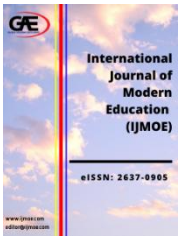
International Journal of Modern Education
EISSN: 2637-0905
Volume: 8 Issue: 31 (September 2026) PP. 1999-2027



INTERNATIONAL JOURNAL OF MODERN EDUCATION (IJMOE)
www.gaexcellence.com/ijmoe

DEVELOPMENT AND USER ACCEPTANCE OF SMARTEDUARABIC: A WEB-BASED GAMIFIED PLATFORM FOR ARABIC LANGUAGE LEARNING IN HIGHER EDUCATION

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Article Info:

Article history:
Received date: 30.07.2026
Revised date: 26.08.2026
Accepted date: 24.09.2026
Published date: 30.09.2026

To cite this document:

Noor, N. M., & Fazelif, M. Q. M. (2026). Development And User Acceptance of SmartEduArabic: A Web-Based Gamified Platform for Arabic Language Learning in Higher Education. *International Journal of Modern Education, 8*(31), 1999-2027.

Abstract:

In order to deal with the problem of low student engagement and the limited use of technology in Arabic language courses, this study created SmartEduArabic, a web-based, gamified learning programme. The programme was designed to act as a supplement to the current classroom activities and is in line with the TAC501 Introductory Arabic (Level III) syllabus at Universiti Teknologi MARA (UiTM) in Malaysia. It was developed using the System Development Life Cycle (SDLC) on an Agile basis, with traditional activities being transformed into interactive online modules. The application allows students to carry out independent practice and receive feedback, while lecturers are able to manage the activities, carry out formative assessments and monitor students' progress. The programme was assessed by 53 respondents (48 students and 5 lecturers) using the Technology Acceptance Model (TAM). The results indicated positive opinions in all four of the TAM constructs. Perceived Usefulness obtained the highest score, with item means varying from 3.91 to 4.36 and an overall mean of 4.36 (SD = 0.62). The respondents also expressed positive attitudes regarding ease of use, attitude toward use and intention to use. SmartEduArabic was well accepted and has the potential to serve as a supportive digital platform for teaching and learning Arabic. Nevertheless, these findings are based on user perceptions and not on direct evidence of improved proficiency. It is therefore recommended that further research be carried out with larger, multi-institutional samples and with direct measurements of learning achievement.

International Journal of Modern Education
EISSN: 2637-0905
IJMOE
Volume: 8 Issue: 31 (September 2026) PP. 1999-2027

DOI: 10.35631/IJMOE.831117 **Keyword:**

Arabic Language Learning, Digital Classroom, Gamification, Language Skills, Self-Determined Learning (Heutagogy), Web-Based Learning Platform, Technology Acceptance Model (TAM)

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Introduction

Educational frameworks have evolved from static, teacher-centred instruction toward increasingly learner-directed, collaborative and technology-integrated models, paralleling the broader transition from Web 1.0 to Web 3.0 (Shukla et al., 2025). This paradigmatic progression aligns with a corresponding shift in pedagogical theory - moving from pedagogy to andragogy and ultimately heutagogy - culminating in personalised, adaptive, and self-determined learning environments (Shukla et al., 2025). Digitalization serves as the principal driver of this transition, as digital platforms fundamentally redefine the spatial, temporal and methodological boundaries of learning (Wickramasinghe, 2026).

A comprehensive systematic review by Krath et al. (2021) demonstrates that gamification research has been underpinned by more than one hundred theoretical frameworks, with Self-Determination Theory, Flow Theory, Goal-Setting Theory, Social Cognitive Theory, Behaviour Reinforcement Theory and Achievement Goal Theory among the most frequently adopted. The review further concludes that gamification supports learning by clarifying learning goals, providing immediate feedback, reinforcing positive behaviours, simplifying complex learning tasks, enabling adaptive learning pathways, encouraging social interaction and allowing learners to pursue personalised goals according to their abilities. Consequently, gamification has consistently been associated with improvements in learner motivation, engagement, participation, collaboration, critical thinking, knowledge acquisition, academic achievement and learning performance, although its effectiveness depends largely on appropriate instructional design rather than merely introducing game elements into learning environments.

In this paper, a gamified learning strategy is implemented in the development of an Arabic language learning web-based application. The application is subsequently evaluated through a Technology Acceptance Model (TAM) to assess users' acceptance, perceived usability and overall effectiveness in supporting Arabic language learning.

Literature Review

Adaptation of Gamification in Arabic Teaching and Learning

Arabic language learning encompasses four fundamental language skills: listening, speaking, reading and writing. Rather than developing these skills independently, recent studies have

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EISSN: 2637-0905
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emphasised the importance of their integrated development to achieve comprehensive communicative competence (Nurjannah et al., 2024; Hakim, 2018; Hendri, 2017; Damsing & Haron, 2026). An integrated approach is particularly beneficial because listening and speaking facilitate real-time communication, while reading and writing contribute to vocabulary development, grammatical knowledge and linguistic accuracy (Damsing & Haron, 2026). Therefore, the integration of these four skills can provide learners with a more holistic language learning experience and enable them to apply Arabic more effectively in authentic communication contexts.

Despite the importance of an integrated approach, Arabic language learning has traditionally relied heavily on teacher-centred instructional practices, with classroom activities often emphasising memorisation, repetition and passive learning. Such conventional approaches may contribute to low learner engagement and provide limited opportunities for meaningful communication (Zubair, 2025; Nurjannah et al., 2024; Zubair, 2026). In response to these limitations, researchers have increasingly investigated alternative pedagogical strategies, including language games, digital gamification and role-playing activities, to create more interactive and engaging learning environments. These approaches have been associated not only with increased learner satisfaction but also with greater active participation, collaboration and sustained motivation throughout the learning process (Nurjannah et al., 2024; Almelhes, 2024; Ghani et al., 2022).

In recent years, gamification has gained increasing attention in language education as a pedagogical approach for enhancing learner motivation, engagement and academic achievement. Existing research indicates that the incorporation of game-based elements into language learning can positively influence learners' motivation and engagement, particularly in areas such as vocabulary acquisition and grammar learning among non-native Arabic learners (Almelhes, 2024). In the Malaysian context, Ismail et al. (2023) reported that gamification has considerable potential for Arabic language education, although its implementation remains relatively limited. Their findings suggest that gamified learning environments can contribute to increased learner interest and confidence while supporting improved performance across different Arabic language skills. These findings highlight the potential of gamification as an alternative or complementary approach to conventional Arabic language instruction, particularly when designed to integrate listening, speaking, reading and writing within an interactive learning environment.

Scholars recognize gamification can improve the development of all four language skills, although instructional strategies different according to the specific skill. In listening skills, it is benefited from structured, progressive activities that guide learners through identification, imitation, comprehension and integrated listening-reading approach (Wahyuni et al., 2023). Speaking proficiency improves through communicative activities such as role-playing and gamified feedback, which have been shown to increase fluency, build confidence and reduce speaking anxiety (Zubair, 2025).

Reading skills are similarly enhanced through active learning strategies and game-based instructional media. Studies have documented improvements in oral reading performance and role-playing game (RPG)-based learning environments are regarded as both feasible and motivating for learners (Almsbhieen et al., 2023; Farhan et al., 2024). Writing skills also show positive outcomes when supported by gamified assessment and digital learning technologies. For instance, the Arab Point Games approach and the integration of ChatGPT with gamified

activities have significantly improved learners' writing performance and engagement (Naqi'ah & Arifah, 2025; Asikin et al., 2025).

Web Technology for Gamified Arabic Learning

Web technologies are now integral to modern language education, providing flexible access to learning materials, interactive activities and collaborative environments that support self-determined learning (Bizami et al., 2022; Chen, 2018). Gamification further enhances these environments by increasing motivation, engagement, and academic achievement compared to conventional teaching approaches (Chen, 2018; Temel & Cesur, 2024; Pradana et al., 2023). Additionally, educators benefit from features such as automated assessment, behavior tracking and real-time learning analytics, which simplify classroom management and support timely instructional decisions (Setiawan & Marliza, 2025; Barahona Mora, 2020; Jaysukhbhai et al., 2026).

