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EFFECT OF COMBINING GAMIFICATION AND A SCAVENGER HUNT ON PRE-SERVICE TEACHERS' PERCEPTIONS AND ACHIEVEMENT

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ABSTRACT

Aim/Purpose	To investigate the application of game elements to a non-gaming context (gamification), specifically on an early childhood teacher-training course.
Background	This research proposes a teaching strategy that combines gamification elements via e-quizzing tools with the main principles of a scavenger hunt (SH). The purpose of this blend is to provide learners with an exciting learning environment.
Methodology	A convenience sample of 41 students was selected from the Early Childhood Department of the School of Education in Imam Abdulrahman University (IAU), Saudi Arabia. The learners' perceptions of gamification and the Quizizz e-tool were investigated using online scales, a focus group, and classroom observations. The teachers were also interviewed to gather their views on this strategy.
Contribution	Gamification has been a focus of recent educational research, but many educators find it challenging to apply gamification effectively. Therefore, this research proposes a teaching strategy that combines e-quizzing gamification elements with the main principles of an SH to create an exciting learning environment.
Findings	Gamification was found to improve trainee teachers' perceptions of the selected teaching strategy. It also increased their motivation for learning and engagement with their peers, thereby proving Quizizz to be a useful gamification tool, despite some technical difficulties.

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Recommendations for Practitioners	This study recommends that teachers who utilize technology should do so for educational purposes and in new ways, rather than merely increasing the time spent using technology in the classroom. This will ensure that classes are more interesting, thereby eliciting enthusiasm from their students.
Recommendations for Researchers	Further research is recommended to explore students' development in the area of collaboration, synthesis of information, critical thinking, and problem-solving, as a result of gamification strategies in education.
Impact on Society	The study participants expressed a willingness to apply this strategy later in their careers with other students and on other courses. The collaborative and problem-solving skills learned are likewise transferable to other contexts and lifelong learning.
Future Research	Further research is recommended to explore students' development of other skills such as collaboration, synthesis of information, critical thinking, and problem-solving.
Keywords	gamification, scavenger hunt, Quizizz, perception, engagement, motivation

INTRODUCTION

The use of digital games has evolved in the last decade, going from being a tool used purely for entertainment to one that can also accommodate educational goals. Educators often seek new pedagogical tools that can increase learners' interest in learning, motivation, and active engagement with learning content. In this regard, the adaptation of digital computer games has been found to be more fun and attractive for students compared to traditional learning methods (Attali & Arieli-Attali, 2015; Yıldırım, 2017). Gamification has been defined in the literature as the use of game mechanics, features (such as badges, rewards, points, and leaderboards), and game thinking in a non-gaming context (Akpolat & Slany, 2014; Alsawaier, 2018). The aim of such implementation is to create a supportive and engaging learning environment, as described by Bicen and Kocakoyun (2018).

Nevertheless, gamification is not restricted purely to younger learners (da Rocha Seixas et al., 2016; Lo & Hew, 2018). Due to the positive results that gamification has already produced, a move towards its use in higher education is well underway worldwide (Akpolat & Slany, 2014; Buckley & Doyle, 2017; Cheong et al., 2014; Yıldırım, 2017). However, a challenge posed by gamification to educators in higher education is finding an effective method of application to promote students' interest in learning, engagement, and collaborative skills (Rapp et al., 2019). Kassens and Enz (2018) approached this challenge via 'scavenger hunt' (SH), a game that was familiar to the learners. Here, the learners searched for several clues to win a prize at the end of the game, gaining knowledge in the process. The scavenger hunt has been demonstrated as an educational tool that is attractive to learners and capable of promoting learning (Kassens & Enz, 2018; Owen, 2017; Serna & Taylor, 2019; Wells, 2012).

In teaching a 'Production and Utility of Teaching Aids' course for pre-service teachers at Imam Abdulrahman bin Faisal University (IAU), some practical lessons were being included at the time of conducting this study. These were aimed at training students in the production of educational technology teaching tools. Meanwhile, other lessons were more theoretical, exploring educational technology and design theory. In the latter, the students appeared to lack interest and motivation for learning. Therefore, the researchers sought a way of increasing their interest and motivation, while at the same time introducing them to an app and teaching strategy that they could use in their future teaching careers. The current research explores the use of gamification in the form of an SH game, which includes online gamification quizzes as a teaching strategy to increase learners' levels of excitement and engagement. It also investigates the effect of this intervention on students' learning gains

and their perceptions of gamification, as well as the teachers' views of the selected game as a teaching strategy.

The originality of this study lies in the fact that it looks at the implementation of gamification with pre-service teachers, who have never engaged in this form of SH before. It could enable a clearer understanding of how SH activities influence learners' motivation and engagement. Moreover, the sample used in this study, consisting of pre-service teachers in early childhood education, were already using quiz applications in most of their university classes and during their kindergarten teaching practice. This frequent use of such quizzes could therefore reduce the learners' excitement over their implementation as teaching tools. Consequently, incorporating an SH that requires physical movement, in addition to the quiz application, could increase the learners' motivation and excitement. In addition, SHs could be used by early childhood pre-service teachers in their future work with young learners, especially as these games require physical movement, which is encouraged among younger learners during play (Giske et al., 2018). The present study also aims to provide educators with a pedagogical tool to implement gamification, bearing in mind the findings of Yang et al. (2017), wherein educators tend to have limited knowledge of how to implement gamification.

LITERATURE REVIEW

To understand the gamification concept, it is important to note that it adds game elements/strategies (such as badges and rewards, which are outlined in more detail later) to an educational context, in order to enhance learning and collaboration, while also encouraging engagement, creativity, and positive behaviour (Alsawaier, 2018; da Rocha Seixas et al., 2016). Nevertheless, merely adding these elements to a learning context has been dismissed as mere pontification (Cheong et al., 2014). Indeed, elements should be properly integrated and have a clear function. These strategies have been classified in the literature as either 'mechanic' or 'dynamic,' both of which will be clarified below (Andriamiarisoa, 2018; González et al., 2016; Milenković et al., 2019).

DESIGNING GAMIFICATION: MECHANICS AND DYNAMICS

There are numerous elements to consider when designing gamification, in order for it to have an optimal impact on students' enthusiasm and engagement during their learning (Kapp, 2012a). These elements include: (1) encouraging students to engage in a game; (2) any flow and sequence of events that is sufficiently interesting to maintain students' engagement; (3) storytelling to motivate students; and (4) frequent feedback. Buckley and Doyle (2017) added that visible rewards are essential (for example, prizes, grades, or leaderboards) to motivate students. By drawing on the concept of gamification, other researchers have set out gamification designs based on crucial mechanics and dynamics for learner engagement (Andriamiarisoa, 2018; da Rocha Seixas et al., 2016; González et al., 2016).

Game mechanics and dynamics are important in the course of creating an engaging atmosphere through game features in a non-gaming context (Bunchball, Inc., 2010). Here, mechanics refer to game rules, leading the players towards specific actions that will enable them to proceed to other levels (Bunchball, Inc., 2010). These mechanics can enhance students' enjoyment, interest, competitiveness, and curiosity (Bicen & Kocakoyun, 2018). In particular, Bunchball, Inc. (2010) defines six game mechanics that can incentivize players' behaviour (see Table 1): **points** have various categories and are used to reward players for their game performance; **levels** refers to the various stages that a player completes in the course of playing the game; **challenges** are tasks that must be completed successfully; **badges** are awarded to acknowledge that a player has completed a level or overcome a challenge to achieve a goal (Antin & Churchill, 2011); **virtual goods** are non-physical items that players can purchase with their points, and the **leaderboard** shows where players rank in a game, compared to their fellow players (Buckley & Doyle, 2017).

