Playing your way to knowledge

The impact of digital games on student learning in marketing and business studies

Sabine Wollscheid and Siv-Elisabeth Skjelbred

NIFU

Playing your way to knowledge

The impact of digital games on student learning in marketing and business studies

Sabine Wollscheid and Siv-Elisabeth Skjelbred

www.nifu.no

Preface

Oslo, August 10th, 2021

Roger André Federici
Head of Research

Structure

Summary

Purpose

Digital games have become an integral part of higher education. Thus, many university teachers have been increasingly using digital games, in hope to increase student motivation, engagement, and learning. This literature review looks at digital games' impact in marketing and business studies on student learning, a dynamic field.

Design/ methodology/ approach

This study is informed by a 'systematic search and review' methodology. (Grant & Booth, 2009) combining the advantages of a critical review with a systematic literature search.

Findings

We reviewed 33 studies. Findings are ambiguous, depending on learning outcomes, implementation, and context factors. It is difficult to draw clear conclusions about the games' effectiveness, as we identified only few studies that applied a causal design. Furthermore, most studies were based on subjective perceptions of games' efficacy rather than objective measures of achievement.

Research limitations/implications.

More studies are needed to identify for whom, and under what circumstances, digital games are effective, and for what types of outcomes in a 21st century learning context.

Practical implications

The work with this review started before the Covid-19 pandemic and large-scale initiatives to digitally transform higher education. Further studies might investigate the impact of digital games in combination with other digital learning

methods on students' learning during and in the aftermath of the pandemic, for different disciplines and study programmes.

Originality/ value

We have made a valuable contribution to the literature on the impact of digital games in marketing and business studies. Choosing a systematic search and review methodology strengthens rigor and transparency of the literature review, reducing bias in retrieving, selecting, and analyzing eligible studies.

1 Introduction

Enabled by accelerating technological developments, new opportunities for learning and teaching are emerging in higher education, and the use of digital games has increased across many subjects and disciplines (e.g., Mammone and Maynes, 2019). However, the evidence on digital games' educational effectiveness on student learning has been unconvincing so far (Connolly et al., 2012; Young et al., 2012).

While the use of digital games in higher education is relatively new, the use of games as such is not. Games have been used for more than 60 years in marketing and business studies (e.g., Faria et al., 2009; Kotler and Schultz, 1970). The lack of convincing evidence on the educational value of games is, however, partly due their diversity and a low number of studies on comparable interventions (All et al., 2013, 2014; Clark et al., 2013). Even within marketing and business, there are many educational games, differing in mode, curriculum objectives, duration, collaboration, and pedagogy. Such contextual factors complicate assessment and discussion of their effects on learning.

The digitization of games has increased their realism, accessibility, availability, compatibility, flexibility, scale, simplicity of use, and communication possibilities (Faria et al., 2009). In marketing studies, digital games appear to be 'well-established as a device for [...] education' and 'have been used as laboratories for experimentation into various aspects of learning and behaviour' (Tonks, 2005, 372). At the same time, digital games are used in the field of marketing, for example in advertising (Vashisjt et al., 2019).

Focussing on marketing and business administration, an innovative field of studies (Efrat et al., 2017), we look at study programs with a long tradition of student-active learning (e.g., Kotler and Schultz, 1970; Lu et al., 2018;). As a pedagogical approach, student-active learning has become increasingly popular across different study programs to address a more diverse student population. Their popularity can be seen as a result of the Bologna process with the aim to increase quality in higher education and facilitate a stronger connection between learning content and its relevance for working life (e.g., Lillejord et al., 2018).

Research on digital games in higher education has rapidly increased during the past few years (e.g., Mammone and Maynes, 2019; Vlachopoulos and Makri, 2017). Digital games are assumed to be inherently motivating and allow learners to gain skills and knowledge by leveraging entertainment and weaving it within learning environments (e.g., Bawa, 2020; Story et al., 2020). While many program descriptions and qualitative information on various games exist, empirical studies with experimental designs are scarce (Rogmans and Abaza, 2019; Abdul Jabbar and Felicia, 2015). Existing reviews have identified few studies that measure the effect of games compared with other instruction modes. Furthermore, the results of these studies are inconsistent (Anderson and Lawton, 2008; Girard et al., 2013; Tonks, 2005) and differ across student groups (e.g., Park, 2012; Rogmans and Abaza, 2019). Limiting the scope, this study aims to review current studies that have measured the effect of games on marketing and business students' learning, which is in itself a broad field of study.

1.1 Digital games in marketing and business studies

The literature consists of two strands of research for games in marketing and business studies: gamification and game-based learning. Gamification takes game mechanisms and com-ponents and applies them to existing courses and content to motivate and engage learners. The underlying principle is to turn the whole learning process into a game (Karagiorgas and Niemann, 2017). For example, students may earn achievement badges or points. Aguilar et al. (2015, 2) use the term 'gameful design' whenever the goal is to structure tasks in a way that better support intrinsic motivation. Simply put, gamification is the application of game mechanisms to a non-game activity.

Game-based learning refers to the inclusion of digital games as part of a curriculum and using them for educational purposes (Nadolny and Halabi, 2015). There are many terms and definitions, including serious games (Miller et al., 2011), educational games, video games (Gros, 2007), and learning games (Bellotti et al., 2013). These are practically synonyms, and all describe games where the primary focus is education rather than enjoyment. Our review uses the term digital games to distinguish from analog ones such as card and board games (Van Esch et al., 2015).

Within marketing and business education simulation games are widespread. Simulations are interactive games with realistic representations of reality and clearly defined aims and interaction rules (Ranchhod et al., 2014). Business and marketing simulations are usually specific industry games in which participants learn skills while managing a virtual company within a dynamic competitive environment. Some simulations cover only a single function or concept, while others

integrate a range of functional business areas, such as marketing, finance, research and development, and production (Ranchhod et al., 2014). Simulations are described as 'effective pedagogical tools in the area of disruption' (Bolton et al., 2019, 16).

1.2 Review questions

Digital games are user-centered and can promote challenges, co-operation, engagement, and the development of problem-solving strategies: the extent to which they succeed in doing so is still an empirical question. This article reviews the literature of digital games' impact on learning in marketing and business studies. It aims to retrieve, select, describe and synthesize relevant literature and identify knowledge gaps to inform further research in higher education. We limit the review to games developed for higher education and include all educational games that offer a digital platform for gameplay. Studies of gamification are only included if it results in a discrete digital game. In the following, we ask: What does the literature tell us about the impact of digital games in marketing and business administration studies on student learning? And what characterizes the methodology and validity of the existing studies? And what are the knowledge gaps?

2 Method

Our review addresses a relatively broad research question. We have therefore chosen a methodological approach informed by a 'systematic search and review' methodology. This approach combines the advantages of a critical review with a systematic literature search. It can be described by a broad, systematic and transparent literature search, minimal narrative, and tabular summary of included studies, in addition to state-of-the-art knowledge, implications for further research and practice, and limitations. Using this approach requires a certain degree of transparency and rigor, but contrary to a traditional systematic review, it does not comprise a standardized quality appraisal of single studies (see Grant and Booth, 2009). Its strength is that it provides a more unbiased picture of the prevalence of research on the specific topic – digital games in marketing and business administration studies. In the following, we describe the literature search, study selection, coding, and analysis.

2.1.1 Literature search

Addressing our review question above, we defined the following criteria for eligible studies that informed our research strategy: 1) the population must comprise students in higher education institutions; 2) the study is about digital educational games in marketing and business administration; 3) the study reports an assessment of learning. The relatively broad scope of the review question and its embeddedness in an interdisciplinary epistemology (marketing and business studies, computer technologies, pedagogics) means that it comprises various study designs, study outcomes, and terminology.