New developments in educational technology have achieved this through the use of digital platforms, mobile applications, adaptive learning systems and artificial intelligence. Nowadays, e-learning systems at universities include multimedia resources, online tests and interactive exercises, which allow learners to practice their listening, speaking, reading and writing in more genuine and engaging manners (Ivanov et al., 2021). It has also been discovered that the use of multimedia and interactive technologies increases learners' creativity, their cognitive engagement and their motivation (Denisova et al., 2019). Replayable multimedia content, interactive writing exercises and genuine learning materials all help to encourage repeated practice and continuous engagement, especially in online learning environments (Ivanov & Korolchuk, 2020).

The web architectures currently in use, particularly those that make use of JavaScript frameworks and RESTful APIs, allow applications to be developed which provide personalised feedback, facilitate the ongoing monitoring of progress, and offer responsive learning experiences (Hellín et al., 2023; Lehinovych et al., 2025; Jaysukhbhai et al., 2026; Lu & Chen, 2024). Nevertheless, the literature repeatedly stresses that technology alone is not enough. If genuine learning outcomes are to be achieved, teachers have to successfully integrate game features, recognize student achievements, and actively encourage learner participation throughout the learning process (Mahmud et al., 2020; Villagrasa et al., 2014).

TAM and Self-Learning Foundation

In the field of educational technology, the well-known Technology Acceptance Model (TAM) states that perceived usefulness (PU) and perceived ease of use (PEOU) are factors which predict user adoption (Granić & Marangunic, 2019; Granić, 2022). When Self-Determination Theory is combined with this model, the satisfaction of the three basic needs (autonomy, competence and relatedness) - acts as a direct predecessor to both of the core TAM perceptions (Fathali & Okada, 2018; Alsubaie et al., 2025; Bali et al., 2024). A path analysis involving 162 language learners who used web-based e-portfolios showed that need satisfaction had a direct effect on both PU and PEOU, competence being the most significant factor (Fathali & Okada, 2018).

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A study with 1,298 undergraduate students with special needs showed that psychological needs accounted for 78.4% of the variation in ease of use and 85.2% of the variation in usefulness (Şahin & Yildiz, 2024). In the case of mobile language learning environments, when instructors address students' basic needs, need fulfillment and PEOU together account for 70.5% of the total variation in continuance intention (He & Li, 2023). Furthermore, a structural model based on data from 515 language students also proved that satisfaction of psychological needs has a significant predictive effect on both PU and PEOU, directly affecting ongoing user commitment (Yang & Lou, 2024).

The relationship between the Technology Acceptance Model (TAM) and self-directed learning is mutual. The ease with which technology is used directly contributes to an individual's capacity to regulate their own learning (Zheng et al., 2026; Alqurni, 2026). If educational software reduces technical difficulties, students experience greater AI-supported self-efficacy, which allows them to concentrate on setting their own goals and engaging in reflection rather than on navigating the platform (Alqurni, 2026). On the other hand, undergraduates who have stronger self-regulated learning skills always report higher levels of perceived usefulness and ease of use, thus establishing a mutually reinforcing cycle (Barz et al., 2024).

The processes involved are often influenced by affective and motivational factors. A study involving 409 vocational students showed that acceptance of technology had an indirect effect on self-regulation via learning interest (Sutirman et al., 2026). That said, there are differences depending on the context. Qualitative research shows that although digital educational platforms reliably help to enhance students' feelings of autonomy and competence, their capacity to satisfy the need for relatedness is less consistent than that provided by face-to-face teaching (Stalmach et al., 2025). Moreover, multigroup analyses have found that web-based self-learning environments lead to a significantly greater degree of autonomous attitudes in female undergraduates than in male undergraduates (García et al., 2024).

To sum up, the Technology Acceptance Model (TAM) is closely related to self-determined learning. According to Self-Determination Theory, the psychological factors that underlie users' adoption of educational systems are explained, whereas TAM addresses the usability beliefs that support continuous autonomous learning engagement.

Problem Statement

Arabic language education continues to face challenges in sustaining learner engagement, promoting active participation and effectively integrating technology into instructional practices. For non-native learners, Arabic can be particularly challenging due to the need to develop listening, speaking, reading and writing skills concurrently, while also acquiring knowledge of its complex phonological, morphological and syntactic structures (Haq et al., 2024; Murtadho & Amrullah, 2026; Faiqoh et al., 2025). These challenges can become more pronounced when instructional practices do not adequately accommodate the diverse linguistic and learning needs of students.

In many educational settings, Arabic instruction continues to rely predominantly on teacher-centred, translation-based and memorisation-oriented approaches. Although such approaches may support the transmission of linguistic knowledge, their extensive use can result in less engaging learning experiences and provide limited opportunities for learners to actively construct knowledge, practise communication and develop independent learning skills (Ghani

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EISSN: 2637-0905
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et al., 2022; Asfihani et al., 2025; Faiqoh et al., 2025). Consequently, students may assume a predominantly passive role in the learning process, with greater emphasis placed on examination performance than on developing practical communicative competence. This situation may also make it difficult for learners to connect classroom-based Arabic knowledge with authentic and real-life communication contexts (Ghani et al., 2022; Mubarak et al., 2023). Limited engagement and motivation may further affect learners' ability to acquire vocabulary, develop communicative competence and gain confidence in using Arabic actively (Mubarak et al., 2023; Ibrahim, 2025). This issue is particularly significant because effective language acquisition requires opportunities for meaningful interaction, contextualised practice and continuous learner engagement. Interactive and student-centred learning environments can provide learners with greater opportunities to practise language skills and participate actively in the learning process (Mubarak et al., 2023; Ibrahim, 2025).

Despite the increasing availability of educational technologies and digital learning approaches, a gap remains between the potential of technology to support Arabic language learning and its effective integration into pedagogical practice. In particular, there is a need for learning environments that can integrate the four core Arabic language skills - listening, speaking, reading and writing, while simultaneously providing interactive, engaging and learner-centred learning experiences. Addressing this gap is important for supporting more meaningful language practice, strengthening learner engagement and facilitating the development of communicative competence among non-native Arabic learners.

Recent research shows that digital technologies are able to overcome these difficulties by improving the interactivity, flexibility, and adaptability of Arabic language learning. E-learning platforms, mobile applications and gamified tools have been found to boost learner motivation, participation, enjoyment and overall learning results, as well as enable self-paced and personalized teaching (Haq et al., 2024; Faiqoh et al., 2025). Game-based and quiz-based approaches create more engaging and student-focused learning environments, help with the acquisition of vocabulary and grammar and encourage active classroom participation (Almelhes, 2024; Ghani et al., 2022; Gofur et al., 2025; Syihabuddin et al., 2026; Darmawansah et al., 2026; Ramli et al., 2025).

Yet the existing literature shows that present Arabic learning technologies and gamified platforms have not completely solved these problems. A great many of the digital resources focus mainly on beginners, provide only limited grammar teaching, neglect the productive language skills, or do not correspond to curricular aims and classroom teaching methods (Aljarf, 2026; Asfihani et al., 2025; Faiqoh et al., 2025). The implementation of these resources is also obstructed by infrastructure difficulties, unequal access, low levels of digital literacy among teachers, and a lack of adequate professional development, all of which reduce their effectiveness in educational settings (Haq et al., 2024; Syihabuddin et al., 2026; Rani et al., 2023; Sarah et al., 2024). Moreover, the evidence from wider gamification research is unclear if the design of the platform lacks pedagogical relevance or does not support engagement, usability, and the specific needs of the classroom (Luo, 2023; Sabilar & Fitria, 2026).

The fact that these gaps have been identified shows that there is a need for a more integrated and pedagogically appropriate method of learning Arabic. Since learner autonomy is a key aspect of this aim, structured guidance, constructive feedback and easy access to digital resources all help to promote independent learning, motivation, and proficiency in the language (Aljarf, 2026; Almelhes, 2025; Jabir et al., 2026). The platform in question should therefore

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include gamified engagement, feedback supported by teachers, a balanced development of the various language skills, learning activities that are situated in real-life contexts and agreement with the official curriculum outcomes (Almelhes, 2024; Asfihani et al., 2025; Haq et al., 2024; Murtadho & Amrullah, 2026; Rani et al., 2023).

Study Questions and Objectives

To address these issues systematically, this paper seeks answers to the following core questions:

1. What are the current pedagogical practices in Arabic language teaching and learning?
2. What gamification principles should be integrated into a web-based application to support listening, writing, reading and speaking skills in Arabic language teaching and learning?
3. What is the user acceptance level of the gamified Arabic language learning application based on perceived ease of use and perceived usefulness?

