

EVALUATION OF A GAMIFIED DRILL AND PRACTICE MOBILE APP FOR USE-OF-ENGLISH IN NIGERIA UNIFIED TERTIARY MATRICULATION EXAMINATION

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Abstract

This study evaluated a gamified drill and practice mobile application developed to enhance students' mastery of the Use-of-English component of Nigeria's Unified Tertiary Matriculation Examination (UTME). The mobile app, designed using the Octalysis Gamification Framework and past Joint Admission and Matriculation Examination questions of Use-of-English, was developed through the ADDOE model which is an adaptation of the ADDIE instructional design model that incorporates the Octalysis phase. Evaluation of the app involved both expert assessment and student testing. Educational Technology and English Language experts assessed the app for content validity, usability, functionality, and pedagogical soundness. A quasi-experimental design was also adopted involving 223 UTME candidates selected using snowball sampling technique. Data were gathered through expert rating scales, a Use-of-English performance test, and a learner engagement questionnaire. Findings revealed high expert ratings across all dimensions. Participants showed improved performance between the pretest and posttest, showing higher motivation and significant improvement in post-test scores. The study concludes that the gamified app is a valid and effective instructional tool for UTME preparation and recommends its integration in language tutorial programs.

Keywords: Gamification, Drill and Practice, Use-of-English, UTME, Octalysis Framework, Expert Evaluation.

Introduction

Drill and Practice is an instructional practice that can be used to promote the acquisition of skills and knowledge through repetition of instruction items or contents. It is a behaviourist aligned technique in which students are given the same materials repeatedly until mastery is achieved (Ayres 2020). In each iteration, students are given similar questions to answer or activities to perform, with a certain percentage of correct responses or actions moving the student to the next level of difficulty. Drill and Practice is an important type of computer assisted instruction and it provides opportunities for students to repeatedly practice the skills that have previously been presented and that further practice is necessary for mastery.

Drill and practice software provides activities in which students engage with example items, usually one at a time, and receive feedback on their correctness. These software applications differ in the type of feedback they deliver in response to student input. Rooted in educational theories, drill and practice strategies focus on delivering information to aid students in acquiring and retaining knowledge and skills. They are applicable across various learning contexts, assuming that initial instruction and guidance have already taken place (Gee & Umar, 2014). The process is akin to tutorials, with the key difference being the selection of items instead of the presentation of information in the subsequent step. Feedback and assessment are tailored to the item and its associated behaviours. When digitalized, Drill and Practice can deliver adaptive practice, immediate feedback, and self-paced learning (Liu, 2024). Despite criticisms of being mechanical, when gamified, it can motivate learners to practice more frequently and meaningfully (Gee, 2020).

The effectiveness of the Drill and Practice instructional package relies heavily on students' deliberate engagement. Whether they're preparing for exams or pursuing learning goals, students must

commit to daily effort, actively engaging with the package's content, answering questions, and repeating the learning process. Deliberate practice entails students consistently striving to surpass their previous performances, requiring sustained dedication to improvement. This involves regularly allocating quality time to practicing exercises within the instructional package, as highlighted by Mlumun et al (2021). Integration of gaming elements into an instructional package can serve as a motivational tool for students to engage in deliberate learning practice. Research by Alsawaier (2018) suggests that students exposed to gamified learning environments demonstrate enhanced persistence, continuing their learning journeys over time as game-based elements such as challenges, feedback loops, and progressive rewards motivate them to push through failure. Within gamified learning environments, self-direction becomes essential and is cultivated through gameplay. Furthermore, gamified instruction fosters the development of social skills and encourages students to become more self-directed learners.

