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Instructor and Adult Learner Perceptions of a Cloud-Based Integrity Game in Malaysian Distance Education

Asnina Anandan[1], Christina Sook Beng Ong[2*], and Jayaeswari Sangaralingam[3]

[1] School of Psychology and Social Sciences, IMU University, Malaysia.
[2] School of Humanities, Universiti Sains Malaysia.
[3] School of Digital Technology, Wawasan Open University, Malaysia.

*Corresponding author: christinaong@usm.my

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Abstract

Existing game-based learning platforms are increasingly used in teaching to enhance learner motivation and engagement but their generic question types and designs often cater more to younger audiences. To address this, a cloud-based game tailored for adult learners was developed. The content was based on a university-wide course on integrity and anti-corruption, mandated by the Malaysian Ministry of Higher Education. Developed using the open-source Laravel PHP framework, the game includes levels, points, badges, leader boards, and avatars, following the Mechanics Dynamic Aesthetics framework to promote competition, rewards, and self-expression. Instructors can set questions, manage user data, and perform administrative tasks, while learners benefit from interactive questions and real-time feedback. This study qualitatively examines instructor and learner perceptions of the cloud-based game in a distance education setting. The instructor highlighted the need for more time to master administrative features, especially question editing, while adult learners valued the diverse question types and instant feedback that motivated them to continue playing. The participants in this study showed mixed reactions to the game, describing it as both engaging and anxiety-inducing. This study highlights the practical potential of cloud-based games in higher education, emphasising the need for instructor support, alignment with diverse learning styles, and the cost-effectiveness of cloud infrastructure.

Keywords: adult learners, cloud-based game, distance education, gamification, instructor, interactive questions

1. Introduction

As distance education continues to evolve, integrating engaging and interactive learning experiences has become increasingly important, often facilitated by technology. With rising demand for digital solutions and limited resources, cloud computing has emerged as a practical option for supporting online learning (Blanton & Schiller, 2010). It offers benefits such as cost savings, optimised resource allocation, and the ability to deliver innovative instructional solutions (Wu et al., 2011). One promising application is cloud-based games, which may create immersive and dynamic learning environments, especially for adult learners. Although game elements such as levels, points, badges, leaderboards, avatars, and interactive feedback are not innovative as they have been implemented in platforms such as Discord with bots (e.g., MEE6, Carlbot), H5P, or Learning Management System (LMS) plug-ins like Moodle, the development of a customised Laravel-based application provides distinct advantages. Unlike generic tools, a tailor-made system allows seamless integration of multiple gamification features within a single platform, greater flexibility for customisation, and alignment with the pedagogical needs of distance education. It also addresses the need for an adaptable and scalable solution that can be locally managed without reliance on third-party services, thereby enhancing usability, sustainability, and cost-effectiveness in resource-constrained contexts. Given the growing reliance on online platforms in distance education, exploring how such games support adult learning is timely and relevant. While cloud-based gamification may enhance both teaching and learning experiences, its effective implementation still requires further investigation. Sužnjević and Homen (2020) noted that its use in education remains limited. Gamification, applying game elements to non-game contexts, has shown potential in improving engagement and motivation in online settings (Chen et al., 2018), particularly for adult learners who benefit from interactive and self-directed learning (Farmer, 2011; Tuparov & Tuparova, 2018).

Active learning is transformative in adult education and includes various methods, such as gamified approaches (Whitton, 2018). It is important to distinguish between game-based learning and gamification. A game-based learning approach involves using gamefulness, gameful interaction, and gameful design as strategies to motivate students to participate in class activities (Hartt et al., 2020). Examples of game-based learning includes Kahoot, Quizizz, Wordwall, and EdPuzzle which are increasingly used to boost learner motivation, engagement, and achievement. Lee et al. (2019) found that Kahoot has been shown to enhance motivation among rural students and improve learning performance, classroom dynamics, and learner attitudes. While these platforms are user-friendly and offer suggested activities, they are often generic and limited to simple formats like multiple-choice quizzes. Their design and aesthetics tend to appeal more to younger learners. By contrast, gamification focuses on applying specific game elements in broader educational contexts, which may offer more flexibility and sustainability in distance education. To reiterate, gamification is the use of game design elements in non-game environments to engage students through constructivist approaches that promote active participation and self-directed learning (Deterding et al., 2011). In the Malaysian context, although several studies have explored gamification in education, there is limited research focusing specifically on adult learners in distance education, especially in developing countries. This gap is highlighted in the findings of Por et al.'s (2025) bibliometric analysis.

