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Theories, Principles, and Game Elements that Support Digital Game-Based Language Learning (DGBLL): A Systematic Review

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Abstract. The potential of Digital Game-Based Language Learning (DGBLL) in enhancing language learning outcomes has been demonstrated in previous studies. However, some scholars and educators maintain a skeptical perspective regarding its integration into language classrooms. Thus, this paper presents a systematic review examining the integration of DGBLL and its impact on language learning outcomes. This study examines 18 peer-reviewed articles published between 2014 and 2023 from Scopus, Web of Science (WoS), and ERIC research databases. The review explores relevant theories, principles, and game elements supporting DGBLL. It also investigates the types of digital games developed by both researchers and game developers that have already been studied, the most popular of which is serious games (83%). While the examined studies did not explicitly focus on digital game elements, they acknowledged the pivotal role of certain aspects, such as narrative, goals, rewards, and feedback, in enhancing language learning experiences. Notably, this paper affirms the positive impact of digital games on contextualized vocabulary acquisition, oral communication skills, and grammar learning, compared to conventional language teaching methods. These findings underscore the benefits of DGBLL in language education. Hence, this systematic review looks to reveal the multifaceted dimensions of DGBLL, emphasizing the theories, principles, and game elements of digital games that support the transformative potential of DGBLL for language instruction. Lastly, this paper advocates for an ongoing inquiry into the diversity of game genres and the continual refinement of frameworks to meet the evolving needs of language learners.

Keywords: digital game-based language learning; digital game-based language learning theories; digital game-based language learning principles; game elements; digital games

1. Introduction

In the ever-evolving landscape of education, the integration of technology has become pivotal in enhancing the effectiveness of language learning methodologies. One such innovative approach is Digital Game-Based Language Learning (DGBLL). Gaining prominence, it capitalizes on the inherent engagement and interactive potential of digital games to foster language learning (Li, 2023; Li et al., 2022; Kirkwood, 2023). Thus, this study explores the rationale for incorporating digital games into language learning contexts by investigating relevant theories, principles, digital game elements, and sample games from pertinent studies. It also compares DGBLL to conventional methods.

Digital games, with their immersive environments and interactive narratives, offer a dynamic and captivating platform for language learners (Pultbek, 2023; Tang & Taguchi, 2020). They provide an authentic and contextualized language experience, enabling learners to practice and apply language skills in real-life situations (Rasti-Behbahani, 2021). The incorporation of multimedia elements in digital games, such as visuals, audio, and interactivity, aligns with contemporary language learning theories that emphasize the importance of multimodal experiences for enhanced comprehension and retention (Lazou & Tsinakos, 2023; Vu et al., 2022).

Moreover, the gamified nature of digital games for language learning taps into the intrinsic motivation of learners, fostering a positive attitude towards the language acquisition process (Hong et al., 2022; Kapp, 2012). Principles from motivational theories, such as Self-Determination Theory, posit that autonomy, competence, and relatedness significantly contribute to sustained engagement and achievement in learning contexts (Martin et al., 2018; Ryan & Rigby, 2019). By allowing learners to navigate through challenges at their own pace, providing immediate feedback, and promoting a sense of accomplishment, digital games align with these motivational principles, thereby enhancing the overall language learning experience. However, while these are positive features, the use of digital games learning is not only limited to these principles.

To illustrate this contextualization, consider the features embedded in language learning apps like Duolingo, Mondly, FluencyU, etc. These applications incorporate gamified elements, such as feedback, achievement, and interactivity, making language learning an enjoyable and motivating experience. Learners can engage with the content through game-like scenarios, reinforcing vocabulary, grammar, and conversational skills in a playful yet effective manner (Cornillie et al., 2012; Wen, 2023). Moreover, the integration of other types of games such as Massively Multiplayer Online Role-Playing Games (MMORPGs) in language learning extends the benefits of digital games by fostering a collaborative and communicative language learning experience. In such games, learners engage in interactive social environments in which communication is facilitated with other players in the target language, creating authentic and context-rich language learning experiences (Gibbons, 2007; Song et al., 2023).

In sum, the effectiveness of digital games when learning a language is rooted in the game's ability to create immersive, interactive, and motivating environments

that align with core language learning theories and principles. Through the incorporation of gamified elements, digital games not only enhance cognitive engagement but also cater to diverse learning styles, promoting a more diverse and effective language learning experience. With this backdrop, this inquiry presents studies that support the integration of DGBLL. In doing so, the paper is centered on the following questions:

1. What are the relevant theories, principles, and game elements that support the rationale of DGBLL?
2. What are the digital games that demonstrate the potentials of DGBLL in language instruction?
3. To what extent can DGBLL be compared to conventional methods in language learning, based on relevant studies?

2. Literature Review

2.1 Relevant Studies in DGBLL

Several studies reveal the potential of digital games for language learning. These have gained significant research interest, encompassing both serious games specifically designed for educational purposes and commercial games like MMORPGs (Butler, 2018; Hung et al., 2018; Jabbari & Eslami, 2019; Peterson & Jabbari, 2022; Young et al., 2012).

Both types of games present benefits alongside distinct advantages and challenges. Serious games, beyond entertainment, illuminate promise for targeted instruction and environment (Chung, 2015; Dignan, 2011; National Research Council, 2011; Neck & Greene, 2011). However, this type of game presents a challenge in terms of engagement (Den Haan & Van Der Voort, 2018). Despite this, Ravysse et al. (2017) believe that collaborative learning is an effective approach for successful serious games. They also contend that it is not unexpected for player-to-player interaction to have emerged as a prominent reason behind the success serious games. Arnab et al. (2015) revealed that one significant challenge of serious games is converting interest and potential into practice. Thus, serious games must exhibit the effective application of learning, while maintaining an enjoyable and captivating experience. Further, the instructional emphasis of serious games can at times impact the games' overall potential (Susi et al., 2007) in comparison to commercially developed games. This can result in decreased mastery and diminished learning outcomes (Booker & Mitchell, 2021).

Notably, serious games directly incorporate language learning objectives, tailored content, and mechanics for specific language skills development. In language learning, one common objective of serious games is vocabulary acquisition and development. Several studies highlight the significance of vocabulary and grammar acquisition in serious games, emphasizing their effectiveness in targeted skill development (Connolly et al., 2012; McGregor et al., 2019; Rodríguez-Cerezo et al., 2014; Zou et al., 2021). Furthermore, serious games offer a unique advantage in language learning by providing learners with purposeful and context-driven language experiences. For instance, a study by Westera et al. (2019) demonstrated that serious games designed for specific language domains (Ishaq, 2022), such as business communication or medical terminology, significantly enhance learners'

proficiency in domain-specific language skills (Backlund & Hendrix, 2013; Popescu et al., 2013).

