 Analyze existing solutions related to the research problem

Many strategies that use game-like elements and educational tools are being created to keep students interested and encourage more participation in school. The Motivation-Exploration-Implementation Theory for Gamification in Education, developed by (Cabello C., et al., 2021) gives a detailed guide for understanding how gamification can enhance or improve the learning experience of the students. It further amplifies the way how learners are hooked and attached with different technologies entailed with various online games and applications making them more motivated and engaged. (Cabello, C. et al., 2021), identifies essential ideas, such as how using game-like elements can work in various school subjects. It demonstrates how these elements encourage students to think critically, while also keeping them motivated and actively involved in their learning experiences. Based on these main ideas, ten key points or propositions were developed, including the importance on having designs that are simple and easy to use, creating activities that catch people's interest, clear instructions, and establishing a system to give rewards after specific achievements are reached. These key points have been used successfully in many educational environments.

### Conceptual Framework




## 3.0 METHODOLOGY

### 3.1 Research Design

This study will use a descriptive research design to determine participants experiences in gamified learning environments. The learning system will be the independent variable, while the dependent variables will include student attitudes, engagement, and satisfactions. This design will be appropriate for providing a clear summary of student's experience specifically within gamified learning environments. The study will aim to gather findings that highlight student attitudes, engagement, and satisfaction in these environments.

### 3.2 Participants

The participants in this study were the first–year Bachelor of Science in Information Technology (BSIT) students at South East Asian Institute of Technology Inc., with a total of 150 students. This study will measure student engagement, student attitude, and

satisfaction allowing us to evaluate the effectiveness of the gamification learning environments.

### 3.3 Data Collection

Quantitative data were gathered through structured questionnaires designed to assess students' attitudes, engagement, and satisfaction with the gamified learning environment. Random sampling was used to ensure that data were collected from a representative sample of the target population, allowing for accurate results. The data collected were suitable for statistical analysis, enabling the identification of trends and patterns in student responses and their correlation with improvements in usability, accessibility, and overall satisfaction with the system.

### 3.4 Data Analysis

The quantitative data gathered from structured questionnaires and descriptive will be analyzed with descriptive. Descriptive statistics, such as means, standard deviations, and ranges, will be calculated for all survey items concerning student attitudes, engagement, and satisfaction with the gamified learning experience.

### 3.5 Ethical Considerations

The study will prioritize protecting participant privacy and data. Informed consent will be requested from each party, participants have the option to withdraw at any time. Any results that are released will not reveal the participants' identity. The researchers will follow the ethical guidelines for HCI research, ensuring that research participants will not experience discomfort or harm caused during the study.

## 4.0 ADVANCED HCI SYSTEM DESIGN

### 4.1 System Architecture

The advanced HCI QuizFi system is designed to enhance student engagement, student attitude, interactive learning through gamified quizzes and games, and user’s satisfaction. It consists of several core components that facilitate communication, data processing, and user interaction.

