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Drivers and barriers to the utilisation of gamification and game-based learning in universities: A systematic review of educators' perspectives

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Abstract

While gamification and game-based learning have both been demonstrated to have a host of educational benefits for university students, many university educators do not routinely use these approaches in their teaching. Therefore, this systematic review, conducted using the PRISMA guidelines, sought to identify the primary drivers and barriers to the use of gamification and game-based learning by university educators. A search of multiple databases (Web of Science, Scopus and EBSCO (Business Source Complete; ERIC; Library, Information Science & Technology Abstracts)) identified 1330 articles, with 1096 retained after duplicates were removed. Seventeen articles (11 quantitative, two mixed-methods and four qualitative) were included in the systematic review. The primary drivers described by the educators that positively influenced their gamification and game-based learning usage were their beliefs that it encourages student interactions and collaborative learning; provides fun and improves engagement; and can easily be used by students. Alternatively, the university educators' major barriers included a lack of time to develop gamification approaches, lack of proven benefits and classroom setting issues. Many

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of these and other less commonly reported drivers and barriers can be categorised as attitudinal, design-related or administrative in nature. Such categorisations may assist university educators, teaching support staff and administrators in better understanding the primary factors influencing the utilisation of gamification and game-based learning and develop more effective strategies to overcome these barriers to its successful implementation.

KEYWORDS

facilitator, higher education, learning, serious games, student engagement, teaching, tertiary education

Practitioner notes

What is already known about this topic

- Gamification and game-based learning may have many benefits for university students.
- The majority of university educators do not routinely use gamification and game-based learning in their teaching.

What this paper adds

- University educators' major drivers that positively influence the use of gamification and game-based learning include their perceptions that it encourages student interactions and collaborative learning, provides fun and improves engagement and can easily be used by students.
- University educators' major barriers that negatively influence the use of gamification and game-based learning include their perceptions of a lack of time to develop gamification approaches, lack of proven benefits and classroom setting issues.
- These drivers and barriers may be classified as attitudinal, design-related and administrative, with these categories providing a useful way for universities to develop strategies to better support educators who wish to use these approaches in their teaching.

Implications for practice and policy

- Attitudinal factors such as university educators' intention to use gamification and game-based learning are influenced by a host of their perceptions including attitude, perceived usefulness and ease of use.
- A range of design-related and administrative barriers may need to be overcome to increase the use of gamification and game-based learning in the university sector.

INTRODUCTION

Educators, be it in schools, universities or other settings, are often looking for innovative approaches to improve student engagement, overall learning experience and graduate employability outcomes. Contemporary approaches educators may consider are gamifi-

cation and game-based learning (GBL). While these and other terms including games for good, alternative purpose games or serious gaming have been used in the literature, the similarities and differences in these terms are not always clearly described or understood (al Fatta et al., 2019; Alvarez & Djaouti, 2011). Within the confines of this review, the term 'gamification' will be used to describe the process in which 'the use of game elements, such as incentive systems, to motivate players to engage in a task they otherwise would not find attractive' (Plass et al., 2015, p. 259). GBL can be defined as 'an environment where game content and game play enhance knowledge and skills acquisition and where game activities involve problem solving spaces and challenges that provide players/learners with a sense of achievement' (Qian & Clark, 2016, p. 51). On the basis of these two definitions, it could be stated that gamification and GBL are two ends of a continuum of how games can be used in educational contexts.

Regardless of how gamification and GBL are viewed and implemented, a systematic review identified how university educators and students feel such approaches are beneficial (Subhash & Cudney, 2018). Such perceptions have been more quantitatively supported by a meta-analysis (Bai et al., 2020), that involved 30 independent quantitative gamification interventions and 3202 participants across school and university settings. This meta-analysis indicated that gamification resulted in a significant medium effect size benefit for student academic performance compared with non-gamified approaches (Hedges $g = 0.504$, 95% CI [0.284–0.723], $p < 0.001$). It has been hypothesised that these gamification-related improvements in learning reflect how gamification may (1) significantly increase students' enthusiasm and motivation (Zainuddin et al., 2020); (2) significantly improves student enjoyment, especially when grappling with challenging content (Aşıksoy, 2018; Forndran & Zacharias, 2019); and (3) provide educators with in-class feedback on students' progression and comprehension of key content areas (Smith, 2017).

Within their systematic review and meta-analysis, Bai et al. (2020) also analysed 32 qualitative studies to gain some insight into the perceptions students held regarding gamification. Not only four primary reasons for students' enjoyment of gamification were identified (foster enthusiasm, provide performance feedback, provide recognition for learning and promote goal setting) but also two reasons for their dislike (does not bring additional utility and can cause anxiety or jealousy) (Bai et al., 2020). It was interesting that these four primary reasons for why students enjoyed gamification matched that of the literature for educators as well as several theories underpinning the benefits of gamification described by Bai et al. (2020) including self-efficacy, self-determination, social comparison, flow theory and operant conditioning theory.

In a systematic review and meta-analysis, Clark et al. (2016) reported significant learning benefits associated with GBL implementations compared with non-game conditions (Hedges $g = 0.33$, 95% CI [0.19, 0.48], $p < 0.05$). They also conducted moderator analyses to demonstrate that student learning effects varied across different game design techniques including but not limited to game mechanics, visual characteristics and overall narrative. This was further underscored in a recent meta-analysis where Thompson and von Gillern (2020) found that GBL can make a significant difference in promoting knowledge acquisition and promote substantial gains in student learning.

