Design Guidelines for Effective Digital Business Simulation Games: Insights from a Systematic Literature Review on Training Outcomes

Research Paper

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Abstract. Increasing uncertainty in today's business environment demands innovative training approaches to improve decision-making in complex situations. Digital business simulation games (DBSGs) provide a gamified, experiential learning environment where participants engage in complex decision-making. Despite the widespread use of DBSGs in higher education and corporate learning, research on DBSG effectiveness remains fragmented and lacks comprehensive design guidelines to maximize impact. This study presents a systematic literature review of 64 empirical studies published between 2014 and 2024 to identify DBSG training outcomes and derive evidence-based design guidelines for DBSG development and training implementation. We identify four training outcomes: attitudinal reactions to training, motivational, behavioral, and cognitive learning outcomes. Based on these findings, we develop a design guideline framework. By linking specific design features to measurable training outcomes, this study deepens the theoretical understanding of DBSG effectiveness and provides practical guidance for developers and instructors to enhance training impact.

Keywords: *Digital business simulation games, training effectiveness, design guidelines, literature review*

1 Introduction

As digitalization reshapes the world of work, the demand for competent decision-making in complex business contexts continues to grow. Corporate learning departments and higher education institutions must implement training methods that prepare managers, employees, and students to manage complexity in dynamic environments (Schefer-Wenzl & Miladinovic 2019). Effectively addressing complexity involves approaching informed decision-making through iterative experimentation and reflection (Snowden & Boone 2007). However, integrating decision-making experimentation into training formats requires an active role for training participants. Traditional trainer-centered methods often position learners in a passive and receptive role (Fitó-Bertran

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et al. 2014). In contrast, using information and communication technologies in training environments can foster active engagement and experiential learning (Chatpinyakoop et al. 2024, Dumblekar et al. 2024).

Digital business simulation games (DBSGs) offer a promising approach to active learning by combining experiential learning principles with game-based methodologies, allowing participants to explore complex systems through hands-on experimentation (Ben-Zvi 2010, Carter 2024, Prifti et al. 2017). Unlike traditional training methods, DBSGs enable learners to apply their knowledge in risk-free environments, reinforcing decision-making skills without real-world consequences (Aldrich 2010). Empirical research has demonstrated that DBSG-based training significantly influences attitudes, motivation, behavior, and cognitive learning outcomes (Clarke & Clarke 2009, Krath et al. 2021, Sitzmann 2011). However, despite their advantages, existing studies report mixed results regarding the effectiveness of DBSG training, particularly in terms of motivation and attitudinal impact (Adib 2024, Pérez-Pérez et al. 2021). This inconsistency highlights the need to synthesize empirical evidence to determine how developers and instructors should design and implement DBSGs to maximize training effectiveness.

While previous reviews have explored specific aspects of DBSGs, they typically focus on design-specific features, learning outcomes, or implementation contexts (Faisal et al. 2022, Löffler et al. 2019). However, evaluating DBSG training effectiveness requires an integrated analysis of all relevant outcomes, their interdependencies, and the transfer into design guidelines for DBSG development and training implementation. Therefore, this systematic literature review aims to answer the following research question: *How can DBSGs be designed and implemented to maximize training effectiveness?*

To answer this question, we conducted a systematic literature review of 64 empirical studies on DBSG training use published between January 2014 and August 2024. Our analysis identifies four DBSG training outcomes: participants' attitudinal reaction to training, motivational, behavioral, and cognitive learning outcomes. Based on these training outcomes, we provide a framework for optimizing DBSG development and training implementation by systematically linking the identified training outcomes to design guidelines. The remaining paper is structured as follows: The next section provides the theoretical background on DBSGs, followed by the research approach. We then present the literature review results and the derived design guidelines. Finally, we discuss the variability of DBSG training effectiveness and conclude the paper.