We conducted a systematic search in the following digital databases: Web of Science (WoS) Collection and Education Resources Information Center (ERIC). The WoS Collection comprises the world's leading scholarly journals, books, and proceedings in the sciences, social sciences, and arts and humanities and navigate the full citation network. In WoS, we are able to limit the literature according to publication type and language (English).

The search was conducted in March–April 2019 and was updated in October 2020. We limited our search to peer-reviewed journal articles published in English between 2000 and 2020. Additionally, we conducted a manual search in three leading international journals, European Journal of Education, the Journal of Marketing Education and Marketing Education Review, and a search in reference lists of the most relevant studies (snowballing). Combining a systematic search in international electronic databases and a strategic search in additional key sources, we aimed to retrieve a representative sample of studies on the field.

To retrieve eligible articles, we applied a range of paired search terms together with Boolean operators in the search string. After pilot testing the search string in WoS together with our research librarian, we used the following search string. It combined relevant search terms and synonyms related to game-based learning (the condition), marketing and business studies (disciplinary context), and study design: (simulat* OR "game based" OR "computer assisted") AND (learning OR teaching OR education) AND ("business studies" OR "business economics" OR "business administration" OR marketing OR management) AND (RCT OR randomi* controlled trial OR intervention OR effect* OR experiment*).

The searches in WoS and ERIC generated 2020 records (without duplicates). After screening titles and abstracts, we excluded 1972. The first author was mainly responsible for screening titles and abstracts but consulted the second author in questionable cases. The main reasons for exclusion were that they did not use a digital education game, were not in marketing or business or did not include an assessment of learning.

Additionally, we identified additional 16 articles by snowballing, manual searching in the three journals, expert consultation, and a search in ResearchGate. That process left 70 articles for further exploration and potential inclusion. A close reading of these articles by the two authors independently resulted in excluding a further 47. In questionable cases, the two authors discussed until consent was reached. Full-text articles were excluded if the study was not conducted in the field of marketing and business studies, if it did not evaluate a digital educational game, if it did not include an assessment of learning, or if the piece was a conceptual paper and not an empirical study. We finally included 33 articles. Among these, two articles were identified in the updated search in 2020. Figure 1 illustrates the selection process.
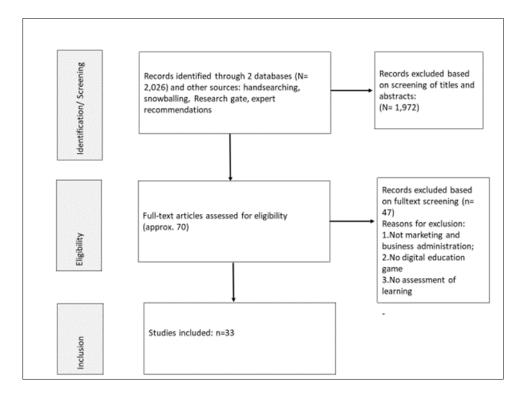
Figure 1: Selection of studies

Our sample included studies that assess whether digital games result in increased learning. Learning refers to the gains in knowledge or skills that a student possesses (Bacon, 2016). We distinguish between assessments based on perceptions of learning and measures of actual learning. The term perceived learning refers to a student's self-report of knowledge gain, generally based on reflection and introspection (Bacon, 2016). Students' perceptions about their academic competence can be important for motivation, lifelong learning, and performance (Bong and Skaalvik, 2003) but are distinct from actual student learning (Bacon, 2016; Cronan et al., 2012). Measures based on actual, direct evidence of knowledge are often referred to as objective (e.g., Schuman et al., 2014). However, this term is somewhat imprecise, as any assessment is subjective by being situated in the assessment developer's and interpreter's perspective. We use the less controversial term 'achievement', which includes test and exam scores and the instructor's evaluation of a student's performance (Anderson and Lawton, 2008).

2.1.2   Data coding, assessment, and analysis

According to the review question, we coded the following information from each article: Article descriptives (first author; year of publication); discipline/study program; study aim; learning game; outcomes and outcome measures; study design; main findings and limitations. Using an Excel spreadsheet, data from each

included article were inserted under the respective heading. Data coding was conducted by the first review author and validated by the second review author after both had read each article. In the case of disagreement, consent was reached via discussion.

3   Findings

We identified 33 studies for marketing and business administration. Even though digital games vary between marketing and business administration, the variation within each subject is at least as large. Many of the marketing games combine features of a simulation with that of a game, which means that they present a simplified dynamic model of business organizations, and decisions are made in a competitive market.

Table 1 presents the included studies according to information on the subject, the digital game, outcome measures, study design, and study aim.

Table 1: Included studies

Study ID: first author (year)	Subject	Digital game	Outcome measures	Type of outcome measure	Study design	Aim of study (with respect to the review question)
Arias-Aranda (2007)	Business management	Praxis Hispania MMT version 10.1	Simulation experience	perception	Descriptive; survey (closed and open questions)	To present a methodology that overcomes some of those limitations by having participants interact with real agents who play different roles to guide the experience towards realism and learning
Ashley (2019)	Marketing	Fantasy Brand League, Teaching Innovation	Student confidence in marketing knowledge and data visualization skills and self-directed learning	perception	two in-class surveys	Investigation whether a specific type of game, Fantasy Brand Leagues, can motivate class discussions anchored in knowledge of current events, increase student confidence and their abilities to avoid fake news and integrate information by improved information literacy, and, can help prepare students for their careers and self-directed learning
Brennan (2013)	Marketing;	Sim Brand	Test of numeracy and financial skills	achievement	Pre/post-test single-group quasi experiment design/ single institution exploratory study.	Exposed to marketing calculations and financial data in a real world-context simulation, it is assumed that students' numeracy and financial skills and their self-efficacy with respect to marketing calculations, will improve
Canhoto (2016)	Marketing studies;	Google Online Marketing Challenge	Perceived learning outcome, Reflections on how the GOMC's features enable students and educators to reach the benefits of experiential learning	perception	Conceptual/ descriptive	To present a set of propositions for the development of initiatives that deliver deep learning, promote engagement, and develop digital marketing and soft skills

Study ID: first author (year)	Subject	Digital game	Outcome measures	Type of outcome measure	Study design	Aim of study (with respect to the review question)
Caruana (2016)	Marketing class in business program	Markstrat	Perceived learning outcome, Learner satisfaction, performance expectancy, effort expectancy	perception	Exploratory; data collected from three groups of students who had followed a study unit in Strategic Management in the first year of the 2-year MSx in marketing	To contribute to better understanding of learners' perceptions and experience of marketing simulation games and to examine how these relate to learning outcomes. To investigate learners' satisfaction with a marketing simulation game, its antecedents and influencing variables
Cela-Ranilla (2014)	Education and Marketing;	Simul@	Teamwork abilities (identity, communication, implementation, regulation); self-management (planning, organization, development, assessment)	achievement	Descriptive: observation (participants and non-participants) and documentary analysis	Describe how transferable skills such as self-management and teamwork have been developed by students
Cheng & Wang (2011)	Business administration –marketing course;	3D virtual environment	Test of marketing theory	achievement	Experiment with pre-and post-test	The objective is to explore if business students' application ability of theory would be enhanced through the training of a 3D VLE
Cook (2006)	Sales management simulation	MARS Sales Management Simulation	Student perceptions of the game	perception	Survey design	To ascertain student perceptions of the efficacy of using a business simulation game in sales management education. The guiding hypothesis was that a sales management simulation would be superior to a textbook to achieve certain pedagogical objectives
Fito-Bertran (2015)	Business administration	Cesim Global Challenge (www.cesim.com)	Generic competencies; participants' satisfaction in terms of experience; effect	perception	Survey	To analyze whether obtaining generic competence through business games has any kind of influence on the participants' learning results