In addition to students' perspectives, a host of other factors may have a profound influence on the likelihood of GBL being effectively used in universities. One framework which can be used to provide a greater understanding of these factors is the Serious Games Design and Development (SGDD) process (Hirumi & Stapleton, 2009). This approach describes how interested educators may need to work with a multidisciplinary team including teaching support computer specialists (or other educators with the required IT skills) and business managers (in the University context, these may be referred to as administrators) to determine how GBL might be useful and then develop, implement and evaluate the game(s) (Hirumi &

Stapleton, 2009). Unfortunately, due to the number and complexity of some of these SGDD processes, a host of barriers may negatively influence even those educators who are highly interested in and motivated to develop GBL approaches for their university students.

A description of some of the facilitators (drivers) and barriers influencing educators' ability to effectively implement and use gamification and GBL, as well as some recommendations to overcome these barriers has been provided in a range of reviews (Carenys & Moya, 2016; Sulphrey, 2017; Tseklevs et al., 2016; Young et al., 2012). The most common drivers facilitating the usage of gamification and GBL include the educators' perspective regarding how gamification and GBL can improve student engagement, problem-solving and learning outcomes. In contrast, the major barriers identified related to the educators' perceptions of their students and themselves. The most common barriers relating to educators' perceptions of the students were whether different student cohorts would respond similarly; and how much time they would need to teach their students how to use these gamified approaches. Barriers reflecting the educators' self-perceptions, included whether these approaches provided benefits that transferred to real-world situations; their lack of technical skills; lack of finances to purchase some relevant games and how much time they had to invest in developing, identifying and/or administering the use of such games.

However, the generalisability of these reviews across the University sector internationally may be somewhat unclear for several reasons. Some of these reviews are, perhaps, becoming a little dated due to the major technological advances, especially the widespread access to smart devices and the Internet by students, over the last 10 years. Another potential issue is that these reviews have either been generalised across several education settings, including schools (Tseklevs et al., 2016; Young et al., 2012), focused on a specific university population, that is, accounting and business students (Carenys & Moya, 2016), students from one particular country (Sulphrey, 2017) or the definition and delineation of gamification and GBL are not made clear (Becker, 2021). As there may exist considerable differences between school and university settings in terms of the perspectives of students, educators and administrators on gamification and GBL; and as these perspectives may differ across different disciplines and countries, it is somewhat unclear what are the major drivers and barriers to the effective utilisation of gamification and GBL by educators across the university sector internationally.

Therefore, the primary goal of this systematic review was to identify the drivers and barriers that influence the adoption of gamification and GBL by educators in the university sector. We believe that these findings (supplemented by our critical appraisal of the included studies' methodologies) will allow us to provide some recommendations on how universities may better support their educators who wish to use gamification and GBL in their teaching.

METHODS

Protocol and registration

This systematic review was registered on the Open Science Framework (<https://osf.io/d4z85/>) and followed the Preferred Reporting Items for Systematic Reviews and Meta Analyses (PRISMA) guidelines (Page et al., 2021).

Eligibility criteria

To identify relevant studies, the following search terms were combined to reflect the setting (University OR College OR 'Higher Education' OR 'Tertiary Education'), population (Professor

OR Lecturer OR Educator OR Teacher OR Practitioner OR Faculty), concept (Gamification OR Gamified OR Gamify OR 'Game based' OR Game-based) and outcome (Adoption OR Teaching OR Pedagogy OR Barrier OR Facilitator OR Motive OR Determinant). To be eligible to be included in this review, all studies had to (1) include the perceptions of university educators on factors that positively or negatively influence the use of gamification, GBL or both gamification and GBL, (2) be published in English, (3) be peer-reviewed journal publications and (4) be published from 2011 onwards, due to the technological advances that occurred at the start of that decade, which meant that older studies may not necessarily be applicable to the current situation. Specifically, by 2011 a third of the global population had now accessed the internet for the first time (Statista Research Department, 2022) and global smartphone sales rocketed towards 500 million (O'Dea, 2022). Exclusion criteria included studies that (1) did not include outcomes reflecting educators' perceptions on why they have or have not adopted gamification and/or GBL in their teaching or (2) obtained the views of students only. As the perceptions of university educators on this topic could be examined using quantitative, mixed-methods or qualitative approaches, studies using any of these approaches were eligible to be included in the review. For the purposes of this systematic review, mixed-methods research is a study that combines aspects of both qualitative research and quantitative research to understand the phenomenon of interest more fully. This meant that quantitative studies including some open-ended questions that merely reported participant quotes and/or just listed the most numerous responses were not considered mixed method.

Search strategy

Databases searched included Web of Science, Scopus and EBSCO (Business Source Complete; ERIC; Library, Information Science & Technology Abstracts). After consolidating the references from the multiple databases into one Mendeley folder, duplicates were removed. This de-duplicated combined file was then uploaded into a web-based platform (Covidence) that was used to screen the articles based on title and abstract. For those articles identified as being eligible or potentially eligible, a complete screening of their full texts was performed by two reviewers (DL and DF) independently.

Critical appraisal and data extraction

Due to the high likelihood of finding eligible quantitative, mixed-methods and qualitative studies, the Mixed Methods Appraisal Tool (MMAT, 2018 version) (Hong et al., 2018) was used to critically appraise the methods of the included studies. For each of these research designs, five questions (criteria) that focused on different relevant aspects of research design were included, with each of these questions graded on a three-point scale (Yes, Unclear or No). The critical appraisals were initially conducted by two researchers (JK with either AL, IL or VM depending on the study methodology) independently. A consensus process was then used to reach an agreement where required.

Data extraction was performed independently by one researcher (JK) and checked by another researcher (AL, IL or VM) depending on the study methodology, using predefined data extraction tables developed specifically for the quantitative, mixed-method and qualitative studies, respectively. For each quantitative study, the following data were extracted: study citation details, participant characteristics, sampling approach, survey approach and sections, theoretical approach the survey was based on, response rate, primary drivers for gamification and/or GBL and primary barriers for gamification and/or GBL. As the questions tended to use Likert scale questions worded in a positive fashion, with the following anchors

(1 = strongly disagree; 3 = neutral; 5 = strongly agree), scores >3.0 were typically defined as drivers, whereas scores <3.0 were defined as barriers. For negatively worded questions, for example, 'Technology scares me' as used in Fisher et al. (2014), these values were reversed with drivers being defined with scores <3.0 and barriers defined as scores >3.0.