Conversely, dynamics refer to players' interaction with a game's mechanics and narrative (Yildirim, 2017; Zichermann & Cunningham, 2011). Da Rocha Seixas et al. (2016) emphasise the importance

of the following dynamics for learners in gamification (see Table 2): **rewards** are points awarded to a learner for behaviour, thereby encouraging the repetition of this behaviour, while **status** means the recognition or attention that individuals receive after performing an activity successfully (achievable through the mechanism of the leaderboard). Specifically, **accomplishments** are what players love to be challenged to achieve, and their goal and mechanism consist of a game's challenges. Meanwhile, **self-expression** of autonomy or originality can take place through characters and avatars. Finally, **competition** is encouraged by comparing players' performance with each other, which can be achieved via the leaderboard (Bunchball, Inc., 2010).

Table 1. Summary: Game mechanics (Bunchball, Inc., 2010)

Game Mechanics	Description
Points	Used to reward players for their game performance and weighted according to different categories
Levels	Various stages completed by a player over the course of a game
Challenges	Tasks that must be completed successfully
Badges	Awarded to acknowledge that a player has completed a level or overcome a challenge to achieve a goal
Virtual goods	Non-physical items that players can purchase with their points
Leaderboard	A virtual board showing the players' rankings in a game, in comparison with their fellow players

Table 2. Summary: Game dynamics

Game Dynamics	Description
Rewards	Points awarded to learners for their behaviour, thereby encouraging the repetition of this behaviour
Status	Attention or recognition received by individual players after performing an activity successfully
Accomplishments	Players' achievement of goals and successful performance of mechanisms, these being the game's challenges
Competition	Encouraged by comparing players' performance

Scavenger Hunt (SH) Design and Implementation

According to the literature (Erenli, 2013; Hutzler et al., 2017), SHs can be designed using a variety of methods, one being a multilevel approach where various clues are hidden in different locations, eventually leading to a prize. An alternative is the 'mystery' method, where a series of puzzles or riddles must be solved to find clues that will lead to a prize or the end result of the SH. A third type of SH involves a series of barcodes, each linked with a quiz or riddle, which then leads to another barcode and finally, to a prize of some kind. The latter method was used in a study by Erenli (2013), producing positive outcomes with regard to learners' perceptions and ease of use for both teachers and learners. In this current study, it was decided to incorporate a 'barcode' method into the design of the SH, as it was considered to be the best means of enabling the SH to deliver the intended content. Barcodes were also combined and linked to quizzes and learning content for implementation in this study (which will be discussed further in the Methodology section).

In addition, Hutzler et al. (2017) proposes several guidelines for achieving positive outcomes from an SH. These guidelines include creating a path for learners to follow; using software to create quizzes (in the present study, Quizizz); using a barcode generator to create the barcodes and hiding the barcodes in locations that students can access, as well as ensuring that they cannot be tampered with by a third party. All of these guidelines were followed in this study.

Students' Perceptions of Gamification

Pre-teachers' perceptions of gamification have already been studied in the literature. For example, Gómez-Carrasco et al. (2019) administered a questionnaire to examine perceptions of gamification used in a flipped classroom among 20 pre-teachers. The findings showed that the pre-teachers were motivated, and their learning was successful. These findings were justified by the students enjoying the varied teaching strategies. Moreover, Bicen and Kocakoyun (2018) surveyed 65 pre-service student teachers' perceptions of gamification and found that it developed the students' motivation, ambition to succeed, and interest. Furthermore, qualitative methods were adopted by Wingo et al. (2019) to investigate nursing students' perceptions through focus groups and observations. Wingo et al. (2019) found similar results, because the students perceived the game positively since it increased their knowledge retention and test-taking skills.

These positive perceptions can be justified by the scaffolding that the learners received from their teachers in the form of instant feedback to help them understand content and consequently achieve higher test scores (Cheong et al., 2014; Kapp, 2012b; Wingo et al., 2019). Meanwhile, Cheong et al. (2014) considered a points system, leaderboards, and achievement badges as types of feedback, as each of these indicates a level of personal performance and encourages competition.

Peer collaboration is another form of scaffolding that can have a positive impact on students' engagement, motivation, and perceptions (Ismail et al., 2019; Leaning, 2015). Da Rocha Seixas et al.'s (2016) study gives an indication of how this collaboration can intrinsically motivate learners to help others and complete their learning activities. This assumption is supported by Bicen and Kocakoyun (2018), who claim that gamification enhances students' achievement because it enables them to see where they rank among their peers, and how they have improved their knowledge and abilities in certain areas. Gamification takes advantage of people's competitiveness and motivation to obtain rewards. Thus, it is expected to have a positive influence on their behaviour, attitudes, and perceptions (Attali & Arieli-Attali, 2015; Yang et al., 2017). Simply put, students who receive more rewards from their teacher display significantly higher achievement (da Rocha Seixas et al., 2016).

Conversely, while many studies have demonstrated the positive impact of gamification, Hanus and Fox (2015) found a decline in students' motivation and grades after its implementation. As justification, they cited the novelty of gamification as a learning strategy, as well as the relatively short duration of the study (16 weeks). Moreover, Türkmen and Soybaş (2019) found no statistical differences in achievement or attitude between students taught through gamification, and a control group studying mathematics via traditional methods. In the same vein, Yildirim (2017) revealed only a limited positive impact of game-based teaching on students' achievement and attitude, and this impact did not include any cognitive effect. Likewise, another study found no relationship between gamification features and students' engagement and motivation (Hanus & Fox, 2015).

Teachers' Perceptions and Experiences of Gamification

Teachers' perceptions of gamification have been the focus of several studies. For instance, Alabbasi (2018) sampled 47 teachers who were using gamification in their classes and found that almost all of them had positive attitudes to gamification, because of its beneficial effects on students' motivation. For more details of teachers' views of the benefits and barriers presented by using gamification, interviews were carried out by Sánchez Mena and Martí Parreño (2017), using a sample of 16 teachers. These teachers identified four benefits of gamification: increasing students' attention and motivation,

keeping students entertained, providing activities, and facilitating students' learning. Conversely, the above authors also mentioned four main barriers: a lack of material, knowledge and time resources (affecting quality of preparation, knowledge of gamification, classroom settings); students' lack of interest; poor subject fit (impairing classroom dynamics, allocation of rooms), and university atmosphere. However, if these difficulties were considered by teachers and the higher administration before integrating gamification into classrooms, teachers might be more motivated to use it and could have more positive perceptions of the approach (Sánchez-Mena & Martí-Parreño, 2016).

Quizizz and Scavenger Hunt (SH)

Various online platforms have been used to incorporate gaming as a pedagogical tool, including Badges (Akpolat & Slany, 2014), digital video games (Alsawaier, 2018; Attali & Arieli-Attali, 2015), online gamification tools such as Kahoot (Bicen & Kocakoyun, 2018), and Quizizz (Rahman et al., 2018). The tool used in the current study was Quizizz (Quizizz, 2020), an online gamification quiz tool that is available free of charge for educators and students. Such e-tools have been found to increase both learning motivation and learning awareness among students (Ismail et al., 2019). Moreover, online gamification quizzes have been demonstrated to improve learning engagement, task completion, time efficacy, and active learning (Cook & Babon, 2017; Rahman et al., 2018).