Study ID: first author (year)	Subject	Digital game	Outcome measures	Type of outcome measure	Study design	Aim of study (with respect to the review question)
	a. management		of generic competencies on learning expectation			
Garber (2012)	Marketing	The Marketing game	Beliefs and attitudes towards learning experience, collaborative learning, competition and analysis exercise	perception	Survey	To add to and extend the literature by testing The Marketing Game!, one of the functional business games that has rarely, if ever, been tested
Martín-Pérez (2012)	Business studies	Business Strategy Game 6.0	Teamwork knowledge, skills and abilities (KSA) 1) conflict resolution 2) collaborative problem solving, 3) communication 4) goal setting and performance management 5) planning and task coordination	achievement	Use of treatment and control group; administration of pre- and post-test measures	To evaluate the effectiveness of strategic management simulations as a learning-by-doing tool so that university students can learn to work in a team
Mitchell (2004)	Strategic management course	Traditional case method (TCM); Computer simulations plus cases (CSC), by replacing about half of the casework with a computer simulation	Test of strategic management skills (course relevant questions and one business vignette), perception of whether the course help develop course learning objectives and learning reflections (enjoyment and relevance)	achievement; perception	Randomized assignments of two different course designs to sections, limited to approx. 25 students	To compare the effectiveness of two strategic management course designs: one centered on case discussions and the other combining a computer-based simulation with some cases

Study ID: first author (year)	Subject	Digital game	Outcome measures	Type of outcome measure	Study design	Aim of study (with respect to the review question)
Morin (2020)	Business finance, flipped classroom	Simulation Cap-SimCore platform	Performance for graded simulation rounds is based on stars earned, communicated through a report of company performance generated by Capsim; reflective learning captured by reflection essays	achievement; perception	Quasi-experimental one group pretest, post-test research design	To measure cognitive gains through pretest and posttest assessments of simulation game learners in a business finance, flipped classroom course
Nguyen (2015)	Business studies: operations management course	A web-based simulation game called Littlefield Laboratories	Intrinsic motivation (measured by a 5-point Likert scale); Deep-learning strategy use (composed of 4 items)	perception	Quasi-experiment	Assessing the impact of the web-based simulated game practiced in operations management courses on students' intrinsic motivation and their use of deep learning strategy. This impact is also compared to that of no-game conventional teaching approach
Pasin (2011)	Business administration	New simulation game: HECOpSim	Technical mistakes in the game	achievement	Data gathered from 100 teams of four or five undergraduate students in business administration, taking their first course in operations management	To present a new simulation game and analyze its impact on operations management education. The proposed simulation was empirically tested by comparing the number of mistakes during the first and second halves of the game
Peng (2018)	Accounting education	Virtual world market simulation using Second World	Perceived learning outcome and learning reflections (enjoyment and relevance)	perception	Field experiment: a simulation implemented in 3 different platforms early in the semester	To examine the success of using different simulation platforms in creating a market simulation to teach business processes in the accounting information systems course. Specifically, this paper details the use of virtual world simulation using Second Life [TM], Blackboard [TM] discussion board simulation, and face-to-face

Study ID: first author (year)	Subject	Digital game	Outcome measures	Type of outcome measure	Study design	Aim of study (with respect to the review question)
						simulation to test the relationship among students' perception of realism, computer efficacy, and student-learning reflections
Perez-Bennett (2014)	Business studies	Case-simulation	Pre- and post-simulation questionnaire about the causality of variables (direction and presence). Outcome: development of correct answers and types of mistakes. Preferred game-strategy and strategy coherence	achievement	Survey of 12 executive MBA students in the first round; 72 full-time MBA students in the second round; students were surveyed after finalizing the simulation in two rounds	To examine the use of simulators as pedagogical complements to traditional case studies
Qudrat-Ullah (2010)	Business studies	FishbankILE System dynamics simulation based interactive learning environments (SDILEs) in classroom	Task performance, decision time, information system access	achievement	Action experiments in a natural setting	Describes the construction, integration, and evaluation of an interactive learning environment in two educational settings. It explores how undergraduate business students perceive SDILEs and SDILEs-based course approach
Ranchhod et al. (2014)	Management studies;	Students	Perceived learning outcome, Cognitive, affective and behavioral learning outcomes	achievement, perception	Secondary and primary data: literature review, survey; Principal	To develop and validate an educational value generation model that represents the relationships between the learning experience and three categories of learning outcomes: cognitive learning, skill development, affective evaluations

Study ID: first author (year)	Subject	Digital game	Outcome measures	Type of outcome measure	Study design	Aim of study (with respect to the review question)
					Component Analysis; Structural Equation Modelling	
Romme (2003)	Management education	2 microworlds: - the 'Mobile Phone Subscriber' microworld focusing on the work of marketing and customer services director of a mobile phone operator and - the 'Professional Services' microworld focusing on the strategic management of a large professional service firm	Perceived (Deep) learning outcome and perception of the game	perception	The 2 courses were evaluated by program management based on standard evaluation forms	To explore the adoption of microworld simulations as educational tools for preparing undergraduate students for managerial work and for deepening and accelerating learning by part-time MBA students
Saxton (2015)	Marketing	Badging the simulation	Perceived overall course learning, the simulation as a learning experience, collaborative learning, functional learning, team performance	perception	quasi-experiment	Although marketing simulations are games, students may have become so used to them that the game itself is no longer as much fun. Badges might be a way to make the learning process within the marketing simulation more fun and engaging. Hence, the innovation described here is how to take an existing marketing

Study ID: first author (year)	Subject	Digital game	Outcome measures	Type of outcome measure	Study design	Aim of study (with respect to the review question)
						simulation and leverage badges as a mechanism for increasing the motivation to per-form well
Stewart (2012)	Management and Marketing	Marktstrat	Faculty perception of business simulation games	perception	Survey-instrument	-Do faculty members agree with student evaluations of business simulation games as effective learning tools? -Do they believe simulations are more effective than traditional experiential methodologies? -What value do they receive from the incorporation of simulations in their teaching methods?
Story (2020)	Marketing	Marketplace simulation	Percveived marketing learning, interesting in marketing, perceived increaes in critical thinking, cognitive learning strategy, group performance perceptions, need for cognition, lone wolf tendency	perception	Survey, structural equation modelling	This research examines student traits that may influence their experience with a computer simulation experiential learning activity and how much students perceive their skills and knowledge grow, thereby increasing the value of the experience to students
Tanner (2012)	Business studies	Simulations and experiential learning tools	Faculty perception of learning outcomes	perception	quasi-experimental: perceptions of two faculty groups	This study focuses on perceptions of management and marketing faculty in U.S. business schools. Both groups perceive simulations as useful teaching tools for their undergraduate courses

