Kasetsart Journal of Social Sciences 44 (2023) 867–876

Kasetsart Journal of Social Sciences

journal homepage: http://kjss.kasetsart.org

Development of Game-Based Assessment Tools (GBAT) using *Quizizz* application for Technology and Livelihood Education (TLE) subject

Joseline M. Santos[a,*], Daniel DJ. Bantog[a], Vince R. Del Rosario[b]

[a] *Information Technology, College of Education, Bulacan State University, Bulacan 3000, Philippines*
[b] *Computer Education, College of Education, Bulacan State University, Bulacan 3000, Philippines*

Article Info

Article history:
Received 21 April 2022
Revised 14 October 2022
Accepted 7 November 2022
Available online 15 September 2023

Keywords:
acceptability,
assessment,
game-based,
Quizizz,
usability

Abstract

The main objective of the study is to develop game-based assessment tools (GBAT) for the Technology Livelihood Education (TLE) subject in the Junior and Senior High School of K-12 Program using Quizizz Application. The study utilized a developmental approach to research. The students as contributors were trained to equip themselves on how to use the Quizizz Application to create game-based activities. The students as contributors created GBAT and curated them to the TLE Learning Hub developed by the researchers. Developed GBATs were evaluated by 5 experts and 24 TLE teachers to identify the level of acceptability, and the TLE Learning Hub to assess its system usability. The study adopted a Technology Acceptance Model (TAM) to measure the level of acceptability of GBAT. System Usability Scale (SUS) was adopted to assess the usability of the TLE Learning Hub. General mean was computed to identify the acceptability of the GBAT and percentile rank for the system usability of the materials. The result of this study shows that the experts and TLE teachers who served as the evaluators find the GBAT highly acceptable since all ratings from perceived usefulness, perceived ease of use, attitude towards using it, and intention to use were rated in the range of 'Strongly Agree'. The result illustrates that the evaluators appreciate the development of the GBAT and TLE Learning Hub. It is recommended for further study to train the TLE teachers to use Quizizz and be one of the contributors in the TLE Learning Hub.

Introduction

Discussion on 21st-century learning skills that need to be developed for learners, always has as a consideration, how lessons should be delivered. However, the COVID-19 pandemic created the need to change education forever. The impact of the pandemic moved the academe to be responsive to the changing times. Now that most schools have turned to distance online learning, teachers are compelled to update their knowledge and skills in

* Corresponding author.
E-mail address: joseline.santos@bulsu.edu.ph (J. M. Santos).

https://doi.org/10.34044/j.kjss.2023.44.3.24
2452–3151/© 2023 Kasetsart University.

learning the new normal set-up of education. According to an Organization for Economic Co-operation and Development (OECD) report, teachers were not adequately and meaningfully prepared to incorporate tech tools into 21st-century pedagogy, and as a result, tech tools were not used effectively (Tuscano, 2020). The teachers face an expected dilemma wherein the only option is to continue. According to the most recent DepEd data, 3,885,427 students prefer "modular" learning, in which printed or digital modules are used as an alternative learning option. Meanwhile, 2,074,010 students said they wanted to learn online (Hernando-Malipot, 2020). It is a reality that there are still students who prefer online distance learning over the modular mode.

The Mihaly Csikzentmihalyi's flow model (1970) in the context of education supports the utilization of game-based learning in the classroom. A state of mind known as "flow" combines cognitive, physiological, and emotional components (Biasutti, 2011). Teachers can reduce interruptions to encourage focus on the current activity. When working on academic assignments, students are likely to be in the flow state and have favorable subjective learning experiences (Schmidt, 2010). Since the desire for power is a major factor in why so many students are drawn to games, it is crucial for educators who are concerned about GBL in the classroom to comprehend and know how to manipulate this desire. Game-based learning encourages participation and ongoing enthusiasm for learning.

Beyond military strategy, Friedrich Fröbel's theories of learning by play gave birth to Kindergarten in the mid-1800s (Cahill, 2019). Further, Cahill mentioned that game-based learning (GBL) is based on the idea of teaching through repetition, failure, and goal achievement. Goals, interaction, feedback, problem solving, competitiveness, story, and engaging learning experiences can all be incorporated into games to improve learner involvement and motivation (University of Waterloo, 2016). GBL has elements of competition where the score-keeping factor and/or winning conditions motivate players and provide feedback on their results; engagement wherein interest, power, and fantasy are all seen as intrinsic motives; and immediate rewards, where players earn immediate enjoyment in the form of victory or points, and often even descriptive feedback, as soon as goals are completed (Science Education Resource Center [SERC], 2019). Game-based learning has emerged as a cutting-edge teaching method that can boost student motivation, emotional engagement, and enjoyment.