Gamification involves strategically incorporating elements from games into various systems, services, organizations, and activities to simulate the engaging experiences found in gaming, aiming to motivate and engage users. It entails integrating game features into contexts outside of gaming to foster motivation and engagement, particularly in learning settings (Zirawaga, Olusanya & Maduku, 2017). Components such as player statistics, rules, badges, points, leaderboards, quests, prompts, and feedback have been examined for their potential to enhance training design and encourage deliberate engagement in instruction. Dale (2014) defined gamification as the application of typical gaming elements like rules, scoring, and competition to other areas to engage users in problem-solving. Similarly, Smith and Abrams (2019) described gamification as applying game mechanics, aesthetics, and thinking to engage people, motivate action, and facilitate learning.

Gamification can be used in many different contexts (Valamis, 2021). Businesses often apply gamification to employee training, recruitment, evaluation, and organizational productivity. Gamification elements can be applied to development of instructional packages and applications in different curriculum subjects to motivate learners' active participation and deliberate learning. Figueroa-Flores (2015) identified gamification tools like Duolingo, Edmodo, Class Dojo, Brainscape, and Socrative that can be utilised to teach English Language as a second language to non-English speakers as effective and motivating. Likewise, Zirawaga Olusanya and Maduku (2017) designed games such as word search, crossword, jigsaw puzzle, brain teasers and sliding puzzle using an open-source tool called ProProfs to teach History Lessons.

Gamified drill and practice instructional package operate on principles of active learning, wherein students have specific learning objectives and increased motivation, both intrinsic and extrinsic, to complete their tasks (Kalogiannakis, Papadakis & Zourmpakis, 2021). This approach supports scientific inquiry and enhances learners' cognitive abilities and higher-order thinking skills (Hugerat & Kortam, 2016). Moreover, gamification applications offer insights into learners' progress or examination candidates' readiness in a non-intrusive manner. The applications can collect real-time data, provide feedback, and offer a more comprehensive understanding of students' progress and characteristics compared to traditional assessment methods. This is achieved through embedded real-time tracking mechanisms such as points, levels, internet cookies, and eye-tracking (Tulloch & Randell-Moon, 2018). These advanced assessment techniques have the potential to furnish teachers and tutors with a thorough

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and holistic assessment of candidates' preparedness for an examination, including the administration of mock exams.

English language proficiency plays a decisive role in Nigeria's educational system as the medium of instruction, communication, and academic assessment. Performance in the Use-of-English paper of the Unified Tertiary Matriculation Examination (UTME) has, however, remained persistently low (JAMB Chief Examiner's Report, 2023). Common weaknesses include inadequate comprehension, limited vocabulary, and weak grammatical accuracy (Ogunmodede & Afolayan, 2019). Traditional methods of preparing for the Use-of-English examination such as printed past questions and rote memorization often fail to sustain learners' interest or improve higher-order language skills. With the increasing adoption of mobile learning technologies, gamified instructional tools have emerged as effective means to promote engagement and mastery (Dichev & Dicheva, 2017; Hamari et al., 2014). Gamification integrates game mechanics such as points, rewards, leaderboards, and feedback into learning tasks, thereby transforming passive study habits into active, engaging experiences.

This study developed and evaluated a Gamified Drill and Practice Mobile Application for Use-of-English in UTME, guided by the Octalysis Framework (Chou, 2015) and the ADDOE model—an adaptation of the ADDIE instructional design model that incorporates an additional gamification phase. The ADDIE model is a widely-used instructional design model that guides the development of instructional applications. The model stands for Analysis, Design, Development, Implementation, and Evaluation. Each stage of the model is important in creating an effective instructional application (Nwokocha, Gambari & Tukur 2020). During the analysis phase, the researcher examines the needs of the learners and the learning environment, as well as the goals and objectives of the instructional application. During the design phase, a prototype of the app was produced and evaluated using an adapted App Checklist for Educators (ACE) from the study of Lubniewski, McArthur & Harriott (2018). The validation results and feedbacks were used to develop the app for proper implementation among the UTME candidates.

Objectives

The specific objectives of the study are to:

1. Design and develop a gamified drill and practice mobile app for Use-of-English examination practice based on the Octalysis gamification framework and ADDIE instructional design model.
2. Determined expert ratings of the developed App by experts in Educational Technology and English Language specialists.
3. Evaluate the effectiveness of the app in promoting performance among prospective UTME candidates.