This paper aims to achieve these objectives: -

1. To investigate the current pedagogical practices in Arabic language teaching and learning.
2. To develop SmartEduArabic, a web-based application for supporting listening, writing, reading and speaking skills in Arabic language education using identified gamification principles.
3. To evaluate the user acceptance level of SmartEduArabic among Arabic language students and lecturers.

Methodology

Study Overview

SmartEduArabic integrates gamification to enhance learner engagement, foster autonomy, and promote self-paced, active participation. Students independently complete learning activities, monitor their progress and receive immediate feedback. Teachers manage classes, track student performance, record learning activities and assess learners through a centralised web-based platform. A relational database stores user information, learning records, assessment results, and achievement data, thereby enabling effective learning management.

The System Development Life Cycle (SDLC) was implemented using an Agile approach to design, develop and evaluate SmartEduArabic. Agile methodology was selected for its capacity to support iterative development, allowing the application to be continuously refined through regular testing and user feedback at each stage. The development process comprised two interrelated elements: the application of the Agile-SDLC cycle and the integration of gamification features into the learning platform. Development proceeded through brief, iterative cycles encompassing requirement analysis, design, feature development, testing, evaluation and revision. Each sprint yielded a functional application version informed by user feedback (Halimi et al., 2026; Suartana et al., 2024; Djutalov et al., 2024).

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This approach is particularly suited to educational systems, where institutional workflows and user expectations frequently evolve during development. Consequently, stakeholder input is incorporated at each cycle rather than deferred until project completion (Halimi et al., 2026; Djutalov et al., 2024; Tumbo & Tinambunan, 2026).

In research into language learning, the various gamification features tend to revolve around a limited number of fundamental elements: points, badges, leaderboards, feedback, progress tracking, levels, rewards, and challenges (Zhang & Hasim, 2023; Yuan & Abdullah, 2026; Patty & Matatula, 2025). Studies of gamified language platforms also indicate that immediate feedback and the ability to see progress are particularly important since they enable learners to keep an eye on their mistakes, follow their progress, and remain engaged when carrying out repeated practice (Shortt et al., 2021; Zhang & Hasim, 2023; Patty & Matatula, 2025).

SmartEduArabic was developed in accordance with the syllabus for TAC501: Introductory Arabic (Level III) at Universiti Teknologi MARA (UiTM) in Malaysia. The application was created to support the course's learning outcomes, which stress the improvement of the students' listening, writing, reading and speaking abilities. The system includes within it the learning material such as vocabulary, grammar, everyday conversations and cultural aspects and traditional teaching methods including blended learning, listening and reading activities, role-play, language enrichment activities and supervised learning have been turned into interactive web-based learning experiences.

Following the development phase, the application was evaluated using a Technology Acceptance Model (TAM) involving its intended users. The evaluation assessed users' acceptance of SmartEduArabic in terms of usability, functionality, ease of use and its effectiveness in supporting gamified Arabic language learning. The results were subsequently analysed to determine the suitability of the application for enhancing Arabic language teaching and learning.

Requirements Analysis

TAC501: Introductory Arabic (Level III) Course Review

This is the third-level Arabic language course offered at Universiti Teknologi MARA (UiTM) and the course information was approved in 2025. The course is designed to develop students' communicative competence by introducing Arabic vocabulary, grammar, common expressions and basic conversational skills in everyday situations. In addition to language proficiency, the course incorporates cultural elements to provide learners with a broader understanding of the Arabic language in authentic contexts. Learning activities emphasise the integration of the four language skills (listening, writing, reading, and speaking) to enable students to communicate using simple Arabic expressions at the CEFR Low A2 level.
At the end of the course, students should be able to:

1. Select essential information from short audio recordings in Arabic on everyday matters at CEFR Low A2 level (A3).
2. Respond to simple sentences and short texts, pictures, and dialogues on everyday matters in Arabic at CEFR Low A2 level (A3).
3. Practice basic interpersonal skills while interacting using simple Arabic sentences and phrases at CEFR Low A2 level (A3).

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The TAC501 syllabus consists of five thematic lessons that reflect common daily communication contexts, namely Travel (As-Safar), Services (Al-Khadamaat), Telecommunications (Al-Ittisaalaat), Occupation (Al-'Amal) and Health and Treatment (As-Sihah wa al-'Ilaaj). These topics progressively introduce learners to vocabulary, grammar, sentence structures and conversational expressions required for everyday communication.

The TAC501 course adopts a 100% continuous assessment approach consisting of three assessment components:

1. Group Project (40%) – Students complete a role-play activity in groups to demonstrate interpersonal communication skills in Arabic (CLO 3).
2. Listening Test (30%) – Students answer multiple-choice questions based on Arabic audio recordings to evaluate listening comprehension (CLO 1).
3. Writing Test (30%) – Students complete objective and subjective questions to assess grammar, vocabulary, reading comprehension, and writing skills (CLO 2).

During the requirement analysis phase, the course specification and classroom activities of TAC501: Introductory Arabic (Level III) were analysed to determine the instructional and system requirements for SmartEduArabic. The analysis was based on the course learning outcomes, syllabus content, teaching activities and assessment methods. The identified requirements provided the basis for transforming conventional classroom practices into a web-based gamified learning environment. These requirements were subsequently used to guide the system design phase, including the development of the application architecture, database, user interfaces and functional modules.

Design

In SmartEduArabic, these assessment components are embedded within the four modules through gamified activities. Listening, writing, reading and speaking exercises are designed to reflect the learning outcomes and assessment requirements of the TAC501 course. Learners receive immediate feedback together with points, badges and achievement rewards after completing each activity, while their learning progress and performance are automatically recorded for educators. This approach allows continuous monitoring of students' achievement while creating a more engaging, learner-centred and technology-enhanced Arabic language learning environment.

To enrich the learning experience, SmartEduArabic extends the original syllabus by incorporating an additional module on Numbers and Calculation, bringing the total number of learning modules to six. This supplementary topic complements the existing curriculum by reinforcing learners' comprehension of numerals and fundamental arithmetic operations, which are frequently encountered in everyday communicative contexts.

Table 1 presents the module design of SmartEduArabic. The system is organised into four language skill modules: listening, writing, reading and speaking. Each module integrates learning activities from all six lesson themes enabling learners to practise every topic through different language skills. This modular design ensures comprehensive coverage of the TAC501 syllabus while supporting the implementation of gamified learning activities within a web-based environment.

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Table 1: SmartEduArabic Gamification Modules and Components

Module	***Listening***	***Speaking***	***Reading***	***Writing***
Thematic Lesson	Travel Services Telecommunications Occupation Health and Treatment Numbers			

Implementation

In this stage, every lesson was turned into a series of web-based, gamified learning activities which include all four language skills. The listening exercises are aimed at improving audio comprehension, the speaking activities promote oral communication by involving practice of pronunciation, the reading activities help to build up vocabulary and text comprehension, and the writing activities work on grammar and sentence construction. The way the skills are integrated allows learners to practise all of them in realistic learning situations at the same time and encourages active participation as well as self-directed learning.

The graphical user interface (GUI) of SmartEduArabic was designed with a view to improving the overall user experience, giving special consideration to simplicity, consistency and ease of use according to Human–Computer Interaction (HCI) principles. English was chosen as the interface language since it is the common means of instruction and communication among the target users and thus enables them to navigate the application more easily. Even though the interface is in English, all the learning materials, exercises and assessments still concentrate on enhancing proficiency in the Arabic language.

Table 2 shows that the names of the language skill modules and the thematic lessons were changed so as to better reflect their learning objectives and to improve user understanding. This has the effect of increasing the overall usability of the application and at the same time maintaining consistency with the learning outcomes and the syllabus of the TAC501: Introductory Arabic (Level III) course.

Table 2: SmartEduArabic Module and Lesson Terminology

Modules				
Design Terminology	Listening	Writing	Reading	Speaking
SmartEduArabic Terminology	Listening Hub	Writing Hub	Reading Hub	Speaking Hub
Thematic Lesson				
TAC501 Design Terminalogy	Travel Services Telecommunications Occupation Health and Treatment Numbers			
SmartEduArabic	Exploration & Travel			

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Terminalogy	Services & Transactions Social & Communication Careers & Professions Health & Well-being Numbers & Calculations

The SmartEduArabic web application was successfully developed after the implementation phase. It was constructed using PHP, JavaScript, HTML/XML, MySQL, Google Text-to-Speech (TTS), Visual Studio Code and XAMPP. Furthermore, a relational database was put in place in order to manage user information, lesson content, quizzes, gamification activities, study sessions, class groups, student profiles, lecturer profiles and learning records.