To address the lack of gamification initiatives tailored for Malaysian adult learners in distance education, this study developed a cloud-based gamification system rather than a conventional game-based learning platform. The study’s novelty lies in the creation of this game which would be described in the method section. Hakak et al. (2019) asserts that the use of cloud computing for gamification is still in its early stage of development. It is validated by past research which has been focusing on effects of existing online games (Koppitsch & Meyer, 2022) or gamification from a typical learning management system and an online learning environment (Antonaci et al., 2019; Chen et al., 2018; Geelan et al.,

2015). Findings from this study can contribute to the existing literature on gamification in adult learning and inform instructors and researchers interested in designing gamified learning activities for distance education courses.

Since instructor and learners are the primary users of this game and are directly involved in the online teaching and learning process, this study aims to explore perceptions of Malaysian distance education instructors and adult learners using a tailor-made cloud-based game. The research questions of this study are as follows.

i. How do Malaysian adult learners perceive and experience the use of a cloud-based game in a distance education course?
ii. How does the course instructor perceive the usability, administrative functionality, and practicality of the cloud-based game for distance education?

2. Literature Review

2.1. Online Learning for Adults

Motivation is a key predictor of academic success, influencing the effort and time students devote to learning (Linehan, 2012). In the context of online and distance education, sustaining motivation is important, as adult learners often face various challenges such as isolation, competing responsibilities, and limited opportunities for direct interaction with instructors and peers. Given the popularity of games and their ability to foster motivation and engagement, integrating game mechanics to motivate adult learners is an appealing strategy. Adults typically seek immediate application of knowledge and are often motivated by their roles as workers, parents, or community members. Therefore, traditional methods used for younger learners may be ineffective with adults. Teaching adults requires instructors to not only deliver relevant content but also actively foster motivation and engagement (Burns, 2020). Gamified learning, using elements like feedback, rewards, and progressive challenges, could be a promising approach to enhancing adult education and supporting persistence in online learning contexts.

Although existing literature suggests that gamification is normally used as a tool from primary to tertiary level of education (Behl et al., 2022; Koppitsch & Meyer, 2022; Li & Chu, 2021), there are studies on gamification for adult learners. Most of them investigated whether the integration of gamified elements positively or negatively impact adult learners' motivation, engagement and academic performance. For instance, Mora et al. (2016) found that adult online learners showed good acceptance and improved motivation levels in a gamified e-learning experience within a software engineering course. Riedmann et al. (2022) did not find higher engagement and intrinsic motivation among adult learners in a game-based environment created for introducing the Spanish language; instead, they inferred that it may be because the popularity of Spanish as a second foreign language in Germany and the feedback they received on their actions in all conditions. In a systematic review of adult learning in online environments, Abedini et al. (2020) revealed factors facilitating (i.e. positive characteristics of adult learners such as independent, experienced-centred and goal oriented) and hindering (i.e. their physical conditions such as aging and fatigue) their learning engagement.

2.2. Framework and Design Considerations for Cloud-Based Gamification

Cloud-based gaming presents a promising solution to challenges in educational game delivery (Homen & Sužnjević, 2019). In this model, games are hosted and executed entirely on cloud servers, with high-definition content streamed to users and their commands sent back to the server. This setup allows institutions to adopt gamification without upgrading existing infrastructures, as cloud computing provides flexible, scalable resources ideal for