Another distinction of digital games, perhaps in DGBLL, is the existence of commercial-off-the-shelf (COTS) games such as MMORPG (Van Eck, 2009) which are not intentionally developed for language learning and teaching (Cornillie et al., 2012). Several DGBLL scholars demonstrate that COTS games can provide authentic language exposure and facilitate high levels of motivation and engagement (Acquah & Katz, 2020; Govender, 2021; Hung et al., 2018; Scholz, 2016; Zacharski, 2003). Additionally, the games can also present an uncontrolled environment (Buday et al., 2012; Smith et al., 2013). Authentic language exposure is a critical way to utilize Massively Multiplayer Online Role-Playing Games (MMORPGs) for language learning as it provides players with immersive encounters with natural and contextually relevant language in real-world scenarios, thereby surpassing the limitations of controlled environments (Bytheway, 2011; Li, 2019; Palmer, 2010). Empirical evidence from studies conducted by Zhang et al. (2017) and Kongmee et al. (2011) indicate the efficacy of MMORPGs in enhancing vocabulary and comprehension skills through interactive engagements with fellow players. Moreover, the appeal of engaging narratives, social interactions, and diverse gameplay mechanics contributes to increased motivation and immersion to further promote sustained language learning efforts. Research conducted by Jabbari and Eslami (2019) further substantiates this claim, emphasizing the positive impact of MMORPGs on L2 motivation and self-efficacy in language learning. However, the uncontrolled nature of commercial games introduces challenges, as noted by Chen and Hsu (2020), including potential distractions from specific language learning goals and the exposure to inappropriate language. Addressing these challenges, this study emphasizes the necessity for guidance, considering several theories and principles in DGBLL to optimize language learning gains within the context of both serious and regular gaming environments.

2.2 Theories and Principles in DGBLL

Karl Kapp's (2012) book "The Gamification of Learning and Instruction" explores several theories and principles that support learning and instruction through gamification. On the one hand, intrinsic motivation emerges as a foundational concept, emphasizing the innate desire for engagement and fulfillment during the learning process. This aligns with Ryan and Deci's (2017) Self-Determination Theory, which underscores autonomy, competence, and relatedness as crucial factors contributing to sustained intrinsic motivation. Kapp further delved into Malone & Lepper's (1987) Instructional Design Principles for intrinsic motivation, emphasizing the significance of control, challenge, curiosity, and contextualization in fostering a learner's inherent drive. These principles find support in various studies, such as that by Malone and Lepper (1987), which affirms the positive impact of well-designed challenges and autonomy on motivation.

On the other hand, extrinsic motivation, highlights the role of external rewards and recognition as motivators for learners (Kapp, 2012). This idea is corroborated

by a number of studies, such as that by Alexiou and Schippers (2018) emphasizing the importance of a well-designed reward structure. In another study, Kapp (2012) defined several models and theories supporting instructional design. The first is the ARCS Model (Attention, Relevance, Confidence, Satisfaction). This model underscores the importance of capturing attention, establishing relevance, building confidence through clear expectations, and ensuring satisfaction by applying knowledge in practical settings, all while tapping into intrinsic motivation and maintaining consistent standards for sustained learner engagement. Additionally, the Taxonomy of Intrinsic Motivation further distinguishes internal motivation, shedding light on the complexity of factors influencing learners' internal drive.

Several established theories also underpin the foundational aspect of gamification and digital games for learning and instruction. For instance, classical and operant conditioning theories from BF Skinner and Ivan Pavlov underscore the role of reinforcement in shaping behavior. Furthermore, Kapp's exploration extends to the psychological aspects of learning, incorporating theories such as Distributed Practice, Scaffolding, and Episodic Memory. The concept of Distributed Practice, supported by research such as that by Cepeda et al. (2006), emphasizes the need for spaced intervals and rehearsal in the learning process. Scaffolding, grounded in Vygotsky's Zone of Proximal Development, underscores the importance of providing appropriate support to learners at different learning stages to facilitate a personalized and progressive learning environment. Episodic Memory, drawing from cognitive psychology, relates to the recollection of information based on contextual cues, as evidenced by studies on memory and environmental cues (Godden & Baddeley, 1975). Furthermore, the Social Learning Theory, based on Bandura's work, emphasizes the role of observation and imitation in the learning process. Finally, the Flow Theory, as elaborated by Kapp, highlights learners' cognitive involvement and engagement when immersed in a challenging yet achievable task that incorporates components like clear goals, feedback, and a loss of self-awareness. Csikszentmihalyi's (1990) work on flow provides additional support for the positive impact of these elements on engagement and intrinsic motivation. Ultimately, the theories and principles discussed encapsulate the diverse psychological, motivational, and design processes that contribute to effective learning and instruction through gamification and digital games.

2.3 Game Elements

While traditional educational methods often rely on didactic approaches, digital games offer a unique paradigm for learning by encompassing various elements that significantly contribute to enhanced cognitive engagement and improved learning outcomes. Kapp (2012) distinguished several game elements that contribute to a better engagement and immersive learning experience. He emphasized that one or two game elements alone cannot produce a better learning outcome. First, *abstractions of concepts and reality* within digital games create dynamic and interactive environments, allowing learners to explore and internalize complex ideas in a contextualized manner. Additionally, games often have explicit *goals* that guide player actions, providing a sense of purpose and direction. Rueda et al. (2016) also emphasized the importance of well-defined goals in games, arguing that they contribute to focused cognitive engagement and

learning. Moreover, *rules*, a fundamental element of games, not only structure gameplay but also introduce a set of constraints that necessitate strategic thinking and problem-solving skills (Van Eck & Hung, 2010).

Another key digital game element is the incorporation of *conflict, competition, or cooperation* to foster social interactions and collaborative learning experiences. Although Kapp (2012) posited that these elements can be separated, he also contended that a good game design should incorporate these three. Another element discussed in his book is *time*. This adds a sense of urgency and challenges learners to make quick decisions, enhancing cognitive flexibility and adaptability (Bavelier & Green, 2003; Kapp, 2012).

Additionally, the *reward structure* in games, distinct from the educational setting (e.g. badges, points), serves as a powerful motivator. The concept of extrinsic motivation, as discussed by Alexiou & Schippers (2018), suggests that well-designed reward systems can increase engagement and persistence in learning tasks. Just like in the educational setting, *feedback mechanisms* are necessary in games. However, in digital games, this element is often tied to the actions of players, providing continuous assessment and opportunities for improvement (Kapp, 2012). Furthermore, the incorporation of *levels* or stages in games shapes learning progression, ensuring a gradual increase in difficulty and complexity. Kapp also discussed how another crucial element, *storytelling or narrative*, is not present in all games. He emphasized that it is both important for learning and intertwines with another element: the *curve of interest*. The connection between these elements can increase or lose the interest of players (Padilla-Zea et al., 2014). This element suggests that maintaining an optimal level of challenge in games can lead to a state of flow, where learners are fully immersed and intrinsically motivated. Moreover, players are sometimes captivated by appealing graphics. Hence, another element is *aesthetics*, which encompasses the design and visual elements of games and contributes to each game's overall engagement and appeal (Kapp, 2012). Lastly, the concept of *replay or do-over* in games allows learners to revisit challenges, reinforcing learning and promoting mastery through failure (Gee, 2003; Kapp, 2012).