The application has two kinds of users: Lecturers/Teachers and Students, each of which offers different functions in order to aid classroom teaching and learning. When registering, users must set up an account and choose their role before they can use the system.

The process of teaching and learning starts when the lecturer or teacher sets up an Academic Session and establishes a Class Workspace. This Class Workspace acts as the principal environment in which classroom activities are organised, students are managed and the learning material is presented. Once the class has been created, the students will be able to register and join the correct class by using the information given.

After students have enrolled, the lecturer will be able to manage the learning activities via the Skill Hub interface. Since each module includes the lesson activities which have been developed from the TAC501 syllabus, the lecturer can organise and keep an eye on students' learning during the course. The lecturer dashboard includes facilities for monitoring students' performance and their progress in their learning. It allows lecturers to obtain the assessment results, examine both individual and class performance, and keep track of the students' achievements for each class they have registered.

The system automatically keeps records of the students' scores according to their participation and performance in the gamified learning activities during the six thematic lessons. These records are stored in relation to the students' registered class, which enables lecturers to keep a continuous watch on learning progress and to assess students' achievements over the course. The way in which classroom management, learning activities and performance analytics are integrated allows SmartEduArabic to provide support for both instructional management and learner engagement on a single web-based platform.

In order to gain access to the gamified learning environment, students must first set up an account and then enrol in the class that has been set up by their lecturer or teacher. The enrolment process in the class makes it possible for students to be assigned to the right classroom for the semester, so that all of the learning activities and the assessment records can be linked to the correct lecturer.

Students who enrol in the wrong class or do not join the class that has been designated for them will not be able to take part in the activities of the intended classroom and their learning records will not appear in their lecturer's assessment. Once the enrolment procedure has been finished, the students are taken to the main dashboard.

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As shown in Figure 1, the interface gives access to the four language skill modules – Listening, Writing, Reading and Speaking. From the interface, access is provided to all four language skill modules: the Listening Hub, the Writing Hub, the Reading Hub and the Speaking Hub. The learning activities can be carried out either on their own or in accordance with the timetable set by the lecturer. Whether or not they follow the learning mode, the system automatically keeps records of the students' participation, achievements and assessment results for continuous monitoring during the semester.

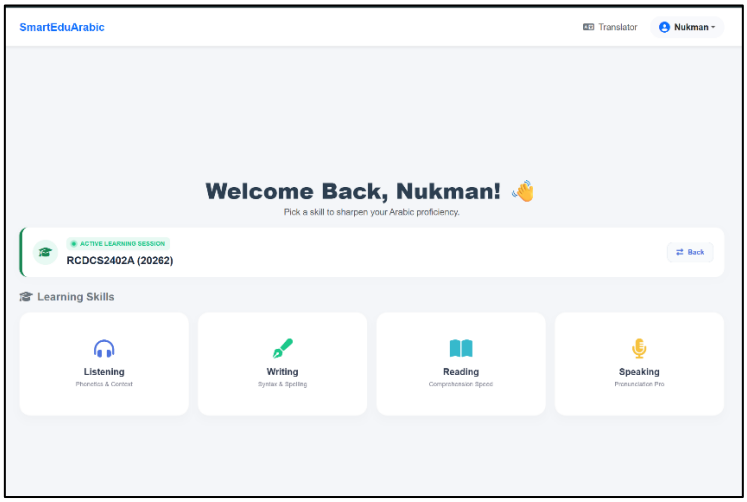
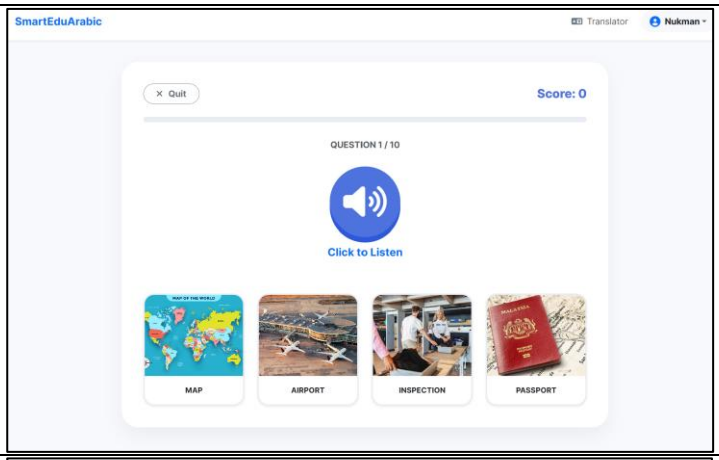
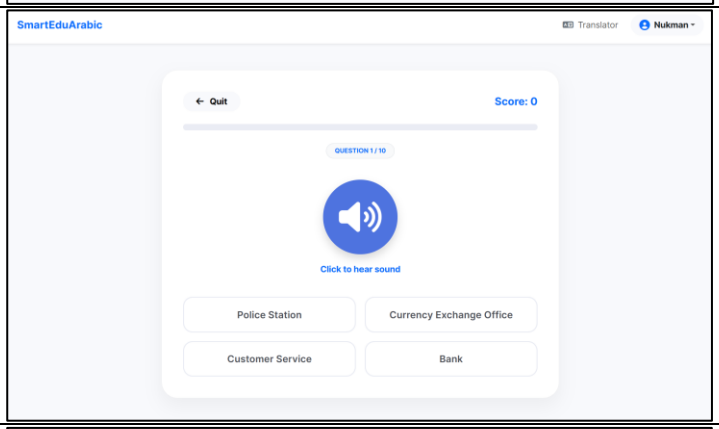
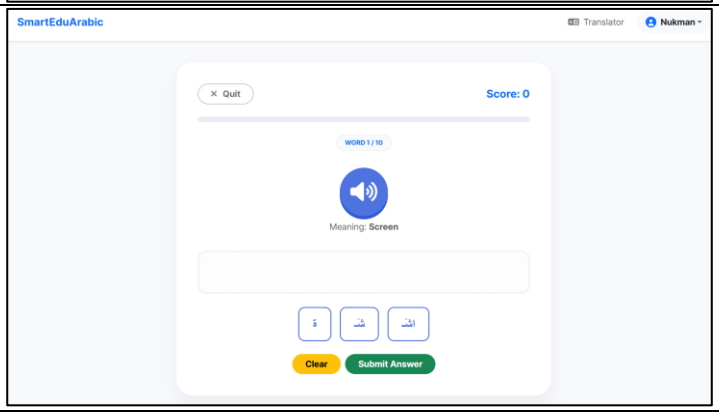


Figure 1: Student Learning Skills Module in SmartEduArabic

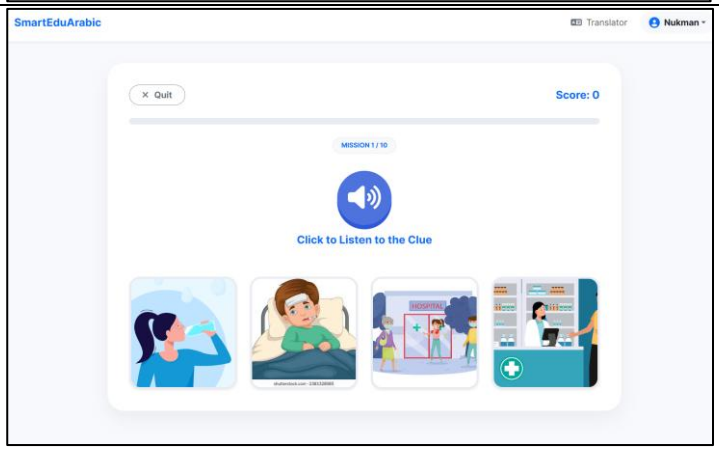
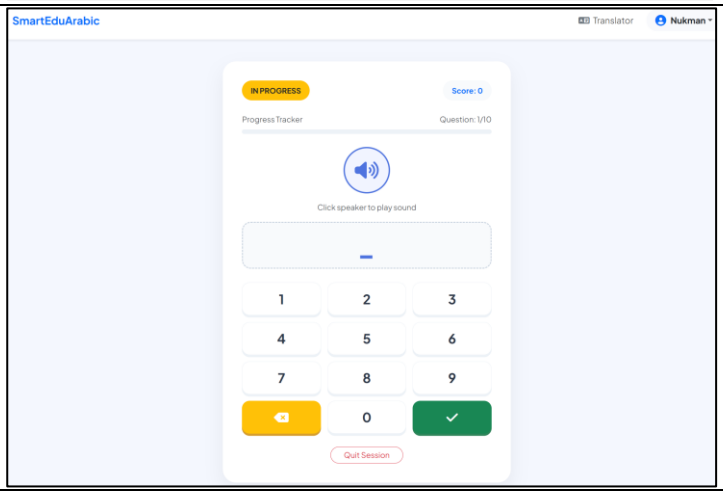
Gamified learning begins when students enter one of the language skill modules. Although each module covers the same six thematic lessons, the learning activities are specifically designed to develop the corresponding language skill. Tables 3–6 summarise the gamified learning activities implemented across the four language skill modules in SmartEduArabic. Each table presents the activities designed for a specific language skill module and its corresponding thematic lessons.