Research Questions

The following research questions guided the study:

1. How was the gamified drill and practice mobile app for Use-of-English designed and developed using the ADDIE model and Octalysis framework?
2. What are Educational Technology and English Language experts' ratings of the developed mobile app?
3. What is the effect of using developed gamified drill and practice Instructional App among prospective UTME candidates?

Materials and Methods

A mixed-method quasi-experimental design was employed. Quantitative data were derived from pre-test/post-test results and expert ratings, while qualitative feedback from experts and learners enriched interpretation. The population for this study consists of all the students that are preparing to write the English Language examination in the Unified Tertiary Matriculation Examination (UTME) organised by Joint Admission and Matriculation Board (JAMB). The Target Population for this study are students who have enrolled in private tutorial centres for instructions on the UTME English Language curriculum in Kwara State. This selection of candidates that are enrolled in tutorial centre is because of the need for instruction before a Drill and Practice instructional package can be used. Also, there is guarantee that all the users of the Drill and Practice package are UTME candidates, preparing for their examinations. The exponential non-discriminative snowball sampling technique was utilised to select samples that are needed to generate data needed for the study. The study started with sample size of 12 candidates and grew to 223 by the 6th week who had finished the 30th Drill as at the end of the sixth week which was the end of data collection period.

This study utilised these instruments:

- i. Gamified Drill and Practice Mobile App - The app was built with the Octalysis motivational framework, integrating points, badges, leaderboards, time-limited challenges, and instant feedback. It included over 800 validated JAMB Use-of-English past questions (2010–2023), categorized by comprehension, lexis, and structure. Its design followed the ADDOE process, ensuring alignment between learning objectives, content, and game mechanics.
- ii. Expert Evaluation Checklist - The rating form is an adapted App Checklist for Educators (ACE) from the work of Lubniewski *et al* (2018). ACE was developed and tested with a variety of educational groups, with the goal of identifying the key criteria for evaluating an app for classroom or student use. The ACE rubrics were developed to validate the suitability and usability of the Application developed for the study participants. The rating instrument evaluates the characteristics and interests of app users, the design features, connection to curriculum, and instruction features. This study added the gamification elements of Octalysis to the rating forms for experts to determine their appropriateness in the study.
- iii. Use-of-English Performance Test (UEPT) - A 40-item multiple-choice test derived from standardized past JAMB multiple choice questions, reviewed by two language education experts used for the pretest and posttest.

The study proceeded in three stages:

1. Expert Validation Phase: The app prototype was presented to experts for evaluation. Their quantitative ratings and qualitative suggestions were used to refine the interface and content.
2. Experimental Phase: Students were administered a pre-test – which was a set of 40 multiple choice questions selected from the set of questions banked for the app, followed by six weeks of app engagement sessions. The participants used the app at their will and 30 minutes daily under supervision of the tutor.
3. Post-test: A post-test which was a reshuffled version of the Pretest was administered to the participants to obtain a post treatment performance.

Results and Discussions

Research Question 1: How was the gamified drill and practice mobile app for Use-of-English designed and developed using the ADDIE model and Octalysis framework?

The development of the Gamified Drill and Practice Mobile App (GaDPIA) for the Unified Tertiary Matriculation Examination (UTME) Use-of-English was guided by combining the ADDIE instructional design model and Yu-Kai Chou's Octalysis Framework for Gamification. The ADDIE model (Analysis, Design, Development, Implementation, and Evaluation) provided a structured and systematic process for creating the application, ensuring

alignment between instructional goals, user experience, and technological functionality. The development phases are detailed as follows -

Analysis Phase:

During the analysis phase, the goals, objectives, and instructional requirements of the GaDPIA were defined. The primary goal was to develop a mobile application that would serve as an interactive preparatory tool for candidates sitting for the JAMB UTME Use-of-English examination. The objective was to enhance learners' motivation and engagement through gamified drill and practice exercises, thereby promoting deliberate and sustained learning behaviour. To achieve this, selected gamification elements such as Epic Meaning & Ownership, Accomplishment, Challenge & Competition, Empowerment, Social Influence, Tokens, Rewards, and Avoidance were adapted from the Octalysis framework to serve as motivational drivers within the app.