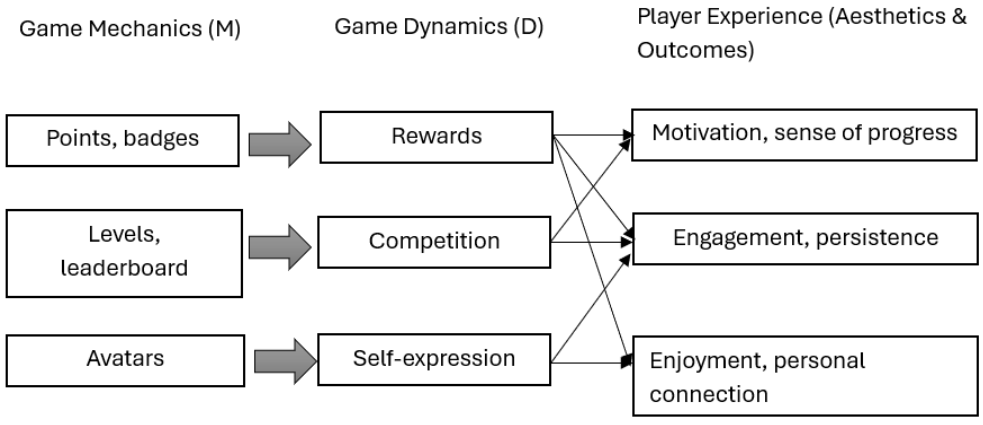
educational use (Rahman et al., 2017). For adult learners, it offers a cost-effective approach to enhance learning experiences. Nonetheless, potential technical issues must be considered, including server limitations, network congestion, and the need to maintain optimal Quality of Experience (QoE).

Gamification design elements fall into three categories: dynamics, mechanics, and components (Werbach & Hunter, 2012). Dynamics involve high-level elements like constraints, emotions, narrative, progression, and relationships. Mechanics are the rules behind user interactions, such as challenges, competition, cooperation, and rewards. Components are specific examples of these, including points, badges, and leader boards. For instance, points (components) offer rewards (mechanics) and encourage progression (dynamics). Commonly used components include points, badges, levels, leader boards, and progress bars, forming the PBL (points, badges, leader boards) approach (Nicholson, 2015). Gamification aligns with andragogical principles by motivating adult learners through engaging, game-like experiences (Por et al., 2025). However, its effectiveness depends heavily on thoughtful, context-sensitive design (Toda et al., 2018). Driven by research indicating the need for a better understanding of how game elements influence learning behaviour and motivation (Dichev & Dicheva, 2017), this study aims to explore instructor and learner perceptions, as well as the learners' experiences using gamification components.

The design of the cloud-based game in this study was guided primarily by Shrestha et al.'s (2023) gamification framework, which is grounded in Hunicke et al.'s (2004) Mechanics Dynamic Aesthetics (MDA) framework. The MDA framework conceptualises game design in three layers: mechanics (rules and components), dynamics (system interactions), and aesthetics (player experience). Figure 1 illustrates how the present study's cloud-based game maps onto these three layers, demonstrating a clear alignment with MDA principles. Gamification components such as points, badges, and leaderboard systems, avatars, and feedback are reward-based and competition-based dynamics that foster self-expression and enhance the overall sense of engagement and enjoyment. In this context, the gamified environment is primarily designed to reinforce knowledge and sustain motivation. As such, the contribution of this study is best understood as demonstrating how MDA-guided gamification can be leveraged to improve engagement and motivation in Malaysian adult learners.

Figure 1

Cloud-based Gamification Framework



3. Research Method

This study adopted a qualitative approach using written interviews to gather user perceptions and experiences with a customised cloud-based game. This section begins with the description of the game, followed by the sampling method, data collection method, which includes the instrumentation used, and the data analysis method.

3.1. Design and Development of the *KIAR* Game

A cloud-based game for a university wide course on integrity and anti-corruption was developed. *Kursus Integriti dan Antirasuah* (*KIAR*) (i.e. Integrity and Anti-bribery course) is a course recently introduced by the Ministry of Higher Education, Malaysia. It is a compulsory university wide course aiming to instil integrity, dignity and a strong sense of identity in combating corruption (Jabatan Pendidikan Tinggi, 2023).

A backend specialist and a frontend developer cum game specialist developed the game using Laravel, a free open-source PHP framework. Besides, MySQL and Vue.js were used for database management and dynamic frontend interactions. There would be two types of users. First, the administrator, which is assigned to the course instructor, has the right to edit questions, view and manage user data. This cloud-based game allows instructors to customise lower-order thinking skill, middle-order thinking skill and higher-order thinking skill questions covering all topics of the course. One uniqueness of this game worth highlighting is that there are different types of questions (e.g., MCQ, anagram, and gap filling) in a level. Second, basic users are learners who play the game by answering the questions created by the course instructor.