Consequently, these game elements offer a paradigm shift from conventional educational methods by providing an immersive and experiential learning environment (De Freitas & Liarokapis, 2011). Unlike traditional approaches, which often rely on passive content delivery, digital games present dynamic and interactive scenarios that allow learners to explore, apply knowledge, and make decisions in real-time (Caballé et al., 2010; Whitton, 2014). The explicit goals in games foster focused cognitive engagement, providing a clear sense of purpose compared to the sometimes abstract nature of content in traditional settings. Moreover, the rules in games promote critical thinking and problem-solving skills, attributes that may be underemphasized in conventional approaches (Brown, 2018).

Notably, the motivational elements embedded in digital games, such as reward structures and intrinsic motivation derived from well-structured challenges and

storytelling, contrast with the often limited engagement in conventional methods (Costello, 2020; Kapp, 2012). As traditional approaches operate in controlled environments, they may lack the dynamic and authentic nature of game-based learning (Bytheway, 2011; Li, 2019). This control, however, may hinder the exposure of learners to the complexities and uncertainties of real-world situations, a key aspect of the transformative potential offered by digital games (Greipl et al., 2020). Hence, the multifaceted elements of digital games collectively contribute to a transformative learning experience that supplements the limitations of conventional methods.

3. Methodology

This study employed a quality systematic review approach to address the research questions, which focused on the theories, principles, game elements, and digital games that support the integration of DGBLL for improved learning outcomes (Alexander, 2020; Newman & Gough, 2019). This approach looks to offer a comprehensive and structured analysis of existing literature to provide a solid foundation for future research and practice in the field of digital game-based language learning (Newman & Gough, 2019).

3.1 Inclusion and exclusion criteria

Table 1 presented the inclusion and exclusion criteria set for this study. These criteria were instrumental in filtering related studies and refining the results to facilitate a more through discussion aligned with the theme of the paper.

Table 1. Inclusion and Exclusion Criteria

Inclusion	Exclusion
Presence of at least one from: game elements, theories and/or principles, digital game	Absence of both game elements, theories and/or principles, digital game
Compares DGBLL and conventional teaching methods (empirical studies)	No comparison between DGBLL and conventional methods of teaching
Peer reviewed	Not-peer reviewed
Full paper must be available in the database or accessible via the researcher institution's online library.	Only contain title and abstract
Published articles from 2014 to 2023	Other papers (e.g., books, proceedings, news articles, etc.) than published articles

On the one hand, inclusion criteria should encompass at least one category from game elements, theories, principles, or digital games, particularly for those studies which compare DGBLL with conventional instruction (empirical studies). Additionally, the published articles should be peer-reviewed with full papers accessible through databases or, if this is not available, through the researcher institution's online library system. On the other hand, excluded articles included those which were not published articles and lacked discussion on game elements, theories and principles, digital games. Moreover, they did not include distinct

comparisons between DGBLL and conventional methods, were not peer-reviewed, and only provided titles and abstracts. The timeframe for inclusion spans from 2014 to 2023.

3.2 Research databases

The research databases employed in this study were Scopus, WoS, and ERIC. Scopus was selected to ensure a comprehensive review of articles. Web of Science was utilized to gauge the scholarly influence and relevance of the identified articles. ERIC was chosen to specifically target articles in the field of language learning. The combination of these databases enabled a thorough inquiry of DGBLL literature, ensuring a diverse and well-rounded selection of peer-reviewed, full-text articles from reputable sources.

An initial article searching phase strategy was employed across three prominent databases using the keywords “Digital Game-Based Language Learning” or “DGBLL.” The pre-reading results revealed a substantial pool of potential articles, with 42 from Scopus, 15 from Web of Science, and 10 from ERIC, spanning the years 2014 to 2023. Following a thorough examination of these articles against the inclusion and exclusion criteria, the final selection was refined to 14 articles from Scopus and 4 articles from ERIC, excluding papers from WoS due to redundancy of results. This iterative process ensured a focused and pertinent collection of peer-reviewed, full-text articles aligned with the research objectives.

4. Results and Discussion

4.1 Relevant Studies

Figure 1 illustrated the distribution of relevant studies retrieved from research databases. Notably, 14 studies (78%) were identified from Scopus, while 4 studies (22%) were sourced from ERIC. Although WoS was also utilized, the same studies appeared in the Scopus search results. Therefore, the final list solely considered the searched papers on the Scopus and ERIC databases to avoid redundancy of the results.

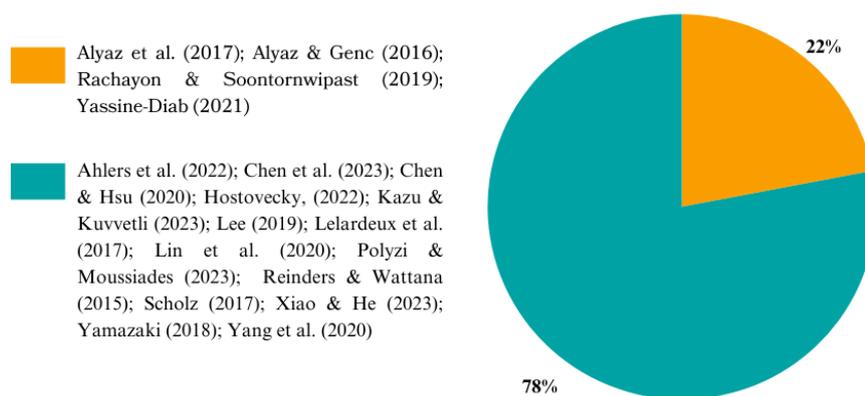


Figure 1: Relevant Studies from the Research Databases

Specifically, the studies from ERIC include the following: Alyaz et al. (2017), Alyaz & Genc (2016), Rachayon & Soontornwipast (2019), and Yassine-Diab (2021). On the other hand, the studies from Scopus come from Ahlers et al. (2022),

Chen et al. (2023), Chen & Hsu (2020), Hostovecky (2022), Kazu & Kuvvtli (2023), Lee (2019), Lin et al. (2020), Polyzi & Moussiades (2023), Lelardeux et al. (2017), Reinders & Wattana (2015), Scholz (2017), Xiao & He (2023), Yamazaki (2018), and Yang et al. (2020).