Study ID: first author (year)	Subject	Digital game	Outcome measures	Type of outcome measure	Study design	Aim of study (with respect to the review question)
Tao (2012)	Business studies	Business simulation games (BSG)	Student performance measured by grades and perceived learning outcome	achievement; perception	In-depth case study to teach three different complexities of BSGs to students enrolled in different majors	To understand the relationship between student profile/characteristics and performance in the classroom with BSG-facilitated learning
Treen et al. (2016)	Marketing;	Marketplace@ – Strategic version	Performance in the game and team size	achievement	Summary statistics for performance and time spent on the game and group's size	Determining the impact of group size and the total time taken on decisions by a group on the group's performance in the Strategic Marketing version of the simulation game, Marketplace
Tsai (2013)	Communication Management	Intervention concerning Web-mediated game-based learning	Learning performance: exam scores	achievement	Experiment	To explore undergraduates' interactions with teachers and peers through web-mediated game-based learning (GBL) and SRL and facilitate students' learning
Tunstall (2010)	Enterprise education	EB2S01 – Enterprise Planning	Experience and perception of learning (self-reported)	perception	Combination of survey and written feedback.	To explore the role of electronic simulation case studies in enterprise education, their effectiveness, and relationship to traditional forms of classroom-based approaches to experiential learning
Ueltschy (2001)	Marketing/ International marketing	Electronically interactive classroom	Learning outcomes: student participation, team building skills, test scores and perceived learning outcome	achievement; perception	Explorative and descriptive	To suggest ways in which an electronically interactive classroom can be integrated into the marketing curriculum to increase student learning, involvement, and enjoyment of the course

Study ID: first author (year)	Subject	Digital game	Outcome measures	Type of outcome measure	Study design	Aim of study (with respect to the review question)
Van Esch (2020)	Marketing management	Online marketing simulation	Academic outcomes: GPA Student engagement: Conscious attention, enthused participation, social connection Customer engagement scale by Vivek et al. (2014) that has been validated	achievement; perception	Experiment	To investigate the effect of an online asynchronous marketing simulation on student engagement and GPA
Vos (2014)	Marketing	The Marketing Game	Perception of different learning methods, including business game. Perceived benefit from playing business game. Lecturers' perspective on game.	perception	Survey	To understand marketing students' perceptions of the learning achieved from the use of simulation games, and marketing lecturers' perceptions of the barriers to increased use of simulation game
Wellington (2010)	Marketing (Principles of Marketing Course); Marketing Simulation Game	Students and professors	Students' perceptions of their decision-making abilities	perception	Basic pre-test vs. post-test quasi-experiment	Examination how the decision-making experience during the play of a marketing simulation impacts game participants' perceptions of their decision-making abilities; whether the experience of participating in a business simulation game will have an effect on self-reported decision-making ability and attitude of the game participants

Study ID: first author (year)	Subject	Digital game	Outcome measures	Type of outcome measure	Study design	Aim of study (with respect to the review question)
Woodham (2018)	Marketing	Marketplace Live	Time spent on decision-making (in minutes). Performance in the game (profit generation, market effectiveness, marketing performance). Midterm and end-of term course grades	achievement	Administrative data, mediation analysis	To answer this long-standing call for evidence that marketing simulations improve learning in marketing courses. It also introduces the reader to a particular marketing simulation, Marketplace Live, and tests whether the performance in the simulation was related to understanding marketing concepts and performance in the course, beyond the underlying influence of grade point average (GPA)

4   Synthesis and discussion

The following section provides a synthesis of the main findings and identifies similarities and differences across the studies.

4.1   The studies' research design

Most of the studies apply a descriptive design (survey) or a quasi-experimental design with pre- and post-test, without a control group. Only a few exceptions apply a more rigorous design with a randomized assignment of groups (Mitchell, 2004) or (field) experimental design (e.g., Cheng and Wang, 2011; Peng and Abdullah, 2018; Rogmans and Abaza, 2019; Van Esch et al., 2020). This means that most of the studies do not contrast the outcomes students obtain after gameplay with outcomes after other instruction modes, meaning that they can not infer the causal effect of digital games on learning. Furthermore, it means that when the studies talk about learning gains, we do not know how much students would have learned with an alternative instruction mode.

Whether games are successful depends on the underlying intention behind their introduction. Games are expected to increase various outcomes, including skills, motivation, and self-efficacy (e.g., Bawa 2020, Story et al., 2020). In addition to different targeted outcomes, the studies also differ concerning how these outcomes are measured. While 15 studies used measures of performance and achievement, 23 used measures based on self-reported perception of learning. We qualitatively summarize the findings across these different measures.

The achievement measures include tests of numeracy and financial skills (Brennan and Vos, 2013), teamwork abilities and self-management (Cela-Ranilla et al., 2014; Martín-Pérez et al., 2012; Ueltschy, 2001), subject knowledge (Brennan and Vos, 2013; Cheng and Wang, 2011; Mitchell, 2004; Perez-Bennett et al., 2014; Tao et al., 2012; Tsai et al., 2013), performance in the game (Morin and Buhagiar, 2020; Pasin and Giroux, 2011; Qudrat-Ullah, 2010; Treen et al., 2016, Tsai et al., 2013) and grade point average (GPA) (Van Esch et al., 2020). Ranchhod et al. (2014) developed and validated an educational value generation model representing the

relationships between the learning experience and three categories of learning outcomes: cognitive learning, skill development, and affective evaluation.

The perception measures that are studied include students' subjective evaluation of perceived learning (Canhoto and Murphy, 2016; Caruana et al., 2016; Mitchell, 2004; Peng and Abdullah, 2018; Ranchhod et al., 2014; Romme, 2003; Tao et al., 2012; Ueltschy, 2001; Wellington et al., 2010), as well as faculty's perceptions of students' learning outcomes (Tanner et al., 2012). Moreover, there are studies on confidence and reflection (Ashley, 2019; Canhoto and Murphy, 2016; Peng and Abdullah, 2018), perception of learning games, enjoyment and relevance (Mitchell, 2004; Peng and Abdullah, 2018), learner satisfaction (Caruana et al., 2016; Fito-Bertran et al., 2015) and learners' engagement (Van Esch et al., 2020).

4.2   Achievement

There are indications that digital games help develop decision-making abilities, particularly in complex and dynamic situations (Ranchhod et al., 2014). The results also suggest that digital games can help develop specific skills, such as numerical and financial skills (Brennan and Vos, 2013). Drawing on administrative data and mediation analysis, Woodham (2018) found that marketing simulations seemed to contribute to learning marketing concepts.

However, the effect of games on measures of performance seems to be heterogeneous across the student population. While knowledge and skills, student participation, and tacit learning preference improve performance, students with high learning motivation may not perform well with digital games (Tao et al., 2012). Martín-Pérez et al. (2012) found that features such as intelligence, personality, attitude to teamwork, and teamwork self-efficacy were not determinants of individual learning. However, gender seems to affect the value of digital games, but this might be due to the correlation between gender and other predictors, such as the efficacy of using computers (Peng and Abdullah, 2018).

Mitchell (2004) studied students' written answers to questions relevant to the course and responses to a short business vignette. He found that computer-based simulation with some cases and case discussion were equally valuable in achieving mainstream learning objectives. Perez-Bennett et al. (2014) studied students' ability to correctly identify the causal relationship between interactions between relevant variables (related to the market, competitors, funding, and the firm itself) in a case study. They conclude that when a simulation supported the case study, students' understanding of causality increased. However, unlike Mitchell (2004), they have no comparison with other teaching strategies.

Rather than relying on an overall performance measurement, Pasin and Giroux (2011) study the evolution of different types of mistakes in the game itself. Fewer

errors after some gameplay was considered as an indicator of learning. They found that many had relatively high levels of skills before the game and made few mistakes. However, those who had not mastered the topic before the game made fewer mistakes in the second half. Based on this, they argue that simulation games are more effective than traditional teaching methods to develop decision-making skills, as the game allows students to manage complex and dynamic situations. But again, we do not know whether the same group could have experienced a similar increase in performance with other instruction modes.

Similarly, Morin and Buhagiar (2020) assessed mastery of course and simulation game concepts by a multiple-choice pre-test and post-test, administered immediately before simulation game training and following completion. They found significantly higher average scores at post-test than at pre-test and thus support the hypothesis that the simulation improves the mastery of course and business management concepts. But again, we cannot know whether it results in improvements beyond that of other teaching methods.