Several studies have proven the effectiveness of GBL in the improvement of the performance of the students. In the study by Hartt et al. (2020), they examined how gamification influenced students' perceptions of learning, interaction, and teamwork, and found that students enjoyed and were more interested in game-based lectures. Lin et al. (2018) used flipped contextual game-based learning instruction to boost students' English writing performance, and found that those who studied using the flipped method made fewer writing errors than those who learned using the traditional method. Another study of the English subject by Wu (2018), showed that students who used the game-based vocabulary practice system, which imitated the common block elimination game and combined test items of article, difficulty, and teacher model in accordance with curriculum objectives and demands, were more focused and invigorated in their learning. All et al. (2017) employed digital game-based learning effectiveness research to investigate the benefits and drawbacks of adding a pretest, and they were able to demonstrate that the game was highly successful, as both game groups outperformed the slide-based community that earned a pre-test.

Hébert and Jenson (2019) undertook a study addressing pedagogical methods for promoting digital game-based learning in K–12 classrooms in a survey of 34 teachers. They also noted that their research would inform future professional development sessions that aimed to better understand the effect of modeling and addressing these digital game-based pedagogies. The current study, which is all about the development of online assessment tools, will be a great help for teachers to check the understanding in the lesson of their students using small-bite assessments synchronously or asynchronously.

Technology and Livelihood Education (TLE) is a specialized subject offered in the Philippine education system. The subject develops the competencies of students in terms of home economics, industrial arts, agriculture, entrepreneurship, and information communication technology. The content of the curriculum cannot be considered a general subject compared to English, Science and Mathematics, wherein basic content is general and acceptable universally. The curriculum of the TLE subject is delivered in Philippine context. Available GBAT online do not cover the content of the TLE curriculum, and teachers are just starting to learn to use the online educational app as they think it is necessary during pandemic.

The use of digital GBL has been practiced in other countries over recent years, but most schools in the Philippines are just entering the world of digitization. The COVID-19 pandemic pushed many of the education sectors, which were caught unprepared for the new set-up in education, to begin online learning. Distance learning, which has been implemented for a year, seems to be in a

long-term shape. Professional development of teachers should still be continued to accustom teachers in using online learning approaches.

The main objective of the study was to develop a game-based assessment tool (GBAT) for the Technology Livelihood Education (TLE) subject in the Junior and Senior High School of K-12 Program using Quizizz Application (App).

Specifically, the study sought answers to the following questions:

1. What is the coverage of the GBAT for TLE subjects in terms of:
    1) grade level
    2) area of specialization; and
    3) topics?
2. How may the assessment of GBAT and TLE Learning Hub by the experts and TLE teachers be described in terms of:
    1) level of acceptance;
    2) level of system usability?

The study aimed to develop a GBAT for the TLE subjects of the Junior and Senior High School using Quizizz App, which is a free tool to teach and learn anything, on any device, in-person or remotely. It is an online educational application that can be used by educators to make an interactive assessment for their students in synchronous or asynchronous modes of delivery of the lesson. Topics to be included in the development of GBAT were organized by the researchers to make sure that there was no duplication. Third-year students enrolled in the Bachelor of Technical Livelihood Education (BTLEd) program and taking Technology for Teaching and Learning 1 (TTL1) subject for the first semester of the academic year 2020–2021 were involved in the study. The students were trained to use the Quizizz App as part of the curriculum. They were required to create a short assessment for checking understanding using the different types of tests of Quizizz.

Developed game-based assessment tools were evaluated for acceptability by an expert using a standard evaluation tool. A TLE Learning Hub was designed to manage and organize the GBAT using Google Sites. The hub was evaluated based on its usability by the experts and volunteer users.

Literature Review

The use of Quizizz application as a game-based assessment tool has been the subject of several studies with the findings on its effectiveness to the performance of the students, engagement of the students in the classroom, implications of the application to the teachers and students.

Effectiveness of Quizizz

Several studies have proven that the use of Quizizz application as a game-based tool is effective together with other online application or against other applications. In the study by Huei et al. (2021), the results demonstrated that participants improved their fill-in-the-blank scoring after the post-test. A moderately high mean score on a Likert scale questionnaire supports the findings. Furthermore, the participants stated that the leaderboard on Quizizz suited their preferred learning approach. This feature tends to elicit a good learning environment. As a result, Quizizz has the potential to improve vocabulary achievement among primary English as a Second Language (ESL) students in rural schools. The same result was identified in the study by Mohamad (2020). In comparison to the findings obtained using the traditional method, the results revealed that respondents build their understanding of the topic on their own using Quizizz as a tool. The effectiveness of Quizizz using a traditional method of teaching reading comprehensio n was revealed from the study by Zalika et al. (2020) and Handoko et al. (2021). The experimental group's post-test scores were significantly higher than the control group's post-test scores. There was a substantial difference in students' reading comprehension success in learning narrative texts between those who were taught using Quizizz as an alternate game versus those who were not. Quizizz was also tested with the use of other online tools by Amalia (2020). It was found that Classes that used the Zoom Cloud Meeting and Quizizz media had a better level of learning enthusiasm than those who used the WAG medium (Whatsapp Group). In the result of the study by Göksün and Gürsoy (2019), both Kahoot application and Quiziz had a positive effect on the performance of the students, but when the graphs produced by MANOVA were examined, when compared to the control group, the impact of Kahoot-based instructional activities on academic success and student engagement was found to be higher. However, when compared to the control group, the instructional activities conducted with Quizizz were less successful.