4.2 Theories, Principles and Approaches in DGBLL

Table 2 presents the distinct theories, principles, and approaches derived from the 18 relevant studies considered for the review. It should be noted that while the inclusion criterion for the years 2014 to 2023 applies specifically to published articles, the theories, principles, and approaches presented in Table 2 are not limited by this timeframe. This method was also conducted as some of the studies have incorporated several approaches to language teaching in the game design or development process and instruction.

Table 2: Theories, Principles, and Approaches from the Relevant Studies

Theories, Principles, and Approaches	Description
Piaget's Theory of cognitive development	This theory underscores the inherent strength within a child's mind. According to this theory, knowledge is incrementally constructed and integrated with existing understanding, enhancing the child's mental framework until it reaches the desired highest level (Fenrich, 2016; Polyzi & Moussiades, 2023).
Piaget's constructivism theory	Constructivism theory posits that learners independently construct knowledge, guided by instructors. Students, guided by their interests, receive motivation and feedback from teachers. Appropriate educational tools should facilitate self-paced practice, fostering mastery through interactive and enjoyable processes (Karoulis et al., 2008; Fenrich, 2016; Polyzi & Moussiades, 2023).
Vygotsky's sociocultural theory	Sociocultural theory suggests that human knowledge evolves through collaborative social interaction, leading to internalization and mastery. In language acquisition, meaning construction happens within linguistic interactions, which is particularly evident in computer-based education through user interactions. Game-based communication enhances students' self-esteem, fostering a positive attitude toward foreign languages and improving language acquisition (Ang & Zaphiris, 2008; Che Mustafa et al., 2018; Fahim & Haghani, 2012; Polyzi & Moussiades, 2023; Poonpon et al., 2021).
Willingness to communicate (WTC)	DGBLL positively impacts learners' willingness to communicate in a second language by reducing communication apprehension, boosting confidence, and creating an engaging environment that encourages active language use (Reinders & Wattana, 2015).
Task-based instruction using a digital game in a flipped learning environment (TGF)	The integration of task-based language teaching (TBLT), digital game-based language learning, and flipped learning (TGF) suggests that language learning tasks are central. Students engage with instructional

	content outside the traditional classroom through flipped learning methods. Digital games are incorporated to enhance language acquisition, making the learning process interactive and engaging (Rachayon & Soontornwipast, 2019).
Halliday's (1975) functions of language (instrumental, regulatory, interactional, personal, heuristic, imaginative, and representational)	According to Lin et al. (2020), in the context of language learning, instrumental, regulatory, heuristic, and representational language functions, among others, suggest that learners use language not only for expressive purposes but also to navigate information, gain knowledge, and convey factual information, highlighting the potential alignment of Halliday's model with various aspects of language learning facilitated by Technology-enhanced Language Learning (TELL), specifically contextualized game-based learning.
Computer-assisted learning of communication (CALC)	According to Yamazaki (2018), CALC emphasizes the experiential acquisition of communicative skills by immersing participants in realistic virtual world scenarios. Unlike traditional language instruction, CALC does not involve explicit grammar lessons or isolated vocabulary drills; instead, it promotes task-based learning through context-specific activities, such as navigating transportation or social interactions and fostering communication skills within the virtual environment.
Cognitive complexity-based competition strategy (CCBCS)	CCBCS involves adapting digital games to learners' cognitive complexity, aiming to enhance language learning by addressing individual differences and minimizing cognitive overload (Yang et al., 2020). Studies utilizing this focus on comparing its effectiveness to conventional methods in learning performance, motivation, and anxiety reduction.
Octalysis Gaming Framework (OGF)	According to Chen et al. (2023), this model, rooted in gamification, asserts that different games tap into specific core drives within individuals, thus influencing their decisions and activities. The Octalysis framework provides a lens through which to analyze and understand the motivational aspects of gamified experiences.
Digital game-based vocabulary learning (DGBVL)	Polyzi and Moussiades (2023) utilized the concept of DGBVL, which Rasti (2021) characterizes as an educational instrument fostering elevated motivation through visual elements, enjoyable experiences, challenges, and imaginative aspects. Computer games, according to Rasti, boost students' self-assurance and inquisitiveness, encouraging their readiness to acquire new vocabulary.
Language for Specific Purposes (LSP)	Language for Specific Purposes (LSP) involves the use of DGBLL to support technical language learning. While ESP typically provides broad training for teachers, experts in specific fields, such as the Train Your Technical English for Mechanical Engineering

	(TOTEM) project (Lelardeux et al., 2017), develop technical tools to enhance LSP learning. This highlights the role of DGBLL in facilitating targeted language acquisition tailored to specific professional or disciplinary contexts.
Second language development (SLD)	Scholz (2017) posits that SLD in DGBLL shifts the emphasis from mere acquisition to a broader perspective that considers the ongoing development and practical use of language, especially in extramural settings. This approach acknowledges the significance of language use in real-world scenarios that, while challenging to observe, are highly meaningful for learners as they navigate and apply their language skills in authentic contexts beyond formal learning environments.
Complex adaptive system (CAS)	According to Scholz (2017) CAS views of language incorporates both cognitive and social aspects, enabling comprehensive analyses considering numerous factors for a holistic understanding of change and Second Language Development (SLD).
Social Virtual Reality (SVR)	SVR addresses issues by allowing location-independent, time-flexible language learning and easy access to a global user pool. In the case of Hololingo!, it offers collaborative tandem tasks for Digital Game-Based Language Learning (DGBLL) within an immersive SVR adventure, facilitating communicative and collaborative practice in a 3D environment (Ahlers et al., 2022).

Several theories mentioned in the articles have further established DGBLL. First, according to Polyzi and Moussiades (2023), educational theories such as Piaget's cognitive and constructivism and Vygotsky's sociocultural theory can reinforce the views of DGBLL. On the one hand, the view that the inherent strength of a child's mind gradually builds and integrates knowledge aligns with DGBLL by emphasizing the incremental nature of construction of understanding, which is conducive to the iterative nature of digital game-based learning (Fenrich, 2016). Additionally, constructivism theory, which advocates for learners' independent construction of knowledge and self-paced practice, supports DGBLL's learner-centric approach, emphasizing interactive and enjoyable processes for mastery (Karoulis et al., 2008; Fenrich, 2016). Both perspectives reinforce DGBLL's effectiveness in fostering gradual and self-driven knowledge acquisition. On the other hand, sociocultural theory posits that human knowledge develops through collaborative social interaction, a concept that aligns with DGBLL's emphasis on collaborative game-based communication and fosters a positive attitude toward foreign languages and enhancing language acquisition (Ang & Zaphiris, 2008; Che Mustafa et al., 2018; Fahim & Haghani, 2012; Poonpon et al., 2021). This perspective highlights the role of DGBLL in leveraging social interactions for effective language learning. Consequently, Reiders and Wattana (2015) emphasized that learners' willingness to communicate (WTC) can be positively influence by DGBLL as it addresses communication apprehension, enhances confidence, and fosters an engaging environment that promotes active language

use.