For each mixed-methods study, the following data were extracted: study citation details, participant characteristics, sampling approach, quantitative approach, qualitative approach, response rate, quantitative results/most frequent concepts and qualitative results/primary themes within each concept. For each qualitative study, the following data were extracted: study citation details, participant characteristics, sampling approach, data collection approaches, interview/focus group questions, qualitative analysis methodology, major driver themes for gamification and/or GBL and primary barriers for gamification and/or GBL.

RESULTS

Study selection

The search produced a total of 1330 articles, with 1096 articles available to review after duplicates were removed. After screening of titles and abstracts, a total of 101 articles were sought for retrieval. Of these, 35 articles were retained for full-text review, with 17 articles retained for the systematic review (see Figure S1)

Critical appraisal

A summary of the critical appraisals of the quantitative, mixed-method and qualitative studies are provided in Tables S1–S3, respectively. Eleven of the included articles were quantitative, two were mixed-method and four were qualitative studies.

Within the 11 quantitative studies, a low risk of bias was found across eight studies for Criteria 4.3 and across nine studies for Criteria 4.5. In contrast, only three studies reported a low risk of bias for Criteria 4.2 (Fisher et al., 2014; Kapralos et al., 2011; Vanduhe et al., 2020). For the two mixed-methods studies, a low risk of bias was found for both studies for Criteria 5.2–5.4 (Dimitriadou et al., 2021; Marti-Parreno et al., 2021). The highest risk of bias was found for Criteria 5.5, as Dimitriadou et al. (2021) had a high risk of bias. Within the four qualitative studies, the lowest risk of bias was found for Criteria 1.4, with two studies having a low risk of bias (Ismiyani, 2020; Sanchez-Mena & Marti-Parreno, 2017), with the remaining being unclear (Arnab et al., 2017; Lock et al., 2018). The highest risk of bias was found for Criteria 1.2 and Criteria 1.5, where all studies had a high/unclear risk of bias.

Study characteristics

Summaries of the study characteristics and major findings of the quantitative, mixed-method and qualitative studies are provided in Tables 1–3, respectively

The 11 quantitative studies included seven studies that focused on gamification (Durao et al., 2020; Fisher et al., 2014; Moreira et al., 2018; Sanchez-Mena et al., 2017a, 2017b, 2019; Vanduhe et al., 2020), three studies that focused on GBL (Kapralos et al., 2011; Marti-Parreno et al., 2021; Shah, 2017) and one study that examined gamification and GBL (Wiggins, 2016). These 11 studies had sample sizes ranging from 6–375 participants, with most studies' samples having a mean age of 40–50 years and a tendency for a slightly greater proportion of male educators. While four studies did not adequately describe their sampling process (Durao

et al., 2020; Moreira et al., 2018; Shah, 2017; Wiggins, 2016), snowballing was the most common approach used (Sanchez-Mena et al., 2017a, 2017b, 2019). Online/email surveys were used by all quantitative studies, except Shah (2017) and Vanduhe et al. (2020) (Phase 1), who did not adequately describe how participants accessed the surveys. Five studies did not report any theoretical approach informing survey development (Durao et al., 2020; Kapralos et al., 2011; Moreira et al., 2018; Shah, 2017; Wiggins, 2016). Of those with a theoretical approach, the most common were the Technology Acceptance Model (Sanchez-Mena et al., 2017a, 2019; Vanduhe et al., 2020) or Kellers Attention, Retention, Confidence and Satisfaction scale (Noraddin & Kian, 2015; Sanchez-Mena et al., 2017b). The response rate of the studies was not reported in six studies, with response rates varying from 7.3% (Kapralos et al., 2011) to 69–82% (Vanduhe et al., 2020) in the remaining five studies

In the two mixed-methods studies, one study focused on gamification (Marti-Parreno et al., 2021) and one on GBL (Dimitriadou et al., 2021). There was some variation in the number of participants ($n = 8\text{--}41$), with somewhat limited demographic characteristics again provided (Dimitriadou et al., 2021; Marti-Parreno et al., 2021). Snowball sampling was used in both studies (Dimitriadou et al., 2021; Marti-Parreno et al., 2021). The study with the largest number of participants used online surveys (Dimitriadou et al., 2021), whereas the smaller study used face-to-face data collection (Marti-Parreno et al., 2021). A variety of qualitative and quantitative approaches were performed in these studies, although neither study reported response rates for their quantitative data

The four qualitative studies consisted of two studies that focused on gamification (Ismiyani, 2020; Sanchez-Mena & Marti-Parreno, 2017), one on GBL (Lock et al., 2018) and one on a combination of gamification and GBL (Arnab et al., 2017). These four studies had sample sizes ranging from 4 to 16 participants, with limited demographic characteristics provided. Sanchez-Mena and Marti-Parreno (2017) was the only study to describe their sampling approach. A variety of data collection approaches were used, with the most common being a reflective case study of the researchers' gamification experiences (Arnab et al., 2017; Lock et al., 2018). Only two studies clearly described the questions the participants were asked and the qualitative analysis methodology used (Ismiyani, 2020; Sanchez-Mena & Marti-Parreno, 2017), although it was unclear how a phenomenology approach was used by Sanchez-Mena et al. (2017).