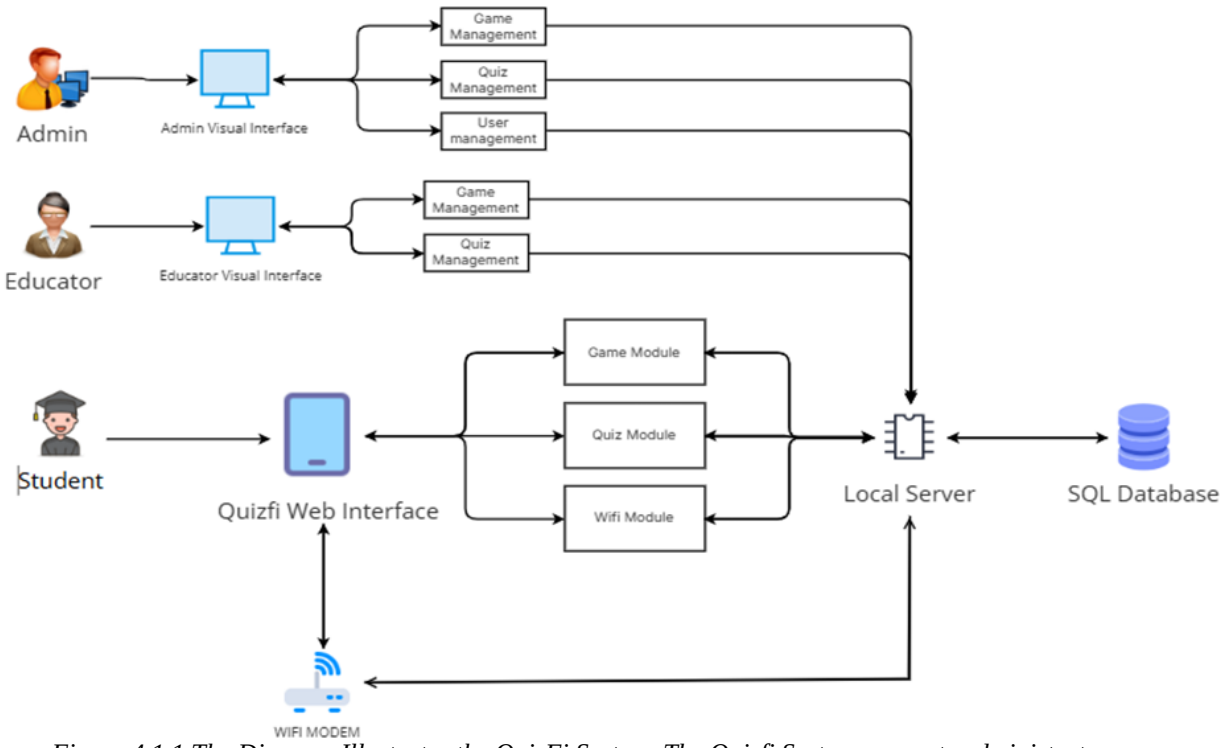



*Figure 4.1.1 The Diagram Illustrates the QuizFi System, The Quizfi System connects administrators, educators, and students through game, quiz, and user management modules. It runs on a local server with an SQL database for efficient data handling.*

- **Client–side (User–Interface)**

  This serves as the primary interaction layer for users, allowing them to access the system through a web browser. It provides a structured and user-friendly interface for navigating quizzes, games, and account management.

- **Game Management**

  This component is responsible for storing and managing game-related questions and rewards. Games are well-organized and accessible, improving student engagement through interactive learning experiences.

- **Quiz Management**

  This stores and manages quiz questions and rewards. It facilitates the creation and organization of quizzes.

- **User Management**

  This handles the registration and authentication of students. It maintains user credentials, assigns roles, and ensures secure access to system.

- **Backend Database**

  This is the system's central storage, securely storing user's data, quiz results, game records, and system logs.

### 4.2 Features and Functionalities

**Features and Functionalities:**

- **Interactive Game and Quizzes**

  Game–like features that include games and quizzes with different question types, like multiple–choice, true or false, and short answer, all adjusted to each student's skill level. These games will use points, levels, and rewards to make learning more interactive and engaging.

- **Rewarding System**

  The students can exchange the earned points for Wi–Fi vouchers, giving them free internet access. Rewards to real–world benefits increase the value of participation and motivates students who might feel disconnected, improving their engagement in learning.

- **Ranking System**

  This system will include a leaderboard showing the top students based on their quiz scores and points earned.

- **Wi–Fi Voucher Conversion**

  Students can exchange earned points for Wi–Fi voucher, allowing them to have free internet access.

- **Internet Connection**

  The system will provide a internet connection for all users, guaranteeing smooth access to quizzes, and games.