Furthermore, the majority of the studies discussed several principles and approaches that support DGBLL. Incorporating specific principles and approaches to game design or development and instruction propelled the use of various games (serious games and COTS), as discussed in the articles. Rachayon and Soontornwipast (2019) utilized *Cool Nurse*, a game they developed for a flipped learning environment. They coined such an approach as TGF being drawn from the principles of TBLT, positioning language tasks as central for engaging learning experiences. Further, Lin et al. (2020) stressed that Halliday's functions of language align with TELL in that they emphasize diverse language functions through contextualized game-based learning. Yamazaki (2018) also employed an instructional approach he called CALC, which experientially acquires communicative skills through virtual scenarios, distinguishing itself from traditional methods. Moreover, Yang et al. (2020) postulated that CCBCS adapts games to learners' cognitive complexity levels, aiming for enhanced language learning and comparative effectiveness with conventional methods. Notably, Chen et al. (2023) affirmed that the OGF model influences decisions and activities in gamified experiences. In addition, Polyzi and Moussiades (2023) used the term DGBVL to specifically utilize visual elements and enjoyable experiences and boost self-confidence and curiosity among learners (Rasti, 2021). Addressing the issues of ESP, Lelardeux et al. (2017) posited that LSP tailors DGBLL for technical language learning in specific professional contexts. Scholz (2017) noted that SLD shifts emphasis from acquisition to ongoing practical language use, especially in extramural settings. Additionally, to provide a holistic understanding of language change and development, Scholz (2017) clarified CAS through its incorporation of the cognitive and social aspects of language. Lastly, Ahlers et al. (2022) described how SVR enables flexible language learning by incorporating collaborative tandem tasks for DGBLL within an immersive SVR adventure and enhancing communicative practice in a 3D environment.

Other articles hinged on the previously discussed theories and principles such as motivation (Chen et al., 2020; Lee, 2019; Xiao & He, 2023; Yang et al., 2020; Yassine-Diab et al., 2021), which only ingrains the innate importance of DGBLL's ability to harness the motivational impact of digital games among learners. The studies underscored the significance of motivation in the context of DGBLL, highlighting how the dynamic and interactive nature of digital games captivates learners' creativity, interest, and enthusiasm. Furthermore, Lee (2019) and Yassine-Diab et al. (2021) provided insights into how the narrative elements of digital games contribute to sustaining intrinsic motivation by illustrating a game cycle of creativity, curiosity, exploration, and engagement. Collectively, these studies affirmed that DGBLL, with its inherent capacity to align with motivational theories and principles, stands as a potent and versatile tool for language learning that not only captures learners' attention but also keeps them intrinsically motivated.

4.3 Game Elements

The examined studies not directly cover digital game elements as their primary

theme. Nevertheless, they recognized the crucial function of game elements in promoting effective language learning experiences. For example, Rachayon and Soontornwipast (2019) integrated narrative, goals, rewards, and feedback into a task-based instructional approach employing a digital game to enhance English verbal communication skills. This perspective resonates with Kapp's (2012) holistic view of digital games, emphasizing the importance of a narrative, goals, and rewards with which to engage and immerse learners. Yassine-Diab et al. (2021), referencing the work of Hung et al. (2018), emphasized the significance of game-based websites to establish a clear definition of learning games. They particularly stressed the function of these games in fostering positive learning environments. This reinforced the motivational elements discussed by Alexiou & Schippers (2018) regarding well-designed game systems. Hostovecky highlighted the importance of gaming graphics, challenges, and teaching in supporting vocabulary learning, echoing Kapp's (2012) stance on the importance of game aesthetics and engaged design in influencing the learning experience. In particular, Lee (2019) stressed that the narrative of a digital game is a pivotal agent for promoting intrinsic motivation among learners. Further, Chen and Hsu (2020) identified three essential components in the design of educational games: captivating game design, immersive language input, and compelling stories. Although the studies did not specifically investigate digital game elements, they together emphasized the importance of including captivating and immersive game elements to improve language learning outcomes.

4.4 Digital Games Utilized in Relevant Studies

The list of digital games presented in Table 3 were derived from the relevant studies considered for this research. The table also indicates how the majority of the scholars in the field of DGBLL have embraced serious games in recent years.

Table 3: Digital Games Utilized by the Relevant Studies

Games	Descriptions	Developer
Adventure German: The Mystery of the Nebra Sky Disc	German: A Learning Adventure - The Mystery of the Nebra Sky Disc is an educational video game designed to teach German as a second language, specifically targeting beginners at Level (Alyaz et al., 2017). The game is amusing and at the same time transmits and consolidates knowledge of the German language.	Goethe-Institut
Adventure German: A Mysterious Mission	A German adventure game designed for proficient learners at Level B1 and above (Alyaz & Genc, 2016). In a professional setting, the players solve a thrilling criminal investigation.	Goethe-Institut
Cool Nurse	An online PC role-playing game where players assume the role of a new nurse in an international hospital (Rachayon & Soontornwipas, 2019). During a two-month probation period, players complete twelve tasks, such as checking patient details and giving directions under the observation and evaluation of	Rachayon & Soontornwipas (2019).

	nurse supervisors. Successful task completion earns players three stars and collecting every star completes the probation stage and players receive a pay rise. Developed as an instructional tool for the TGF framework, students play the game during their free time to reinforce course-related vocabulary and improve their skills of identifying main ideas and details from listening texts.	
Check Your Smile (CYS)	CYS is a collaborative digital game-based language learning web platform designed to address the gap in technical English terminology acquisition among French electronics students (Yassine-Diab et al., 2021).	Yassine-Diab et al. (2021)
Playing History: Slave Trade	A serious game that delves into the historical context of the transatlantic slave trade (Chen & Hsu, 2020). It also offers players an interactive experience in which to explore and understand the challenges, decisions, and consequences associated with this historical period.	Serious Game Interactive
Looking for Prepositions with Me	A single player serious game. According to the Hostovecky (2022), it is a stand-alone interactive computer game-based application intended for primary school learners.	Hostovecky (2022)
Quizizz 2.0	Quizizz is an online platform for creating and playing quizzes, often used in education for interactive and gamified assessments (Kazu & Kuvvetli, 2023).	Quizizz Inc.
Her Story	<i>Her Story</i> is an interactive video game that unfolds a narrative through a series of live-action video clips (Lee, 2019). Players piece together a mystery by searching and watching videos in a complex and immersive storytelling experience.	Sam Barlow
Train Your Technical English for Mechanical Engineering (TOTEM)	TOTEM is developed to address the issues of ESP for language learning. It is suggested that through this tool, students learn technical terms which promote LSP (Lelardeux et al., 2017).	Lelardeux et al. (2017)
Ragnarok Online	Ragnarok Online is a popular MMORPG (Massively Multiplayer Online Role-Playing Game) known for its anime-inspired graphics and extensive virtual world (Reinder & Wattana, 2015). Players create characters, embark on quests, engage in battles, and explore a fantasy realm filled with monsters and other players. The game has a rich class and job system, providing diverse gameplay experiences for its global player base.	Gravity Co. Ltd.