Student Engagement

Aside from knowing that Quizizz application is effective to improve the performance of the students, several studies

revealed that the application also focused the students more on the lesson. The study by Saputra and Rusmana (2021) and Rahmah et al. (2019) revealed that students had positive sentiments toward using Quizizz during emergency remote instruction. They thought it was a valuable program that was simple to use, and they said they planned to use it again in the post-pandemic era. Furthermore, this approach has the potential to improve students' cognitive, behavioral, and emotional learning involvement. Related studies by Amalia (2020) and Irwansyah and Izzati (2021) demonstrated that students have a positive opinion of Quizizz and are more motivated to learn.

Implication of the Use of Quizizz

The use of Quizizz in the teaching and learning process indicates that there are changes in the process. Based on the study by Akhtar et al. (2019) and Darmawan et al. (2020), the findings revealed that teachers had a positive attitude toward Quizizz and were expected to employ it in the learning process in the future. The study by Akhtar et al. (2019) also found that the teacher's age influenced his or her desire to use Quizizz. The older a teacher is, the less likely that teacher is will utilize Quizizz. According to the study by Saleh and Sulaiman (2019), teachers are ready to use Quizizz as one of their teaching aids in the classroom to assess students while Turhan Kariko and Ayuningtyas (2021) also agreed that teachers should use interactive online quizzes like Quizizz when teaching online and make it one of their key teaching tools, but such should not be utilized as a formative assessment tool all of the time because it may cause students to become distracted from their learning and self-development.

Existing studies revealed that students reacted positively to the use of Quizizz in the classroom. In the study by Permana and Permatawati (2020) and Anak Yunus and Hua (2021) showed that using Quizizz as a formative exam tool in learning language was successful. Furthermore, pupils reacted well to the use of Quizizz in the classroom. Rahayu and Purnawarman (2019) found that with the use of Quizizz, as a result of their capacity to recognize their strengths and weaknesses, students were able to undertake self-assessment. Quizizz successfully reduces test anxiety due to the application's usage of game features as shown in the study by Pitoyo et al. (2019). As a result, using Quizizz on the exam is a great alternative for teachers.

Several studies have examined the effectiveness of the Quizizz application as a game-based assessment tool, with conclusions on its impact on student performance, classroom engagement, and consequences for teachers and students.

Methodology

The study utilized a developmental approach to research. The students as contributors were trained to equip themselves on how to use the Quizizz application to create game-based activities. They were asked to look for DepED learning material (modules) to be the basis of their activities. The study disclosed the fact that the content of the GBATs was from approved DepEd modules to ensure that contents are reliable and valid. The students as contributors created GBAT and curated it to the TLE Learning Hub developed by the researchers. A total of 259 developed GBATs were evaluated to identify the level of acceptability. After the evaluation, only 165 GBATs were retained. This was to ensure that the materials to be uploaded in the learning hub had quality. Approved GBATs were curated in the TLE Learning Hub to assess its system usability.

The study adopted a Technology Acceptance Model (TAM) from the study by Weng et al. (2018) to measure the level of acceptability of GBAT. The System Usability Scale (SUS) utilized by Lewis (2018) in his study was adopted to assess the perceived usability of the TLE Learning Hub by the experts and volunteer TLE Teachers. The instruments were checked and validated by experts from the field.

Participants

Five (5) experts in teaching TLE were invited to evaluate the GBAT and TLE Learning Hub. Each expert was assigned with particular subjects to focus on their evaluation. There were 3 of them who were Teacher 1, one Teacher 2, and 1 Head Teacher 3 of their respective school.

There were 24 TLE teachers who voluntarily used the TLE Learning Hub and GBAT for evaluation purposes, 11 of whom were from Private Schools and 13 from the Public Schools around Bulacan. There were 12 teachers who had 1–5 years of teaching, 8 of them with 6–10 years of teaching, 1 teacher teaching for 11–15 years, 2 of them already having taught for 16–20 years, and 1 teacher for 20–25 years.

Data Collection

Experts and TLE teachers evaluated the materials. Subjects for their evaluation were categorized based on the following: Expert 1 (Computer Hardware/Software Servicing, Empowerment Technologies, and Occupational Safety and Health); Expert 2 (Cookery, Food Processing, Beauty Care and Dressmaking); Expert 3 (Entrepreneurship,

Drafting, Automotive, Electrical, Electronics, Masonry, Metal Works, Plumbing, Tile Setting); Expert 4- (Bread and Pastry Production, Household Services, and Caregiving); and Expert 5- (Agriculture, Handicraft, Carpentry, and RAC Servicing). Twenty-four volunteer TLE teachers were invited to use the TLE Hub and the GBAT. These TLE teachers were from different DepED schools and had been teaching TLE subjects for a number of years.