Overall, in the literature, the SH concept has been used in numerous studies as a form of gamification for higher education (Lu et al., 2015), especially in university orientation programmes (Kubasik et al., 2016), for example, undergraduate courses relating to economics (Kassens & Enz, 2018), nursing (Owen, 2017), finance (Serna & Taylor, 2019), and music (Wells, 2012). In many of these cases, gamification has been found to increase learners' motivation, interest in learning, and teamwork skills (Kassens & Enz, 2018). However, the novelty of this study is its combination of Quizizz and SH game principles in a single educational context among trainee kindergarten teachers. These pre-service teachers had been using games applications in their university courses and in their kindergarten teaching practice. They were also encouraged to create opportunities for children to physically play and move around for educational purposes. The combination of Quizizz and SH should enable them to achieve this goal.

Finally, the theoretical base of gamification in this study is self-determination theory (SDT), which is founded on three principles: autonomy, competence, and relatedness (Seaborn & Fels, 2015). Autonomy is related to the willingness to perform a task and make decisions during a game; competence is linked to the motivation to overcome challenges and accomplish tasks, and relatedness refers to relationships between learners/players, based on mutual respect (Baard et al., 2004). These three principles comprise the research variables. The learners' willingness to learn (autonomy), their motivation to overcome challenges (competence), and their collaboration while playing (relatedness) were examined by surveying their perceptions of the intervention.

Purpose of the Study

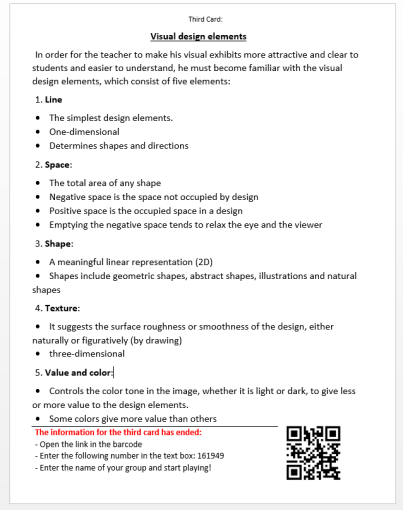
The aim of this study was to evaluate students' perceptions of gamification and its effect on learning, and to investigate the perceptions of students and teachers of the specific e-tool used for gamification in the intervention, namely Quizizz, integrated with the SH game. In pursuit of this aim, the following questions were formulated and addressed:

1. What are the students' perceptions of gamification in the form of combining Quizizz and the SH game?
2. What are the students' perceptions of the effectiveness of Quizizz?
3. What are the teachers' views of gamification as a teaching strategy, and of the game implemented in their classroom in this study?

METHODOLOGY

THE INTERVENTION

The game was delivered in four lessons over a period of four weeks. As mentioned earlier, the SH method chosen for this study entailed a series of barcodes linked to quizzes, ultimately leading to a prize. In the class, the teacher introduced the first lesson with a short presentation, defining the term 'gamification' along with its benefits and uses. The teacher also provided the learners with instructions for the game under study. The students subsequently divided themselves into fixed groups of three and gave their groups names. In each lesson, the students learned a topic by playing four games, all resembling SH. The content of every lesson was therefore divided into four parts, each printed on four sequential cards with a QR code, which the students scanned. This led them to an online quiz (Figure 1). These cards were hidden around the college campus. The quiz consisted of four questions (Figure 2), relating to the information provided on the cards. Once each team had answered the four questions, a clue to finding the next card was presented in the online quiz. This was repeated until the teams had found all four cards and completed their quizzes. However, to find the first card, the teacher gave the learners/teams an initial clue, leading them to its location.



Third Card:

Visual design elements

In order for the teacher to make his visual exhibits more attractive and clear to students and easier to understand, he must become familiar with the visual design elements, which consist of five elements:

1. **Line**
   - The simplest design elements.
   - One-dimensional
   - Determines shapes and directions
2. **Space**:
   - The total area of any shape
   - Negative space is the space not occupied by design
   - Positive space is the occupied space in a design
   - Emptying the negative space tends to relax the eye and the viewer
3. **Shape**:
   - A meaningful linear representation (2D)
   - Shapes include geometric shapes, abstract shapes, illustrations and natural shapes
4. **Texture**:
   - It suggests the surface roughness or smoothness of the design, either naturally or figuratively (by drawing)
   - three-dimensional
5. **Value and color**:
   - Controls the color tone in the image, whether it is light or dark, to give less or more value to the design elements.
   - Some colors give more value than others

The information for the third card has ended:
- Open the link in the barcode
- Enter the following number in the text box: 161949
- Enter the name of your group and start playing!

Figure 1. Example of a card and QR code used in a lesson: Presents information about visual design elements, details of the relevant technology, and a QR code allowing the students to access the online Quizizz game

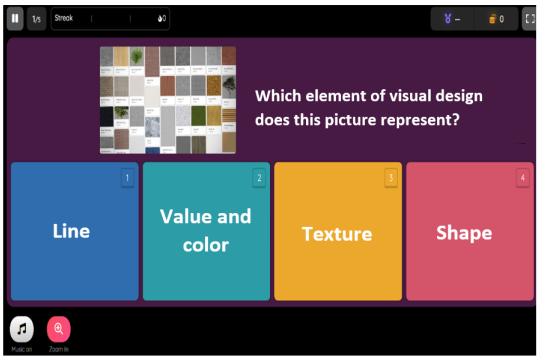


Figure 2. Screenshot of typical Quizizz question about information presented on the cards, with four possible answers to choose from

The gamification mechanics applied in this intervention were as follows: points, levels, leaderboards, status, and self-expression. After answering each question in Quizizz, the students were given instant feedback, whereupon their points were displayed to them immediately through the application, alongside a meme (an expressive image of a well-known character). The meme displayed positive expressions for a correct answer and negative expressions for a wrong answer. Correct answers were also highlighted for the students (Figure 3). In addition, the students could see their points and levels in the leaderboard (Figures 4 and 5), relating to other groups in their class who were also playing the game, as well as those of groups from other classes. At the end of the class, a leaderboard was presented to the students on Blackboard (the eLearning management system used in the university), showing the top three groups (Figure 6). Moreover, at the beginning of the next class, a leaderboard was presented in an Excel file, showing the groups' overall performance, set out in terms of accuracy and speed (Figure 7). At the end of each class, the teacher asked the students for their feedback on the SH, so that their comments could be considered when designing the next game.

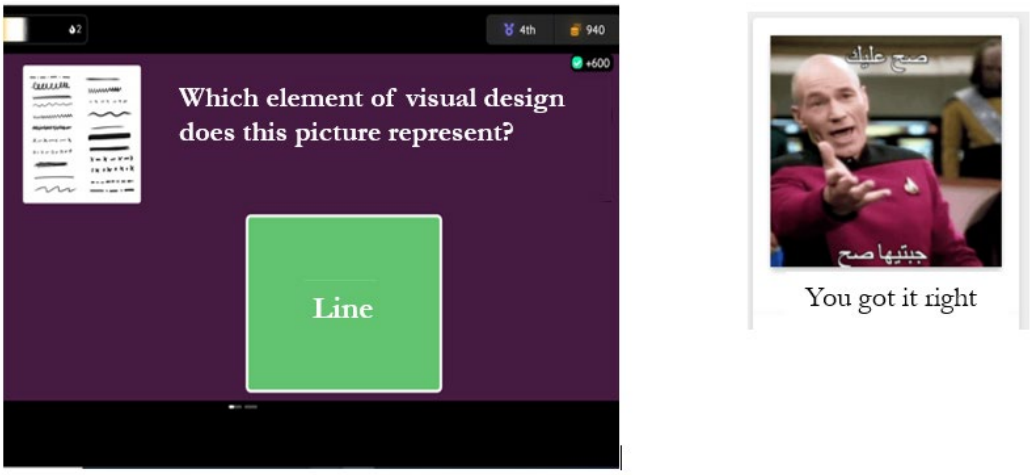


Figure 3. Screenshot displaying format for a correct answer and an accompanying meme