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Table 3. Gamified Learning Activities for the Listening Hub in SmartEduArabic

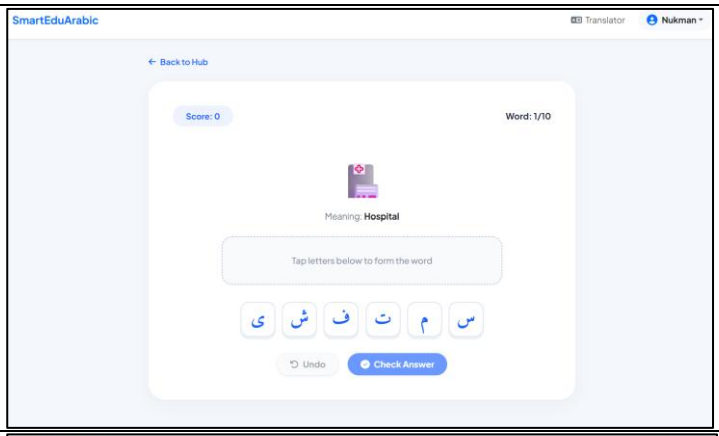
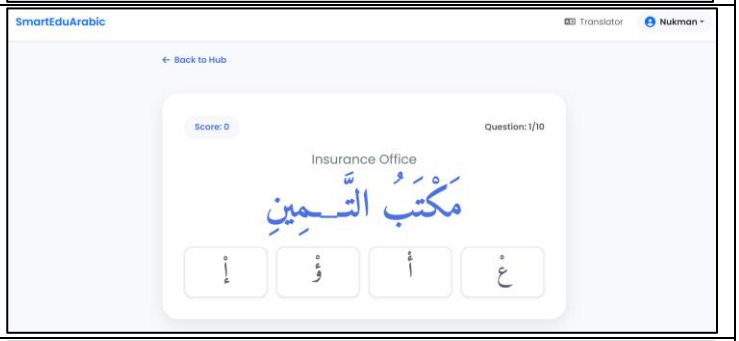
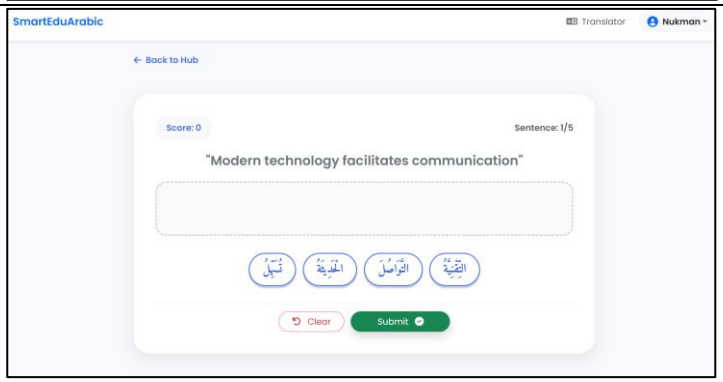
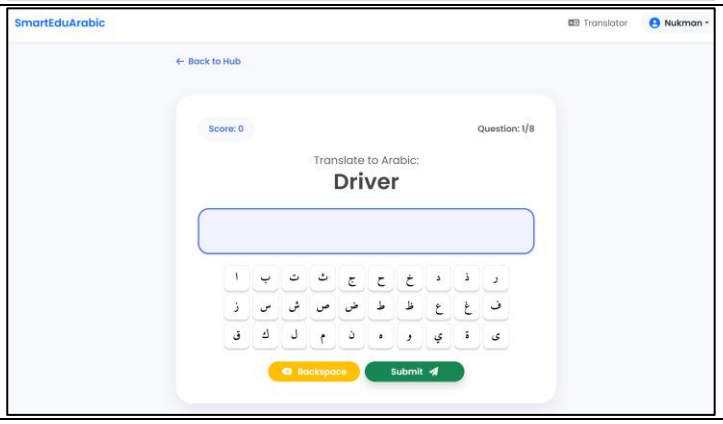
Thematic Lessons	Listening Hub	
	Game Activity	SmartEduArabic Gamification
Exploration & Travel	Listening Mission	
Services & Transactions	Audio Choice Mission	
Social & Communication	Syllable Match	

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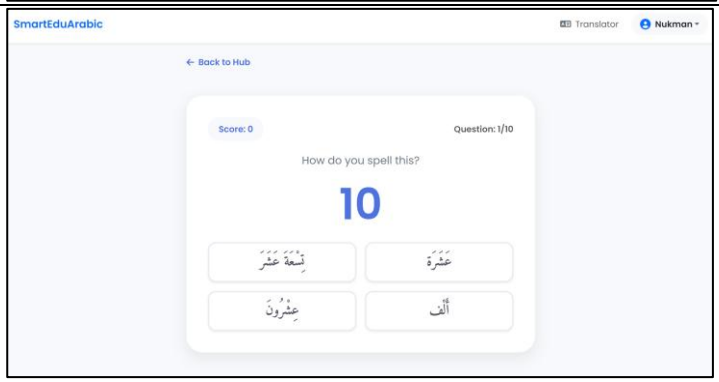
Careers & Professions	Word Pop	
Health & Well-being	Picture Detective	
Numbers & Calculations	Num Dictation	

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Table 4. Gamified Learning Activities For The Writing Hub In Smarteduarabic

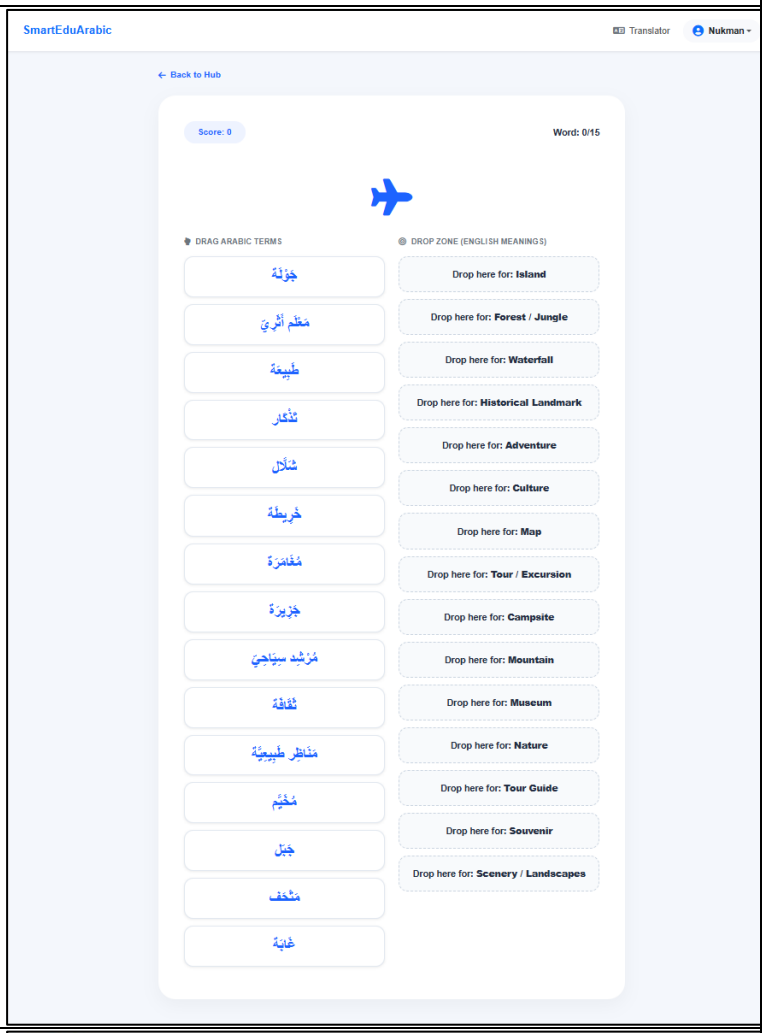
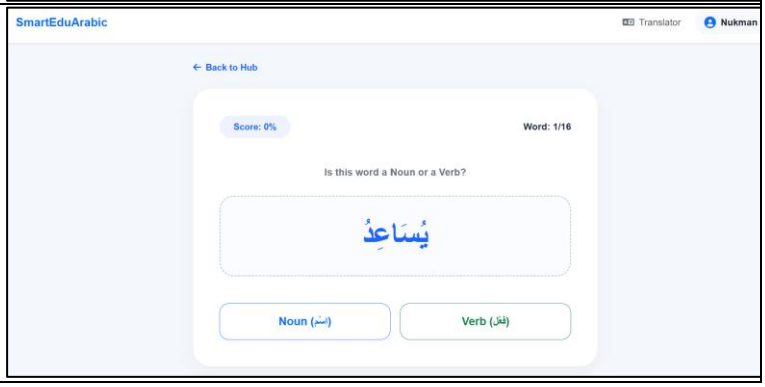
Thematic Lessons	Writing Hub	
	Game Activity	SmartEduArabic Gamification
Exploration & Travel	Word Builder	
Services & Transactions	Missing Letter	
Social & Communication	Sentence Scramble	
Careers & Professions	Translation Write	