The content of the application comprised JAMB UTME Use-of-English past questions from 2010 to 2023. These items were chosen because they had undergone prior validation by the examination body, ensuring reliability and appropriate difficulty levels. In addition, English Language experts reviewed and validated all question items and answers to guarantee accuracy, relevance, and alignment with current UTME standards.

Design Phase:

The design phase integrated principles from both DBR and ADDIE, emphasizing the creation of a prototype that combined instructional design with game mechanics. The prototype included basic interface structures, navigation flow, question layouts, and sample content drawn from validated past UTME questions. Key gamification features such as points, levels, badges, leaderboards, and reward systems were incorporated to promote engagement, persistence, and competition among users. The interface was designed to be visually appealing through the use of colour, icons, and animations that enhance user experience and reduce cognitive load.

In addition, a reaction questionnaire was designed to measure user perceptions of the embedded gamification elements, evaluating the extent to which each element contributed to engagement and motivation. The design also integrated an adaptive progression system, enabling learners to advance from 30-question sessions to 60-question sessions as they improved in proficiency. A built-in feedback mechanism was also developed to provide users with immediate responses to incorrect answers upon submission, thereby reinforcing learning through formative feedback.

Development Phase:

The development phase involved the actual construction of the GaDPIA platform, optimized primarily for Android mobile devices due to their accessibility and widespread use among Nigerian students. This phase focused on both content integration and technical functionality.

Using appropriate software development tools, the interface was designed to ensure smooth navigation, easy usability, and minimal loading time. The content database included comprehensive sets of JAMB Use-of-English past questions, classified according to the examination's key areas - Comprehension, Lexis and Structure, and Oral English. All validated items and answers were uploaded to the platform, while attention was paid to consistency in question formatting, readability, and responsiveness across devices. The user interface underwent iterative revisions based on expert and peer feedback before deployment.

Implementation Phase:

In this phase, the developed application was deployed among UTME candidates enrolled in tutorial centres within the Ilorin metropolis. The snowball sampling technique was adopted to expand participation, resulting in a total of 223 users who downloaded and interacted with the application. Snowball sampling serve as an effective technique for identifying participants in the study focused on the development and evaluation of a gamified drill-and-practice instructional application for JAMB Use of English, because the target population includes specific subgroups of learners who are not easily accessible through formal lists as they are enroled in different tutorial centres across town.

The process begins by selecting a small group of initial participants, often referred to as "seeds," who meet

the study's criteria, students currently preparing for JAMB familiar with JAMB Use-of-English demands from a particular tutorial center A. These initial participants are introduced to the study, and after their consent, they are asked to share the application to other potential participants who share similar characteristics. This chain-referral process expands the sample progressively, enabling the researcher to access a larger pool of JAMB candidates who may be studying privately, attending tutorial centers, or preparing informally in communities that do not have centralized records. Through this referral-based mechanism, the sampling procedure becomes particularly useful during the evaluation phase of the gamified app, where user testing, feedback collection, and usability assessment are required from authentic JAMB candidates.

As participants recommend others within their networks, the researcher gains access to diverse learners with varying proficiency levels, learning habits, and digital experiences, which enriches the evaluation data. Snowball sampling therefore allows the study to gather realistic insights on how different categories of JAMB users interact with the gamified application, how effectively they respond to game elements such as points, badges, feedback, or levels, and how the app supports their drill-and-practice needs. This approach ultimately ensures that the developed instructional application is tested in a naturalistic and representative learner environment, strengthening its validity and practical relevance. Participants were informed about the dual purpose of the app which were to serve as a learning tool and as part of an ongoing research project. The participants consented to participate in the study and were provided with weekly reminders to engage with the app.