Summary of findings

Within the 11 quantitative studies, three general approaches were used for data analysis, with the simplest being the proportion of the sample who gave a particular response (Kapralos et al., 2011; Shah, 2017; Wiggins, 2016). Four studies obtained the participants' perceptions using five-point Likert scale questions (Durao et al., 2020; Fisher et al., 2014; Moreira et al., 2018; Noraddin & Kian, 2015). The majority of these questions were written in a positive way, with higher scores reflecting drivers rather than barriers to gamification and/or GBL. These questions tended to focus on the educators' own beliefs, or their perceptions of how their students may perceive gamification and/or GBL, with relatively few questions about potential drivers and barriers relating to the educators' perspective of the wider higher education environment. The Likert scale scores tended to be between 3 and 4, suggesting the studies identified weaker to moderate drivers, with few barriers reported. Of these drivers, only a small number of questions had mean scores ≥ 4 out of 5. These included the following: gamification could be incorporated into mobile learning classes (Durao et al., 2020; Moreira et al., 2018); students can be taught how to use gamification apps (Moreira et al., 2018); and digital games can bring fun and enjoyment to learning (Noraddin & Kian, 2015). Only two studies reported the educators' barriers to the use of GBL

TABLE 1 Summary of eligible gamification, game-based learning and combined gamification/game-based learning quantitative studies' methodologies and findings.

Study	Participants	Sampling approach	Survey approach and sections	Theoretical approach	Response rate	Primary drivers for gamification and/or GBL
<i>Gamification</i>						
Durao et al. (2020)	212 (80 SE, 71 AS and 61 SA) 44.8% F, with most between 31 and 50 yrs	Not reported	Online survey with six sections (Demographics, prior knowledge, participation/engagement, use of mobile devices mobile use in classroom and self-efficacy)	Not reported	Not reported	<ul style="list-style-type: none"> Requires little effort to learn how to use mobile [game-based] applications (LS = 4.15, 4.44 and 3.97) for SE, SA, AS); Students can be taught how to use apps mobile device with gamification apps (LS = 3.93, 4.23 and 3.99) for SE, SA, AS); Gamification could be incorporated into ML classes (LS = 3.96, 4.11 and 3.69 for SE, SA).
Fisher et al. (2014)	26 NATBE (16 F, 6 M), 50% with >20 yrs University teaching experience but varying levels of gamification knowledge	From 70 NABTE member institutions in 31 USA states and two Canadian provinces	Online survey with six sections (Knowledge of gamification, attitudes of gamification experiences and demographic characteristics)	Constructivism	39% (respondents) and 37% (respondents with usable data)	<ul style="list-style-type: none"> Technology scares me (LS = 1.20); Increases motivation for learning (LS = 3.64); Increases competitiveness (LS = 3.64).
Moreira et al. (2018)	37 Portuguese and 33 Spanish in the Iberian Peninsula (23 F, 47 M, with 55.7% between 41 and 50 yrs)	Not reported	Online survey with six sections (Demographics, prior knowledge, participation/engagement, use of mobile devices, mobile use in the classroom and self-efficacy)	Not reported	Not reported	<ul style="list-style-type: none"> Ability to download gamification mobile apps (70.3% Portuguese and 60.6% Spanish professors); Gamification can be incorporated into ML classes (LS = 4.08 and 3.73 for Portuguese and Spanish professors); Students can be taught how to use gamification apps (LS = 4.05 and 3.76 for Portuguese and Spanish professors).

TABLE 1 (Continued)

Study	Participants	Sampling approach	Survey approach and sections	Theoretical approach	Response rate	Primary drivers for gamification and/or GBL
Sanchez-Mena et al. (2017a)	312 higher education teachers (52.4% M, aged 42.8 yrs)	Snowballing	Online survey with four sections (Perceived usefulness, perceived ease-of-use, attitude and behavioural intentions)	TAM	Not reported	<ul style="list-style-type: none"> Perceived usefulness was a significant predictor of attitude ($\beta = 0.68$), with attitude a significant predictor of intention to use video games ($\beta = 0.81$); Perceived ease of use was a significant predictor of perceived usefulness ($\beta = 0.43$), but not attitude ($\beta = 0.06$); Age was a significant moderator of the perceived ease of use on perceived usefulness ($\beta = 0.07$) but not any other predictor variable.
Sanchez-Mena et al. (2017b)	312 higher education teachers (52.4% M, aged 42.8 yrs)	Snowballing	Online survey with four sections (Attention, relevance, attitude towards gamification and intention to use gamification)	Kellers ARCS	Not reported	<ul style="list-style-type: none"> Attention was a significant predictor of attitude ($\beta = 0.54$), relevance ($\beta = 0.83$) and intention to use gamification ($\beta = 0.34$); Attitude was a significant predictor of intention to use gamification ($\beta = 0.58$)
Sanchez-Mena et al. (2019)	312 educators (52.4% M, aged 42.8 yrs)	Snowballing	Online survey with four sections (Perceived usefulness, perceived ease-of-use, attitude and behavioural intentions)	TAM	Not reported	<ul style="list-style-type: none"> Perceived usefulness was a significant predictor of attitude ($\beta = 0.69$) as well as intention to use educational video games ($\beta = 0.13$); Attitude was a significant predictor of intention to use ($\beta = 0.72$); Ease of Use was a significant predictor of perceived usefulness ($\beta = 0.45$), but not attitude ($\beta = 0.08$)

(Continues)

TABLE 1 (Continued)