The following paragraphs provide a detailed description of the game design, outlining its core features and mechanics. When the learners first log in, they get to select an avatar to represent themselves in their game profile as shown in Figure 2.

Figure 2

Self-Expression Game Dynamics of the Cloud-Based Game That Incorporates Avatars

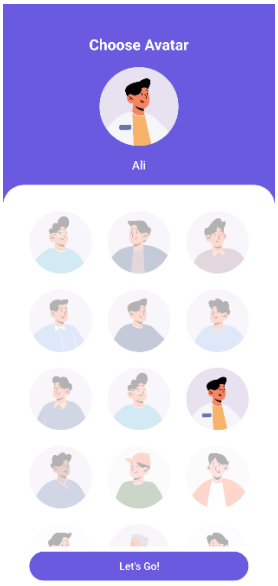
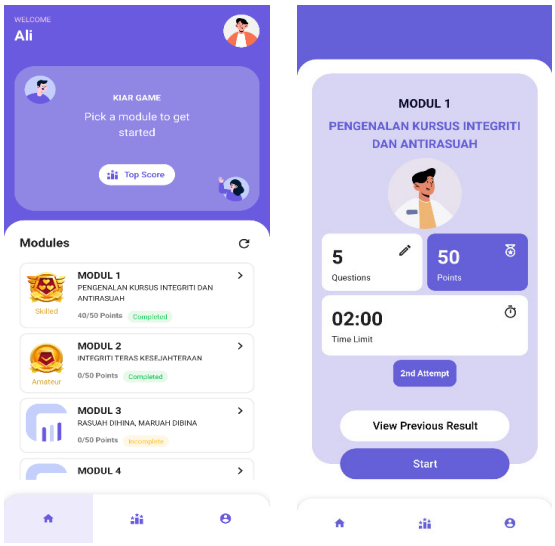


Figure 3 is an example of a student/player's profile showing the modules that they have and have not completed, the number of questions in each module as well as points collected. Modules in this context are equivalent to the game levels that players need to complete.

Figure 3

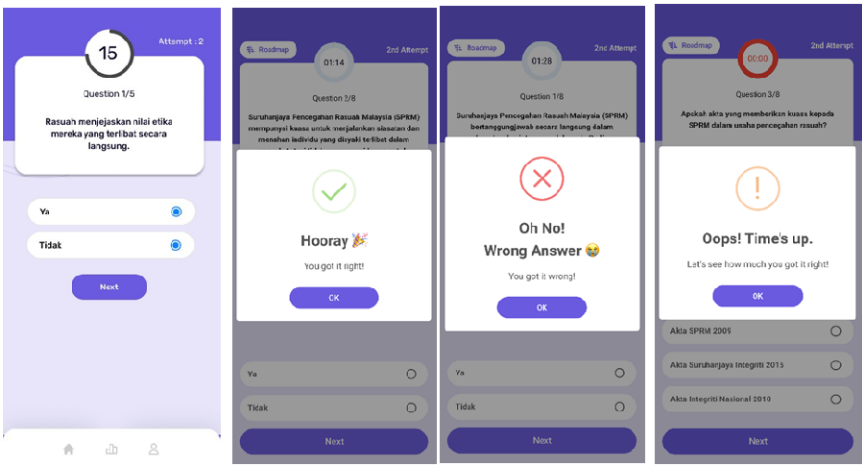
Profile of Player Indicating Modules of the KIAR Games and Points Collected



When the user starts the game, the question, timer and number of attempts are displayed, a positive or negative response, depending on the accuracy of the answer is prompted immediately after an answer is submitted (see Figure 4). Another page is shown with the total points collected upon completion of each module/level of the game. A reward system based on points is identified as a key component for implementing gamification in education (Hakak et al., 2019). Similarly, the *KIAR* game utilises a point-based system, where a higher number of correct answers results in a greater total score. A timer is incorporated, giving each learner a few minutes to answer each question. The time limit increases slightly with each level to accommodate rising difficulty, and the timer resets at the start of each new question. This feature, as claimed by Matenga et al. (2018), would encourage learners to be more focused on the task which then leads to user productivity.