Data Analysis

Data from the experts and teachers as they evaluated the acceptability of game-based tool created using Quizizz were computed to get the general mean to identify its acceptability and percentile ranks for the usability of the materials. The Technology Acceptance Model (TAM) was used to measure the acceptability of the GBAT. Computed mean were interpreted using the following: 4.20–5.00 (Strongly Agree); 3.40–4.19 (Agree); 2.60–3.39 (Don't know); 1.80–2.59 (Disagree); 1.00–1.79 (Strongly Disagree).

The usability of the TLE learning hub was analyzed based on interpreting the positive scores of the System Usability Score (SUS). Percentile ranks were calculated from raw SUS scores. The average (50th percentile) score was 68, that is, a raw SUS of 68 or more is above normal, whereas a raw SUS of 68 or lower is below average. These scores were interpreted with acceptability and adjective verbal interpretations. The system usability score was interpreted using the following: 85–100 (Best Imaginable); 80–84 (Excellent); 70–79 (Good); 50–69 (Ok); 25–49 (Poor); and 0–24 (Worst Imaginable). For the acceptability, it was interpreted using the following: 70–100 (Acceptable); 50–69 (marginal); and 0–49 (Not acceptable).

Results

Topics Covered in the Development of GBAT and TLE Learning Hub

There are 26 areas of specialization in TLE with 122 topics. There are 82 Exploratory subjects, 8 topics under Grade 9, 13 topics in Grade 10, and 19 topics from SHS. These topics are from the DepEd modules available on the internet. Areas of specialization covered are agriculture, animal production, automotive servicing, beauty care, bread and pastry production, caregiving, carpentry, computer hardware servicing, computer software servicing, cookery, drafting, dressmaking/tailoring, electrical, electronics, empowerment technology, entrepreneurship, food processing, handicrafts, household services, masonry, metal works, occupational safety and health, plumbing, refrigerator/air condition servicing, statistics, and tile setting.

Technological Acceptance of GBAT and TLE Learning Hub

The GBAT and TLE Learning Hub were evaluated by 5 experts and 24 volunteer users. They evaluated the GBAT based on its technological acceptance and the TLE Learning Hub based on its usability. The experts also gave detailed comments to make sure that all GBATs were acceptable, and the hub was usable.

Table 1 shows the perceived usefulness of GBAT by the experts having the verbal interpretation of 'Strongly Agree' ($\bar{x}$ = 4.85; σ = .09) and the Teachers ($\bar{x}$ = 4.58; σ = .03). They rated the use of application enhancing their teaching with a mean of 4.63. The experts and the teachers found GBAT useful in teaching TLE during online learning.

The perceived ease of use of GBAT by the experts is illustrated in Table 2. The experts strongly agree in all the items ($\bar{x}$ = 4.85; σ = .12). The items which describe the use of the Quizizz app are easy and understandable, and the use of it is more flexible to teach than the traditional one with the perfect value of mean of 5.0. The TLE Teachers also had a verbal interpretation of strongly agree in general ($\bar{x}$ = 4.54; σ = .03). The teachers found that it was easy to become skillful at using Quizizz App, and the use of the application was easy and understandable, having the highest mean of 4.58. The experts and the teachers found the easiness of using GBAT as part of conducting online learning.

Table 1 Perceived Usefulness of GBAT

Question	Expert	Verbal Interpretation	Teachers	Verbal Interpretation
Q1. Use of Quizizz App helps me to control the pedagogy.	5.0	Strongly Agree	4.54	Strongly Agree
Q2. Use of Quizizz App enhances the teaching performance.	4.8	Strongly Agree	4.63	Strongly Agree
Q3. I find the Quizizz App useful in my class.	4.8	Strongly Agree	4.58	Strongly Agree
Q4. Use of Quizizz App makes it easier to catch individual students' needs.	4.8	Strongly Agree	4.58	Strongly Agree
Gen. Mean	4.85	Strongly Agree	4.58	Strongly Agree
SD	0.09		0.03	

Table 2 Perceived Ease of Use of GBAT

Question	Expert	Verbal Interpretation	Teachers	Verbal Interpretation
Q5. It is easy to become skillful at using Quizizz App.	4.8	Strongly Agree	4.58	Strongly Agree
Q6. I find it easy to apply the Quizizz App in my class.	4.6	Strongly Agree	4.50	Strongly Agree
Q7. Use of Quizizz App is easy and understandable.	5.0	Strongly Agree	4.58	Strongly Agree
Q8. Use of Quizizz App is more flexible to teach than traditional one.	5.0	Strongly Agree	4.54	Strongly Agree
Gen. Mean	4.85	Strongly Agree	4.54	Strongly Agree
SD	0.12		0.03	

The attitude toward using the Quizizz app by the expert is described in Table 3. It is shown that the experts have a positive attitude in using the Quizizz app ($\bar{x}$ = 4.96; σ = .08). There were 5 items evaluated, 4 of which got a perfect mean of 5.0. The experts strongly agreed that the use of the Quizizz app in class was favorable, it was a positive influence for them to use the app in class, they thought that it was valuable to use the app in class and it was a trend to use the app in class. The TLE Teachers also had a positive attitude on the use of the application ($\bar{x}$ = 4.52; σ = .03). They thought that it was valuable to use the application, which got the highest mean of 4.58.