Study	Participants	Sampling approach	Survey approach and sections	Theoretical approach	Response rate	Primary drivers for gamification and/or GBL
Vanduhe et al. (2020)	Phase 1: 375 educators from a Cyprus university; Phase 2: 37 (20F, 17M) and 31 educators from Phase 1 provided pre-and post-test data, respectively	Phase 1: all English educators Phase 2: not stated	Phase 1: survey (unclear how provided to participants) on motivations and behavioural intentions to use gamification Phase 2: online survey regarding the learning benefits of the Moodle Gamification Training Platform for creating gamification resources	TAM	Phase 1: 75%; Phase 2: 82% and 69% of those invited for Pre- and Post-test, respectively	<ul style="list-style-type: none"> TTF was a significant predictor of perceived ease of use ($\beta = 0.153$); SI was a significant predictor of perceived usefulness ($\beta = 0.179$); SR was a significant predictor of perceived usefulness ($\beta = 0.386$); SR was a significant predictor of perceived ease of use ($\beta = 0.250$); Perceived usefulness was a significant predictor of attitude ($\beta = 0.231$); Perceived ease of use was a significant predictor of perceived usefulness ($\beta = 0.53$); Perceived ease of use was a significant predictor of attitude ($\beta = 0.665$); Attitude was a significant predictor of continuance intentions ($\beta = 0.74$)
GBL						
Kapralos et al. (2011)	18 Canadians, 83% between 20 and 40yrs, 44% currently use simulation and serious games	All 158 full-time and 87 part-time educators invited	Online survey with seven sections (content of the sections not explicitly reported)	Not reported	7.3% (calculated by the authors of this review) 14% (reported in the paper)	<ul style="list-style-type: none"> Feel simulations and serious games are useful (72.7%).

TABLE 1 (Continued)

Study	Participants	Sampling approach	Survey approach and sections	Theoretical approach	Response rate	Primary drivers for gamification and/or GBL
Noraddin and Kian (2015)	273 (134 F, 139 M) 74.4% between 31 and 49 yrs, with 41% > 11 yrs teaching	Random sampling of 5 universities across faculties, programs and levels of teaching experience	Online survey with five sections (Demographics, motivational, collaborative and instructional; and open-ended questions) university lecturers	Kellers ARCS	14.4%	<ul style="list-style-type: none"> Digital games can bring fun and enjoyment to learning (LS = 4.04); Digital games allow learners to work together to solve problems that could not be solved individually (LS = 3.75); Using digital games can place the learner in a simulated world environment where they can apply the concept (LS = 3.80)
Shah (2017)	6 United Arab Emirates at a Woman's only University	Not reported	Semi-structured interview questions provided via email	Not reported	Not reported	<ul style="list-style-type: none"> Positive impact on the introductory accounting course (67%); Useful in applying accounting concepts (67%); Games develop interest in practising accounting outside the classroom (67%)
<i>Gamification and GBL</i>						
Wiggins (2016)	48 communication educators from all 4 yr and 4 of the 2 yr universities in Arkansas, USA	Not reported	Online survey with four sections (previous usage of GBL; future likely usage of GBL; familiarity with gamification; demographics)	Not reported	32%	<p>Open-ended questions resulted in four concepts associated with GBL use:</p> <ul style="list-style-type: none"> involved interaction with individuals or groups; emphasises technology and stages of digital resource production; include production of digital resources; can be used as an assessment, with non-digital games preferred over digital

Abbreviations: ARCS, Attention, Retention, Confidence and Satisfaction scale; AS, Asia; DGHE, Directorate General for Higher Education in Portugal; F, female; FST, Foundation for Science and Technology; GBL, game-based learning; LS, Likert scale scores (1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree); GBL, game-based learning; M, male; ML, mobile learning; NABTE, National Association of Business Teacher Education; SA, South America; SE, southern Europe; SI, social influence; SR, social recognition; TAM, Technology Acceptance Model; TTF, task technology fit.

TABLE 2 Summary of eligible gamification, game-based learning and combined gamification/game-based learning mixed-methods studies' methodologies and findings.

Study	Participants	Sampling approach	Quantitative approach	Qualitative approach	Response rate	Quantitative results/Most frequent concepts	Qualitative results/primary themes within each concept
<i>Gamification</i>							
Marti-Parreno et al. (2021)	8 (4 M, 4 F), mean age 43 yrs; with a minimum of 3 yrs gamification teaching experience	Mixture of quota (heterogenous in terms of knowledge areas, age and sex) and snowball sampling	Multidimensional scaling analysis and cluster analysis	Concept mapping developed on the participants perceptions of how gamification can be used to develop student competencies	Not reported	Four dimensions were generated from concept mapping • Advantages in teaching-learning process (LS = 7.35) • Playful dimension (LS = 7.17) • Negative aspects (LS = 6.53) Advantages and limitations for teachers (LS = 6.99)	Advantages in teaching-learning process • students learn by doing; • students learn by trial and error; • students do not need prior subject knowledge. Playful dimension • increases student interest by disrupting traditional lectures; • shows the "child" within; • must provide value for students. Negative aspects • grouping students can be difficult; • unmotivated students are reluctant to engage. Advantages and limitations for teachers • use for addressing complex problems is difficult; • benefits teacher-student relationship; • requires higher teacher investment

TABLE 2 (Continued)

Study	Participants	Sampling approach	Quantitative approach	Qualitative approach	Response rate	Quantitative results/Most frequent concepts	Qualitative results/primary themes within each concept
<i>GBL</i>							
Dimitriadou et al. (2021)	41 post-secondary North American educators with a variety of game development experience, subjects taught and teaching approaches.	Snowball sampling	Online survey sent out to four major organisations involved in digital learning development. No information provided on the contents of the online survey or open-ended questions.	Coding of data and identification of subthemes based upon Hirumi and Stapleton (2009) Stages of Serious Game Design and Development conceptual framework	Not reported	Most common challenges: <ul style="list-style-type: none"> Administrative (36.1%) Design-related (25%) Attitudinal (25%). 	Administrative <ul style="list-style-type: none"> getting time or money resources; lack of institutional support; need for strong data to support success. Design related <ul style="list-style-type: none"> linking outcomes, game design and game design; finding capable game designers; balance learning and fun. Attitudinal <ul style="list-style-type: none"> tracking and evaluating learning criteria, measurement of outcomes and connection to gameplay; overcoming traditional academic attitudes towards fun

Abbreviations: F, female; GBL, game-based learning; LS, Likert scale scores (1 = strongly disagree; 10 = strongly agree), M, male; yr, years.