2 Related Work

The use of DBSGs has a long history (Faisal et al. 2022, Hallinger et al. 2020, Hookham & Nesbitt 2019). Scholars widely recognize the introduction of the Top Management Decision Simulation in management seminars in 1956 as the starting point of business simulation games as a training tool (Hodgetts 1970). Since then, the use and development of DBSGs have expanded considerably, with increasing adoption in corporate and

educational settings, particularly in information systems (IS) and management training (Faisal et al. 2022, Vos 2015).

Due to their widespread adoption, multiple definitions of DBSGs exist (Betzwieser et al. 2024, Greco et al. 2013, Scholtz & Hughes 2021). Aldrich (2010) identifies ten distinct terms in the gamified learning domain, among which gamification, game-based learning, serious games, and simulation games are particularly relevant for classifying DBSGs. While gamification is defined as the use of game elements in non-game contexts (Deterding et al. 2011), game-based learning encompasses full-fledged games with explicit learning objectives (Plass et al. 2015), including serious games (Abt 1987). Sitzmann (2011, 490) defines DBSGs as "[…] instruction delivered via personal computer that immerses trainees in a decision-making exercise in an artificial environment to learn the consequences of their decisions". Consequently, there are significant overlaps between serious games and DBSGs (Greco et al. 2013). Salas et al. (2009) extend Sitzmann's definition and see role-play and board games as business simulation games. Given the definitional diversity, we adopt Sitzmann's definition of DBSGs as digital learning tools designed to enhance training outcomes through experiential learning. To distinguish our research object clearly from role play and haptic business simulation games, we use the term DBSG.

DBSGs facilitate experiential learning by enabling participants to apply their pre-existing knowledge within the simulated setting (Lee et al. 2022, Léger 2006, Lovelace et al. 2016). Experiential learning is a recurring process with four phases (Kolb 1984). Learning develops from (1) concrete experience through (2) reflective observation, (3) abstract conceptualization, and (4) active experimentation (Adib 2024, Samaras et al. 2022). Integrating DBSGs into training programs has significantly impacted training outcomes (Sitzmann 2011). While Kolb's experiential learning theory provides a valuable foundation for understanding skill development in DBSG training, it offers limited consideration of motivational factors that are particularly relevant to DBSG training effectiveness (Bitrián et al. 2020, Tiwari et al. 2014). Self-determination theory (Ryan & Deci 2000) offers a complementary perspective by emphasizing the role of autonomy, competence, and relatedness as essential drivers of intrinsic motivation that positively influence participant engagement and learning performance in DBSG training (Buil et al. 2019). Based on this theoretical grounding, the following section outlines the research approach.

3 Research Approach

To investigate and synthesize empirical research on the design and implementation of DBSGs for maximizing training effectiveness, we conducted a systematic literature review (SLR) following the methodological frameworks of vom Brocke et al. (2009) and Webster & Watson (2002). Our approach is an assessing review to identify distinct DBSG training outcomes (Leidner 2018). For the study selection process, we followed the PRISMA guidelines for systematic reviews (Page et al. 2021). The research began with a keyword search in the IEEE Xplore, Scopus, and Web of Science databases. Based on an analysis of the data sources used in existing literature reviews on DBSGs,

we identified these databases as the most relevant and comprehensive sources for examining research in game-based learning. We formulated the search string using three key search terms: DBSGs, education and training, and effectiveness. We based the keywords on prior SLRs on DBSG (Faisal et al. 2022, Faizan et al. 2019), which we have further developed to focus on training contexts. The search string was as follows: *(("business game*" OR "serious game*" OR "simulation game*" OR "management simulation*") AND (teach* OR educat* OR train* OR learn* OR develop* OR instruct*) AND (impact* OR outcome* OR effect* OR skill* OR behaviour* OR attitude* OR knowledge OR assess* OR evaluat*))*.

To ensure the quality of the selected studies, we focused on highly reputable journals in IS and management. Initially, outlets rated A(+) and B were considered (VHB 2024). However, we identified only four papers based on this selection. We expanded the search to include journals listed in the VHB ranking whose titles explicitly reference education, learning, and training without restrictions on ranking (e.g., Journal of Education for Business). Furthermore, we identified relevant education and training outlets through discussions with other researchers in the field of DBSGs (e.g., International Journal of Management Education). This approach led to a total of 360 relevant outlets.