Table 4 shows the intention to use by the experts and TLE Teachers. They all had strong intentions to use the Quizizz application ($\bar{x}$ = 4.88; σ = .10). The experts perfectly evaluated the use of the Quizizz application in their class to enhance students' learning interest, and they used the application to provide multi-approaches on teaching. The TLE Teachers rated the item that they intend and love to use the Quizizz application in their classes with a mean of 4.58.

The experts gave their detailed evaluation of the GBAT. They commended the way GBAT is organized and the availability of several topics in each specialization. Activities under handicraft were commended because of their consistent visuals on both pages. The experts gave recommendations/suggestions for improvement of the GBAT like checking the duration of the activities, some misspelled words, and wrong grammar structure. They also noticed that there were some questions repeated in the other topics. These observations were noted by the researchers and served as a guide in the improvement of the GBAT.

Volunteer TLE teachers who were requested to try the GBAT also gave their general comments. Most respondents believed that using a Game-Based Assessment Tool allowed students to participate and engage more actively in the teaching-learning process, and that such would easily catch the students' interest. Additionally, the respondents observed that since it was in the format of a game, it would help students feel more at ease when taking the formative and summative

Table 3 Attitude toward Using the GBAT

Question	Experts	Verbal Interpretation	Teachers	V Verbal Interpretation I
Q9. Use of Quizizz App in class is good.	4.8	Strongly Agree	4.54	Strongly Agree
Q10. Use of Quizizz App in class is favorable.	5.0	Strongly Agree	4.50	Strongly Agree
Q11. It is a positive influence for me to use Quizizz App in class.	5.0	Strongly Agree	4.50	Strongly Agree
Q12. I think it is valuable to use Quizizz App in class.	5.0	Strongly Agree	4.58	Strongly Agree
Q13. I think it is a trend to use Quizizz App in class.	5.0	Strongly Agree	4.50	Strongly Agree
Gen. Mean	4.96	Strongly Agree	4.52	Strongly Agree
SD	0.08		0.03	

Table 4 Intention to Use

Question	Mean	Verbal Interpretation	Teachers	Verbal Interpretation
Q14. I tend to use Quizizz App in my class.	4.8	Strongly Agree	4.58	Strongly Agree
Q15. I increase the occurrences of using Quizizz App in class.	4.8	Strongly Agree	4.42	Strongly Agree
Q16. Use of Quizizz App in my class enhances students' learning interest.	5.0	Strongly Agree	4.50	Strongly Agree
Q17. I'd love to use Quizizz App in my class.	4.8	Strongly Agree	4.58	Strongly Agree
Q18. I use Quizizz App to provide multi-approaches on teaching.	5.0	Strongly Agree	4.50	Strongly Agree
Gen. Mean	4.88	Strongly Agree	4.52	Strongly Agree
SD	0.10		0.06	

assessments. Furthermore, some of them believe that GBAT was also beneficial to teachers, especially in the new normal setting. They find it as a user-friendly tool since it is simple to use and accessible, allowing even non- "techy" teachers to get the most out of it.

System Usability of TLE Learning Hub

The TLE Learning Hub is a website where all the GBAT created using the Quizizz applications were curated for easy access of the users.

Table 5 illustrates the system usability of the TLE Learning Hub of the experts and TLE teachers. They rated the hub in the highest range which is acceptable and having the adjective interpretation of 'Best Imaginable' and having a SUS score of 96.5 by the experts and 88.02 by the teachers. The experts thought that the hub was easy to use, could be used without the support of a technical person, was easy to learn, very intuitive, and gave a feeling of confidence when using it. These items (3, 4, 7, 8, and 9) were rated the highest among the 10 items. The TLE teachers rated item number 5 as the highest, which was they found the various functions in the hub were well integrated.

The experts also gave detailed comments on the TLE Learning Hub. They praised the researchers for providing great and timely assistance to both teachers and students when it came to assessing the students' learning. The hub is accessible 24/7 and very easy to use. For them, it is something new to be enjoyed, and at the same time, an informative and reliable tool for conducting assessments. They believe that this will catch the students' attention, and that the way it looks is attractive because of the images and colors used.

On the other hand, there were some disadvantages that were noted by the respondents. Since it is an online platform, the stability and quality of internet connection can hinder the students using it. In addition, the respondents suggested some things that needed to be changed or improved in terms of the visuals and structure of the questions.

The TLE teachers, as volunteer users of the TLE Learning Hub, noted its creation for its significant contribution in making the teaching and learning process more engaging and unique for both students and teachers. In this light, the respondents also observed that it covers a variety of TLE courses and can be utilized as an additional learning tool. Since it is easy to use and to understand, all teachers and students will be at ease using it. The hub also organizes the links, making it very easy to find them. Moreover, the graphics/images used are also observed to be clearly innovative and correspond to each specialization. Overall, TLE Learning Hub is a very useful tool in a time of pandemic.