TABLE 3 Summary of eligible gamification, game-based learning and combined gamification/game-based learning qualitative studies' methodologies and findings.

Study	Participants	Sampling approach	Data collection approach	Interview/focus group questions	Qualitative analysis methodology	Major driver themes and subthemes ^a	Major barrier themes and subthemes ^a
<i>Gamification</i> Ismiyani (2020)	7 TOEFL educators within an Indonesian University; 6 had used Kahoot for 1–2 yrs	Not stated, but appears to be a convenience sample from the researcher's University	Interview with semi-structured questions	<ol style="list-style-type: none"> 1. What are the general perspectives of the educators of Tanjungpura University towards Kahoot? 2. What constraints do the educators face during the using the technology? 3. In what ways does the use of Kahoot influence the educators' enthusiasm in teaching? 	Not stated	Kahoot is interesting and engaging <ul style="list-style-type: none"> • music background. Suitable for reviewing materials and evaluating student understanding. Increases teaching confidence and performance	Internet connection challenges <ul style="list-style-type: none"> • off-campus access. Word limits in Kahoot questions

(Continues)

TABLE 3 (Continued)

Study	Participants	Sampling approach	Data collection approach	Interview/focus group questions	Qualitative analysis methodology	Major driver themes and subthemes ^a	Major barrier themes and subthemes ^a
Sanchez-Mena & Marti-Parreno, 2017)	16 educators (9 F and 7 M), mean age 44 yrs and mean 2.3 yrs of gamification experience	Snowball	Online survey with structured questions	<ol style="list-style-type: none"> Have you ever used gamification in your courses? (filter question) How long have you been using gamification in your courses? Please describe in your own words the type/s of gamification activity you mostly use in your courses Please describe the main drivers that encourage you to use gamification in your courses Please describe the main barriers that prevent you from using gamification in your courses 	Phenomenology was stated. However, no description of phenomenology was provided. Wordstats 7.0.11 was used for text mining and identification of most frequent phrases emerging from interview questions.	<p>Attention – motivation</p> <ul style="list-style-type: none"> ↑ attention to learning materials; ↑ student motivation. <p>Entertainment</p> <ul style="list-style-type: none"> interactivity learning while having fun; active learning; empathy. <p>Easiness to learn</p> <ul style="list-style-type: none"> easier than traditional learning 	<p>Lack of resources</p> <ul style="list-style-type: none"> lack of time; lack of training; inappropriate classroom setting; lack of economic support. <p>Student apathy</p> <ul style="list-style-type: none"> perceived waste of time. <p>Subjects</p> <ul style="list-style-type: none"> does not fit subject; does not fit subject schedule. <p>Classroom dynamics</p> <ul style="list-style-type: none"> disturbs classroom atmosphere; potential conflict with other teachers

(Continues)

TABLE 3 (Continued)

Study	Participants	Sampling approach	Data collection approach	Interview/focus group questions	Qualitative analysis methodology	Major driver themes and subthemes ^a	Major barrier themes and subthemes ^a
<p>GBL</p> <p>Lock et al. (2018)</p>	<p>4 F educators within a Canadian university</p>	<p>Not stated, but appears to be a convenience sample from the researchers' University</p>	<p>Reflective case study of the researchers' teaching practices</p>	<p>Not specifically stated, but reflection was based on online microblogs, student assignments and informal surveys</p>	<p>Reflective approach whereby the data was reviewed from the data sources and teaching experiences and reflected using signature pedagogies (Shulman, 2005) and design tensions (Tatar, 2007) frameworks</p>	<p>Surface structure^b</p> <ul style="list-style-type: none"> • use of avatars for students' online activities, XPs and leaderboards. <p>Deep structure</p> <ul style="list-style-type: none"> • ongoing student negotiations about goals and rules of the games within the course. • promotes a gameful learning disposition in students; • provides opportunities for transforming learning culture 	<p>Surface structure^b</p> <ul style="list-style-type: none"> • university grading scheme requirements; • student tensions between game-like activities and graduate level scholarship; • student discomfort with leaderboard and translation into grades. <p>Deep structure</p> <ul style="list-style-type: none"> • differences between student game-based learning advocates and non-advocates. • requires student critical thinking, complex problem-solving and ICT literacy

TABLE 3 (Continued)

Study	Participants	Sampling approach	Data collection approach	Interview/focus group questions	Qualitative analysis methodology	Major driver themes and subthemes ^a	Major barrier themes and subthemes ^a
Arnab et al. (2017)	Five educators from the same UK university	Not stated, but appears to be a convenience sample from the Game Changers program	Reflective case study of the researchers' Game Changers program	Not specifically stated, but reflection was based on participants' experiences in 6 weeks long, Game Changers program and critical evaluation by researchers	Reflective approach whereby participant feedback of the researchers' experiences were reflected using a transdisciplinary approach (Arnab & Clarke, 2017)		New game developers did not feel supported in the following ways by the program ^b : <ul style="list-style-type: none"> • uncomfortable in sharing their ideas; • fixed and linear timelines; • specific learning outcomes and bespoke and problem-solving emphasis.

Abbreviations: GBL, game-based learning; TOEFL, Test of English as a Foreign Language; UK, United Kingdom; yrs, years; XP, experience points for course activities.

^aFor the primary driver and barrier themes and subthemes, the subthemes are listed in bullet points underneath each of the larger themes.