Figure 4

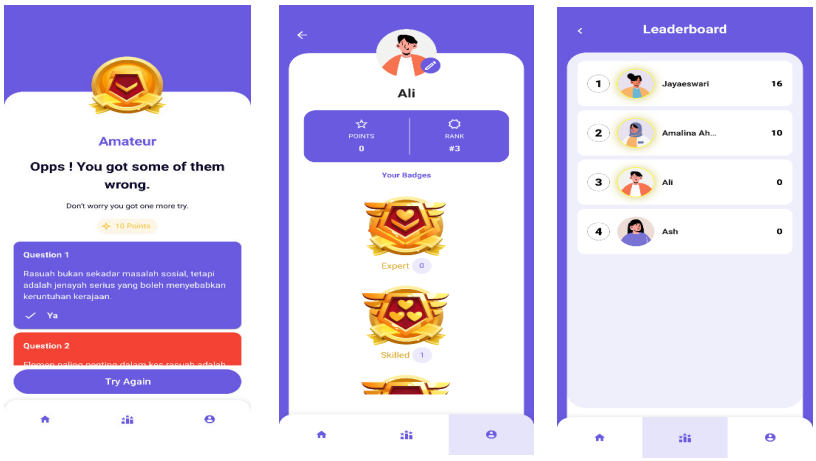
Questions Page That Indicates Timer and Feedback Page of the KIAR Game



To track progress and achievement, badges were incorporated in addition to awarding points for each correct answer, providing a visual representation of personal accomplishment. There are four distinct badges, each indicating a level of proficiency: beginner, intermediate, advanced, and expert as shown in Figure 5. A leaderboard is another frequently used game element in distance education gamification to record the achievement of all students / players (Sumer & Aydin, 2022), and it is also included in the *KIAR* game. All the features above-mentioned correspond to the three game dynamics (self-expression, competition, and rewards) based on the MDA framework.

Figure 5

Rewards and Competition Game Dynamics of the KIAR Game



3.2. Sampling of the Participants

Purposive sampling was employed to select participants who had direct experience using the cloud-based game developed for this study. The course lead of *KIAR* and ten learners from the Software Engineering programme were recruited for this study. The latter took the course in the May 2024 semester via the distance learning mode, which means they met the tutor and their classmates three times virtually and relied on various means including the learning management system to learn about the course. This approach ensured that the participants could provide relevant insights based on actual engagement with the gamified learning environment.

3.2.1 Demographic Information of the Participants

The demographic information and pseudonyms of the ten adult learners and one instructor are presented in Table 1. All the learners are undergraduates pursuing a degree in software engineering in an open university.

Table 1

Demographic Information of the Undergraduates and Instructor

Participants	Gender	Age	Academic term/year
Rebekah	Female	30	T2/2024
Shane	Male	41	T1/2024
Timothy	Male	36	T1/2024
Ming	Female	32	T1/2024
Ananthi	Female	29	T2/2024

Participants	Gender	Age	Academic term/year
Johnny	Male	33	T3/2024
Ting Ting	Female	26	T3/2024
Fen Wa	Female	30	T3/2024
Matthew	Male	25	T2/2024
Maria	Female	40	T2/2024
Instructor X	Female	45	-

3.2.2 Ethics

This study was approved by the Research Ethics Board of Wawasan Open University. All the participants provided their written informed consent. They were assured of data confidentiality, and no personally identifiable information was collected.

3.3. Data Collection and Instrument

Ten participants attended a physical session where the study was explained, and they were given access to the cloud-based game. After completing three game levels, they responded to semi-structured written interview questions about their experiences and perceptions. Those who completed both tasks received a token of appreciation. The instructor was introduced to the admin features through module one and then tested the system with modules two and three. She later shared her perceptions via email and also received a token of appreciation.

The questions focusing on three areas related to the participants' experiences and perceptions of playing the *KIAR* game are listed in Table 2.