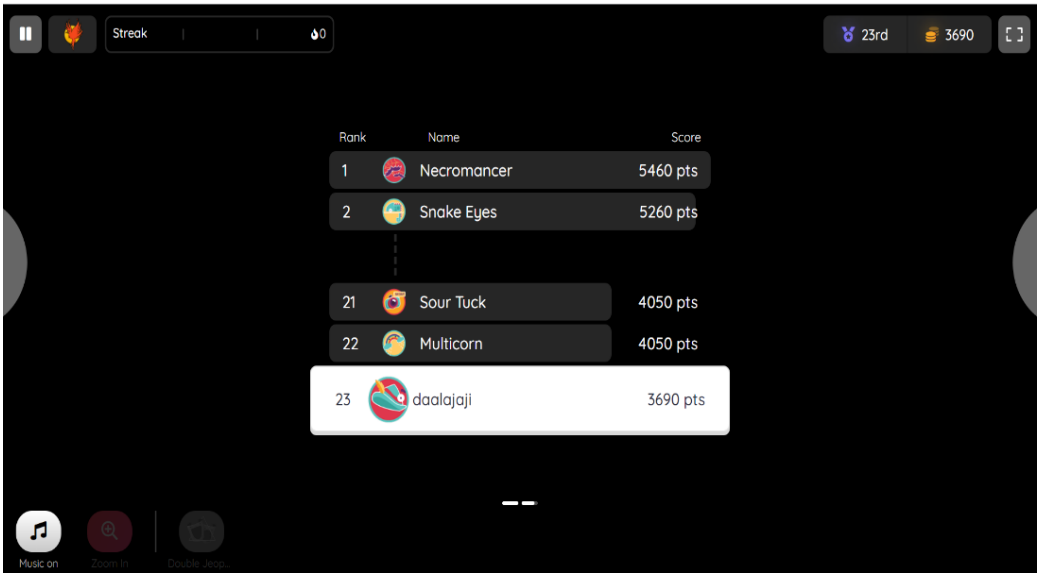


Figure 4. Screenshot of group rankings

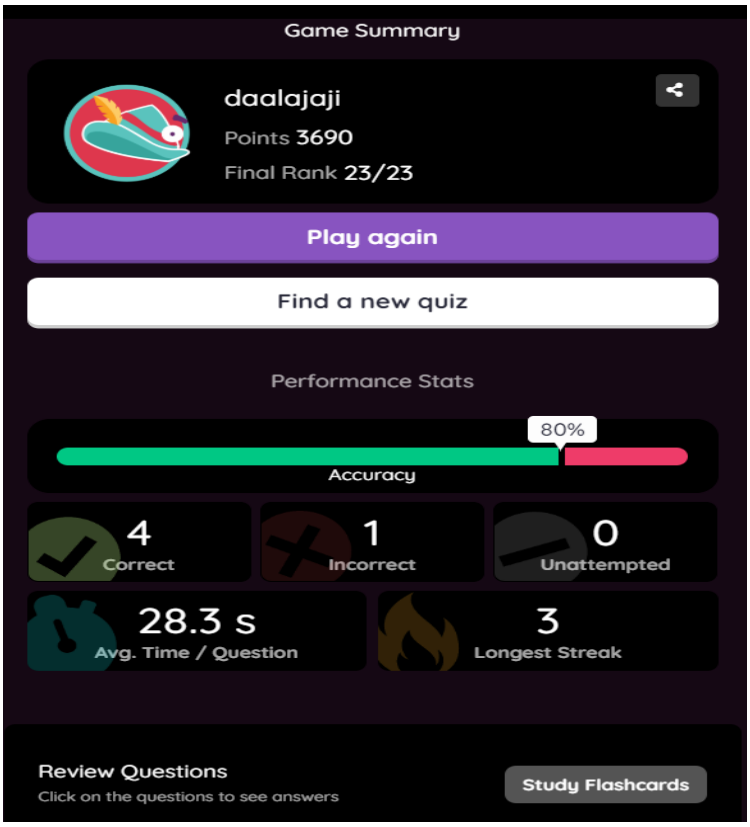


Figure 5. Screenshot of a game score summary

Figure 6. Leaderboard, showing the groups in first, second, and third position

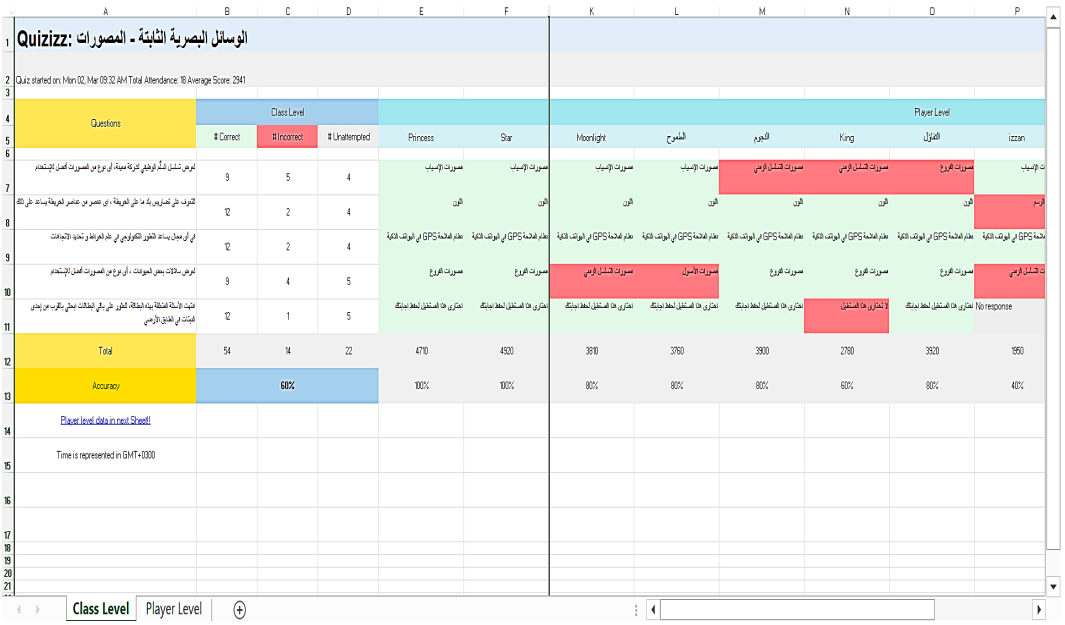


Figure 7. Example of a typical Excel sheet showing the students' correct and incorrect answers for each question

The Study Participants and Data Collection Strategy

A convenience sample was used in this study, as the researchers worked at the same College. The sample comprised 41 students (all participants responded to the Quizizz questions and online survey). The sampled students were registered in three different classes (sections) of the same course, taught by two different teachers, and were distributed across the sections in classes of 18, 12 and 11. The sample was selected from the Early Childhood Department at the School of Education in Imam Abdulrahman University (IAU). The participants were all in their second year at the College, and were aged between 19 and 21. Moreover, the sample was exclusively female, as the Department only trains female kindergarten teachers, since kindergarten teaching is limited to female teachers in Saudi Arabia. In addition, each participant owned a smart phone and was familiar with using technology, including mobile apps.

Both of the instructors teaching the above course used the same method of applying the game under study. These teachers were two female faculty members of the Education Department at the same university where the interventions were carried out. One had a Master's degree in Educational Technology and the other held a PhD in the same subject area. These teachers received orientation in the current research design and were interviewed to discover their perceptions of the intervention.