^bFor this study, the findings were derived from a reflective case study approach and, therefore, did not explicitly develop themes from interviews or focus groups. The findings presented here are given as potential drivers as well as barriers for effective game-based, learning-based three levels of signature pedagogies (Surface, Deep and Implicit) (Shulman, 2005).

(Kapralos et al., 2011; Shah, 2017). Shah (2017) reported that five of the six (83%) educators in their study believed that games were not useful in teaching basic concepts of accounting. The participants in Kapralos et al. (2011) also expressed some concerns regarding whether games are completely accurate, whether real-world logic can be applied to them by students and if such games are realistic; whether educators can find games relevant to their field; and the educators' lack of time to identify such games.

Four studies used regression analyses to identify predictors of the intention to use gamification (Sanchez-Mena et al., 2017a, 2017b, 2019; Vanduhe et al., 2020). These studies identified that an educator's attitude to gamification was the strongest predictor of their intentions to use gamification (Sanchez-Mena et al., 2017a, 2017b; Vanduhe et al., 2020). The educators' attitude to gamification was in turn influenced by a host of variables (e.g. perceived usefulness, ease of use, social influence and social recognition) that were inter-related; meaning these indirectly influence the educators' intention to use gamification (Sanchez-Mena et al., 2017a, 2017b, 2019; Vanduhe et al., 2020).

With respect to the two mixed-method studies, the concept mapping approach used by Marti-Parreno et al. (2021) identified the most common drivers being the educators' perceptions of how gamification would improve the teaching-learning process, increase student interest and benefit the teacher–student relationship. Most of the barriers were categorised as administrative, design-related and student/staff attitudinal (Dimitriadou et al., 2021; Marti-Parreno et al., 2021), with administrative challenges considered to be the major barrier (Dimitriadou et al., 2021).

The four qualitative studies appeared to focus on digital gamification and/or GBL approaches. Three of these studies reported themes that reflected the educators' drivers to gamification and/or GBL usage based on the overall student learning benefit including student engagement, attention and motivation (Ismiyani, 2020; Lock et al., 2018; Sanchez-Mena & Marti-Parreno, 2017) and increased teaching confidence and performance (Ismiyani, 2020). All four studies also identified educators' barriers, with these being design-related (Arnab et al., 2017; Ismiyani, 2020; Sanchez-Mena & Marti-Parreno, 2017), student attitudes (Lock et al., 2018; Sanchez-Mena & Marti-Parreno, 2017) or administrative challenges reflective of university/subject constraints (Lock et al., 2018; Sanchez-Mena & Marti-Parreno, 2017) and Internet connection issues (Ismiyani, 2020).

DISCUSSION

This systematic review identified 17 studies (11 quantitative, two mixed-method and four qualitative) that met the inclusion and exclusion criteria. Of the 17 studies, 10 focused on gamification, five on GBL and two on a combination of gamification and GBL. Across these 17 studies, the university educators perceived several drivers that positively influenced their use of gamification and/or GBL in the University sector. The most common of these included the educators' perceptions that gamification and GBL: encourages student interactions and collaborative learning (Noraddin & Kian, 2015; Sanchez-Mena & Marti-Parreno, 2017; Shah, 2017; Wiggins, 2016); provides fun and improves engagement (Marti-Parreno et al., 2021; Noraddin & Kian, 2015; Sanchez-Mena & Marti-Parreno, 2017); can easily be used by students (Durao et al., 2020; Fisher et al., 2014; Moreira et al., 2018) and improves student motivation and competitiveness (Fisher et al., 2014; Sanchez-Mena & Marti-Parreno, 2017). Alternatively, common barriers included the following: a lack of time to develop gamification and/or GBL approaches (Dimitriadou et al., 2021; Kapralos et al., 2011; Marti-Parreno et al., 2021; Sanchez-Mena & Marti-Parreno, 2017); lack of proven benefits (Kapralos et al., 2011; Lock et al., 2018; Shah, 2017); classroom setting issues (Lock et al., 2018; Marti-Parreno et al., 2021; Sanchez-Mena & Marti-Parreno, 2017) and financial considerations (Dimitriadou et al., 2021; Sanchez-Mena & Marti-Parreno, 2017). Due to the relatively small number of studies that focused on

GBL compared with gamification, it was a little difficult to be certain if these primary drivers and barriers were substantially different between these two educational approaches. Closer inspection of the studies for the primary drivers and barriers suggested that the educators felt that the ease of use by students (Durao et al., 2020; Fisher et al., 2014; Moreira et al., 2018) and improvements in student motivation and competitiveness (Fisher et al., 2014; Sanchez-Mena & Marti-Parreno, 2017) were major drivers for the use of gamification but not GBL. Alternatively, a barrier for GBL, but not necessarily gamification, was the educators' perception of little if any proven benefits for GBL (Kapralos et al., 2011; Lock et al., 2018; Shah, 2017).

Due to the wide range of drivers and barriers identified, the use of a theoretical framework to categorise them may provide more actionable insights to improve learning and teaching outcomes via gamification and/or GBL. Although developed for GBL, the SGDD framework, described by Hirumi and Stapleton (2009) and used by Dimitriadou et al. (2021) may be one such option, whereby the major drivers and barriers were categorised as attitudinal, design-related or administrative.