## 4.3 User Interface Design

### Landing Page

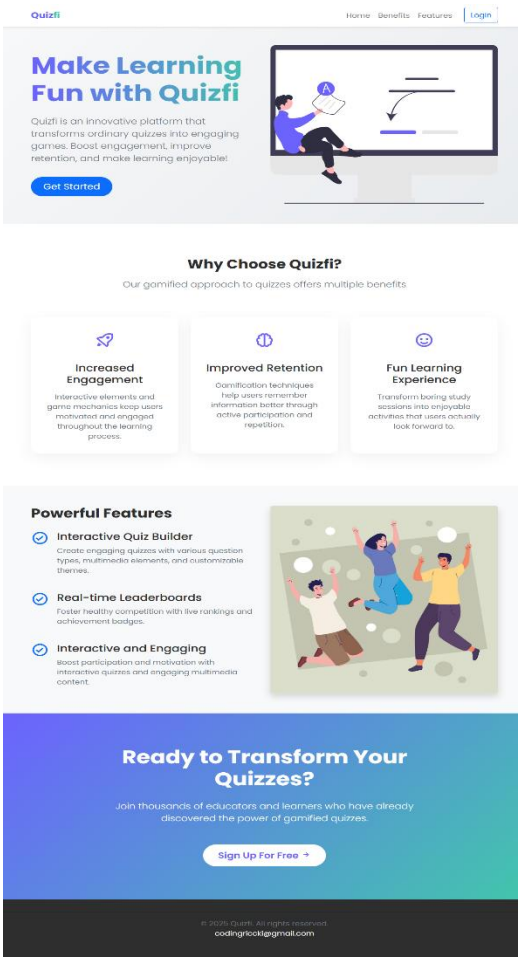



*Figure 4.3.1 Landing Page for QuizFi System*

### Admin Login Page

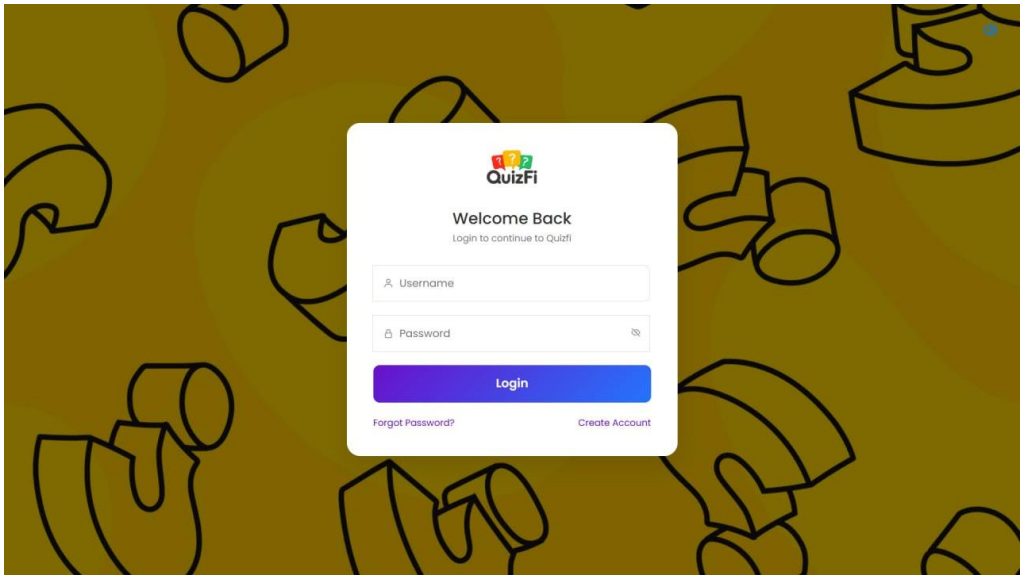



*Figure 4.3.2 Admin Login Page for QuizFi*

**Interactive Game and Quizzes Page**

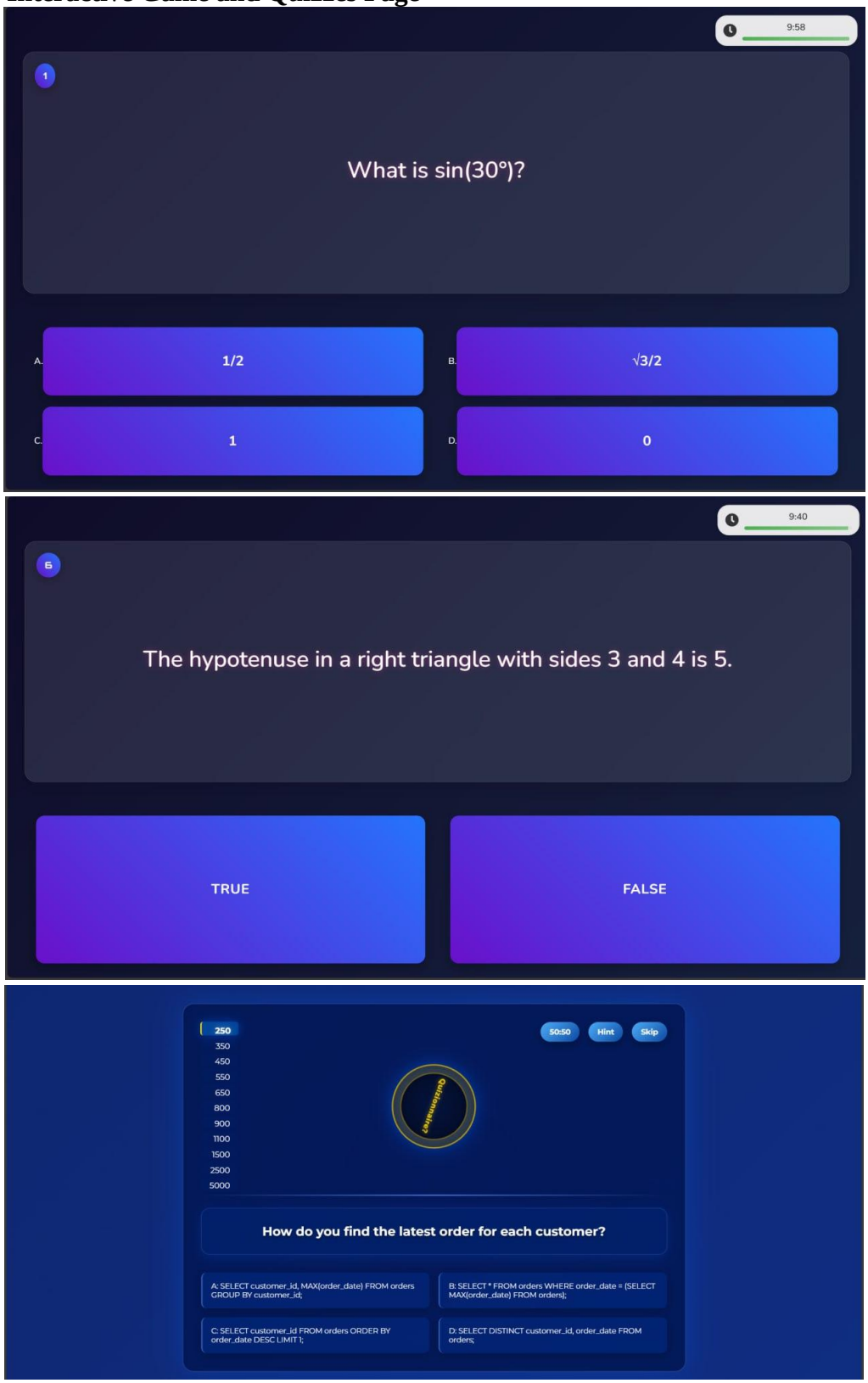



*Figure 4.3.3 Interactive Game and Quizzes Page for QuizFi*

## Rewarding System Page

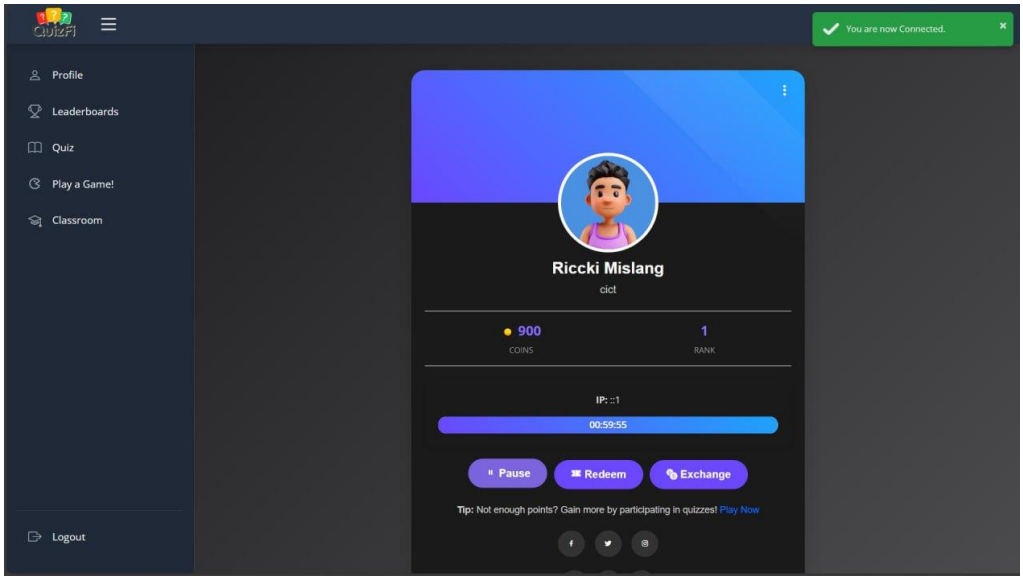



*Figure 4.3.4 Reward System Page for QuizFi*

## Ranking System Page

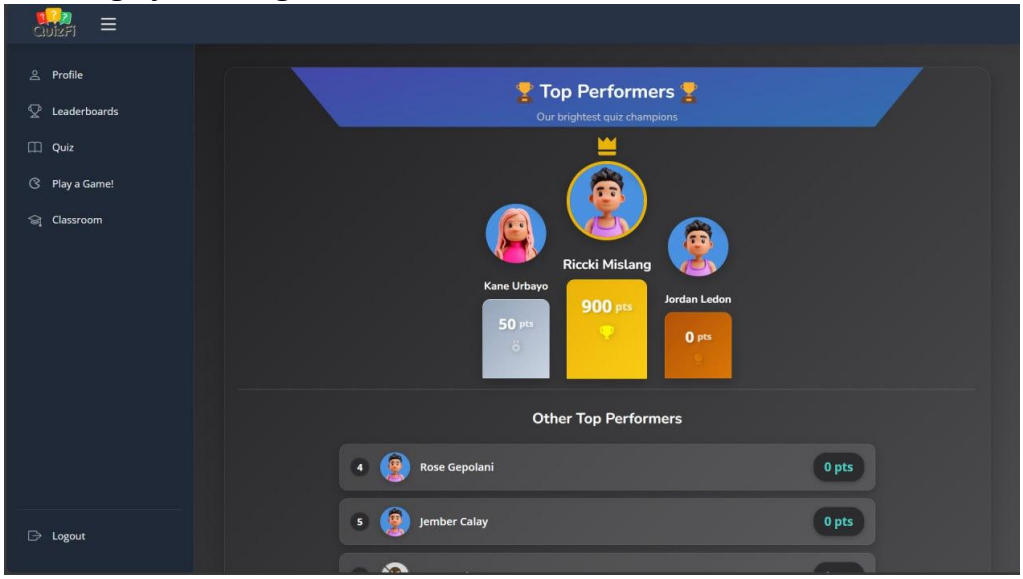



*Figure 4.3.5 Ranking System Page for QuizFi*

## Wi–Fi Voucher Page

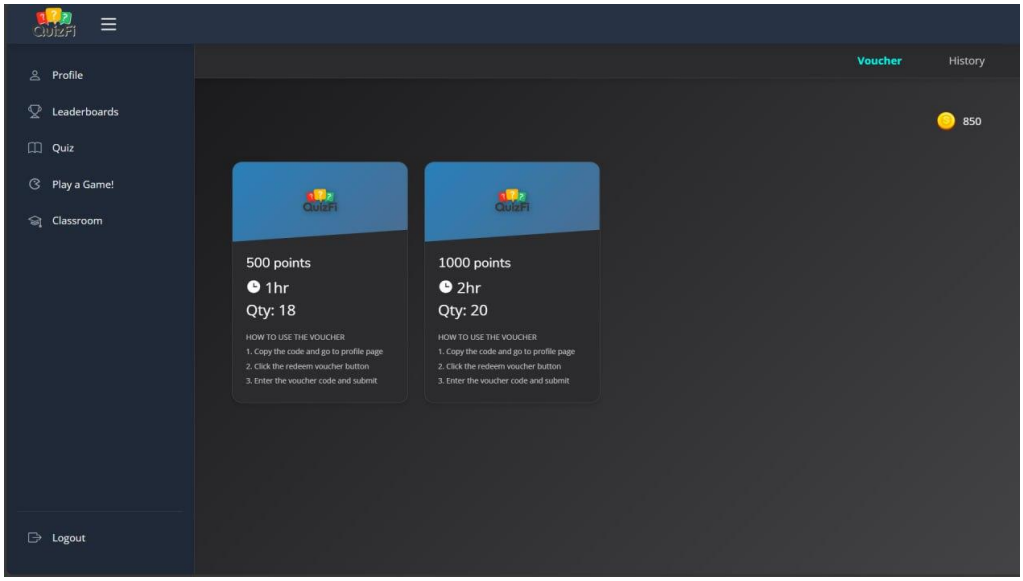



*Figure 4.3.6 Wi–Fi Voucher Page for QuizFi*

## Internet Connection Page

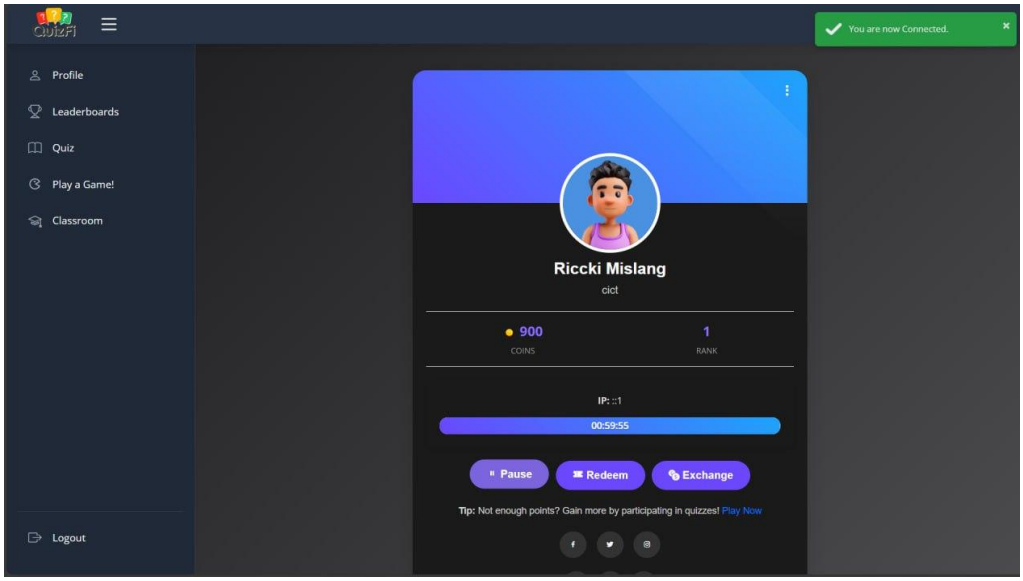



*Figure 4.3.7 Internet Connection System Page for QuizFi*

## 5.0 EVALUATION AND RESULTS

### 5.1 Usability Testing

Usability testing was perceived as generally usable, nearing the favorable end of the scale. Users felt confident using the tool (3.26 or 81.5%), found it easy to use (3.12 or 78%), and expressed willingness to use it frequently (3.24 or 81%). However, there were mixed feelings about consistency (2.68 or 67%) and ease of learning for new users (2.79 or 69.75%).

**Table 5.1.1 Usability Result Table**

| Questions | Mean |
|---|---|
| 1. I thought the system was easy to use. | 3.12 |
| 2. I found the system unnecessarily complex. | 2.91 |