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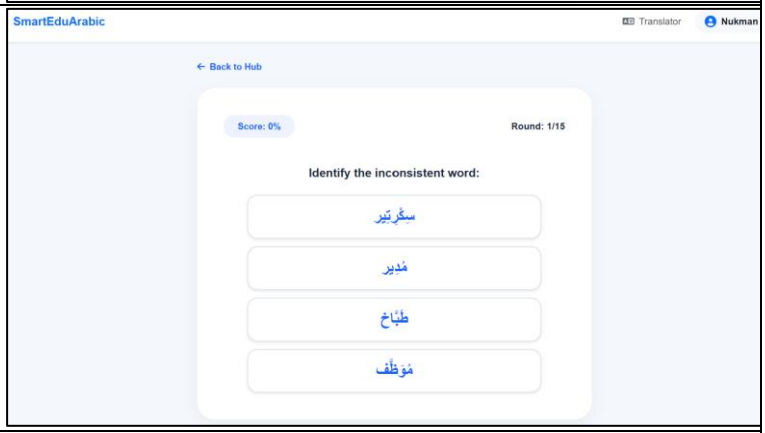
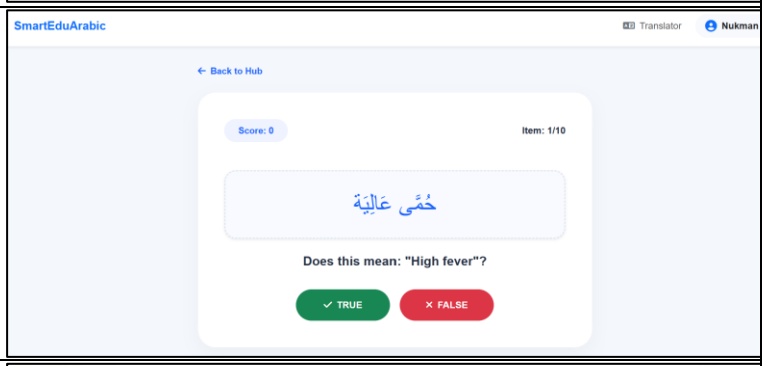
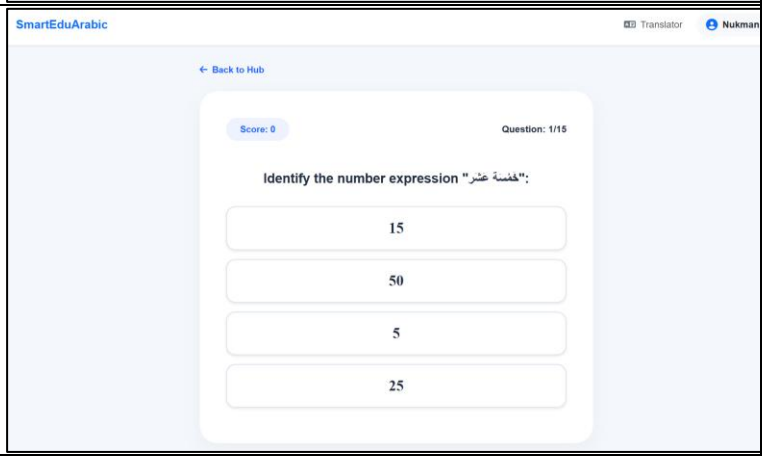
Health & Well-being	Harakat Master	
Numbers & Calculations	Number Spelling	

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Table 5. Gamified Learning Activities for the Reading Hub in SmartEduArabic

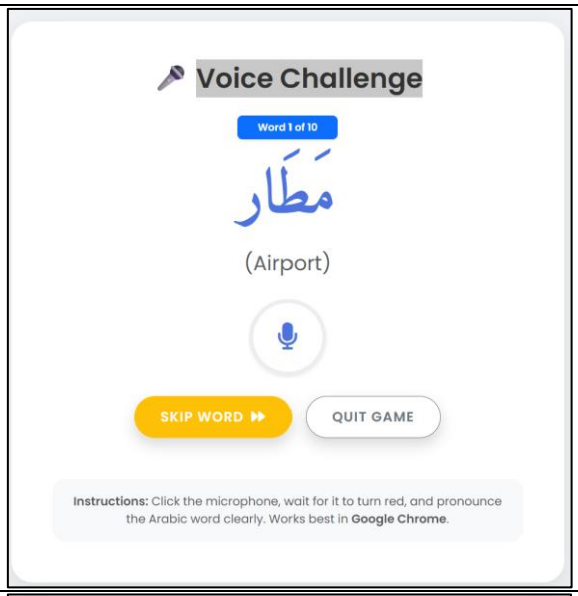
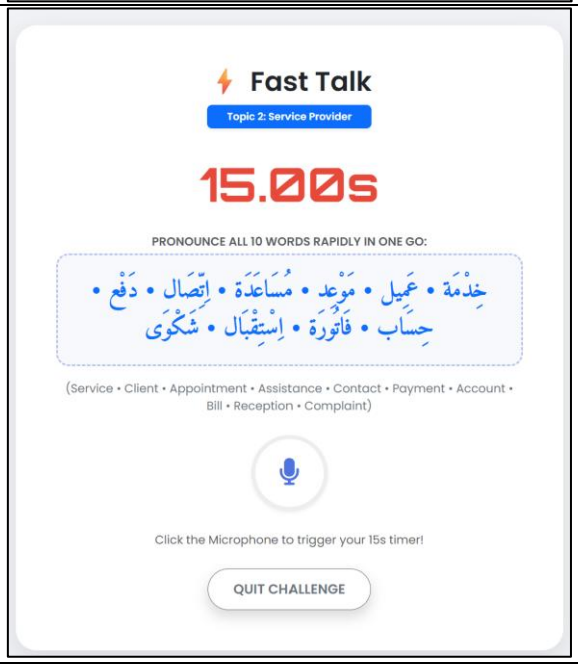
Thematic Lessons	Reading Hub	
	Game Activity	SmartEduArabic Gamification
Exploration & Travel	Matchword Challenge	
Services & Transactions	Grammar Sorting Challenge	