Table 2

Written Interview Questions

Topics	Questions
Feature and Relevance	1. How would you describe your experience with the content of the cloud-based game, and in what ways did you find it relevant or irrelevant to the course? 2. Are you motivated to continue completing the game? Which elements kept you engaged? 3. Can you describe your experience with the visual representation of the game? Explain the simplicity or complexity of the visuals, the colour variability used, and any other notable features.
Feedback and activities	1. Can you describe your experience with the feedback provided by the game? Do you think the feedback was timely and effective? 2. How did you perceive the variety of activities offered? 3. How did the progressively increasing difficulty impact your experience? Explain whether it was a positive or negative experience and explain why.
Interface and interaction	1. What issues, if any, did you encounter when logging in and navigating the system using different browsers? 2. What are your thoughts on the overall experience and satisfaction of the cloud-based game? Please share any aspects that particularly pleased or disappointed you, and feel free to provide any suggestions for improvement. 3. Can you describe your overall experience with the cloud-based game interface, specifically, how easy was it to use, and did you encounter any issues while using it (e.g. any bugs or experience crashes)? 4. Can you describe your experience when navigating between different sections or questions, including how quickly the tool responded to your inputs during your interactions with it?

Additionally, participants were requested to make a comment on the overall experience and their satisfaction with the game, including their emotional experience (e.g., stimulating, frustrating, enjoyment, or fun).

3.4. Data Analysis

All written interviews collected from a Google form were imported into NVivo. The learner writings were then read multiple times to thoroughly explore their perceptions of their experiences navigating the features of the cloud-based game. Their responses were then categorised based on emerging themes. The instructor's interview transcript was analysed separately.

4. Findings and Discussion

4.1. Findings

The present study aims to explore the adult learners' and instructor's perceptions and experiences of using a cloud-based game in distance education. This section presents the findings in two sub-sections, starting with discussion of the learners, followed by the course instructor.

4.1.1. Adult Learners' Perceptions and Experiences of the Cloud-Based Game

Most participants of this study found the cloud-based game interesting, particularly because each level incorporated different question formats (e.g., true/false, anagram, multi-select). This diversity, unlike familiar tools such as Kahoot, which typically rely on a single format, was highlighted as a key strength. They noted that the variety of activity types kept them engaged, stimulated curiosity, and helped them maintain interest. They also expressed that the game supported course content revision while breaking the monotony of traditional quizzes.

> "Unlike the usual method we use like Kahoot in class, where there is one type of questions only like MCQ. This has other types like anagram, fill-in-blanks." (Shane)

> "This is first time trying cloud-based game in my learning. I'm quite new to this, but seems good that there are different types of questions, at least helps us revise our learned content" (Ananthi)

> "I cannot comment much on the interesting part, but it does excite us with the different methods of questioning. Not the same old boring methods used in our previous quizzes." (Johnny)

Overall, participants expressed their interest of playing an educational game if it is developed and incorporated in their course. They appear to accept gamification elements as part of their curriculum and hold positive perceptions of them.

With regard to the practicality of gamification elements (i.e. points, badges, leaderboards), participants of this study mentioned that leaderboards motivated them to aim for higher scores. For example, Fen Wa expressed excitement about trying to "catch up with others," while Rebekah noted that having only two attempts encouraged her to get it right the first time. This supports findings in gamification literature that competition can increase engagement (Hakak et al., 2019; Sumer & Aydin, 2022). However, the competitive dynamic had mixed effects. Some participants reported feeling embarrassed or anxious when their low scores were publicly visible:

> "The leader board feature is good…but to see myself being at the lower score points is kinda embarrassing, especially when my course mates can see that too." (Maria)

This suggests Zhang and Chen's (2021) claim that leader boards can be demotivating for players at the lower end is applicable in this study. The reward system, represented by badges that help players to track their achievement is generally overlooked, while the competitive element, represented by the leaderboard is prioritised. While points and leaderboards were strong motivators for some, badges (meant to signify achievements) were largely ignored likely because their design was too abstract for participants to interpret.

Feedback was generally well-received, but some participants reported having anxiety due to time constraints primarily because of the imposed time limits and the difficulty of identifying the right keywords in open-ended questions. It must be noted that the course material is in the Malay language; thus, the same language was used to design the questions and answers. Some participants identified the language used as a concern. This is probably because the Malay language is a second or third language to most of the participants, especially the Chinese and Indian adult learners.