Attitudinal factors can be described as the university educators' personal beliefs about the benefits and challenges in using gamification and/or GBL. Results of four studies using regression analyses indicated an educator's attitude to gamification was the strongest predictor of their intentions to use gamification, with these intentions also influenced by other attitudes including perceived usefulness and ease of use (Sanchez-Mena et al., 2017a, 2017b, 2019; Vanduhe et al., 2020). Such results suggest that only educators who believe gamification and/or GBL is beneficial (especially for GBL), not too challenging for their students to perform (especially for gamification) and not too challenging for themselves to develop and implement, are likely to invest time in developing gamification and/or GBL teaching approaches. However, even educators with positive attitudes to gamification and/or GBL may encounter a range of design-related and administrative barriers that negatively impact the development and ongoing implementation of these approaches in the University sector. The perception that the educators have regarding how students may more easily use gamification compared with GBL approaches (Durao et al., 2020; Fisher et al., 2014; Moreira et al., 2018) may also have some implications for innovative teaching practice. One approach might be that educators interested in using more gamification and/or GBL may initially start with gamifying certain aspects of their teaching; and over time look to develop some GBL approaches as they and their students become more familiar with gamification. It may also mean that educators wishing to incorporate GBL in their teaching would need to spend more time demonstrating and explaining how to use (and why they wish the students to use) GBL, compared with the lesser time and effort they would require implementing gamification only.

For both the design-related and administrative barriers, teaching support staff and university administrators could support educators to develop and implement gamification and/or GBL in their teaching. Administrators, teaching support staff and educators who routinely use gamification and/or GBL may look to develop courses and other learning resources for other educators who need assistance in developing and implementing appropriate gamification and/or GBL approaches for their students. These courses might be particularly important for educators wishing to develop a GBL approach due to the potentially reduced number of drivers and greater number of barriers associated with GBL compared with gamification. Research into educational courses for university educators wishing to develop gamification and/or GBL teaching approaches has been conducted by Arnab et al. (2017) and Vanduhe et al. (2020). While both studies reported some benefits to the educators who completed the training, Arnab et al. (2017) reported some educators did not feel fully supported by the program, especially due to its rigidity and timelines. Universities may, therefore, need to consider how to provide greater flexibility with the resources and programs they develop to up-skill educators who wish to improve their ability to develop and implement gamification and, perhaps, even more so GBL in their teaching.

A number of limitations inherent to our review process as well as the studies found eligible for inclusion need to be acknowledged. With respect to the review process, we decided to focus on studies published from 2011 onwards as the change in Internet access and smartphone technology since that point in time was substantial, with such changes likely to influence university educators' perceptions on gamification and/or GBL. While we followed PRISMA guidelines and were assisted by an expert librarian when determining the most appropriate databases, search terms and inclusion/exclusion criteria, due to the breadth of journals and discipline areas in which educational research is published, some eligible papers may have been missed.

There were also some limitations with respect to the 17 eligible studies included in this systematic review, with many of these identified in the critical appraisal and data extraction processes. Of the 11 quantitative studies, eight had an unclear or high risk of bias with respect to Criteria 4.2 which reflected the representativeness of the sample, with one of the major issues being an over-representation of gamification users in these samples. Such a lack of representativeness is also often an issue in mixed-methods and qualitative studies. Several of the mixed-methods and qualitative studies also had an unclear or high risk of bias with respect to several important aspects of the data collection and analysis methods. As a result of these methodology limitations and the wide variety of countries and discipline areas from which educators were sampled in the studies, it is somewhat unknown if the major results of this review would equally apply across all countries and discipline areas. It also must be acknowledged that while gamification and GBL are different, they can potentially be considered different ends of a continuum in which games are used for educational purposes. As some of the major drivers and barriers we identified were only found for gamification or GBL, the inclusion of studies focusing on either of these educational approaches may have masked some of the potential differences in drivers and barriers that university educators have for two of these approaches.

Notwithstanding the limitations of the review, there are several recommendations and practical applications that emerge from our results. Using the SGDD framework (Dimitriadou et al., 2021; Hirumi & Stapleton, 2009), the major drivers and barriers to the use of gamification and GBL in the University sector can be described as attitudinal, design-related and administrative. By identifying the major drivers and barriers across these three categories, a range of approaches can be developed to improve student outcomes through gamification. From an attitudinal perspective, a major driver for the use of gamification and GBL may be the educators' knowledge on the benefits of gamification and GBL. In contrast, the major barriers may be that some university educators are not aware of these benefits or even believe gamification and GBL is too childish and/or detrimental for university students. These attitudes can be improved by sharing high-quality evidence (i.e. meta-analyses) that support the benefits of gamification and, perhaps, even more so, GBL in the University sector. From a design-related perspective, those individuals who wish to use gamification and GBL in their teaching, may perceive insufficient time and/or expertise, particularly for developing digital games, with some of these challenges even greater for the use of GBL. For these educators, support may be required from teaching support staff or from other educators using gamification and particularly GBL. Lastly, educators may perceive several administrative challenges within their discipline and/or university that are likely to act as barriers (and less likely drivers) of gamification and GBL use. Such barriers may require educators, teaching support staff, administrators and, perhaps, even third parties such as accreditation bodies to have discussions on how to circumvent these issues if gamification and GBL can be used to improve student engagement and learning outcomes.

CONCLUSION

This systematic review identified 17 studies that examined university educators' drivers and barriers to the use of gamification and/or GBL in university teaching. Results demonstrated

that many drivers and barriers exist for the development and implementation of gamification and/or GBL in universities, with these generally being able to be categorised as attitudinal, design-related or administrative. Future research and practice may benefit from university educators, teaching support staff and administrators working collaboratively to develop strategies across these three categories of drivers and barriers to increase the utilisation of gamification and/or GBL to improve student learning outcomes. As there may be fewer drivers and more barriers to the use of GBL than gamification by educators in the university sector, interested educators may wish to start with gamification before considering whether GBL will be suitable for their students.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

As this is a systematic review, we have not collected any new data that may have public benefit. The most relevant data from these eligible studies are included in our summary tables and supplementary resources.

ETHICS STATEMENT

This systematic review identified and used existing published studies and, therefore, did not require any data collection from human participants. We have also followed the 2018 BERA Ethical Guidelines for Educational Research with respect to the (1) Responsibilities to the Community of Educational Researchers and (2) Responsibilities for Publication and Dissemination of this manuscript.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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