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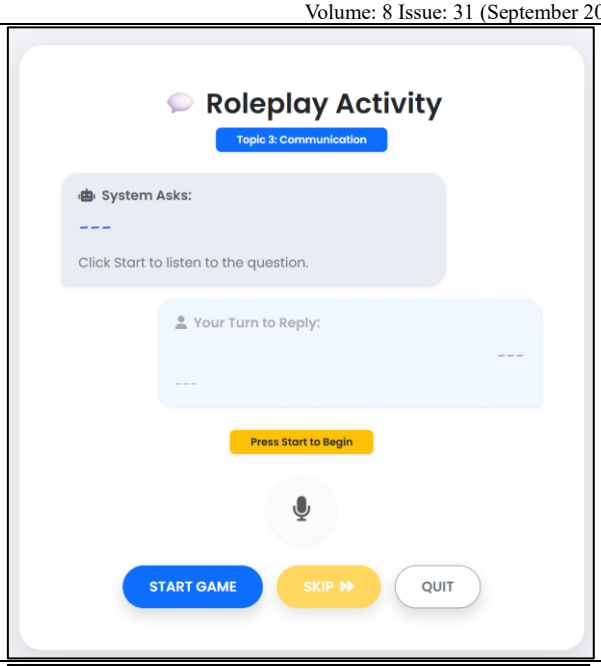
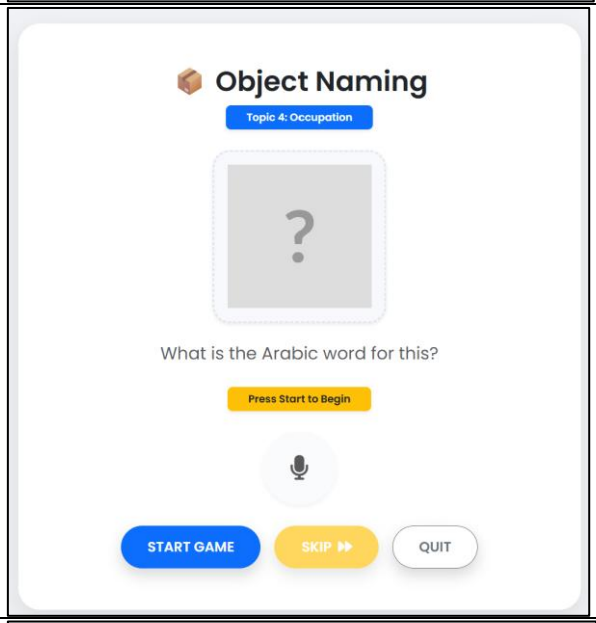
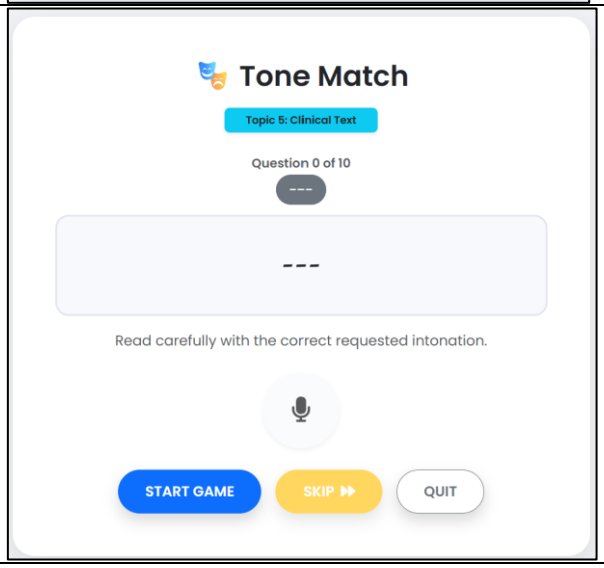
Social & Communication	Synonym Match	
Careers & Professions	Odd One Out	
Health & Well-being	Speed Read	
Numbers & Calculations	Numerical Data	

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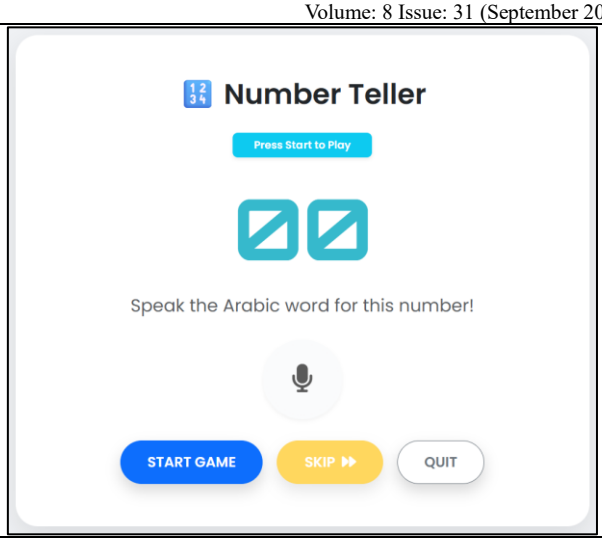
Table 6. Gamified Learning Activities for the Speaking Hub in SmartEduArabic

Thematic Lessons	Speaking Hub	
	Game Activity	SmartEduArabic Gamification
Exploration & Travel	Voice Challenge	
Services & Transactions	Fast Talk	

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Social & Communication	Roleplay Activity	
Careers & Professions	Object Naming	
Health & Well-being	Tone Match	

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Numbers & Calculations	Number Teller	

At the end of the semester, all completed activities are automatically compiled by the system and made available through the lecturer dashboard. Depending on the teaching plan, these activities may be used as formative classroom exercises or as part of the course's continuous assessment. The lecturer can review individual and class performance and export students' achievement records in Microsoft Excel format for each registered class. This functionality simplifies assessment management while ensuring that students' learning progress is systematically documented throughout the course.

Evaluation

The evaluation applied the Technology Acceptance Model (TAM), a framework which is widely used when judging users' acceptance of information systems. As stated by TAM, users' acceptance of a technology is mainly determined by Perceived Ease of Use (PEOU) and Perceived Usefulness (PU), these in turn affecting Attitude towards Using (ATT) and Behavioural Intention to Use (BI) (Davis et al., 1989; Chau, 1996; Malatji et al., 2020; Or, 2024). The four constructs were chosen in order to examine the usability, usefulness and acceptance of SmartEduArabic, a web-based gamified Arabic language learning platform.

The questionnaire was created by researchers from Universiti Teknologi MARA (UiTM) Cawangan Perlis and was sent out online through Google Forms. 53 people took part in the evaluation of the SmartEduArabic application, consisting of 47 students and 6 lecturers. The questionnaire was given to the students of UiTM Cawangan Perlis since TAC501: Introductory Arabic (Level III) is a compulsory course for all UiTM students. The six lecturers were interviewed face to face and used the application for about 10 to 15 minutes. Unlike the students, the lecturers assessed the classroom management features, which enable the setting up of group session classes and the monitoring of students' progress in the gamified activities. The questionnaire had two parts: the first gathered information on the respondents' demographic and background characteristics, and the second assessed user acceptance according to the four TAM constructs. The items were all evaluated using a five-point Likert scale, going from 1 (Strongly Disagree) to 5 (Strongly Agree). This section was intended to outline the characteristics of the people who took part in the study. Students and lecturers were asked to state which category they fell into, and lecturers were also required to give their teaching experience. Other background details collected included gender, computer literacy

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and any previous experience of using multimedia technologies for teaching and learning. This information gave an overview of the respondents who took part in the evaluation.

The second section was concerned with the evaluation of SmartEduArabic in terms of the four TAM constructs. This section evaluated SmartEduArabic by means of the four TAM constructs. Perceived Ease of Use (PEOU) looked at how easy users found the application to learn and to use. Perceived Usefulness (PU) dealt with users' views regarding the application's effectiveness in supporting the teaching and learning of Arabic. Attitude (ATT) looked at users' general opinions of the application and Intention to Use (BI) measured their readiness to carry on using SmartEduArabic in the future. The questionnaire items for each construct are given below:
Perceived Ease of Use (PEOU)

1. [PEU1] I think it is easy for non-native speakers and lecturers to explore the content and obtain vocabulary knowledge using SmartEduArabic as a learning tool.
2. [PEU2] I assume interaction with SmartEduArabic is clear and understandable.
3. [PEU3] I believe interacting with SmartEduArabic does not require much effort for non-native speakers and lecturers.
4. [PEU4] I assume non-native speakers and lecturers are able to use SmartEduArabic independently.
5. [PEU5] Overall, I believe SmartEduArabic is easy to use both in the classroom and at home.

Perceived Usefulness (PU)

1. [PU1] SmartEduArabic would improve my understanding of the subject.
2. [PU2] SmartEduArabic would enhance my effectiveness in the learning process.
3. [PU3] SmartEduArabic would be useful as a tool to support Arabic language teaching and learning.