> "It was difficult the fill-in-the blanks question, especially being in Malay language, I find it challenging to have the right term answered. What if I got it wrong the first time! Makes me very anxious." (Timothy)

> "The time limit keeps prompting and that made me a little anxious to get the answers down in time, I got scared if run out of time and then give wrong answers, then might lose marks." (Ting Ting)

The imposed time limits further contributed to stress, consistent with Cognitive Load Theory (Chandler & Sweller, 1991), which warns against overloading working memory. Nevertheless, countdown timers are common in gamified systems as they are designed to engage players and enhance the overall gaming experience. This suggests a balance must be struck between challenge and cognitive load to maintain a positive learning experience.

The participants in this study generally also found the visual representation of the game appealing, citing its minimalist design and cute icons. Navigation was reported as easy, though suggestions for improvement included adding a navigation bar and expanding the colour palette to make the interface more vibrant and engaging:

> "Yes, the visual representation appears to follow a minimalist theme. While this creates a clean and uncluttered aesthetic, it might lack the energy and vibrancy that could engage a wider audience. Consider incorporating a broader colour palette to enhance the visual appeal." (Matthew)

> "User friendly but navigation bar can be added at the bottom." (Shane)

No major technical issues such as crashes or login failures were reported, indicating that the cloud-based system functioned reliably across devices and browsers. Despite minor critiques of the interface, participants believed the game was useful and could enhance their learning when used alongside existing course materials. This highlights the importance of balancing aesthetics, functionality, and user experience (Maeda Palm, 2022).

4.1.2. Instructor's Perceptions of the Game

The course instructor perceived the cloud-based game as highly usable, noting that its interface was straightforward for entering questions and engaging for students. She

highlighted that learners appeared motivated by the interactive features, which she felt enhanced their participation in the distance education setting.

From a practical perspective, she appreciated the cost-effectiveness of the system, contrasting it with commercial platforms that often require costly subscriptions or licensing fees. This affordability was seen as particularly beneficial in resource-constrained teaching environments.

> "I like how the features can be used without needing to pay extra for the gamified functions or extra storage unlike other platforms online." (Instructor X)

However, the instructor also acknowledged challenges with administrative functionality, particularly with monitoring scores and managing grades. While basic functions such as creating questions were intuitive, more advanced features required additional time and training to master:

> "I'm still new to this and may need some time to explore all the functionalities. Putting in the question is quite straight forward, but other functions like score monitoring and grades I'm still not familiar with." (Instructor X)

The findings suggest that institutions could benefit from (1) training instructors to fully utilise game admin features, (2) tailoring gamification elements to accommodate diverse learner preferences (e.g., making leaderboards optional or anonymised), and (3) investing in customisable cloud-based solutions that integrate easily with university learning platforms.

4.2. Discussion

Educational games, especially for university settings, remain limited. Developing games aligned with existing curricula and presented in local languages would be beneficial (Sužnjević & Homen, 2020). In response, the KIAR game was designed based on a compulsory integrity and anti-corruption course mandated by the Malaysian Ministry of Higher Education, using Malay as the medium. This cloud-based game aims to promote self-learning and motivation among Malaysian adult learners in distance education. Findings show that most participants, i.e. adult learners enrolled in a distance education programme, perceived the KIAR game as engaging, motivating, and relevant to their course learning. Gamification features such as points, levels, and leaderboards enhanced competition, self-monitoring, and curiosity, leading to an overall sense of enjoyment and engagement. This is consistent with the MDA framework (Hunicke et al., 2004), where mechanics stimulated meaningful dynamics and ultimately produced positive learning experiences.

Participants' experiences revealed both benefits and challenges. Most found the game stimulating, supporting Koppitsch and Meyer's (2022) view that gamification enhances student engagement. Firstly, the variety of question types (MCQ, anagram, fill-in-the-blank) contributed positively to the participants' engagement by offering novelty and reducing monotony. Many participants expressed curiosity about the gamified format, which was new to them. However, while points and leaderboards can motivate learners through competition (Antonaci et al., 2019; Hakak et al., 2019; Sumer & Aydin, 2022), a few participants felt embarrassed when their low scores were visible to peers. This echoes Hanus and Fox (2015, as cited in Dichev & Dicheva, 2017), who found that such features may negatively affect learners' motivation and satisfaction. Secondly, they valued timely feedback and progressive difficulty, which encouraged persistence, even though some experienced stress due to strict time limits and language-related challenges. These reactions highlight the needs to balance challenge with cognitive load, as excessive pressure can inhibit learning (Chandler & Sweller, 1991). Adaptive timing or differentiated difficulty settings could be considered to support learners with varying language proficiency and confidence levels.