World of Warcraft (WoW)	WoW is a MMORPG released in 2004. It has become one of the most iconic and successful MMORPGs globally. Players explore the high-fantasy world of Azeroth, completing quests, battling monsters, and interacting with other players. The game is known for its rich lore, diverse character classes, and extensive player-versus-environment (PvE) and player-versus-player (PvP) content (Scholz, 2017).	Blizzard Entertainment, Inc.
Digital Game-Virtual College	<i>Digital Game-Virtual College</i> is an educational game developed for Chinese teenagers using Unity 3D technology (Xiao & He, 2023). It focuses on college-level English courses, specifically College English-Reading and Writing and College English-Listening, Viewing, and Speaking. The game incorporates features like <i>Words Arena Contest</i> and <i>Words Talents</i> to create an engaging and interactive learning experience.	Xiao & He (2023)
Meet-Me (MM)	MM is a 3D virtual world. It provides representations of Tokyo, including authentic transportation systems, reflecting the true-to-life experiences of the players. (Yamazaki, 2018).	Yamazaki (2018)
Game-based situational vocabulary learning system (<i>no specific name</i>)	According to Yang et al. (2020), the Game-based Situational Vocabulary Learning System features three cognitive complexity levels, designed in accordance with Robinson's cognition hypothesis for task-based language learning and second language development (2001). Tasks are sequenced to progressively increase cognitive demands, aiding learners in language development.	Yang et al. (2020)
Hololingo	Hololingo is a Social Virtual Reality designed for the real-time immersive distance learning of German as a Foreign Language (GFL) (Ahlers et al., 2022).	Ahlers et al. (2022)
Japanese Language Learning System (JLLS)	JLLS is a learner-centered Japanese learning system based on Chou's Octalysis gamification framework and designed to enhance the effectiveness of corporate employees' language learning (Chen et al., 2023).	Chen et al. (2023)
Contextualized Game-based Learning System	This learning system is based on a grammar book, <i>Grammar in Context 3</i> , an English as a Foreign Language grammar course (Lin et al., 2020). The unit covers topics like noun clauses, articles, and exercises.	Lin et al. (2020)

Among all the games, 83% account for the use of serious games for language learning. These games include *Adventure German: The Mystery of the Nebra Sky Disc*, *Adventure German: A Mysterious Mission*, *Cool Nurse*, *Check Your Smile*, *Slave Trade*, *Looking for Prepositions with Me*, *Quizziz*, *TOTEM*, *Meet Me*, *Hololingo*, and others not directly named. An additional 50% comprise of researcher-developed serious games, among which are *Cool Nurse*, *Check Your Smile*, *Looking for Prepositions with*

Me, *TOTEM*, *Meet Me*, and others focused on contextualized language learning. The remaining 17% include *Ragnarok Online* and *World of Warcraft*, both of which are MMORPGs, and *Her Story*, an interactive film video game.

It can be inferred that DGBLL has seen a significant increase in the use and development of serious games to meet the diverse needs and backgrounds of language learners (Chen et al., 2023; Lin et al., 2022; Yamazaki, 2018; Ang et al., 2022). This development in DGBLL is consistent with the principles of contextualized game-based learning, which involves the strategic design of games to correspond with specific language objectives in real-life situations (Lin et al., 2020). The growing popularity of these contextualized games demonstrates the distinct environments in which language learning takes place.

4.5 DGBLL vs Conventional Methods

Including experimental studies for this review distinguishes the line between DGBLL and conventional methods of language teaching and learning. For example, Alyaz et al. (2017) and Chen and Hsu (2020) emphasized the complementary role of DGBLL in augmenting traditional language instruction, particularly in enhancing vocabulary and historical knowledge. Rachayon and Soontornwipast (2019) contributed to this discourse by showcasing the efficacy of a task-based instruction using the serious game *Cool Nurse* in improving English oral communication among Thai nursing students.

In contrast, Belda-Medina and Calvo-Ferrer (2022) and Govender and Arnedo-Moreno (2021) explored the attitudinal and design aspects of DGBLL without conducting experimental comparisons with conventional methods. While these studies provided valuable insights into user perspectives and game design elements, the absence of direct comparisons limits the ability to infer the effectiveness of DGBLL. Studies by Ahlers et al. (2022), Xiao and He (2023), and Lin et al. (2020) presented a more affirmative stance, elucidating positive impacts on vocabulary acquisition, oral communication skills, and grammar learning, respectively, through DGBLL interventions. These findings capitalized the potential pedagogical benefits of incorporating digital games into language learning contexts.

In addition, other studies which did not look at serious games highlighted positive outcomes. Lee (2019) explored how *Her Story* leads to enhanced motivation and creativity; moreover, Reinders and Wattana's (2015) use of *Ragnarok Online* revealed increased L2 production and WTC. Lastly, Scholz's (2017) study on *World of Warcraft* emphasized its potential as an immersive language-learning environment, although a direct comparison with conventional methods is not explicitly discussed. These studies collectively stressed increased motivation, creativity, and language production, while recognizing the importance of diverse learner preferences and contexts.

The studies reinforced the evolving nature of DGBLL research, emphasizing a continuous effort for improved frameworks, methodologies, and considerations of diverse learner needs. Hence, while there is a growing body of evidence supporting the efficacy of DGBLL in enhancing various language learning

domains, including vocabulary, oral communication, and grammar, the field remains dynamic, necessitating ongoing investigation, refinement, and consideration of the diverse backgrounds of learners.

5. Conclusion

This study affirms the marked impact of integrating digital games into language learning as foregrounded by the critical contributions of digital game elements, theories, principles, diverse instructional approaches, and sample digital games. The convergence of these dimensions not only fosters a more immersive and engaging learning experience but also enhances contextualized language learning.

Moreover, the review highlights a predominant focus on serious games in the identified studies, which were developed by majority of the researchers. While this focuses on the prevailing trend in the current literature, it is essential to acknowledge the potential of other game genres in language learning contexts. Particularly, the empirical studies included in the review have shed light on the effectiveness and unique advantages of DGBLL over traditional approaches. This has highlighted in more detail the supplementary nature of DGBLL to conventional teaching and learning methods. The prevalence of such comparative studies underpins the growing recognition of the transformative potential that digital games offer in language education. Diversifying the types of games explored in research and practice can offer a richer understanding of the ways in which digital games contribute to language learning, ensuring a more comprehensive and adaptable approach to language education.