Discussion

The study focused on the development and evaluation of GBAT and TLE Learning Hub. The result of this study shows that the experts and TLE teachers who served as the evaluators find the GBAT highly acceptable

Table 5 System Usability of TLE Learning Hub by the Experts and TLE Teachers

Question	Experts	Verbal Interpretation	Teachers	Verbal Interpretation
1. I think that I would like to use the TLE Learning Hub frequently.	3.8	Strongly Agree	3.54	Strongly Agree
2. I found the TLE Learning Hub to be simple.	3.8	Strongly Agree	3.54	Strongly Agree
3. I thought the TLE Learning Hub was easy to use.	4	Strongly Agree	3.58	Strongly Agree
4. I think that I could use the TLE Learning Hub without the support of a technical person.	4	Strongly Agree	3.38	Strongly Agree
5. I found the various functions in the TLE Learning Hub were well integrated.	3.8	Strongly Agree	3.63	Strongly Agree
6. I thought there was a lot of consistency in the TLE Learning Hub.	3.6	Strongly Agree	3.58	Strongly Agree
7. I would imagine that most people would learn to use the TLE Learning Hub very quickly.	4	Strongly Agree	3.58	Strongly Agree
8. I found the TLE Learning Hub very intuitive.	4	Strongly Agree	3.54	Strongly Agree
9. I felt very confident using the TLE Learning Hub.	4	Strongly Agree	3.5	Strongly Agree
10. I could use the TLE Learning Hub without having to learn anything new.	3.6	Strongly Agree	3.54	Strongly Agree
Total	38.6		35.21	
SUS Score	96.5		88.02	

since all ratings from perceived usefulness, perceived ease of use, attitude towards using it, and intention to use were rated in the range of 'Strongly Agree'. The result illustrates that the evaluators appreciate the development of the GBAT and TLE Learning Hub. Teachers believe that gamification promotes teamwork and oral communication abilities, as well as the development of critical thinking and social skills (Martí-Parreño et al., 2021). In the review of literature by Zainuddin et al. (2020), gaming technologies have a direct impact on learning and have the ability to modernize the educational environment in this new digital era. The evaluators consider the GBAT a user-friendly tool because it is easy to use and access, allowing even non-techy teachers to benefit from it.

The use of Quizizz on the development of GBAT brings an interactive way of delivering instruction in the subject of Technology and Livelihood Education (TLE). A lot of studies have already proved that the use of Quizizz had a positive effect on the class performance of the students. Purba (2020) found that using an interactive quiz as a medium for online evaluation of learning in the topic of Physical Chemistry 1 had a positive impact on student outcomes. The study of Razali et al. (2020) revealed that Quizizz significantly related to students' intrinsic and extrinsic motivation. Further, Pitoyo et al. (2020) found in their study that students were motivated and wanted to learn more after doing several gamified tests with Quizizz.

Though gamification with the use of Quizizz application has been a common tool for effective interaction between the subject and the students. The evaluators appreciate the content of the tool. TLE is a subject in the Philippine education curriculum that enhances the personal experiences of the students in practical life lessons and activities. There is a limited number of Quizziz content dealing with the four areas of TLE. The evaluators noticed that the TLE Learning Hub provides a number of assessment activities covering all areas of TLE. The TLE Learning Hub was created to curate the GBAT made in Quizizz. The use of a learning hub in the implementation of online learning paves the way for easy access to the materials, especially that teachers and students only meet online. Teachers who advocate for technology integration must be more diligent in teaching the students a variety of methods for studying today's technology and providing opportunities for them to learn more about using online learning tools (Deb & Bhatt, 2020).

Conclusion

The construction of TLE Learning Hub, where GBATs are curated, is valued by experts and TLE teachers. But as online education became available during the pandemic, particularly in the public schools in the Philippines, the intermittent internet and poor connectivity have always been issues. Although incorporating technology into the teaching and learning process is a requirement of 21st century learning, TLE teachers have a challenge in doing so consistently.

The availability of online learning resources in this pandemic era is one of the concerns of the teachers and students. The education system in the Philippines is not yet ready for distance education in any form. Going to school every day to study is a common scenario in every school. The pandemic pushed many of the educational institutions in the country to turn to online learning without the full readiness of its stakeholders and the capacity to implement it. However, the teachers believe that education should not stop in any type of crisis. Everyone has their part. The College of Education of Bulacan State University did its part through the students who served as the contributors of the GBAT, and the researchers who managed to organize all the output and turn it into a quality online resource for TLE teachers in the public and private schools.

Recommendation

It is recommended for further study to train the TLE teachers to use Quizizz and be one of the contributors in the TLE Learning Hub.

Conflict of Interest

The authors declare that there is no conflict of interest.

Fundings

The Bulacan State University, City of Malolos where the authors are affiliated funded the conduct of the research.