The game was implemented within a Production and Utility of Teaching Aids course in the field of educational technology, where various teaching methods and educational e-tools were proposed and studied. The topic of gamification was also part of the course content. Therefore, applying gamification in practice in class was viewed by the teachers as a way of helping the learners to better understand the concept. The content used in the SH to promote learning and enable the learners to complete the quizzes covered the following four topics: elements of design, design principles, educational graphics, and educational models. Nevertheless, it is important to acknowledge that the research topic – the use of gamification and scavenger hunt (SH) to develop students' performance – is closely related to the course content, which is focused on producing teaching aids that include gamification and the creation of games. This posed the risk of participant bias, but an attempt was made to eliminate such bias among the learners by having the teachers implement the game before starting the gamification unit of the course.

Research Design – Data Collection and Analysis

The research design consisted of mixed methods in concurrent triangulation, as these methods were used to cross-validate the findings (Creswell et al., 2003). The data were collected using four research instruments, including questionnaires, a student focus group, classroom observations, and interviews with the teachers. The results of each game were all taken into account, triangulated by the results of the learners' focus group, classroom observation of the learners, and interviews with the teachers.

The Quantitative Research Methods

The data gathered using quantitative research methods consisted of the game results, in addition to the questionnaire responses. The students' scores from each game were taken as an indicator of their understanding of any information that they had read and discussed in their teams throughout the game. An online questionnaire (based on the Gamification Perception Scale established by Bicen & Kocakoyun, 2018) was administered to the students at the end of the experiment, in order to measure their perceptions of this particular method of gamification as a response to the first research question. Meanwhile, the students' evaluation of the effectiveness of Quizizz was measured using a different scale, namely Bicen and Kocakoyun's (2018) Scale (Effectiveness of the Kahoot Application) to answer the second research question. The two scales were five-point Likert scales, with 5=Strongly agree, and 1=Strongly disagree.

Validity and Reliability of the Scales

The scales were translated by one of the researchers and reviewed by the other, before being back-translated by an independent researcher. The 'General Perceptions of the Gamification Method' Scale contains 32 items in its original version, and these are not classified into separate constructs. Meanwhile, the 'Effectiveness of the Quizizz Application' Scale contains 24 items, to which the current researchers added two further items to measure the effect of feedback on the students' perceptions. For the present study, the items were also classified into five constructs to facilitate the data analysis. The researchers submitted these scales in their preliminary form to a panel of five experts in teaching methodology, so as to benefit from their opinions of the appropriateness of the scale statements. In the views of these experts, the percentage of agreement ranged from 80-100%. A few amendments were subsequently made, based on these expert opinions, regarding the wording of four statements, and additions to the section on demographic data. The scale statements were not classified into constructs, but the experts were asked to classify them according to their expertise, so that it would be easier to identify essential factors of gamification and Quizizz (Tables 3 and 4). Thus, all items received more than 80% approval and the final versions of the scales and corresponding number of items were as follows: 'General Perceptions of the Gamification Method' (32 items) and 'Effectiveness of the Quizizz Application' (24 items).

Table 3. General perceptions of the gamification method - constructs and statements

Constructs	Statements
Gamification enhances feelings, confidence and interest	1-2-4-6-7-11-12-16-17-18-20-21-22-23
Gamification enhances understanding	5-8-9-13-14-15-24-27
Gamification increases competition through collaboration	3-10-19-25-26-28-29
Gamification is positive in crowded classes	30-31-32

Table 4. Effectiveness of the Quizizz application - constructs and statements

Constructs	Statements
Quizizz is a learning tool	1-3-6-9-12-15-20-21-22
Quizizz increases students' interest and excitement	2-4-5-7-8-13
Quizizz attracts students' attention	10-11-14-16-17-18-19-23-24

To calculate the validity of the scales' internal consistency, the researchers applied them to a sample comprising 42 members of the study community. The correlation coefficients were then calculated between the scores for each statement and the total score for the dimension to which they belonged. The corresponding results are presented in Tables 5 and 6, which illustrate that the correlation coefficient is significant at the level 0.01, thereby indicating the internal consistency of the scales.

Meanwhile, Cronbach's alpha was used to compute the reliability of the scales. The values for reliability are reported in Table 7, which shows that the Cronbach's alpha values ranged between 0.710 and 0.909, demonstrating the reliability of the scales. It is suggested that a scale has excellent internal consistency if it has a Cronbach's alpha that is equal to 0.9. Additionally, a scale has good internal consistency if its Cronbach's alpha is equal to 0.8 (George & Mallery, 2003). Accordingly, both scales in this study were found to have excellent internal consistency.

Table 5. Correlation between each item and the total score for its sub-scale for general perceptions of the gamification method (n=42)

Gamification Enhances Feelings, Confidence and Interest				Gamification Enhances Understanding		Gamification Increases Competition through Collaboration		Gamification Is Positive in Crowded Classes	
Item	R	Item	R	Item	R	Item	R	Item	R
1	.491**	16	.829**	5	.733**	3	.720**	30	.895**
2	.574**	17	.631**	8	.761**	10	.523**	31	.905**
4	.729**	18	.640**	9	.674**	19	.705**	32	.520**
6	.624**	20	.587**	13	.706**	25	.856**		
7	.651**	21	.820**	14	.609**	26	.690**		
11	.704**	22	.795**	15	567**	28	.883**		
12	.797**	23	.719**	24	.624**	29	.886**		
				27	.733**				

** 0.01 level

Table 6. Correlation between each item and the total score for its sub-scale for the effectiveness of the Quizizz application (n=42)

Quizizz Is a Learning Tool		Quizizz Increases Students' Interest and Excitement		Quizizz Attracts Students' Attention	
Item	R	Item	R	Item	R
1	.833**	2	.826**	10	.654**
3	.754**	4	.762**	11	.768**
6	.786**	5	.760**	14	.763**
9	.846**	7	.752**	16	.538**
12	.730**	8	.822**	17	.641**
15	.659**	13	.748**	18	.745**
20	.820**			19	.705**
21	.847**			22	.625**
				23	.541**

** 0.01 level

Table 7. Reliability of the scales (n=42)

General Perceptions of the Gamification Method		Effectiveness of the Quizizz Application	
Sub-scales	Alpha	Sub-scales	Alpha
Gamification enhances feelings, confidence and interest	.904	Quizizz is a learning tool	.909
Gamification enhances understanding	.841	Quizizz increases students' interest and excitement	.838
Gamification increases competition through collaboration	.828	Quizizz attracts students' attention	.809
Gamification is positive in crowded classes	.710	Total	.942
Total	.922		

To answer the first and second research questions, mean and standard deviation values were calculated for the statements to show the responses that were most frequently given by the students. Moreover, the weighted averages of the scale constructs were calculated to identify the construct that the students' perceived most positively.

The Qualitative Research Methods

To triangulate the students' views and perceptions of gamification (first research question) and the effectiveness of Quizizz (second research question), qualitative research methods were adopted. Firstly, observation was carried out by an external observer, who was asked to observe the progress of the games alongside the course teachers, who also noted their observations of the students during the game. The external observer and the teachers were asked to focus on the following points, using a semi-structured observation form:

- The start and end times for each task;
- The students' engagement throughout the games, and
- The students' motivation to win badges and score higher on the leaderboard.

Secondly, in order to triangulate the observation results, a focus group was conducted with five students to gather their views on the game. These students voluntarily participated and were from different groups. This provided different views, regardless of their group's overall performance. Moreover, interviews were carried out with the teachers at the end of the intervention to answer the third research question about teachers' views of gamification as a teaching strategy, and teachers' views of the game implemented in the classroom in this study. Both the observations and interviews were subjected to thematic analysis. First, this was performed by applying descriptive codes to the data, after which overarching themes were derived as they emerged from the analysis. Finally, the quantitative and qualitative results were compared to answer the research questions.