To strengthen user engagement and reflect the Octalysis core drives of Accomplishment and Social Influence, a leaderboard was introduced to rank users according to their activity and performance. The top 10 active users at the end of each week received data subscription rewards (1 GB each) as motivational incentives. User engagement increased significantly during the second week, supported by motivational feedback and reward mechanisms. In the sixth week, participants were presented with a test environment featuring a non-adjustable timer and restricted navigation that mirrors real examination conditions. Scores from this phase were compared with their initial trials to evaluate learning progression. To encourage participation, all respondents received a 100 MB data incentive.

Evaluation Phase:

The evaluation phase synthesized findings from user feedback, usage statistics, and test performance data. Quantitative data were analysed to determine the impact of the gamified approach on learning outcomes, while qualitative feedback helped identify user experiences and areas for improvement. Patterns emerging from user interactions such as increased frequency of practice, higher engagement scores, and improved test performance were examined to assess the app's instructional and motivational effectiveness. The results also informed recommendations for further refinement and future research on gamified learning tools for national examinations.

Research Question 2: What are the experts' ratings of the mobile app in terms of content accuracy, usability, interactivity, feedback mechanisms, and aesthetic design?

The developed Gamified Drill and Practice Mobile Application for JAMB UTME Use – of – English was validated by two different sets of experts (the English Language experts and Educational Technology Experts) with the adapted rating form from Ace Rubrics work of Lubniewski et al (2018). Table 1 shows the Educational Technology experts rating for the Application.

Table 1: Educational Technology Experts Ratings

S. No	Items	Mean
1	The Instructional App is easy to use	3.56
2	The App is compatible with other devices aside Android	2.44
3	The App provides users with performance feedback	3.33
4	There are instructions for the installation and use of the package	2.78
5	The application is available to users offline	3.78
6	Answer key and Submission Key are well positioned for answering questions	3.67
7	Theres Exit key, for exiting the package in the App	2.56
8	The countdown timer is available in during the test	3.67
9	Key for moving forward or backward in a lesson	3.67
10	Key for accessing the next lesson in a sequence	3.00
11	The content is structured in a clear and understandable manner	3.44
12	The structure allows learners to move around freely in different units	3.11
13	The package facilitates learning by doing	3.78
14	The presentation of information can stimulate recall	3.67
15	The educators have access to the students' performance data	2.67
	Grand Mean	3.27

Table 1 presents ratings given by educational technology experts on various aspects related to Gamified Drill and Practice mobile app. The ratings are indicated on a scale, where a higher mean score (2.5 and above) generally implies a favourable assessment of the particular aspect. Ease of Use was rated positively at 3.56, indicating the app's user-friendly nature. Compatibility scored relatively lower at 2.44, suggesting limitations in compatibility with devices other than Android. Performance Feedback received a moderate score of 3.33, indicating the provision of feedback to users. Installation Instructions were moderately rated at 2.78, implying some clarity but with room for improvement. Offline Availability scored high at 3.78, indicating accessibility without an internet connection. Answer & Submission Keys were well-positioned, rated positively at 3.67 for answering questions.

Exit Functionality was rated moderately at 2.56, indicating the presence but possibly some issues with the exit key. Countdown Timer was positively rated at 3.67, indicating availability during tests. Navigation Keys received positive ratings at 3.67 for moving within lessons. Lesson Sequence Access was moderately rated at 3.00, suggesting some room for improvement in accessing sequential lessons. Content Structure was moderately positive at 3.44, indicating a clear and understandable structure. Learner Mobility was moderately rated at 3.11, suggesting some limitations in freely moving across units. Facilitation of Active Learning was highly rated at 3.78, indicating effectiveness in promoting learning by doing. Information Presentation was positively rated at 3.67, suggesting the ability to stimulate recall.