4.3 Self-efficacy and perceived ability

Some of the studies suggest that digital games positively affect perceptions of learning outcomes (e.g., Qudrat-Ullah, 2010, Saxton, 2015; Story et al., 2020). Students may obtain a more realistic view of the decision-making process in marketing and business administration (Cook and Swift, 2006). Cela-Ranilla et al. (2014) find that the students had positive perceptions of the suitability of using the simulation to develop transferable skills. Cheng and Wang (2011) also find that students were positive towards being trained in an alternative way, making the authors conclude that VR-technology outcompetes traditional methods in improving students' application skills. Many students and teachers seem to perceive the use of digital games as valuable (Perez-Bennett et al., 2014). Ashley (2019) found improved students' confidence in their knowledge of current marketing events and that the game provided a possibility to develop information literacy, data visualization skills, and students' self-direction skills. Drawing on expectancy-value theory, the findings by Story et al. (2020) indicate that perceived learning outcomes are further influenced by student traits and their feelings about working in teams. Further, Saxton (2015) shows that combining gamification (badging) with a digital game seems to motivate students to perform better and helps explain their perceived learning.

There are, however, indications that not everyone benefits from digital games: poor-performing students may even suffer a decrease in perceived decision-making abilities (Wellington et al., 2010). The results of Brennan and Vos (2013) also suggested that, despite an improvement in skills, there was a possible small

decline in self-efficacy. It thus seems like digital games perform well, in some aspects, while conventional learning is better in others. For example, Nguyen (2015) found that those playing a game felt more competent and experienced more profound learning levels, while conventional teaching gives higher competence and higher effort.

4.4 Motivation, engagement, and enjoyment

One reason to introduce digital games into the curriculum is that games are thought to increase students' motivation, engagement, interest, and enjoyment. The results of Ueltschy (2001) support this view: the author argues that the use of digital games appears to facilitate student participation, recall and understanding of the material, team-building skills, enjoyment of the course, and the learning process. Canhoto and Murphy (2016) argue that gamification strengthens engagement and that it is possible to develop programs that facilitate deep learning and soft skills. Other studies also find that digital games seem to enhance motivation (Ranchhod et al., 2014), engagement (Tunstall and Lynch, 2010), enjoyment and enthusiasm (Vos, 2014), and learner satisfaction (Arias-Aranda, 2007; Caruana et al., 2016). Garber et al. (2012) argue that marketing games can be a positive experience for all learners, as these can frame the game experience to match their preferred learning styles. Games with competitive elements may motivate students to employ their skills and knowledge to perform well in the competition (Arias-Aranda, 2007). However, Van Esch et al. (2020) did not find increased engagement for students participating in a marketing simulation (Marketplace Live), but that the engagement stayed stable over time.

Despite many being positive towards digital games, they seem not to be useful for everyone: motivation, perceived realism, and computer efficacy contribute positively to learning reflection, while students with lower motivation considered the game too complex (Peng and Abdullah, 2018). The effect of digital games on motivation, interest, and enjoyment might depend on multiple factors, including game features and context (Silva et al., 2019) and student characteristics, such as generic competencies (Fito-Bertran et al., 2015) and general motivation (Rogmans and Abaza, 2019). Moreover, experienced, more routine gameplayers are less likely to find the digital game entertaining than non-game players (Tunstall and Lynch, 2010).

Both students and staff seem to prefer a varied range of classroom learning experiences (Tanner et al., 2012; Tunstall and Lynch, 2010). Both management and marketing faculty perceive simulation games as useful for undergraduate students but not superior to traditional learning methodologies (Tanner et al., 2012).

Rogmans and Abaza (2019) actually find that self-reported average student engagement was higher when using traditional case studies than when using simulation.

4.5 Teamwork

Concerning teamwork, the studies show that groups should not be too small nor too large (Treen et al., 2016), and simulations may enhance students' teamwork knowledge, skills, and abilities (Martín-Pérez et al., 2012). Arias-Aranda (2007) finds that students develop leadership, teamwork, and interpersonal skills during gameplay, especially in team discussion leading up to team decisions.

4.6 Impact of digital games on learning in marketing and business

One possible reason for the difference in the success of digital games could be the way they are implemented: games should not be used as a 'stand-alone' resource in class, as this does not cover the breadth and depth of the subject, but as a supplement to other devices (Cook and Swift, 2006). Students need to understand the theory behind the decisions as well as the implications. Romme (2003) draws a similar conclusion: students can be stimulated towards deeper learning by an effective combination of lectures, cases, readings, and microworlds. Qudrat-Ullah (2010) argues that the games' effect on perceived ability and self-efficacy may depend on the education level: games may be more beneficial at higher levels than in introductory courses. Findings indicate the importance of embedding and integrating the specific digital game in the discipline-specific pedagogical strategy instead of using it as a stand-alone learning tool – in line with the literature on the implementation of digital devices in education (e.g., Whitton, 2010). Moreover, we find support for the variation and combination of different learning methods, such as cases, lectures, and readings. Cook and Swift (2006) argue that digital games should only be regarded as supplementary to other learning devices and methods. Students might need texts and lectures to understand the theory behind the decisions they make in the game.

Second, few studies directly compared the impact of digital games on learning with alternative learning methods by applying an experimental design (e.g., Mitchell, 2004; Peng and Abdullah, 2018; Rogmans and Abaza, 2019; Van Esch et al., 2020). Most studies focused on one single intervention with no comparison group. In general, we know relatively little about the impact of digital devices on learning outcomes, independent of educational level (Wollscheid, et al. 2016). At the same

time, digital games typically involve student-active learning pedagogies, a pedagogy with a richer literature (Elken and Wollscheid, 2016).

Third, across studies in marketing and business administration, we find indications that digital games positively impact students' skills. At the same time, findings suggest that such conditions affect different student groups differently. Rogmans and Abaza (2019), for example, conclude that simulation games do not necessarily increase engagement among all students. They suggest that student characteristics and motivation might inform the impact of the game. Furthermore, findings across studies addressing group-based conditions provide some indications that digital games might have a different effect on team-related outcomes than on individual-related outcomes.

Finally, despite this review concentrating on one education level and one education field, the studies in the review were very heterogeneous in terms of games, outcome measures, and other contextual factors. We need more research on the implementation and the impact of digital devices on learning in higher education, and these studies need to consider the pedagogical and epistemological context.

5   Implications and concluding remarks

5.1   Concluding remarks

During recent decades, digital educational games have been increasingly used in business and marketing studies, and in the meantime also in other subjects, for example nursing and health care (e.g., Koivisto et al.,2016). With the stronger focus on evidence-informed practice (e.g., Joseph-Richard and Jessop, 2018; Wilkinson, 2019), there are rising concerns that these games' implementation might be based on availability and cost rather than on evidence of their sustainable effects on student learning (Laurillard, 2008). Addressing a dynamic field, this article has reviewed the literature on the impact of digital educational games on student learning and identifies research gaps for further inquiry. We asked how digital educational games influence learning and what characterizes the methodology and validity of the existing studies.

The 33 included studies differed substantially in terms of the type of games. They tested a large variety of digital educational games embedded in different pedagogics. There was also considerable heterogeneity in study designs and measures of learning outcomes. Future research could benefit from a common understanding of the competencies digital games may contribute to and suitable measures of these competencies.

So far, much of the literature describes how digital games might increase motivation, engagement, and learning in the short term (e.g., Woo, 2014; Whitton, 2010; Wiggins, 2016). Many studies are based on students' own perceptions and evaluations (e.g., Henderson et al., 2017; Qudrat-Ullah, 2010), that is, whether students enjoyed the game and whether they perceived increased learning by the games. Assessments based on direct evidence of student learning, however, are lacking. In addition, the results of existing studies are inconsistent (see also the review on the use of VR in marketing research by Cowan and Ketron, 2019).