However, the study reveals several limitations. Firstly, the inclusion and exclusion criteria may have restricted the scope of literature considered, which may potentially exclude relevant studies that do not precisely align with the set criteria. Secondly, the reliance on peer-reviewed articles accessible through specific databases may introduce selection bias, which could result in overlooked valuable insights from non-peer-reviewed sources or alternative databases. Thirdly, while the study identifies key theories, principles, approaches, and digital games that support DGBLL, there is limited discussion about specific game elements crucial for effective language learning experiences. Additionally, given that there is limited discussion of the articles investigated, the absence of direct comparisons between DGBLL and conventional teaching methods restricts further conclusions regarding other benefits of DGBLL.

Moreover, this paper suggests the expansion of the inclusion criteria to encompass a broader range of game genres, language learning contexts, and a more diverse selection of sources beyond peer-reviewed articles in specific databases. Future studies could further investigate the specific game elements that contribute to effective language learning experiences within digital games. Moreover, conducting experimental comparisons between DGBLL and conventional teaching methods across various language learning domains would strengthen the evidence base and provide clearer insights into the effectiveness of DGBLL.

Finally, this study posits several pedagogical implications to support the implementation of DGBLL as a tool that can enhance various language learning domains such as vocabulary, oral communication, and grammar. Language instructors should consider incorporating diverse game genres and leverage motivational elements inherent in digital games to cater to diverse learning styles and contexts. Furthermore, ongoing investigation and the refinement of frameworks and methodologies in DGBLL research are necessary to ensure the continued improvement and adaptation of teaching practices to meet the evolving needs of language learners.

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7. References

- Acquah, E. O., & Katz, H. T. (2020). Digital game-based L2 learning outcomes for primary through high-school students: A systematic literature review. *Computers & Education*, 143, 103667. <https://doi.org/10.1016/j.compedu.2019.103667>
- Ahlers, T., Bumann, C., Kölle, R., & Lazović, M. (2022). Foreign Language Tandem Learning in Social VR: Conception, Implementation and Evaluation of the Game-Based Application Hololingol!. *i-com*, 21(1), 203-215. <https://doi.org/10.1515/icom-2021-0039>
- Alexander, P. A. (2020). Methodological guidance paper: The art and science of quality systematic reviews. *Review of Educational Research*, 90(1), 6-23. <https://doi.org/10.3102/0034654319854352>
- Alexiou, A., & Schippers, M. C. (2018). Digital game elements, user experience and learning: A conceptual framework. *Education and Information Technologies*, 23, 2545-2567. <https://doi.org/10.1007/s10639-018-9730-6>
- Alyaz, Y., & Genc, Z. S. (2016). Digital game-based language learning in foreign language teacher education. *Turkish Online Journal of Distance Education*, 17(4). <https://doi.org/10.17718/tojde.44375>
- Alyaz, Y., Spaniel-Weise, D., & Gursoy, E. (2017). A study on using serious games in teaching German as a foreign language. *Journal of Education and Learning*, 6(3), 250-264. <https://doi.org/10.5539/jel.v6n3p250>
- Backlund, P., & Hendrix, M. (2013). Educational games-are they worth the effort? A literature survey of the effectiveness of serious games. In *2013 5th international conference on games and virtual worlds for serious applications (VS-GAMES)* (pp. 1-8). IEEE. <https://doi.org/10.1109/vs-games.2013.6624226>
- Bavelier, D., & Green, C. S. (2019). Enhancing attentional control: lessons from action video games. *Neuron*, 104(1), 147-163. <https://doi.org/10.1016/j.neuron.2019.09.031>
- Booker, K. L., & Mitchell, A. W. (2021). From boring to board game: The effect of serious game on key learning outcome. *Journal of Occupational Therapy Education*, 5(4). <https://doi.org/10.26681/jote.2021.050407>
- Brown, K. (2018). *Education, culture and critical thinking*. Routledge. <https://doi.org/10.4324/9780429458026>
- Buday, R., Baranowski, T., & Thompson, D. (2012). Fun and games and boredom. *Games for Health Journal*, 1(4), 257-261. <https://doi.org/10.1089/g4h.2012.0026>
- Butler, Y. G. (2018). Gaming and young learners. In *The Routledge handbook of teaching English to young learners*, 305-319. Routledge. <https://doi.org/10.4324/9781315623672-20>
- Bytheway, J. A. (2011). Vocabulary learning strategies in massively multiplayer online

- role-playing games. [Master's thesis, Victoria University of Wellington]. <https://doi.org/10.26686/wgtn.16985536>
- Cepeda, N. J., Pashler, H., Vul, E., Wixted, J. T., & Rohrer, D. (2006). Distributed practice in verbal recall tasks: A review and quantitative synthesis. *Psychological Bulletin*, 132(3), 354–380. <https://doi.org/10.1155/2010/935169>
- Chen, C. M., Ming-Chaun, L., & Kuo, C. P. (2023). A game-based learning system based on octalysis gamification framework to promote employees' Japanese learning. *Computers & Education*, 205, 104899. <https://doi.org/10.1016/j.compedu.2023.104899>
- Chen, H. J. H., & Hsu, H. L. (2020). The impact of a serious game on vocabulary and content learning. *Computer Assisted Language Learning*, 33(7), 811-832. <https://doi.org/10.1080/09588221.2019.1593197>
- Cornillie, F., Clarebout, G., & Desmet, P. (2012). Between learning and playing? Exploring learners' perceptions of corrective feedback in an immersive game for English pragmatics. *ReCALL*, 24(3), 257-278. <https://doi.org/10.1017/s0958344012000146>
- Costello, R. (Ed.). (2020). *Gamification strategies for retention, motivation, and engagement in higher education: Emerging research and opportunities*. IGI Global. <https://doi.org/10.4018/978-1-7998-2079-6>
- Chung, G. K. (2015). Guidelines for the design and implementation of game telemetry for serious games analytics. *Serious Games Analytics*, 59-79. https://doi.org/10.1007/978-3-319-05834-4_3
- Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York, NY: Harper and Row. <https://doi.org/10.1017/cbo9780511621956.002>
- De Freitas, S., & Liarokapis, F. (2011). Serious games: a new paradigm for education?. *Serious Games and Edutainment Applications*, 9-23. https://doi.org/10.1007/978-1-4471-2161-9_2
- Den Haan, R. J., & Van der Voort, M. C. (2018). On evaluating social learning outcomes of serious games to collaboratively address sustainability problems: A literature review. *Sustainability*, 10(12), 4529. <https://doi.org/10.3390/su10124529>
- Dignan, A. (2011). *Game frame: Using games as a strategy for success*. Simon and Schuster.
- Gibbons, S. (2007). *The academic library and the net gen student: Making the connections*. American Library Association.
- Godden, D. R., & Baddeley, A. D. (1975). Context-dependent memory in two natural environments: On land and underwater. *British Journal of psychology*, 66(3), 325-331. <https://doi.org/10.1111/j.2044-8295.1975.tb01468.x>
- Govender, T., & Arnedo-Moreno, J. (2021). An analysis of game design elements used in digital game-based language learning. *Sustainability*, 13(12), 6679. <https://doi.org/10.3390/su13126679>
- Greipl, S., Moeller, K., & Ninaus, M. (2020). Potential and limits of game-based learning. *International Journal of Technology Enhanced Learning*, 12(4), 363-389. <https://doi.org/10.1504/ijtel.2020.110047>
- Hong, J. C., Hwang, M. Y., Liu, Y. H., & Tai, K. H. (2022). Effects of gamifying questions on English grammar learning mediated by epistemic curiosity and language anxiety. *Computer Assisted Language Learning*, 35(7), 1458-1482. <https://doi.org/10.1080/09588221.2020.1803361>
- Hostovecky, M. (2022). Serious game designed as a support tool for lexicology. *Xlinguae*, 15(3). <https://doi.org/10.18355/xl.2022.15.03.01>
- Hung, H. T., Yang, J. C., Hwang, G. J., Chu, H. C., & Wang, C. C. (2018). A scoping review of research on digital game-based language learning. *Computers & Education*, 126, 89-104. <https://doi.org/10.1016/j.compedu.2018.07.001>
- Jabbari, N., & Eslami, Z. R. (2019). Second language learning in the context of massively multiplayer online games: A scoping review. *ReCALL*, 31(1), 92-113. <https://doi.org/10.1017/s0958344018000058>