Acknowledgments

The authors would like to acknowledge Bulacan State University for funding this research, and the students of Bachelor of Technology & Livelihood Education (BTLEd) and Bachelor of Technical-Vocational Teacher Education (BTVTEd) of the College of Education for their contributions in this study.

References

Akhtar, H., Hasanati, N., & Istiqomah, I. (2019, December 2). Game-based learning: Teachers' Attitude and intention to use Quizizz in the learning process. *Iceap 2019. 2019 International Conference on Educational Assessment and Policy (ICEAP-2019)*, *Jakarta, Indonesia*. https://doi.org/10.26499/iceap.v0i0.202

All, A., Plovie, B., Nuñez Castellar, E. P., & Van Looy, J. (2017). Pre-test influences on the effectiveness of digital-game based learning: A case study of a fire safety game. *Computers & Education*, *114*, 24–37. https://doi.org/10.1016/j.compedu.2017.05.018

Anak Yunus, C. C., & Hua, T. K. (2021). Exploring a gamified learning tool in the ESL Classroom: The case of quizizz. *Journal of Education and E-Learning Research*, *8*(1), 103–108. https://doi.org/10.20448/journal.509.2021.81.103.108

Amalia, D. F. (2020). Quizizz website as an online assessment for English teaching and learning: Students' perspectives. *Jo-ELT (Journal of English Language Teaching) Fakultas Pendidikan Bahasa & Seni Prodi Pendidikan Bahasa Inggris IKIP*, *7*(1), 1–8. https://doi.org/10.33394/jo-elt.v7i1.2638

Biasutti, M. (2011). Flow and optimal experience. *Encyclopedia of Creativity*, 522–528. https://doi.org/10.1016/b978-0-12-375038-9.00099-6

Cahill, B. G. (2015, December 7). *Why game-based learning?*. the Learning Counsel. https://thelearningcounsel.com/articles/why-game-based-learning/

Darmawan, M. S., Daeni, F., & Listiaji, P. (2020). The use of Quizizz as an online assessment application for science learning in the pandemic era. *Unnes Science Education Journal*, *9*(3), 144–150. https://doi.org/10.15294/usej.v9i3.41541

Deb, R., & Bhatt, D. K. (2020). Technology integration through digital learning hub in skill-oriented entrepreneurial education. *Journal of Engineering Education Transformations*, *33*(Special Issue), 503–509. https://doi.org/10.16920/jeet/2020/v33i0/150104

Göksün, D. O., & Gürsoy, G. (2019). Comparing success and engagement in gamified learning experiences via Kahoot and Quizizz. *Computers & Education*, *135*, 15–29. https://doi.org/10.1016/j.compedu.2019.02.015

Handoko, W., Mizkat, E., Nasution, A., Hambali, & Eska, J. (2021). Gamification in learning using Quizizz application as assessment tools. *Journal of Physics: Conference Series*, *1783*, 012111. https://iopscience.iop.org/article/10.1088/1742-6596/1783/1/012111

Hartt, M., Hosseini, H., & Mostafapour, M. (2020). *Game on: Exploring the effectiveness of game-based learning*. Planning Practice & Research; Taylor & Francis Online. https://doi.org/10.1080/02697459.2020.1778859

Hébert, C., & Jenson, J. (2019). Digital game-based pedagogies: Developing teaching strategies for game-based learning. *The Journal of Interactive Technology and Pedagogy*. https://jitp.commons.gc.cuny.edu/digital-game-based-pedagogies-developing-teaching-strategies-for-game-based-learning/

Hernando-Malipot, M. (2020, July 3). DepEd: Most students prefer "modular" learning over online. *Manila Bulletin*. https://mb.com.ph/2020/07/03/deped-most-students-prefer-modular-learning-over-online/

Huei, L. S., Yunus, M. M., & Hashim, H. (2021). Strategy to improve english vocabulary achievement during Covid-19 epidemic. Does quizizz help?. *Journal of Education and E-Learning Research*, *8*(2), 135–142. https://doi.org/10.20448/journal.509.2021.82.135.142

Irwansyah, R., & Izzati, M. (2021). Implementing Quizizz as Game Based Learning and Assessment in the English classroom. *TEFLA Journal (Teaching English as Foreign Language and Applied Linguistic Journal)*, *3*(1), 13–18. https:// https://doi.org/10.35747/tefla.v3i1.756

Kariko, A. A. T., & Ayuningtyas, P. (2021). Examining Students' Preferences of Quizizz and Kahoot's as Formative Assessment and Competitiveness. *2021 International Seminar on Application for Technology of Information and Communication (ISemantic)*. https://doi.org/10.1109/isemantic52711.2021.9573176

Lewis, J. (2018). The System Usability Scale: Past, Present, and Future. *International Journal of Human–Computer Interaction*, 577–590. https://doi.org/10.1080/10447318.2018.1455307

Lin, C., Hwang, G., Fu, Q., & Chen, J. (2018). A Flipped Contextual Game Based Learning Approach to Enhancing EFL students' English business writing performance and reflective behaviors. *Journal of Educational Technology & Society*, *21*(3), 117–131. JSTOR. https://www.jstor.org/stable/26458512?seq=1

Martí-Parreño, J., Galbis-Córdova, A., & Currás-Pérez, R. (2021). Teachers' Beliefs about Gamification and Competencies Development: A Concept Mapping Approach. *Innovations in Education and Teaching International*, *58*(1), 84–94, https://doi.org/10.1080/14703297.2019.1683464.