Similar to previous reviews on games and simulation in marketing and business administration (Anderson and Lawton, 2008; Tonks, 2005; Vlachopoulos and Makri, 2017), our review identified only a few studies with experimental designs (e.g., randomized, controlled trials) on the causal effect of games on learning. Few

compare the impact of digital games with other learning conditions, and most studies use small, unvalidated tests of learning outcomes. Some exceptions of studies in this review apply a robust design for identifying the effect of digital games on achievement in the long run (e.g., Rogmans and Abaza, 2019).

We conclude that, even within disciplines where digital educational games have a strong standing, there is insufficient evidence of these games' effectiveness. Hence, the massive use of digital educational games in marketing and business seems to be primarily based on the belief that these games are advantageous for student learning. Like Girard et al. (2013), we conclude that one should avoid being too enthusiastic about digital games until their effectiveness on actual learning gains has been shown.

5.2 Strength and limitations

Informed by the systematic search and review methodology, we have made a valuable contribution to the literature on the impact of digital games in marketing and business studies. Choosing this approach strengthens the methodological rigor and transparency of the literature review, reducing bias in retrieving, selecting, and analyzing eligible studies.

Given the interdisciplinary and dynamically developing field, there are, however, some limitations. Our review's scope and review question is rather broad, addressing a range of digital games, learning measures, and different study designs. This implies challenges in designing a search string that balances precision and sensitivity in selecting and combining adequate search terms in different databases and sources. Thus, our systematic search might omit some eligible studies that are neither indexed in the databases nor identified by the combination of search terms or not retrieved, as they are published in channels other than scientific journals. Addressing some of these limitations, we conducted strategic manual searches in three key journals. Finally, we included some additional studies recommended by experts, but that were not included in the database search. Further studies need to be undertaken to identify search terms that capture the variety of digital games.

The review question's breadth comprises various digital educational games and outcomes measures, and the research design does not suggest a statistical synthesis by using meta-analysis due to high heterogeneity. At the same time, our approach does not comprise a quality appraisal of single studies (Grant and Booth, 2009), a mandatory part of a full systematic review (Petticrew and Roberts, 2006), which might introduce some bias.

5.3 Implications for further research and education

In sum, few studies on the topic apply experimental designs with control groups, and the evidence on objective measures of actual learning in the long-term is lacking. In general, findings indicate that a combination of digital games and traditional methods (best) supports learning sustainably. Further studies might investigate the purposeful balance between conventional analog learning devices and methods, on the one side, and digital, game-based teaching methods, on the other side. Research indicates that the university's nature is not yet transformed by the 'digital age'; rather, traditional teaching methods and conventional student-thinking continue to exist (e.g., Ashour, 2019). However, the work with this review started before the Covid-19 pandemic and large-scale initiatives to digitally transform higher education. Further reviews of research might investigate the impact of digital games in combination with other digital learning methods on students' learning during and in the aftermath of the pandemic, for different disciplines and study programmes.

Given that most games seem to be played in teams and are competitive, more studies are needed on how these aspects influence games' effectiveness for single team members and with respect to team member characteristics. Future research might consider gender differences, given the extensive literature on gender differences in competitiveness and how females' performance depends on whether they are in teams with males (e.g., Kagel and Roth, 2016). Applying a mixed-methods design Borba et al. (2020) investigated the relationship between learning spaces and the strengthening of student engagement and facilitation of interaction between students and faculty. Thus, informed by this research, further studies might investigate both faculty and student's role in learning with digital games and in interaction with faculty, across disciplines over time applying mixed methods.

References

Abdul Jabbar, A. I., & Felicia, P. (2015). Gameplay Engagement and Learning in Game-Based Learning:A Systematic Review. Review of Educational Research, Vol. 85 No. 4, pp. 740–779. https://doi.org/10.3102/0034654315577210

All, A., Castellar, N. E. P., & Van Looy, J. (2013). A systematic literature review of methodology used to measure effectiveness in digital game-based learning. In P. Escudeiro & C. Vaz de Carvalho (Eds.), Proceedings of European conference on game based learning Reading, England: Academic Conferences, Publishing International, pp. 607–616.

All, A., Castellar, N. P. E., & Van Looy, J. (2014). Measuring effectiveness in digital game-based learning: A methodological review. International Journal of Serious Games, Vol. 1 No. 2, pp. 3–21. https://doi.org/10.17083/ijsg.v1i2.18

*Ashley, C. (2019). Improving information literacy through gamification: fantasy brand leagues. Marketing Education Review, Vol. 29 No. 2, pp. 107–112. https://doi.org/10.1080/10528008.2019.1610332

*Anderson, P., & Lawton, L. (2008). Business Simulations and Cognitive Learning: Developments, Desires, and Future Directions. Simulation & Gaming, Vol. 40, pp. 193–216. https://doi.org/10.1177/1046878108321624

*Arias-Aranda, D. (2007). Simulating reality for teaching strategic management. Innovations in Education and Teaching International, Vol. 44 No. 3, 273–286. https://doi.org/10.1080/14703290701486662

Ashour, S. (2019). How technology has shaped university students' perceptions and expectations around higher education: an exploratory study of the United Arab Emirates. Studies in Higher Education, pp. 1–13. doi:10.1080/03075079.2019.1617683

Bawa, P. (2020). Game On!: Investigating Digital Game-Based Versus Gamified Learning in Higher Education. International Journal of Game-Based Learning (IJGBL), Vol. 10 No. 3, pp. 16–46. DOI: 10.4018/IJGBL.2020070102

Bacon, D. R. (2016). Reporting Actual and Perceived Student Learning in Education Research. Journal of Marketing Education, Vol. 38 No. 1, pp. 3–6. https://doi.org/10.1177/0273475316636732

Bellotti, F., Kapralos, B., Lee, K., Moreno-Ger, P., & Berta, R. (2013). Assessment in and of Serious Games: An Overview. Advances in Human-Computer Interaction, 2013, 136864. https://doi.org/10.1155/2013/136864

Bolton, R. N., Chapman, R. G., & Mills, A. J. (2019). Harnessing Digital Disruption With Marketing Simulations. Journal of Marketing Education, Vol. 41 No. 1, pp. 15–31. https://doi.org/10.1177/0273475318803417

Bong, M & Skaalvik, E. M. (2003). Academic self-concept and self-efficacy: How different are they really? Educational Psychology Review, Vol. 15 No. 1, pp. 1–40. https://doi.org/10.1023/A:1021302408382

*Brennan, R., & Vos, L. (2013). Effects of Participation in a Simulation Game on Marketing Students' Numeracy and Financial Skills. Retrieved from https://search.proquest.com/docview/1651832414?accountid=198347

*Canhoto, A. I., & Murphy, J. (2016). Learning from Simulation Design to Develop Better Experiential Learning Initiatives: An Integrative Approach. Journal of Marketing Education, Vol. 38 No. 2, pp. 98–106. https://doi.org/10.1177/0273475316643746

*Caruana, A., La Rocca, A., & Snehota, I. (2016). Learner Satisfaction in Marketing Simulation Games: Antecedents and Influencers. Journal of Marketing Education, Vol. 38 No 2, pp. 107–118. https://doi.org/10.1177/0273475316652442

*Cela-Ranilla, J. M., Esteve-Mon, F. M., Esteve-González, V., & Gisbert-Cervera, M. (2014). Developing Self-Management and Teamwork Using Digital Games in 3D Simulations. Australasian Journal of Educational Technology, Vol. 30 No. 6, pp. 634–651. Retrieved from https://search.proquest.com/docview/1697500114?accountid=198347

*Cheng, Y. F., & Wang, S. H. (2011). Applying a 3D virtual learning environment to facilitate student's application ability – The case of marketing. Computers in Human Behavior, Vol. 27 No. 1, pp. 576–584. https://doi.org/10.1016/j.chb.2010.10.008

Clark, B. D., Tanner-Smith, E., Killingsworth, S., & Bellamy, S. (2013). Digital games for learning. A systematic review and meta-analysis (Executive summary). Menlo Park, CA: SRI International.