Educator Access to Performance Data received a moderate rating at 2.67, suggesting some limitations in accessing performance data. The overall "Grand Mean" stands at 3.27, indicating a generally positive reception of the app among educational technology experts, with several strengths such as ease of use, offline availability, effective feedback mechanisms, and facilitation of active learning. However, there are also areas identified for improvement, such as compatibility with different devices, clearer instructions, better educator access to performance data, and enhanced learner mobility across units within the app.

Table 2 presents the Use-of-English experts rating of the Gamified Drill and Practice Mobile App for JAMB UTME Use-of English

Table 2: Use-of-English Experts Ratings of Gamified Mobile App

S. No	Items	Mean
1	The content has of Drill and Practice question is in line with JAMB UTME standard	3. 29
2	The answers provided for the questions are accurate and correct	3. 43
3	The package can be used in different instructional settings.	2. 43
4	There are instructions for the installation and use of the package	2. 86
5	The questions are arranged as it would in a real JAMB UTME examination	3. 71
6	The content is structured in a clear and understandable manner	3. 57
7	The questions and answers are devoid of typographical errors	3. 29
8	All aspects of JAMB UTME Use-of English were examined in the gamified drill and practice application	3. 43
9	Every correct answer is awarded with points and rewards	2. 43
10	The application interface can be easily navigated	3. 71
11	The content is structured in a clear and understandable manner	3. 71
12	Users can see questions answered and those yet to be answered at a glance	3. 57
13	The instructional package can be used for instruction alone	2. 43
14	The presentation of information can stimulate recall of similar questions in real exam	3. 71
15	The performance feedback shows questions that the users got wrong and provides the correct answer	3. 71
Grand Mean		3. 29

Table 2 represents Use-of-English experts' ratings of the developed gamified mobile app for UTME Use of English. The table lists several items, each with a corresponding mean score given by the evaluators. The content's relevance to the JAMB UTME standard received a moderately positive score (3.29), indicating it aligns somewhat well. Respondents found the provided answers to be accurate and correct, rating this aspect relatively higher (3.43). The package's adaptability across various instructional settings scored lower (2.43), suggesting limitations in its versatility. Clarity and completeness of installation and usage instructions received a moderate rating (2.86). The alignment of questions in a manner reflective of the actual JAMB UTME exam scored high (3.71). Clear and understandable structuring of content received a positive rating (3.57). The absence of typographical errors received an average score (3.29).

Coverage of JAMB UTME Use-of-English received a moderately positive rating (3.43). Rewarding correct answers scored lower (2.43), indicating a potential dissatisfaction or absence of rewards. The ease of navigating the application interface scored high (3.71). Clear and understandable content structuring was reiterated and scored positively (3.71). Users being able to track answered and unanswered questions easily received a positive score (3.57). The package's limitation to solely instructional purposes scored lower (2.43). The presentation stimulating recall of similar exam questions received a high score (3.71). Feedback showing incorrect answers and providing correct solutions received a high score (3.71).

The overall average or "Grand Mean" of all the items evaluated stands at 3. 29, indicating a generally positive reception but with variations in specific aspects like adaptability, reward systems, and instructional limitations. This table helps identify strengths and areas for improvement in the instructional package, providing insights into its effectiveness for JAMB UTME Use of English preparation.

Research Question 3: What is the effect of using developed gamified drill and practice Instructional App among prospective UTME candidates?

To determine the effect of the developed Gamified drill and practice instructional application for Use-of-English on the performance of the UTME candidates, the 30th test score for the app user which was set to automatically be in an exam mode was compared with the first score the participants had when they installed the app newly.