| 3. I needed to learn a lot of things before I could get going with this system. | 3.10 |
| 4. I would imagine that most people would learn to use this system quickly. | 2.79 |
| 5. I think that I would need the support of a technical person to be able to use this system. | 3.21 |
| 6. I found the tool very cumbersome to use. | 2.80 |
| 7. I felt very confident using the tool. | 3.26 |
| 8. I thought there was too much inconsistency in this system. | 2.68 |
| 9. I think I would like to use this tool frequently. | 3.24 |
| 10. I found the overall experience of using the system satisfying. | 2.82 |
| **TOTAL MEAN** | 2.99 |

### 5.2 Performance Metrics

These performance metrics come up with to assess QuizFi's impact on student's attitude, engagement, and satisfaction. The results measure how students observe the system's usefulness, ease of use, and learning knowledge. This method provides a clear summary of QuizFi's performance and usability, and how effective the system supports student learning.

**Accessibility: 2.98** – The system was accessible and user–friendly. It received high marks for ease of use (3.51), user confidence (3.28), and satisfaction (2.75). But concerns were noted regarding difficulty (2.61), inconsistency (2.61), and the need for technical support (3.32). While users felt confident using the platform, the results suggest that

improving guidance and reducing perceived difficulty could further improve the user experience.

**Table 5.2.1 Accessibility Result Table**

| Questions | Mean |
|---|---|
| 1. I thought the system was easy to use. | 3.51 |
| 2. I found the system unnecessarily complex. | 2.61 |
| 3. I needed to learn a lot of things before I could get going with this system. | 3.30 |
| 4. I would imagine that most people would learn to use this system very quickly. | 2.61 |
| 5. I think that I would need the support of a technical person to be able to use this system. | 3.32 |
| 6. I found the tool very cumbersome to use. | 2.60 |
| 7. I felt very confident using the tool. | 3.28 |
| 8. I thought there was too much inconsistency in this tool. | 2.61 |
| 9. I think I would like to use this tool frequently. | 3.22 |
| 10. I found the overall experience of using the system enjoyable. | 2.75 |
| **TOTAL MEAN** | 2.98 |

**Functionality: 2.55** – The system's functionality received moderate feedback, indicating a balance of strengths and areas that need enhancement. High scores were seen in the reward system's effectiveness (3.47), integration of functions (3.35), and user motivation through the ranking feature (3.40). However, lower scores in system responsiveness (1.89), clarity of function (1.77), and ease of use (1.59) suggest that users experienced confusion and occasional technical limitations. Overall, while key features were appreciated, improving system clarity and responsiveness could greatly boost overall functionality satisfaction.

**Table 5.2.2 Functionality Result Table**

| Questions | Mean |
|---|---|
| 1. The point and reward features worked as expected. | 3.47 |
| 2. The system responded quickly to my inputs. | 1.89 |
| 3. The ranking system made me want to participate more. | 3.40 |
| 4. All major features of the system worked as intended. | 1.77 |
| 5. I found the various functions in this tool to be well-integrated. | 3.35 |
| 6. It is not difficult to understand how the system functions. | 1.77 |
| 7. I do not feel dissatisfied with the functionality. | 3.28 |
| 8. I do not find the system performance to be frustrating. | 1.72 |

| | |
|---|---|
| 9. It is not difficult to understand how the system works. | 3.32 |
| 10. I cannot recall encountering any obstacles in using the system. | 1.59 |
| **TOTAL MEAN** | 2.55 |

### 5.3 Comparative Analysis

In this study, the researchers examined how QuizFi performs compared to other learning platforms. Based on student feedbacks, QuizFi was easier to use and more accessible. Students appreciated its clean layout and simple navigation. Unlike some traditional systems that can feel complicated or overwhelming, QuizFi focused on providing a smooth user experience. Some Information Technology students mentioned minor issues such as slow loading times and the need for more guidance for the first–time users. But behind all these minor concerns, QuizFi still proved to be easier to use than any other gamified learning platforms.