The initial search resulted in 631 unique publications. Following the approach of vom Brocke et al. (2009), we reviewed the title, abstract, and full text. We defined multiple inclusion and exclusion criteria for the review process to ensure the transparency of the literature selection (vom Brocke et al. 2009). We established the inclusion and exclusion criteria based on the research question, the quality assessment of the studies, and our adopted definition of DBSGs. We included studies that met the following criteria: a) peer-reviewed journal or conference papers, b) empirical studies utilizing experimental, observational, or qualitative data, c) IS and management research, d) papers explicitly examining DBSG training outcomes, e) samples consisting of participants of higher education or corporate learning programs. Since our study relates to training effectiveness, we did not explicitly exclude any training formats (remote, hybrid, on-site) from the sample. We excluded studies if they met any of the following criteria: a) non-peer-reviewed journal and conference papers, books, theses, editorials, and other reports, b) nonempirical studies, c) studies examining non-digital business simulation games or entertainment-focused DBSGs, and d) studies with K-12 samples. We only considered papers published after December 2013 to ensure an up-to-date analysis of DBSG training effectiveness. The final set of papers thus included 64 publications (see Table 1).

After finalizing the selection process, we applied a structured analysis to examine the studies in detail. First, key methodological aspects, including sample size, data collection methods, study design, and DBSG content, were extracted from the 64 selected papers to gain an overview of the applied research methodologies. To identify DBSG training outcomes, we used the three-step coding process proposed by Gioia et al. (2013).

Table 1. Databases and selected publications

	IEEE Xplore	**Scopus**	**Web of Science**
Initial search	118	458	297
After duplicates	631		
After the title and abstract	122		
After full-text analysis and final paper set	**64**		

In the first step, we systematically identified and extracted terms and constructs to establish first-order concepts (e.g., "[…] easy to understand"). In the second step, we grouped these first-order concepts into more abstract second-order themes (e.g., perceived ease of use). In the third step, we categorized the second-order themes into aggregate dimensions (e.g., attitudinal reactions), ensuring a synthesis of findings. Based on the developed aggregate dimensions, we then built a concept matrix (Webster & Watson 2002).[1] To address potential bias in the coding process, we conducted team consensus discussions among the authors to iteratively review concepts and themes. The development and hierarchies of concepts and themes were also documented (Nowell et al. 2017).

To derive actionable design guidelines, we analyzed which hypothesized relationships between design features and training outcomes were confirmed, partially, or rejected. In exploratory studies, we considered the propositions on design features as confirmed hypotheses. Many studies in our sample described specific design features of DBSGs and the training implementation, yet did not empirically investigate how these features contributed to the reported outcomes. To strengthen the plausibility of these not directly tested design feature–training outcome relationships, we triangulated our findings by drawing on evidence from systematic literature reviews (e.g., Vlachopoulos & Makri 2017) as well as conceptual (e.g., Léger et al. 2011) and empirical studies (e.g., Betzwieser et al. 2024) on DBSG design. Based on the supported DBSG design feature–training outcome relationships, we developed design guidelines for developers and instructors to adhere to when designing DBSG training.

4 DBSG Training Outcomes

We identified 18 second-order themes and four aggregate dimensions to explore DBSG training outcomes. The outcome variables are participants' attitudinal reactions to DBSG training (n = 66), motivational outcomes (n = 20), behavioral outcomes (n = 36), and cognitive learning outcomes (n = 82). Most measurements for motivational, behavioral, and cognitive learning outcomes are based on DBSG participants' self-assessments and are, therefore, perceived outcomes. Table 2 overviews the identified second-order themes and aggregate dimensions by outlining the number of each second-order theme used in the studies.

[1] The concept matrix is available on request.