Table 3: Participants mean performances in the 1st and 30th drill exercises on the Gamified Drill and Practice Mobile app for UTME Use-of-English

User	N	1 st Drill Mean	30th Drill mean	Mean Gain
Participants	223	25.46	46.94	21.48

To determine the effect of the developed gamified drill and practice instructional application on the performance of prospective UTME candidates, the study compared the participants' first recorded test score with the score obtained after completing the thirtieth drill exercise. The first drill score represents the learners' initial performance when they installed the application, while the thirtieth drill score reflects their performance after engaging repeatedly with the learning tasks and activities built into the app. This comparison makes it possible to observe changes in learning outcomes that occur as a result of consistent interaction with the gamified exercises.

The descriptive statistics in Table 3 show that the 223 participants recorded a mean score of 25.46 in their first drill exercise. By the thirtieth drill exercise, the mean score had increased to 46.94. The difference between these two values represents a mean gain of 21.48 points. This improvement indicates that continuous exposure to the gamified activities, which include features such as progressive levels, points, rewards, and immediate feedback, contributed meaningfully to enhanced mastery of Use-of-English content. The analysis uses a simple pre-test and post-test mean comparison to demonstrate the change in performance, and the size of the mean gain suggests that the application had a strong positive effect on learners' test performance.

Performance comparison between initial and final tests revealed measurable improvement in accuracy and response time that is reflected in the improved performance scores of the participants. This implies a positive effect of gamified practice on learning outcomes and aligns with prior findings that gamified mobile apps can enhance learner motivation, concentration, and achievement in language learning (Dicheva et al., 2015; Li et al., 2021).

Conclusion and Recommendations

The development and evaluation of the gamified instructional mobile application for UTME Use-of-English demonstrated that a well-structured, gamified mobile learning application can serve as a powerful supplementary tool for exam preparation among Nigerian students. By integrating the ADDIE instructional design framework with Yu-Kai Chou's Octalysis gamification model within a Design-Based Research paradigm, the study achieved a balance between pedagogical rigor and learner motivation. The expert evaluations and user feedback confirmed that

the app is not only pedagogically sound but also engaging and effective in promoting learning persistence while enhancing students performance in the Use-of-English. The app's mobile deployment further ensured accessibility, particularly among diverse learners who rely on smartphones as their primary digital learning devices. The results reinforce the potential of gamified mobile learning applications to address challenges of motivation, accessibility, and engagement in examination preparation contexts in Nigeria.

Based on the findings, the following recommendations are proposed:

1. Tutorial centers and secondary schools should integrate Gamified Mobile App for Use-of-English or similar gamified learning applications into their UTME preparatory programs.
2. The Joint Admissions and Matriculation Board (JAMB) and other examination and education bodies should encourage partnerships for developing similar educational applications.
3. Subsequent versions should include social challenges, in-app community spaces, and mastery badges to deepen learner engagement.
4. Future studies should employ true experimental or quasi-experimental designs to compare learning gains between gamified and non-gamified UTME study tools.

Acknowledgments and Declaration of Conflict of interest

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Informed consent was obtained from all individual participants included in the study. Participation was voluntary, and respondents were assured of confidentiality and anonymity of their responses. Participants were also informed of the study's purpose, procedures, and their right to withdraw at any time without penalty.

All procedures involving human participants (expert validators and UTME tutorial candidates) complied with the ethical standards of the University of Ilorin and followed the principles of the Declaration of Helsinki.

Author contributions

Dr. Aderoju led the study, providing the core conceptualization, methodology design, instructional model development, and preparation of the initial manuscript draft, while also overseeing project administration. Prof. Olumori C.O. served as supervisor, validating the methodology, contributing resources, and supporting the review and refinement of the manuscript. Dr. Nuhu K.M. developed the Mobile App, handled data curation, conducted formal analyses, and generated visualizations. Dr. Abdulrahman M.R. coordinated the investigation, data collection, and statistical analysis, contributing to the validation of findings. Dr. Ibironke E.S. supported the literature review, coordinated expert validation exercises, and contributed to manuscript review and editing. Dr. Asiyanbola Caleb was responsible for English language editing, proofreading, and manuscript refinement. All authors reviewed and approved the final version of the manuscript and agree to be accountable for all aspects of the work

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