RESULTS

STUDENTS' PERCEPTIONS OF GAMIFICATION

To answer the first research question, aimed at investigating the students' perceptions of gamification and elicited by combining Quizizz and an SH game, an online questionnaire was administered to the learners following the intervention. Forty-two students responded to the questionnaire. Table 8 shows the mean (M) and standard deviation (SD) of these statements, revealing the three responses with the highest means, as follows: (1) 'Gamification methods are fun' (M=4.93, SD= .261); (2) 'Performing group work with a gamification method illustrates how achievement can be obtained through collaboration' (M=4.90, SD= .297); and (3) 'The will to win increases through gamification' (M=4.89, SD= .472). Meanwhile, the three responses with the lowest means were: (1) 'I force myself to learn when using gamification methods to improve group achievement' (M=4.12, SD=1.234); (2) 'I think my reputation in the classroom improves with the badges I win through gamification' (M=4.00, SD=1.012); and (3) 'I feel bad if I am unsuccessful when a gamification method is applied' (M=3.69, SD=1.179).

Table 8. Students' perceptions of gamification

N.	Item	Mean	Std. Deviation
10.	Gamification methods are fun	4.93	.261
11.	Performing group work with a gamification method illustrates how achievement can be obtained through collaboration	4.90	.297
26.	The will to win increases through gamification	4.89	.267
5.	I want gamification methods to be used in other lessons as well	4.86	.472
3.	Being placed in competition with other students in the classroom via a gamification method increases my motivation	4.83	.377
1.	A gamification method increases my interest in the lesson	4.79	.470
19.	Gamification methods increase classroom competition	4.79	.470
13.	Gamification methods contribute to information exchange among friends	4.74	.445

N.	Item	Mean	Std. Deviation
21.	Gamification methods make me take on more responsibilities to become more successful in the lesson	4.74	.497
4.	I communicate more with my friends to become more successful via gamification methods	4.71	.554
18.	Gamification methods help me to become more ambitious	4.71	.596
24.	Gamification methods enable me to learn about difficult topics while having fun	4.69	.517
28.	The formation of a competitive environment increases my motivation in the classroom	4.67	.650
9.	Use of a learning method blended with a gamification method helped me to understand the lesson better	4.64	.618
14.	Information can be recalled more easily thanks to the gamification method	4.64	.533
17.	Each question I correctly answer improves my self-confidence	4.64	.727
27.	Gamification methods will be successful if used in other lessons	4.64	.821
29.	Creating a competitive environment increases my interest in the lesson	4.64	.656
23.	Applications used in gamification allow me to practice time-management skills	4.60	.734
20.	Racing against time increases my speed in answering questions in the gamification method	4.57	.737
2.	I study more to become more successful via gamification methods	4.55	.670
6.	Using a gamification method through my smartphone makes me feel better	4.50	.804
12.	Winning badges through a gamification method makes me feel important	4.50	.741
32.	Gamification methods help to identify areas of deficiency by collecting different data from individuals in group activities	4.50	.834
22.	Sharing the score I obtain on social networks makes me feel better	4.43	.831
8.	The gamification method allows me to see my achievement status and improve myself in the areas where I am weak	4.38	.909
7.	Rewards associated with gamification motivate me	4.33	.928

N.	Item	Mean	Std. Deviation
30.	Using a gamification method for group work in crowded classes increases the level of competition	4.19	1.042
31.	Gamification methods increase interest in the lesson in crowded classes	4.14	1.072
25.	I force myself to learn when using gamification methods to improve group achievement	4.12	1.234
16.	I think my reputation in the classroom improves with the badges I win through gamification	4.00	1.012
15.	I feel bad if I am unsuccessful when a gamification method is applied	3.69	1.179

The weighted averages of the students' perceptions of the gamification scale constructs were calculated, and these are shown in Table 9, revealing that the 'Gamification increases competition through collaboration' construct scored highest, with a weighted average of 4.70, followed by 'Gamification enhances understanding' (WA=4.64), 'Gamification enhances feelings, confidence and interest' (WA=4.57), and 'Gamification is positive in crowded classes' (WA=4.28).

Table 9. The weighted averages of students' perceptions of gamification constructs

Sub-scale	Mean	Std. Deviation	Weighted Average
Gamification enhances feelings, confidence and interest	63.98	6.63	4.57
Gamification enhances understanding	37.10	3.67	4.64
Gamification increases competition through collaboration	32.88	3.16	4.70
Gamification is positive in crowded classes	12.83	2.34	4.28
Total	146.79	12.63	4.59

To triangulate these quantitative findings, thematic analysis was carried out, exploring the learners' perceptions of gamification. A focus group was consequently arranged with five students, together with observations during the games. Firstly, in the focus group, the students justified their positive perceptions, declaring that they had found this first experience of gamification enjoyable and stimulating. Two of the students explained that it had energized them to accomplish tasks, even though they were initially exhausted because it was the final lesson of the day. All the students agreed that collaboration was a prominent feature of gamification but described this form of collaboration as differing from the type that occurred in their other courses. Most of the interviewees confirmed that they had explained things to each other, helped each other, and engaged in discussion before selecting answers. As Student W described:

> *When we search for the card, we direct each other towards different places, and when we find the card, we divide the content between us, so that each person reads a part, understands it, and explains it to the others before going on to the questions.*

When asking the students what they thought was the best feature of gamification in the intervention, they named the physical activity of searching for cards in the SH. Many described it as a learning

strategy that they might apply with their students as primary education teachers in the future. However, hiding cards in different and difficult locations in the college proved controversial, as some students enjoyed it while others did not. The students who saw the benefits of it, stated the following:

> *It was exciting to search for cards and answers and this helped the information stay longer in our minds.* [Student R]

Confirming significant results for the final construct ('Gamification is positive in crowded classes') in the survey, the students in the focus group appeared to have positive perceptions of competition. Playing games increased the spirit of competition among them, as they were keen to give correct answers and finish first. In particular, this sense of competition was increased by the game mechanics, namely the leaderboard and points. Many students reported that knowing their level in the game after each question increased their focus and helped them to perform better, even if their level was low. Some also enjoyed seeing their points from the last game on the leaderboard at the start of each class, because it created a positive, challenging, and motivating atmosphere for them.

Similarly, the students generally found that gamification had a positive impact on their understanding and retention of information. Two students reported that for them, it highlighted the most important information and key ideas in lessons, which helped them perform better in the corresponding exam. One student reported that she appreciated the breaking down of information into different parts, with questions on each part. Student S declared:

> *It develops retention during tests. I could remember information that was part of the game; I remembered it from the game.*

Nevertheless, some students also described certain difficulties that they experienced during the games. For example, Student W expressed some concerns that the noise they made while searching for the cards and clues disturbed nearby classes. In addition, while playing the game and answering the questions, the learners often found themselves prioritising speed over accuracy. In many cases, this had a negative effect on their overall scores.

The above findings were triangulated by the results of focused observations, carried out by an external observer who observed one group from each class. The first group (Group 1) began the task by searching for the cards. They displayed excitement and eagerness to find the cards quickly and worked as a group. They would then scan the code to read the questions, searching for the answers in the card, discussing them, and selecting an answer in Quizizz. This pattern was repeated throughout the games. In the second lesson, the learners were presented with their rankings in the leaderboard, which motivated them to concentrate on increasing their speed to achieve a higher ranking. The learners' interest in finding out their ranking in comparison to the other groups was apparent. It was also noted that they scanned the content cards for key words from the questions, in an attempt to find answers quickly. However, if they could not find an answer, they analysed the questions and content, looking carefully for the relevant information. The average time spent on each task across the four lessons was just under five minutes. After answering each question, the students then complimented and encouraged one another.