Table 2. Overview of second-order themes and aggregate dimensions

Aggregate dimensions	**Attitudinal reactions to training**	**n**	**Motivational outcomes**	**n**	**Behavioral outcomes**	**n**	**Cognitive learning outcomes**	**n**
Second-order themes	Perceived usefulness	28	Self-efficacy	7	Engagement	12	Critical Thinking skills	29
	Satisfaction with DBSG training experience	21	Emotions	6	Teamwork effective-ness	9	Functional and mana-gerial skills	27
	Perceived ease of use	12	Motivation	5	Behavioral intentions	8	Knowledge acquisition and content understand-ing	10
	Changes in attitudes	5	Flow	2	Collective learning and problem-solving	5	Assessment results	8
					Career de-velopment	2	Soft skills	8
		∑ 66		**∑ 20**		**∑ 36**		**∑ 82**
								∑ 204

Attitudinal reactions to training are participants' first feelings about the training, such as training utility and satisfaction (Alliger et al. 1997, Lacerenza et al. 2017). **Motivational outcomes** include all psychological constructs, such as motivation and intentions, that activate DBSG participants' behavior and direction, and evaluate the experienced psychological state (Buil et al. 2019, Krath et al. 2021). **Behavioral outcomes** refer to observable changes in actions and behavioral patterns that result from DBSG training participation (Adib 2024, Buil et al. 2020). **Cognitive learning outcomes** relate to critical thinking skills (Loon et al. 2015, Lovelace et al. 2016, Mohsen et al. 2019) and functional and managerial skill development (Fearon et al. 2020, Kiss & Schmuck 2020, Scheuring & Thompson 2025). Fewer studies have examined the effects of DBSG training on knowledge acquisition, content understanding, and soft skills. While knowledge acquisition and content understanding represent the lower levels in Bloom's revised taxonomy, soft skills such as critical thinking are categorized as high-order skills (Anderson & Krathwohl 2001).

We find an apparent positive effect of DBSG training participation on cognitive learning outcomes. Moreover, our results show that attitudinal reactions to training, motivational, and behavioral outcomes can reinforce the positive effects on cognitive learning outcomes. Positive attitudinal reactions, such as satisfaction (Dick & Akbulut

2020, Grijalvo et al. 2022, Wei et al. 2022), perceived usefulness (Huang et al. 2022, Kageyama et al. 2022, Vos 2015), and perceived ease of use (Chen et al. 2015, Dick & Akbulut 2020, Vos 2015), reinforce cognitive learning outcomes. A high intrinsic motivation due to DBSG training also improves cognitive learning outcomes (Buil et al. 2019, Tiwari et al. 2014). A central focus of DBSG research is to examine the influence of DBSGs on engagement in training as behavioral outcomes (Huang et al. 2022, Loon et al. 2015, Rogmans & Abaza 2019). Engagement in DBSG training also has an apparent positive effect on satisfaction and cognitive learning outcomes (Adib 2024, Buil et al. 2019, Eder et al. 2019).

5 Design Guidelines

In the previous chapter, we presented the identified DBSG training outcomes. Attitudinal reactions to DBSG training and motivational, behavioral, and cognitive learning outcomes reflect how DBSG training participants experience, become motivated, engage in, and personally develop from DBSG training. Training outcomes depend on game features (Farrell 2020, Kageyama et al. 2022, Wei et al. 2022) and didactic strategies, instructor interventions, and teaching methods (Léger et al. 2011, Löffler et al. 2019, Scholtz & Hughes 2021). Thus, effective DBSG training requires design guidelines that align with the identified outcomes and guide game design and training implementation.

5.1 Design Guidelines for DBSG Development

DBSG training effectiveness depends on training implementation and its underlying DBSG design (Kageyama et al. 2022, Vlachopoulos & Makri 2017). Realistic game scenarios (Kageyama et al. 2022), information quality (Wei et al. 2022), and an interactive game nature (Calabor et al. 2019, Lovelace et al. 2016) collectively contribute to a positive perception of DBSGs. Therefore, DBSG developers should create realistic business scenarios that require participants to make authentic, real-world decisions (a). Providing high-quality in-game information improves participants' satisfaction (b). Additionally, incorporating visual and interactive game elements will enhance participants' immersion (c). Engaging game dynamics (Calabor et al. 2019, Lee et al. 2022) and structured challenge progression (Loon et al. 2015, Vos 2015) foster participants' motivation. DBSG should tell compelling stories that evoke emotions in the participants and place the learning objectives in a meaningful business context (d).