*Cook, R. W., & Swift, C. O. (2006). The Pedagogical Efficacy of a Sales Management Simulation. Marketing Education Review, Vol. 16 No. 3, pp. 37–46. https://doi.org/10.1080/10528008.2006.11488971

Connolly, M. T., Boyle, A. Z., MacAuthor, E., Hainey, T., & Boyle, M. J. (2012). A systematic literature review of empirical evidence on computer games and serious games. Computers & Education, Vol. 59, pp. 661–686. doi:10.1016/j.compedu.2012.03.004

Cowan, K. and Ketron, S. (2019), Prioritizing marketing research in virtual reality: development of an immersion/fantasy typology, European Journal of Marketing, Vol. 53 No. 8, pp. 1585-1611. https://doi.org/10.1108/EJM-10-2017-0733

Cronan, T. P., Léger, P.-M., Robsert, J., Babin, G., & Charland, P. (2012). Comparing objective measures and perceptions of cognitive learning in an ERP simulation game: A research note. Simulation & Gaming, Vol. 43 No. 4, pp. 461–480. https://doi.org/10.1177/1046878111433783

de Borba, G.S., Alves, I.M. & Campagnolo, P.D.B. (2020). How Learning Spaces Can Collaborate with Student Engagement and Enhance Student-Faculty Interaction in Higher Education. Innov High Educ Vol. 45, pp. 51–63. https://doi.org/10.1007/s10755-019-09483-9

Efrat, K., Gilboa, S., & Yonatany, M. (2017). When marketing and innovation interact: The case of born-global firms. International Business Review, Vol. 26 No. 2, pp. 380-390.: https://doi.org/10.1016/j.ibusrev.2016.09.006

Elken, M.; Wollscheid, S. (2019). Academic environment and quality of education: A literature review. Working Paper 1. Oslo: Nordic Institute for Studies in Innovation, Research and Education NIFU.

Faria, A. J., Hutchinson, D., Wellington, W. J., & Gold, S. (2009). Developments in Business Gaming A Review of the Past 40 Years. Simulation & Gaming, Vol. 40 No. 4, pp. 464–487. https://doi.org/10.1177/1046878108327585

*Fito-Bertran, A., Hernandez-Lara, A. B., & Lopez, E. S. (2015). The effect of competences on learning results an educational experience with a business simulator. Computers in Human Behavior, Vol. 51, pp. 910–914. https://doi.org/10.1016/j.chb.2014.11.003

*Garber, L. L., Hyatt, E. M., Boya, Ü. Ö., & Ausherman, B. (2012). The Association between Learning and Learning Style in Instructional Marketing Games. Marketing Education Review, Vol. 22 No. 2, pp. 167–184. https://doi.org/10.2753/MER1052-8008220206

Girard, C., Ecalle, J., & Magnan, A. (2013). Serious games as new educational tools: how effective are they? A meta-analysis of recent studies. Journal of Computer Assisted Learning, Vol. 29 No. 3, pp. 207-219. https://doi.org/10.1111/j.1365-2729.2012.00489.x

Grant, M. J., & Booth, A. (2009). A typology of reviews: an analysis of 14 review types and associated methodologies. Health Information & Libraries Journal, Vol. 26 No. 2, pp. 91–108. https://doi.org/10.1111/j.1471-1842.2009.00848.x

Gros, B. (2007). Digital Games in Education. Journal of Research on Technology in Education, Vol. 40 No. 1, pp. 23–38. https://doi.org/10.1080/15391523.2007.10782494

Henderson, M., Selwyn, N., & Aston, R. (2017). What works and why? Student perceptions of 'useful' digital technology in university teaching and learning. Studies in Higher Education, Vol. 42 No. 8, pp. 1567–1579. https://doi.org/10.1080/03075079.2015.1007946

Joseph-Richard, P., & Jessop, T. (2018). A phenomenographic study of research informed teaching through the eyes of Masters' students. Studies in Higher Education, pp. 1–15. https://doi.org/10.1080/03075079.2018.1554640

Kagel, J. H., & Roth, A. E. (2016). The Handbook of Experimental Economics(Vol. 2).

Karagiorgas, D. N., & Niemann, S. (2017). Gamification and Game-Based Learning. Journal of Educational Technology Systems, Vol. 45 No. 4, pp. 499–519. https://doi.org/10.1177/0047239516665105

Koivisto, J.-M., Multisilta, J., Niemi, H., Katajisto, J., & Eriksson, E. (2016). Learning by playing: A cross-sectional descriptive study of nursing students' experiences of learning clinical reasoning. Nurse Education Today, Vol. 45, pp. 22-28. https://doi.org/10.1016/j.nedt.2016.06.009

Kotler, P., & Schultz, R. L. (1970). Marketing Simulations: Review and Prospects. The Journal of Business, Vol. 43 No. 3, pp. 237–295. Retrieved from http://www.jstor.org/stable/2351779

Laurillard, D. (2008). The teacher as action researcher: using technology to capture pedagogic form. Studies in Higher Education, Vol. 33 No. 2, pp. 139–154. https://doi.org/10.1080/03075070801915908

Lillejord S., Børte K., Nesje K., & E, R. (2018). Learning and teaching with technology inhigher education – a systematic review. Knowledge Center of Education. Oslo.

Mammone, L., & Maynes, N. (2019). A meta-synthesis on the application of gamification in the higher education co-curricular environment. Teaching and Learning, Vol. 12 No. 1. RG/10.26522/TL.V12I1.443

*Martín-Pérez, V., Martín-Cruz, N., & Pérez-Santana, P. (2012). Learning-by-Doing Teamwork KSA: The Role of Strategic Management Simulation. International Journal of Virtual and Personal Learning Environments, Vol. 3 No. 2, pp. 21–34. DOI: 10.4018/jvple.2012040102

Mitchell, R. C. (2004). Combining Cases and Computer Simulations in Strategic Management Courses. Journal of Education for Business, Vol. 79 No. 4, pp. 198–204. Retrieved from https://search.proquest.com/docview/62072846?accountid=198347

*Morin, J., & Buhagiar, T. (2020). Educating business integrators with a computer-based simulation game in the flipped classroom. Journal of Education for Business, Vol. 95 No. 2, pp. 121–128. https://doi.org/10.1080/08832323.2019.1613951

Nadolny, L., & Halabi, A. (2015). Student participation and achievement in a large lecture course with Game-Based Learning. Simulation & Gaming, Vol. 47 No. 1, pp. 51–72. https://doi.org/10.1177/1046878115620388

*Nguyen, T. N. (2015). Motivational Effect of Web-Based Simulation Game in Teaching Operations Management. Journal of Education and Training Studies, Vol. 3 No. 2, pp. 9–15. Retrieved from https://search.proquest.com/docview/1697488229?accountid=198347

Park, H. (2012). Relationship between Motivation and Student's Activity on Educational Game. International Journal of Grid and Distributed Computing, Vol. 5 No. 1, pp. 101-133.