Thirdly, the minimalist visual presentation was generally well-received, though participants recommended improving the colour palette and navigation tools to enhance usability. Notably, the cloud-based design ensured stable technical performance, suggesting that such systems can be effectively adopted in distance education when grounded in usability principles (Maeda Palm, 2022). Learners' perceptions and experiences indicate that gamified approaches can enhance motivation and engagement but require thoughtful design to minimise unintended negative effects.

From the instructor's perspective, the KIAR game was engaging for students and offered clear practical benefits. She valued its cost-effectiveness compared to commercial platforms, which often require costly subscriptions or licensing fees. The straightforward interface made it easy to create and deliver questions, reinforcing the game's usability for instructional purposes. However, administrative functionality presented some challenges: monitoring scores and managing grades required additional time and familiarisation. This suggests that while the system is practical and affordable, its effective use depends on adequate instructor training and institutional support. As Hakak et al. (2019) note, capacity-building is critical to ensure that instructors can fully exploit the pedagogical potential of gamified tools in distance education.

The practical implications of cloud-based games, including the KIAR game, can be considered in three areas. First, higher learning institutions should provide sufficient training and support for instructors to use administrative features like editing questions and tracking scores. While Hakak et al. (2019) highlight the flexibility and ease of gaming tools as beneficial for teacher practice, unfamiliar systems may still frustrate instructors without proper guidance. A key advantage is that instructors do not need to manage IT infrastructure, as cloud games run remotely (Homen & Sužnjević, 2019). Second, course providers should evaluate whether such games accommodate diverse learning styles. Although most participants in this study enjoyed the KIAR game, some may be less engaged due to lower competitiveness. Tailoring gamification elements to suit various learning style is important (Shrestha et al., 2023). Third, cloud technology offers virtualised services such as storage and computing, allowing users to access applications without dealing with installation or maintenance. The KIAR game, developed in PHP for its security and real-time capabilities, can integrate easily with learning platforms and run smoothly on university servers, offering a seamless experience for both instructors and students (Homen & Sužnjević, 2019). Many cloud-based games also include free features, making them attractive to budget-conscious institutions. However, custom game development still incurs costs that vary with complexity. As a practical solution, institutions may consider hiring in-house developers to design and maintain cloud-based games tailored to course needs.

5. Conclusion

Cloud-based games present a cost-effective and innovative approach to enhancing adult learning in distance education. By leveraging scalable computing resources, cloud platforms allow games to run entirely on remote servers, eliminating the need for local infrastructure (Homen & Sužnjević, 2019). A well-designed system simplifies access for both instructors and learners. This study examined perceptions of the KIAR game among ten adult learners and one instructor. Findings revealed that the game was engaging, relevant, and useful for tracking progress. Features such as instant feedback supported adult learning by promoting goal-setting and self-directed learning. Participants expressed curiosity about gamified formats and supported the idea of integrating them in future courses, noting that the game enhanced motivation and provided a novel learning experience. However, while points and badges can increase motivation, they must be thoughtfully designed, as poorly implemented gamification may not yield positive outcomes. Equally important, the sustainability of bespoke systems like KIAR requires careful attention, as challenges with documentation and

long-term maintenance may affect continuity and scalability. Addressing these issues early on would strengthen the game's long-term impact and adoption potential. This study contributes to the growing literature on gamification in adult learning and offers practical insights for educators and instructional designers seeking to integrate cloud-based games into distance learning environments. This study is limited by its small sample size and single institutional context, which may restrict the generalisability of the findings. Additionally, it focused only on learner and instructor perceptions without measuring actual learning performance or long-term outcomes. Future research could address these limitations by involving a larger and more diverse group of adult learners across different disciplines, examining how gamified approaches influence learning engagement and achievement over time, as well as comparing outcomes with established tools such as H5P, which offers ready-made gamified content, or commercial quiz platforms like Kahoot.

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