Furthermore, introducing an incremental level of decision complexity ensures that participants remain challenged and, therefore, motivated to master the challenges without feeling overwhelmed (e). Gamification elements, such as leaderboards, can further enhance motivation by addressing the competition (f). DBSG should encourage participants to actively engage in collaborative learning modes (Lohmann et al. 2019). Therefore, DBSG design should actively stimulate participant interaction, encouraging collaborative problem-solving and peer learning to facilitate behavioral outcomes such as engagement (g).

Skill alignment (Betzwieser et al. 2024, Hendy 2021), in-game feedback (Kageyama et al. 2022, Lee et al. 2022), and scaffolding mechanisms (Farrell 2020) facilitate cognitive learning outcomes. DBSG developers should adapt the intended learning objectives to the participants' existing skills to ensure the training remains appropriately challenging (h). Feedback with report systems, hints, and suggestions reinforces participants' learning and helps them to reflect on their decision-making strategies (i). Integrating scaffolding, such as tutorials, non-player characters, and tooltips, can provide participants with in-game guidance while enabling them to gradually become more independent in their decisions (j). Table 3 provides an overview of training outcomes, their implications for DBSG development, and the derived design guidelines.

Table 3. Design guidelines for DBSG development

DBSG training outcomes	Implications for DBSG development	Design guidelines
Attitudinal reactions to DBSG training	Realistic scenarios, information quality, and captivating game elements lead to a positive perception of the DBSG.	(a) Ensure the real-world value of DBSGs through realistic business scenarios and game mechanisms. (b) Provide high in-game information quality. (c) Enhance immersion through visual and interactive game elements.
Motivational outcomes	Compelling storytelling, progressive decision complexity, and gamification enhance participants' motivation.	(d) Design a compelling narrative to make DBSG scenarios motivating. (e) Challenge participants with an incremental level of decision complexity. (f) Integrate gamification elements (e.g., leaderboards) to spark participant competition.
Behavioral outcomes	Participant interaction promotes behavioral outcomes.	(g) Stimulate the interaction between participants to experience collaboration.
Cognitive learning outcomes	Aligning intended learning outcomes with participants' skills, providing feedback, and integrating scaffolding mechanisms enhance cognitive learning outcomes.	(h) Ensure alignment of intended cognitive learning outcomes with participants' pre-training skill characteristics. (i) Provide feedback (e.g., report systems, hints, suggestions) to reinforce learning. (j) Integrate scaffolding mechanisms (e.g., tutorials, non-player characters, tooltips) to guide decision-making.

5.2 Design Guidelines for DBSG Training Implementation

The successful implementation of DBSG training depends not only on the design of the DBSG itself but also on how the training is structured, facilitated, and enhanced with other learning methods. The training instructor impacts DBSG training satisfaction (Chaurasia 2017, Dumblekar et al. 2024, Scholtz & Hughes 2021). To ensure effective facilitation, trainers must attend a train-the-trainer session before conducting training sessions (k). Moreover, the thorough preparation of the instructor(s) (Backhaus & Heiner 2014) and participants (Chaurasia 2017) fosters positive attitudinal responses. Pre-training briefing sessions and materials clarify the training goals and offer an overview of the DBSG content, reducing cognitive overload and ensuring that participants enter the training well-prepared (l). Trial rounds of decision-making can support participants' familiarity with the DBSG, allowing participants to experiment with decisions without facing performance pressure (m). Learning status checks through self-assessments and reflection exercises enable participants to monitor their skill development (n).