The second group (Group 2) was observed in another class, where it was found that they followed the same pattern as Group 1 in the course of performing the tasks. Often, if a card had a high volume of content, the students would break that content down before reading it to find answers more quickly. With the easier questions, the student holding the mobile device would sometimes answer them without consulting peers. Meanwhile, some students prioritised speed, which led to them answering certain questions incorrectly. The duration for each of these tasks was just under six minutes.

A third group (Group 3) was then observed in the third class. This group adopted a different pattern to complete the tasks. They began by reading the content on the cards and explaining it to each other. They subsequently scanned the code to answer the questions. The students were excited and keen to answer the questions within the time limit. They also collaborated to answer questions and

analysed content to find the correct answer. The average time spent completing the tasks was just under four minutes. The students' scores in the three groups are presented in Table 10.

Table 10. Students' game scores

Lesson	Group 1	Group 2	Group 3
First lesson (/16)	9	13.5	13.5
Second lesson (/16)	15 and an unsaved answer	15	16
Third lesson (/16)	13	12	16
Fourth lesson (/16)	10	15	16

Students' Perceptions of Quizizz

To answer the second research question, aimed at investigating the students' perceptions of the effectiveness of Quizizz, an online questionnaire was administered to the learners after the end of the intervention. Forty-two students responded to the questionnaire. Table 11 shows the mean and standard deviation of the scale statements.

Table 11. Effectiveness of the Quizizz application

N.	Item	Mean	Std. Deviation
15	Using pictures in Quizizz applications allows the user to understand the content more easily	4.83	.377
19	The Quizizz scoring system increases the ambition of students to be a top-five scorer	4.81	.397
24	The feedback through pictures after each question elicited a positive atmosphere around the game	4.81	.552
18	Sharing activities via social media increases motivation	4.79	.470
11	Quizizz improves students' rapid-thinking abilities	4.76	.484
6	Quizizz increases the effectiveness of the lessons	4.74	.445
9	Quizizz enables active learning	4.74	.445
13	Timely questions in Quizizz activities increase students' excitement	4.74	.445
2	Quizizz increases interest in the lesson	4.71	.457
21	The active use of Quizizz builds students' courage to participate in activities	4.71	.508
5	Using Quizizz makes for more effective collaborative learning	4.71	.596
8	Using Quizizz in education increases students' motivation	4.69	.468
4	Activities created using Quizizz are more interesting	4.67	.477
1	Lessons performed with Quizizz enable permanent learning compared to rote learning in traditional classroom environments	4.64	.533

N.	Item	Mean	Std. Deviation
20	The use of Quizizz in the classroom encourages learners	4.62	.582
22	Activities performed using the Quizizz application facilitate learning about a topic	4.62	.582
12	Quizizz provides for permanent learning in classroom activities	4.60	.627
23	The feedback on Quizizz helped me to understand the content	4.60	.912
17	The background audio in Quizizz is distracting	4.57	.770
3	Quizizz improves performance	4.52	.634
10	Question techniques in the activities presented by Quizizz provide students with different perspectives	4.52	.671
14	Quizizz gives students the opportunity to deliver richer content	4.43	.831
7	Quizizz allows for comfortable self-expression	4.24	.906
16	Using videos in the Quizizz application attracts greater student attention	4.21	1.048

The responses given by the students to questions about their perceptions of the effectiveness of Quizizz are shown above in Table 11. The three responses with the highest means were: (1) 'Using pictures in Quizizz applications allows the user to understand the content more easily' (M=4.83, SD= .377); (2) 'The Quizizz scoring system increases the ambition of students to be a top-five scorer' (M=4.81, SD= .397), and (3) 'The feedback through pictures after each question elicited a positive atmosphere around the game' (M=4.81, SD= .552). Meanwhile, the three items with the lowest means were: (1) 'Using videos in the Quizizz application attracts greater student attention' (M=4.21, SD=1.048); (2) 'Quizizz allows for comfortable self-expression' (M=4.24, SD= .906), and (3) 'Quizizz gives students the opportunity to deliver richer content' (M=4.43, SD= .831).

The weighted averages for the students' perceptions of the 'Effectiveness of the Quizizz Application' constructs were calculated and are presented in Table 12, revealing that 'Quizizz is a learning tool' was the most frequently occurring construct, with a weighted average of 4.76, followed by 'Quizizz increases students' interest and excitement' (WA=4.63), and 'Quizizz attracts students' attention' (WA=4.61).

Table 12. Weighted averages of students' perceptions of the effectiveness of the Quizizz application constructs

Sub-scale	Mean	Std. Deviation	Weighted Average
Quizizz is a learning tool	42.02	3.65	4.67
Quizizz increases students' interest and excitement	27.76	2.59	4.63
Quizizz attracts students' attention	41.50	4.00	4.61
Total	111.29	9.70	4.64

Furthermore, the students were asked about their perceptions of the game's mechanics in the intervention, as presented by the Quizizz app. In particular, Student S outlined the following reasons for appreciating the leaderboard's appearance after each answered question:

> *It showed me my achievements. It increased my willingness and enthusiasm to accomplish more. It had a positive impact, even when I knew my level was lower than that of the other groups.* [S]

Nevertheless, other learners experienced some difficulties when using Quizizz. The need for high-speed Internet while undertaking the quizzes posed some problems, especially since the students were physically moving around the college as part of the SH. Irksomely, the quiz would spontaneously restart every time the connection was lost. Student M also explained that the page suddenly became unresponsive during a game, which was frustrating. Some of the students were likewise frustrated at having to enter their names every time they scanned a code.

Teachers' Views of Gamification

To answer the third research question, which sought to garner teachers' views of gamification, interviews were carried out with the two teachers to gather their opinions and observations regarding the intervention. Both teachers noted that the students were excited, interested and motivated to learn the content, courtesy of the opportunity to work with their peers in locating the cards and performing the tasks. The teachers expressed their amazement about the students' positive attitude and high level of engagement and collaboration. They also expressed their willingness to apply this strategy later in their careers with other students and on other courses. In the teachers' experience with respect to normal classes before implementing this strategy, their students were usually tired and disinterested, given that it was their final class of the day.

Conversely, the teachers agreed that the students did not read the instructions, or the content presented on the cards. Instead, they skipped directly to the tasks. They then concentrated on speed, which negatively affected their performance and the number of correct answers given. Some of the groups tried to match the answers with the questions. Therefore, the teachers stated that they would consider this in future games and include questions that required their students to analyse the content on the cards to answer the questions correctly.

Regarding the Quizizz app, both teachers declared that it was relatively simple to use. This app is free and compatible with all types of smartphone, making it easy for learners to download. Quizizz offers some very useful features, including notifications of learners' scores after answering each question, displays of each group's ranking compared with those of other groups playing the same game, and instant feedback with amusing memes (these memes usually made the learners smile). Another useful feature is a game summary, presented at the end of each game (see Figure 7 above) and showing a breakdown of the students' correct and incorrect answers, as well as the time it had taken for these to be given. The teachers believed that these features had a positive impact on learners' motivation and perceptions. However, this level of interactivity required a consistent high-speed Internet connection, which was not always available everywhere on campus. However, this difficulty was overcome by ensuring that all the groups had personal Internet connectivity on their phones and did not need to rely on the campus's wireless Internet. Furthermore, Quizizz provided the teacher with various options, including the option to set a specific time for starting each game, or to allow each group to start each game at their own discretion. Another useful feature reported by the teachers was the option of turning a feature on or off with ease if it was not found to be helpful during the games.