Attitude (ATT)

1. [ATT1] I like the idea of using SmartEduArabic as a learning tool.
2. [ATT2] I have a generally favourable attitude towards using SmartEduArabic.
3. [ATT3] I believe using SmartEduArabic for teaching and learning is a good idea.

Intention to Use (BI)

1. [BI1] Assuming I have access to SmartEduArabic, I intend to use it as my learning tool.
2. [BI2] SmartEduArabic would become one of my preferred applications for learning Arabic.

The responses collected from both lecturers and students were analysed to determine the level of user acceptance of SmartEduArabic across the four TAM constructs. The evaluation findings provide empirical evidence of the application's usability, perceived usefulness, users' attitudes and intention to use, thereby demonstrating the suitability of SmartEduArabic as a web-based gamified platform for supporting Arabic language teaching and learning.

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Result and Discussion

Demographics and Background

53 people took part in the evaluation of SmartEduArabic, consisting of 48 students (90.57%) and 5 lecturers (9.43%). By including both groups, it was possible to obtain feedback from the main users as well as from the teachers who are in charge of classroom management.

The people who gave responses as lecturers had a variety of amounts of teaching experience: one person had between 1 and 3 years, another had between 4 and 6 years, a third had between 7 and 9 years, and two had over 10 years' experience. The rest of the respondents were undergraduate students and therefore did not have any teaching experience.

Of the participants, 58.0 per cent (that is, 29 people) were female and 42.0 per cent (21 people) were male. The majority of the respondents stated that their level of computer literacy was moderate (60.0 per cent, or 30 people), then came those who were experts (30.0 per cent, or 15 people) and finally the basic users (10.0 per cent, or 5 people). Furthermore, 86.0 per cent (43 people) had prior experience using multimedia technologies in the context of teaching and learning, while only 14.0 per cent (7 people) had no such experience. The fact that these results show is that the sample had enough digital competence to assess a web-based learning application such as SmartEduArabic.

TAM Analysis Result

The analysis focused on four TAM constructs: Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Attitude (ATT) and Intention to Use (BI). The questionnaire items were measured using a five-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Descriptive statistical analysis was performed using frequency, percentage, mean (M) and standard deviation (SD) to examine the respondents' perceptions of each TAM item. Table 7 presents the results of all TAM items based on the descriptive and reliability analyses.

Table 7. Descriptive Statistics of TAM Items

TAM Construct	Item	Mean (M)	SD	Interpretation
Perceived Ease of Use (PEOU)	PEU1	4.19	0.65	High
	PEU2	3.92	0.73	High
	PEU3	4.04	0.71	High
	PEU4	3.91	0.56	High
	PEU5	4.09	0.74	High
Perceived Usefulness (PU)	PU1	4.32	0.58	Very High
	PU2	4.23	0.70	Very High
	PU3	4.36	0.62	Very High
Attitude (ATT)	ATT1	4.17	0.70	High
	ATT2	4.19	0.59	High

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	ATT3	4.25	0.62	Very High
Intention to Use (BI)	BI1	4.21	0.60	Very High
	BI2	4.17	0.61	High

Note. N = 53. Mean interpretation: 1.00–1.80 = Very Low; 1.81–2.60 = Low; 2.61–3.40 = Moderate; 3.41–4.20 = High; 4.21–5.00 = Very High.

Perceived Ease of Use (PEOU)

The results of the PEOU survey show that the respondents found SmartEduArabic easy to use. As presented in Table 7, the mean scores for the five PEOU items varied between 3.91 and 4.19, all of which fell into the High category. Item PEU1 had the highest mean score (M = 4.19, SD = 0.65), indicating that the users found it easy to explore vocabulary-related content. This is further confirmed by the large number of Agree or Strongly Agree answers. PEU5 came second in terms of mean score (M = 4.09, SD = 0.74), which means that the respondents regarded SmartEduArabic as appropriate for use both in the classroom and at home. Although PEU4 had the lowest mean (M = 3.91, SD = 0.56), it still belonged to the High category. In general, the respondents believed that SmartE

Perceived Usefulness (PU)

Of the four constructs in the Technology Acceptance Model (TAM), perceived usefulness (PU) had the highest item mean scores. The three items relating to PU varied from 4.23 to 4.36 and were all rated as Very High. PU3 had the highest mean (M = 4.36, SD = 0.62), which shows that the respondents saw SmartEduArabic as a valuable tool for supporting the teaching and learning of Arabic. PU1 also obtained a high mean score (M = 4.32, SD = 0.58), proving that the respondents believed the application had great potential to improve their understanding of the subject. PU2 had a mean of 4.23 (SD = 0.70), further showing that the respondents viewed the application favourably with regard to the learning process. Taken together, these findings show that the respondents clearly recognised the usefulness of SmartEduArabic.

Attitude (ATT)

The findings from the ATT scale show that the respondents generally had a positive opinion of SmartEduArabic, the mean scores lying between 4.17 and 4.25. Specifically, ATT1 had a mean score of 4.17 (standard deviation = 0.70) and ATT2 obtained a mean of 4.19 (standard deviation = 0.59); in both cases the items were rated as High. ATT3 attained the highest mean score (M = 4.25, SD = 0.62) and was classified as Very High. This shows that the respondents held a favourable attitude towards using SmartEduArabic for teaching and learning. The overall results indicate that the respondents kept a positive attitude towards the application and its possible use in the learning of the Arabic language.

Intention to Use (BI)

The findings from the behavioural intention (BI) survey show that the respondents had a positive attitude towards using SmartEduArabic. BI1 had a mean score of 4.21 (SD = 0.60), which was categorised as 'Very High' and shows a strong intention to use SmartEduArabic as a learning tool should it be available. BI2 obtained a mean of 4.17 (SD = 0.61) and was classified as 'High', indicating a similarly positive view of the application as an possible

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educational resource. The small difference between the two mean scores suggests that the respondents' answers were consistent for both of the intention-to-use questions. Taken together, the results point to a generally favourable intention among the respondents to use SmartEduArabic.

Conclusion

The study created and assessed SmartEduArabic, a web-based, gamified learning program intended to assist with the TAC501 Introductory Arabic (Level III) course at UiTM. The evaluation based on the Technology Acceptance Model (TAM), which involved 53 participants, showed a high level of user acceptance, the 13 items all having mean scores ranging from 3.91 to 4.36. The aspect of Perceived Usefulness was rated the highest, especially in respect to the way in which SmartEduArabic supports the teaching and learning of Arabic (mean = 4.36, standard deviation = 0.62).

In general, the results indicate that the respondents thought the application to be useful and easy to use, had a favourable attitude towards it and showed a positive intention to use it.

SmartEduArabic provides lecturers with a digital platform which supplements the activities that currently take place in the classroom by allowing students to practice at their own pace, enabling formative assessment, facilitating progress monitoring and increasing classroom engagement. Yet, these results should be understood as indicating only user acceptance and not as proof of an improvement in Arabic proficiency, motivation or learning outcomes, since the study did not directly examine any gains in learning.

The study is also hindered by its relatively small sample size and the fact that it concentrates on a single course at one institution, which may limit the generalisability of the results. Later research should involve larger and more diverse samples and include direct measures of learning achievement in order to more fully evaluate the educational impact of SmartEduArabic.

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Acknowledgements: The authors would like to express their sincere gratitude to UiTM Cawangan Perlis for providing the necessary resources and support throughout the course of this research. Special appreciation is extended to colleagues and peers who contributed valuable insights and constructive feedback, which greatly enhanced the quality of this paper.

Funding Statement: No Funding

Conflict of Interest Statement: The authors declare that there is no conflict of interest regarding the publication of this paper. All authors have contributed to this work and approved the final version of the manuscript for submission to the International Journal of Modern Education (IJMOE).

Ethics Statement: This study was conducted in accordance with ethical research standards. All procedures involving human participants were reviewed and approved by the UiTM Research Ethics Committee, approval number REC-ERC 153/2026. Informed consent was obtained from all participants prior to data collection. Participation was voluntary and respondents were assured of confidentiality and anonymity. The data collected were used solely for academic purposes.

Author Contribution Statement: All authors contributed significantly to the development of this manuscript. Noorfaizalfarid Mohd Noor was responsible for the conceptualization, methodology and overall supervision of the study. Melissa Qistina Mohamad Fazeli involved in handled requirements analysis, application design and development. Both are contributed to the literature review, drafting and critical revision of the manuscript. All authors read and approved the final version of the manuscript prior to submission.

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