Autonomy in decision-making and achievement recognition enhances participants' motivation. Encouraging self-determined learning is also essential (o), as experiencing autonomy in decision-making leads to intrinsic motivation (Buil et al. 2019). However, instructors must balance participants' autonomy with appropriate support to prevent them from becoming overwhelmed by complexity (Dempsey et al. 2002). Additionally, recognizing achievements in debriefing and coaching sessions (Adib 2024) or by formal certificates increases motivation (p). Moreover, coaching (Léger et al. 2011), learning methodologies mix support (Scholtz & Hughes 2021), and collaborative engagement (Abdullah et al. 2013) foster behavioral development. Coaching sessions during training help participants to improve their decision-making strategies (q). Integrating case studies and role plays provides the opportunity to further increase participants' engagement (r). Collaborative learning through team-based activities helps participants navigate complex business challenges collectively (s).

Debriefings (Bell & Loon 2015, Huebscher & Lendner 2010) and real-world transfer through assignments (Ugrin et al. 2021) foster cognitive learning outcomes. A guided debriefing process is crucial in reinforcing cognitive learning outcomes. It allows participants to analyze their DBSG results (t), reflect on decisions, and learn from mistakes (Léger et al. 2011, Tiwari et al. 2014). Combining theoretical with DBSG experience and real-world examples increases the applicability of what has been learned (u). Encouraging real-world transfer through follow-up discussions and assignments helps reinforce learning retention (v). Moreover, providing DBSG content-related resources such as supplementary reading materials or, if possible, the opportunity to rerun the DBSG in a self-directed way also increases the long-term learning effect (w). Table 4 overviews training outcomes, their implications for DBSG training implementation, and the derived design guidelines.

Table 4. Design guidelines for DBSG training implementation

DBSG training outcomes	Implications for DBSG training implementation	Design guidelines
Attitudinal reactions to DBSG training	Positive attitudinal reactions require experienced instructors, apparent pre-training preparation for participants, and structured mechanisms for ongoing learning process reflection.	(k) Train instructors before DBSG training facilitation using the DBSG method. (l) Facilitate pre-training briefing sessions or provide at least pre-training materials explaining learning objectives and DBSG content. (m) Integrate trial rounds to familiarize participants with the DBSG. (n) Integrate in-training learning status check to reflect on skill development.
Motivational outcomes	Autonomy in decision-making, collaborative learning, and recognition of achievements will increase participants' motivation.	(o) Enable self-determined learning by providing autonomy in the decision-making process. (p) Recognize achievements in debriefing, coaching sessions, and through certificates
Behavioral outcomes	Coaching for reflective decision-making, a mixed learning method approach, and teamwork enhance behavioral outcomes.	(q) Conduct coaching sessions to reflect on decision-making processes. (r) Integrate case studies and role plays as in-training experience. (s) Encourage collaborative learning through teamwork.
Cognitive learning outcomes	Guided debriefings, theory-practice integration, and real-world transfer strategies like assignments enhance cognitive learning outcomes.	(t) Facilitate guided debriefings on DBSG results. (u) Combine theoretical input with DBSG experience and real-world examples to bridge practice and theory in debriefings. (v) Encourage real-world transfer through assignments. (w) Provide DBSG post-training resources for continued learning.

6 Discussion

6.1 Variability in DBSG Training Effectiveness

After presenting a structured framework that systematically links design guidelines to DBSG training outcomes in the previous chapter, we want to discuss the variability in DBSG training effectiveness to evaluate the generalizability of the developed design guidelines. A key question is whether DBSGs offer advantages over traditional training methods across different learning contexts. For instance, Farrell (2020) finds that DBSG training does not lead to significantly greater improvements in critical thinking than traditional instructional methods. In contrast, Samaras et al. (2022) conclude that DBSG training significantly improves critical thinking skills compared to case-based training approaches. These mixed results suggest that the effect on cognitive learning outcomes is not universal but depends on the participant characteristics, such as pre-existing knowledge (Rogmans & Abaza 2019, Scheuring & Thompson 2025) or cultural background (Brown et al. 2020, Levant et al. 2016). Kolb's (1984) experiential learning theory provides a strong foundation for understanding cognitive learning processes through the iterative application of knowledge in DBSG training. The variability in cognitive learning outcomes may result from a misfit between DBSG design features (e.g., content complexity) and individual factors such as participants' prior knowledge or cognitive readiness. A DBSG designed for experienced professionals may overwhelm less advanced participants, whereas a simplified DBSG might not provide sufficient challenge or relevance for more experienced participants.