### 5.4 Results and Findings

The total means of all areas prove that the QuizFi system met its objectives:

- Usability – 2.55
- Accessibility – 2.98
- Functionality – 2.55

The results from the System Usability Scale (SUS) showed that QuizFi scored well in: functionality, usability, and accessibility. Students felt satisfied using the system. The student's found it useful and easy to use, which helped the students stay focused and more engaged during quizzes.

## 6.0 DISCUSSION

### 6.1 Interpretation of Findings

The findings of this study show how gamification and user–interface design contribute to improving student engagement, and satisfaction in a digital learning environment. The analysis of user responses and platform interactions, it was obvious that the integration of game–based features and a well–structured interface encouraged more active participation and improved learning experiences among students.

**Table 6.1.1 Descriptive Survey Result Table**

| Questions | Mean | Standard Deviation |
|---|---|---|
| 1. To what level do gamification features (e.g., points, leaderboards) increase your motivation to participate in learning activities? | 3.14 | 0.54 |
| 2. How often do you participate more actively in lessons when gamification features are used? | 3.18 | 0.58 |
| 3. How would you rate the user–interface design of the gamified learning platform you've used (e.g., layout, icons, colors)? | 3.28 | 0.54 |
| 4. How much do you agree with the: "Gamification elements help me understand and retain lessons better?" | 3.20 | 0.60 |
| 5. How satisfied are you with your learning experience when gamification features are present? | 3.36 | 0.57 |
| **TOTAL MEAN** | 3.23 | 0.57 |

**RQ1:** *How does student's attitude toward gamification features affect their motivation in learning?*

Based on the evaluation results, students showed a positive attitude toward gamification features, which modestly increased their motivation to participate in learning activities, as indicated by a mean score of **3.14**. The use of elements such as points, and leaderboards appeared to improve the engagement, and students participated more actively in lessons where these gamified features were present mean score of **3.18**. These findings suggest that gamification can be an effective motivational tool when integrated into educational platforms.

**RQ2:** *How does the user–interface design of a gamified learning platform affect student engagement and learning outcomes?*

The results show that user–interface design played an important role in **student engagement**, with a mean score of **3.28**. Students responded positively to well–organized layouts, intuitive icons, and appealing colors, which contributed to smoother interaction with the platform. These design elements helped reduce distractions and supported better focus, thereby potentially improving learning outcomes. The results suggest that user–friendly design is a main factor in enhancing the overall learning experience.

**RQ3:** *How do gamification elements affect student satisfaction and overall experience in learning?*

Gamification elements positively impacted **student satisfaction** and learning experience, as shown by a mean score of 3**.36**, the highest among all descriptive items. Students agreed that gamified features helped them better understand and retain lessons mean score of 3.20, contributing to a more engaging and enjoyable learning environment. These results highlight the potential of gamified platforms to improve both educational satisfaction and the effectiveness of the learning process.

### 6.2 Contributions and Innovation

This study adds up to the idea that usability really matters in education technology. QuizFi may not have a lot of advanced features, but what makes it special is how simple it is. That simplicity is actually a big benefit. Students don't waste time figuring things out they just use it. This is a good example for future platforms, showing that keeping things user–friendly can be more powerful than adding too many features.

### 6.3 Limitations and Future Work

This study was limited to a small group of first–year Information Technology students selected through random sampling. Another limitation was the type of devices used during testing. Some students were using outdated or low–end laptops, Personal Computers, and smartphones, which have had an impact on how quickly they interacted with the system.

## 7.0 CONCLUSION

### 7.1 Summary of Key Findings

In usability, QuizFi scored highly, in terms of student's satisfaction and engagement. Students felt more at ease and inspired to learn because of the system's clean layout, easy to understand design, and quick access. The findings also suggest that student experiences with online resources like QuizFi are completely influenced by usability.

### 7.2 Final Remarks

In conclusion, QuizFi is important for being user–friendly and enjoyable. This study shows how a well–designed tool can improve the educational process. QuizFi can be made even better in the future with small improvements and additional student's feedback.