*Pasin, F., & Giroux, H. (2011). The impact of a simulation game on operations management education. Computers & Education, Vol. 57 No. 1, pp. 1240–1254. https://doi.org/10.1016/j.compedu.2010.12.006

*Peng, J., & Abdullah, I. (2018). Building a Market Simulation to Teach Business Process Analysis: Effects of Realism on Engaged Learning. Accounting Education, Vol. 27 No. 2, 208–222. Retrieved from https://search.proquest.com/docview/2034281656?accountid=198347

*Perez-Bennett, A., Davidsen, P., & Lopez, L. E. (2014). Supercharging case-based learning via simulators Achieving double-loop learning with case-sims. Management Decision, Vol. 52 No. 9, 1801–1832. https://doi.org/10.1108/MD-09-2013-0499

Petticrew, M., & Roberts, H. (2006). Systematic reviews in the social sciences: a practical guide. Blackwell Publishing. Malden USA.

*Qudrat-Ullah, H. (2010). Perceptions of the effectiveness of system dynamics-based interactive learning environments: An empirical study. Computers & Education, Vol. 55 No. 3, pp. 1277–1286. https://doi.org/10.1016/j.compedu.2010.05.025

*Ranchhod, A., Gurau, C., Loukis, E., & Trivedi, R. (2014). Evaluating the educational effectiveness of simulation games: A value generation model. Information Sciences, Vol. 264, pp. 75–90. https://doi.org/10.1016/j.ins.2013.09.008

*Rogmans, T., & Abaza, W. (2019). The Impact of International Business Strategy Simulation Games on Student Engagement. Simulation & Gaming, Vol. 50 No. 3, pp. 393–407. https://doi.org/10.1177/1046878119848138

*Romme, A. G. L. (2003). Learning outcomes of microworlds for management education. Management Learning, Vol. 34 No. 1, pp. 51–61. https://doi.org/10.1177/1350507603034001130

*Saxton, M. K. (2015). Adding Badging to a Marketing Simulation to Increase Motivation to Learn. Marketing Education Review, Vol. 25 No. 1, pp. 53–57. https://doi.org/10.1080/10528008.2015.999598

Schumann, P. L., Anderson, P. H., Scott, T. W., & Lawton, L. (2014). A Framework for Evaluating Simulations as Educational Tools. Developments in Business Simulation and Experiential Learning, Vol. 28, pp. 215-220.

*Silva, R., Rodrigues, R., & Leal, C. (2019). Play it again: how game-based learning improves flow in Accounting and Marketing education. Accounting Education, Vol. 28 No. 5, pp. 484–507.
https://doi.org/10.1080/09639284.2019.1647859

*Story, W. K. Y.-L., Mariya A.; Deitz, George D. (2020). Understanding Student Preferences: Improving Outcomes in Computer Simulation Experiential Learning Activities. Journal of Advancement in Marketing, Vol. 28 No. 1, pp. 13–25.

*Tanner, J. R., Stewart, G., Totaro, M. W., & Hargrave, M. (2012). Business Simulation Games: Effective Teaching Tools or Window Dressing? American Journal of Business Education, Vol. 5 No. 2, 115–128. Retrieved from https://search.proquest.com/docview/1697501309?accountid=198347

*Tao, Y. H., Yeh, C. R., & Hung, K. C. (2012). Effects of the heterogeneity of game complexity and user population in learning performance of business simulation games. Computers & Education, Vol. 59 No. 4, pp. 1350–1360. https://doi.org/10.1016/j.compedu.2012.06.003

*Tonks, D. G. (2005). The Processing and Pedagogy of Marketing Simulations. The Marketing Review, Vol. 5, pp. 371–382.
https://doi.org/10.1362/146934705775186872

Treen, E., Atanasova, C., Pitt, L., & Johnson, M. (2016). Evidence From a Large Sample on the Effects of Group Size and Decision-Making Time on Performance in a Marketing Simulation Game. Journal of Marketing Education, Vol. 38 No. 2, pp. 130–137. https://doi.org/10.1177/0273475316653433

*Tsai, C.-W., Hsu, P.-F., & Tseng, H.-J. (2013). Exploring the Effects of Web-Mediated Game-Based Learning and Self-Regulated Learning on Students' Learning. International Journal of Information and Communication Technology Education (IJICTE), Vol. 9 No. 2, pp. 39–51. DOI: 10.4018/jicte.2013040104

*Tunstall, R., & Lynch, M. (2010). The role of simulation case studies in enterprise education. Education + Training, Vol. 52 No. 8/9, pp. 624–642.

*Ueltschy, L. C. (2001). An Exploratory Study of Integrating Interactive Technology into the Marketing Curriculum. Journal of Marketing Education, Vol. 23 No. 1, pp. 63–72. https://doi.org/10.1177/0273475301231008

*Van Esch, P., Von der Heid, T., Frethey-Bentham, C., & Northey, G. (2020). The Effect Of Marketing Simulations On Student Engagement And Academic Outcomes. Marketing Education Review, Vol. 30 No. 1, pp. 43–56.
https://doi.org/10.1080/10528008.2020.1713003

Vashisht, D., Royne, M.B. and S., S. (2019), What we know and need to know about the gamification of advertising: A review and synthesis of the advergame studies, European Journal of Marketing, Vol. 53 No. 4, pp. 607-634. https://doi.org/10.1108/EJM-01-2017-0070

Vlachopoulos, D., & Makri, A. (2017). The effect of games and simulations on higher education: a systematic literature review. International Journal of Educational Technology in Higher Education, Vol. 14 No. 1, p. 22. https://doi.org/10.1186/s41239-017-0062-1

*Vos, L. (2014). Marketing simulation games: A review of issues in teaching and learning. The Marketing Review, Vol. 14 No. 1, pp. 67–96. https://doi.org/10.1362/146934714X13948909473220

*Wellington, W. J., Hutchinson, D., & Faria, A. J. (2010). The impact of playing a marketing simulation game on perceived decision making ability among introductory marketing students. Developments in Business Simulations and Experiential Learning, Vol. 37, pp. 23–31.

Whitton, N. (2010). Learning with digital games. A practical guide to engaging students in higher education. Routledge. New York, London.

Wiggins, B. E. (2016). An Overview and Study on the Use of Games, Simulations, and Gamification in Higher Education. International Journal of Game-Based Learning (IJGBL). DOI: 10.4018/IJGBL.2016010102

Wilkinson, C. (2019). Evidencing impact: a case study of UK academic perspectives on evidencing research impact. Studies in Higher Education, Vol. 44 No. 1, pp. 72–85. https://doi.org/10.1080/03075079.2017.1339028

Wollscheid, S., Sjaastad, J., & Tømte, C. (2016). The impact of digital devices vs. Pen(cil) and paper on primary school students' writing skills – A research review. Computers & Education, 95, 19-35.

Woo, J.-C. (2014). Digital Game-Based Learning Supports Student Motivation, Cognitive Success, and Performance Outcomes. Journal of Educational Technology & Society, Vol. 17 No. 3, pp. 291–307. Retrieved from http://www.jstor.org/stable/jeductechsoci.17.3.291

*Woodham, O. P. (2018). Testing the Effectiveness of a Marketing Simulation to Improve Course Performance. Marketing Education Review, Vol. 28 No. 3, pp. 203–216. https://doi.org/10.1080/10528008.2017.1369356

Young, F. M., Slota, S., Cutter, B. A., Jalette, G., Mulli, G., Lai, B., . . . Yukhymenko, M. (2012). Our princess is in another castle: A review of trends in serious gaming for education. Review of Educational Research, Vol. 82, pp. 61–89. https://doi.org/10.3102/0034654312436980

Included studies are marked with an Asterix.