DBSG training effectiveness also depends on how well the design and implementation of the training address motivational needs. DBSG training participation can enhance intrinsic motivation (Buil et al. 2019, Tiwari et al. 2014), engagement (Adib 2024, Buil et al. 2019), and enjoyment (Bell & Loon 2015). To better explain the motivational effects of DBSG training, we draw on self-determination theory (Ryan & Deci 2000), which posits that satisfying participants' needs for autonomy, competence, and relatedness promotes intrinsic motivation. For example, whether relatedness is satisfied within the same training setting can substantially influence the mechanisms that shape learning attitudes (Kwak et al. 2019), thereby contributing to variability in training outcomes. Accordingly, developers and instructors should adapt the design guidelines to the specific context, target group characteristics, and learning objectives to fully leverage their intended impact on DBSG training outcomes.

6.2 Contributions and Limitations

This study contributes to theory and practice by synthesizing empirical findings on DBSG training effectiveness and deriving evidence-based DBSG design guidelines. Theoretically, we extend existing knowledge on DBSG effectiveness by investigating the multi-dimensional effects of DBSG training. We identified four distinct DBSG training outcomes: attitudinal reactions to training, motivational, behavioral, and cognitive learning outcomes. Additionally, we found that the other outcomes reinforce cognitive learning outcomes, underscoring the importance of conceptualizing cognitive

learning as a process supported by underlying psychological and behavioral mechanisms. Therefore, our study highlights the complementary value of experiential learning theory (Kolb 1984) and self-determination theory (Ryan & Deci 2000) in explaining DBSG training effectiveness. Based on this integrated theoretical lens, we developed a structured framework that systematically links design guidelines for DBSG development and training implementation to measurable training effects.

Practitioners can achieve multiple outcomes by integrating DBSGs into their training programs. This insight can enable educators, corporate trainers, and HR developers to use DBSG to increase participants' motivational and cognitive learning outcomes. In addition, we provide design guidelines to help developers and instructors align DBSG design and training implementation with the intended learning outcomes in educational and corporate contexts.

We derived our findings from an SLR, acknowledging that our selection process imposes inherent limitations. By conducting a forward and backward search, we could have further expanded the scope of the sample. Moreover, we only focused on studies with empirical research and excluded grey literature from practitioners. In a practical field such as DBSG design and training implementation, reports and papers from grey literature may provide valuable additions. Most studies in our sample rely on self-reported training outcomes, subject to biases in participants' self-perception. Such subjectivity may lead to over- or underestimation of the training effects and thereby limit the generalizability of our findings.

7 Conclusion and Future Research

Digitalization is reshaping the world of work, increasing the need to manage complexity in dynamic environments. Addressing this challenge requires training methods such as DBSGs that enhance experiential learning and high motivation. This study synthesized empirical evidence on DBSG training effectiveness by conducting an SLR and derived evidence-based design guidelines to support DBSG development and training implementation. We analyzed 64 empirical studies and identified four distinct training outcomes: attitudinal reactions to training, motivational, behavioral, and cognitive learning outcomes. Based on these findings, we developed a design guideline framework that links specific DBSG design features to measurable training outcomes. Our results also highlighted considerable variability in DBSG training effectiveness. Therefore, developers and instructors should tailor the application of our design guidelines to specific target groups and learning goals.

Future research should empirically validate the proposed design guidelines by isolating the effects of specific design features on DBSG training outcomes through experiments or quasi-experimental research designs. In addition, future studies should apply qualitative research methods, such as expert interviews and focus groups, to evaluate the practical relevance, applicability, and completeness of the proposed guidelines. Finally, future work should explore how participant characteristics, such as pre-existing knowledge or cultural background, moderate the effectiveness of different DBSG designs and their training implementation.

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