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## 9.0 APPENDICES

Appendix A: System Usability Scale (SUS) Likert Scale Survey Questionnaire:

**QuizFi: A Quiz–Based Internet Access Vending Reward System to Develop Internet Accessibility and Academic Engagement at South East Asian Institute of Technology, Inc.**

**Functionality**

| **Questions** | **Ratings** | | | |
|---|---|---|---|---|
| 1. The point and reward features worked as expected. | 1 | 2 | 3 | 4 |
| 2. It is not difficult to understand how the system works. | 1 | 2 | 3 | 4 |
| 3. The system responded quickly to my inputs. | 1 | 2 | 3 | 4 |
| 4. I feel dissatisfied with the functionality of the system. | 1 | 2 | 3 | 4 |
| 5. The ranking system made me want to participate more. | 1 | 2 | 3 | 4 |
| 6. I find the system performance to be slow or unreliable. | 1 | 2 | 3 | 4 |
| 7. All major features of the system worked as I expected. | 1 | 2 | 3 | 4 |
| 8. It is not difficult to understand how the system's function works. | 1 | 2 | 3 | 4 |
| 9. I found the various functions in this tool were well integrated. | 1 | 2 | 3 | 4 |
| 10. I encounter obstacles or complications while attempting to redeem rewards through the system. | 1 | 2 | 3 | 4 |

**Accuracy**

| **Questions** | **Ratings** | | | |
|---|---|---|---|---|
| 1. I thought the system was easy to use. | 1 | 2 | 3 | 4 |
| 2. I found the system unnecessarily complex. | 1 | 2 | 3 | 4 |
| 3. I needed to learn a lot of things before I could get going with this system. | 1 | 2 | 3 | 4 |
| 4. I would imagine that most people would learn to use this system very quickly. | 1 | 2 | 3 | 4 |
| 5. I think that I would need the support of a technical person to be able to use this system. | 1 | 2 | 3 | 4 |
| 6. I found the tool very cumbersome to use. | 1 | 2 | 3 | 4 |
| 7. I felt very confident using the tool. | 1 | 2 | 3 | 4 |
| 8. I thought there was too much inconsistency in this tool. | 1 | 2 | 3 | 4 |
| 9. I think I would like to use this tool frequently. | 1 | 2 | 3 | 4 |
| 10. I found the overall experience of using the system enjoyable. | 1 | 2 | 3 | 4 |

**Accessibility**

| Questions | Ratings | | | |
|---|---|---|---|---|
| 1. The system's visual elements (e.g., icons, buttons, and labels) were clear and easy to identify. | 1 | 2 | 3 | 4 |
| 2. The quizzes were easy to read and understand, even when accessed on different devices. | 1 | 2 | 3 | 4 |
| 3. The reward claiming process (e.g., internet access credits) was simple and straightforward. | 1 | 2 | 3 | 4 |
| 4. I found it easy to locate instructions or help when using the QuizFi system. | 1 | 2 | 3 | 4 |
| 5. The system allowed me to access quizzes without unnecessary delays or errors. | 1 | 2 | 3 | 4 |
| 6. I had difficulty navigating to specific features like checking rewards or claiming internet time. | 1 | 2 | 3 | 4 |
| 7. I was confused about how to use certain parts of the system without guidance. | 1 | 2 | 3 | 4 |
| 8. The system responded slowly or lagged while I was taking a quiz or accessing my rewards. | 1 | 2 | 3 | 4 |
| 9. The internet reward was not immediately accessible after completing a quiz. | 1 | 2 | 3 | 4 |
| 10. I found the system difficult to use when I was in a hurry or under time pressure (e.g., during class breaks). | 1 | 2 | 3 | 4 |

Appendix B: Descriptive Survey Questionnaire:

**QuizFi: A Quiz–Based Internet Access Vending Reward System to Develop Internet Accessibility and Academic Engagement at South East Asian Institute of Technology, Inc.**

1. To what extent do gamification features (e.g., points, leaderboards) increase your motivation to participate in learning activities?

☐ Not At All ☐ Slightly ☐ Very Much ☐ Extremely

2. How often do you participate more actively in lessons when gamification features are used?

☐ Never ☐ Rarely ☐ Often ☐ Always

3. How would you rate the user-interface design of the gamified learning platform you've used (e.g., layout, icons, colors)?

☐ Very Poor ☐ Poor ☐ Good ☐ Excellent

4. How much do you agree with the following: "Gamification elements help me understand and retain lessons better."

☐ Strongly Disagree ☐ Disagree ☐ Agree ☐ Strongly Agree

5. How satisfied are you with your learning experience when gamification features are present?

☐ Very Dissatisfied ☐ Dissatisfied ☐ Satisfied ☐ Very Satisfied