The reports created by Quizizz were comprehensive (see Figure 7 above and Figure 8 below). They included speed, accuracy, and colour-coded charts of the groups' overall performance in the games. These reports were easy to download in a spreadsheet format, which helped with further analysing the learners' performance. Overall, the experience of using Quizizz appeared to be a positive one and the teachers expressed an interest in using it again for different contexts.

	Players	Score	Accuracy	Started At	Info
4					
5	Princess	4710	100%	Wed 04, Mar 10:33 AM	Mobile Safari on iPhone
6	Star	4920	100%	Wed 04, Mar 12:52 PM	Mobile Safari on iPhone
11	Moonlight	3810	80%	Wed 04, Mar 12:51 PM	Chrome Mobile on Generic Smartphone
12	الطموح	3760	80%	Wed 04, Mar 10:32 AM	Mobile Safari UI/WKWebView on iPhone
13	النجوم	3900	80%	Wed 04, Mar 10:34 AM	Mobile Safari on iPhone
14	King	2780	60%	Wed 04, Mar 12:51 PM	Mobile Safari on iPhone
15	التفاؤل	3920	80%	Mon 02, Mar 12:42 PM	Mobile Safari on iPhone
16	izzan	1950	40%	Thu 05, Mar 07:31 AM	Chrome on Other
	السلام	1920	40%	Wed 04, Mar 10:33 AM	Mobile Safari on iPhone

Figure 8. Spreadsheet reporting the groups' overall accuracy scores in the quiz

DISCUSSION

According to the data collected to answer the first research question, which related to the learners' perceptions of gamification, positive perceptions were generally expressed. A possible explanation for this result may be the learners' collaboration within the groups, which helped them to accomplish tasks and encouraged competition between the groups, while at the same time enhancing their motivation and interest. The learners attributed this increased interest to the use of mechanics and dynamics, which are essential for engagement (Andriamiarisoa, 2018; da Rocha Seixas et al., 2016; González et al., 2016).

The results of this study indicate that gamification helped the learners to better understand their lessons. It is possible that this resulted from the opportunity to work with their peers, discussing the learning material, searching for answers, receiving feedback through the scoring system and leaderboards, completing tasks, overcoming challenges, and using technology in a competitive environment. This mirrors the findings of previous studies, where peer collaboration and efficient feedback were demonstrated to have a positive impact on students' engagement, competitiveness, motivation, and performance (Attali & Arieli-Attali, 2015; Bicen & Kocakoyun, 2018; da Rocha Seixas et al., 2016; Kapp, 2012b; Leaning, 2015; Papastergiou, 2009; Seaborn & Fels, 2015; Wingo et al., 2019). It emphasises that people like to be acknowledged and rewarded (for example, winning prizes) for their good behaviour and task accomplishment (Yang et al., 2017), as expounded in self-determination (SDT) theory. Meanwhile, it is interesting to note that the group who read the cards and discussed the information before undertaking the quizzes achieved higher scores than the other groups.

Aside from the above, every learner expressed a desire for all their courses to include educational games. This has been echoed in the literature (Talton et al., 2006), where it was found that an SH positively influences perceptions, retention, and attitudes towards learning. This can be explained by physical activity being the most interesting aspect of the game, specifically in searching for information cards, a perception confirmed in many other studies (Kassens & Enz, 2018; Lu et al., 2015; Owen, 2017; Serna & Taylor, 2019). It indicates the essential role of the environment surrounding gamification in shaping positive perceptions of a game, as reported by Akpolat and Slany (2014) and Erenli (2013).

However, the study findings contradict those of Hanus and Fox (2015), who found a decline in students' motivation and grades after applying gamification. Although there was no control group to

compare the students' performance and perceptions, it could be claimed – based on the teachers' interviews and class observations in this study – that the learners' motivation was much higher in gamified than in non-gamified classes.

In answering the second research question, regarding students' perceptions and evaluations of the effectiveness of Quizizz, the survey findings showed that the students had positive perceptions of the app used for gamification, as was found by Bicen and Kocakoyun (2018). This may suggest that learning information in such a way is more interesting and therefore enduring, compared to the traditional classroom. Learning also occurred through collaboration and active learning while using Quizizz, which developed the learners' thinking skills. In addition, the media element helped to attract their attention. The results of this study correspond to those found in the literature, in which online gamification quizzes have been shown to improve learning engagement, task completion, time efficacy, and active learning (Cook & Babon, 2017; Ismail et al., 2019; Rahman et al., 2018).

Nevertheless, there are other possible explanations for these positive perceptions. For example, some students liked the colour schemes in the app and the feedback they received. They also enjoyed the memes consisting of images of well-known characters, expressing various emotions. This confirms Kapp's (2012a) assertion that frequent feedback is an effective element of game design. Many students also valued the mechanics of gamification, namely the leaderboard and scoring system, crediting it with an increase in their enthusiasm to accomplish tasks and with enhancing competition. This is in line with Buckley and Doyle (2017), who found that visible rewards (such as prizes, scores, and leaderboards) are expected to motivate students. Conversely, there were a few drawbacks to the app, mainly related to Internet connection speed. To combat this, it is recommended to provide students with high-speed Internet in any lessons where gamification is applied. With regard to the aforementioned dilemma between speed and accuracy, the teacher needs to clarify what the students should prioritise, depending on the relevant learning goal.

In answering the third research question, the interviewed teachers concurred with the previous findings, stating that the learners' positive perceptions were evident during the games, as well as in subsequent discussions with learners about elements of the games. This echoes Erenli (2013), where the teachers and learners found the app easy to use. Moreover, the teachers in the current study reported that this strategy could be interesting for both teachers and students, and that it transformed their teaching strategy toward a learner-centred approach, based on collaborative learning. As witnessed by the teachers and observers, most of the students began by scanning the codes and reading the questions to search for answers before reading the content on the cards. Therefore, the teachers changed the nature of the questions in the game, revising them so that they covered all the content presented on the cards and indirectly requiring the learners to analyse the information. This prompted more discussion, a better understanding of the content, and deeper learning. The teachers experienced gamification as a means of providing their students with entertaining content and teaching methods, while at the same time developing their knowledge retention, as confirmed by Alabbasi (2018), and Sánchez Mena and Martí Parreño (2017).

The results also demonstrated that the Quizizz app was relatively straightforward to use and compatible with all types of smartphone, making it easy for learners to download. It appeared to have some helpful features, which motivated the students to accomplish the tasks and promoted learning in the process. Thus, the Quizizz resembled the app used in Ismail et al.'s (2019) study (Kahoot), in its ease of use and potential to engage students. Therefore, Quizizz is recommended for teachers, either with or without the SH element.

CONCLUSION

This study implemented gamification for learning, using an online quizzing tool (Quizizz) as part of an SH game. The study aimed to investigate pre-service kindergarten teachers' perceptions of gamification, as well as examining their perceptions of the effectiveness of Quizizz in an educational context. Moreover, their tutors' views of gamification as a teaching strategy were examined.

The implications of this study include the importance of guided play for children in kindergarten. Consequently, this study was intended to help promote new methods of teaching and learning among educators, thereby facilitating the communication of knowledge by teachers to students. This study suggests that teachers who already utilize technology should also do so for educational purposes and in new ways, rather than merely increasing the hours spent using it for their students to gain points. In particular, further research is recommended to explore students' development of other skills such as collaboration, synthesis of information, critical thinking, and problem-solving. In brief, this paper should encourage university teaching staff to explore ways of avoiding the boredom that is commonly experienced in class by university students, thereby encouraging motivation and enthusiasm among learners.

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