Mohamad, A. M. (2020). Student as teacher–alternative revision method via Quizizz app. *Malim: Jurnal Pengajian Umum Asia Tenggara (Sea Journal of General Studies)*, *21*(1), 150–159. https://doi.org/10.17576/malim-2020-2101-12

Zalika, Y. S., & Mei, S. Y. (2018). Implementing Quizizz as Game Based Learning in the Arabic classroom. *European Journal of Social Sciences Education and Research*, *5*(1), 194–198. https://doi.org/10.26417/ejser. v12i1. p208212

Permana, P., & Permatawati, I. (2020). Using Quizizz as a formative assessment tool in German classrooms. *Proceedings of the 3rd International Conference on Language, Literature, Culture, and Education (ICOLLITE 2019)*, *424*, 155–159. https://doi.org/10.2991/assehr.k.200325.073

Pitoyo, M. D., Sumardi, S., & Asib, A. (2020). Gamification-based assessment: The washback effect of quizizz on students apostrophe learning in higher education. *International Journal of Language Education*, 1–10. https://doi.org/10.26858/ijole.v4i2.8188

Purta, L. S. L. (2020). The effectiveness of the quizizz interactive quiz media as an online learning evaluation of physics chemistry 1 to improve student learning outcomes. *Journal of Physics: Conference Series*, *1567*, 022039. https://doi.org/10.1088/1742-6596/1567/2/022039

Rahayu, I. S. D., & Purnawarman, P. (2019). *The use of Quizizz in improving students' grammar understanding through self-assessment.* The use of Quizizz in improving students' grammar understanding through self-assessment. Atlantis Press. https://www.atlantis-press.com/proceedings/conaplin-18/125911438

Rahmah, N., Lestari, A., Musa, L. A. D., & Sugilar, H. (2019, July). Quizizz online digital system assessment tools. *2019 IEEE 5th International Conference on Wireless and Telematics (ICWT)*. Yogyakarta, Indonesia. https://doi.org/10.1109/icwt47785.2019.8978212

Saputra, E. R., & Rusmana, N. (2021). Students' experience of online game-based assessment tool during emergency remote teaching. *Journal of Physics: Conference Series*, *1987*(1), 012012. https://doi.org/10.1088/1742-6596/1987/1/012012

Razali, N., Nasir, N. A., Ismail, M. E., Sari, N. M., & Salleh, K. M. (2020). Gamification Elements in Quizizz applications: Evaluating the impact on intrinsic and extrinsic student's motivation. *IOP Conference Series: Materials Science and Engineering*, *917*, 012024. https://doi.org/10.1088/1757-899x/917/1/012024

Saleh, S. M., & Sulaiman, H. (2019). *Gamification in T&L of mathematics: Teacher's willingness in using Quizizz as an additional assessment tool*. AIP Publishing. https://pubs.aip.org/aip/acp/article/2184/1/030005/1007111/Gamification-in-T-amp-L-of-mathematics-Teacher-s

Schmidt, J. (2010). *Flow in education*. https://edwp.educ.msu.edu/research/wp-content/uploads/sites/10/2020/06/CHALLENGE_FlowEducation.pdf

Science Education Resource Center [SERC]. (2019, November 18). *What is GBL?*. Science Education Resource Center. https://serc.carleton.edu/introgeo/games/whatis.html

Tuscano, F. J. (2020, May 7). It's not about online learning: A reflection on the "New Normal" in education (Part 2). *EmpowerED*. https://francisjimtuscano.com/2020/05/07/its-not-about-online-learning-a-reflection-on-the-new-normal-in-education-part-2/

University of Waterloo. (2016, September). *Gamification and game-based learning*. Centre for Teaching Excellence. https://uwaterloo.ca/centre-for-teaching-excellence/teaching-resources/teaching-tips/educational-technologies/all/gamification-and-game-based-learning

Weng, F., Yang, R.-J., Ho, H.-J., & Su, H.-M. (2018). A TAM-based study of the attitude towards use intention of multimedia among school teachers. *Applied System Innovation*, *1*(3), 36. https://doi.org/10.3390/asi1030036

Wu, T.-T. (2018). Improving the effectiveness of English vocabulary review by integrating ARCS with mobile game-based learning. *Journal of Computer Assisted Learning*, *34*(3), 315–323. https://doi.org/10.1111/jcal.12244

Zainuddin, Z., Chu, S. K. W., Shujahat, M., & Perera, C. J. (2020). The impact of gamification on learning and instruction: A systematic review of empirical evidence. *Educational Research Review*, *30*, 100326. https://doi.org/10.1016/j.edurev.2020.100326