- Kapp, K. (2012). *The gamification of learning and instruction: Game-based methods and strategies for training and education*. Pfeiffer, USA.
- Kirkwood, K. (2023). *The pedagogical potential of digital games to enhance the learning of spelling for English second language learners in a Persian Gulf state* [Doctoral dissertation, Deakin University]. <https://hdl.handle.net/10779/DRO/DU:24769308.v1>
- Kazu, İ. Y., & Kuvvetli, M. (2023). A triangulation method on the effectiveness of digital game-based language learning for vocabulary acquisition. *Education and Information Technologies*, 28(10), 13541–13567. <https://doi.org/10.1007/s10639-023-11756-y>
- Lazou, C., & Tsinakos, A. (2023). Critical immersive-triggered literacy as a key component for inclusive digital education. *Education Sciences*, 13(7), 696. <https://doi.org/10.3390/educsci13070696>
- Lee, S. M. (2019). Her Story or their own stories? Digital game-based learning, student creativity, and creative writing. *ReCALL*, 31(3), 238-254. <https://doi.org/10.1017/s0958344019000028>
- Lelardeux, C. P., Galaup, M., Panzoli, D., Gilles, P., Minguella-Canela, J., Yassine-Diab, N., & Lagarrigue, P. (2017). Improving mechanical engineering vocabulary through the use of a game. *Procedia Manufacturing*, 13, 1432-1439. <https://doi.org/10.1016/j.promfg.2017.09.098>
- Lin, C. J., Hwang, G. J., Fu, Q. K., & Cao, Y. H. (2020). Facilitating EFL students' English grammar learning performance and behaviors: A contextual gaming approach. *Computers & Education*, 152, 103876. <https://doi.org/10.1016/j.compedu.2020.103876>
- Li, K., Peterson, M., & Wang, Q. (2022). Out-of-school language learning through digital gaming: A case study from an activity theory perspective. *Computer Assisted Language Learning*, 1-29. <https://doi.org/10.1080/09588221.2022.2067181>
- Li, J. (2019). *The role of massively multiplayer role-playing games in facilitating vocabulary acquisition for English language learners: A mixed-methods study* [Doctoral dissertation, Clemson University]. https://tigerprints.clemson.edu/all_dissertations/2342
- Malone, T. W., & Lepper, M. R. (1987). Making learning fun: A taxonomy of intrinsic motivations for learning. In R.E. Snow & M.J Farr (Eds.), *Aptitude, learning, and instruction volume 3: Conative and affective process analyses* (pp. 223-253). Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers.
- Martin, N., Kelly, N., & Terry, P. (2018). A framework for self-determination in massive open online courses: Design for autonomy, competence, and relatedness. *Australasian Journal of Educational Technology*, 34(2). <https://doi.org/10.14742/ajet.3722>
- National Research Council. (2011). *Learning science through computer games and simulations*. National Academies Press.
- Neck, H. M., & Greene, P. G. (2011). Entrepreneurship education: Known worlds and new frontiers. *Journal of Small Business Management*, 49(1), 55-70. <http://dx.doi.org/10.1111/j.1540-627X.2010.00314.x>
- Newman, M., Gough, D. (2020). Systematic Reviews in Educational Research: Methodology, Perspectives and Application. In: Zawacki-Richter, O., Kerres, M., Bedenlier, S., Bond, M., Buntins, K. (eds) Systematic Reviews in Educational Research. Springer VS, Wiesbaden. https://doi.org/10.1007/978-3-658-27602-7_1
- Padilla-Zea, N., Gutiérrez, F. L., López-Arcos, J. R., Abad-Arranz, A., & Paderewski, P. (2014). Modeling storytelling to be used in educational video games. *Computers in Human Behavior*, 31, 461-474. <https://doi.org/10.1016/j.chb.2013.04.020>
- Palmer, D. S. (2010). *Second language pragmatic socialization in World of Warcraft*. University of California, Davis.

- Peterson, M., & Jabbari, N. (2022). Digital games and foreign language learning: Context and future development. In *Digital games in language learning* (pp. 1-13). Routledge. <https://doi.org/10.4324/9781003240075-1>
- Polyzi, P., & Moussiades, L. (2023). An artificial vocabulary learning assistant. *Education and Information Technologies*, 28(12), 16431–16455. <https://doi.org/10.1007/s10639-023-11810-9>
- Popescu, M. M., Romero, M., & Usart, M. (2013). Serious games for serious learning using SG for business, management and defence education. *International Journal of Computer Science Research and Application*, 3(1), 5-15.
- Rachayon, S., & Soontornwipast, K. (2019). The effects of task-based instruction using a digital game in a flipped learning environment on English oral communication ability of Thai undergraduate nursing students. *English Language Teaching*, 12(7), 12-32. <https://doi.org/10.5539/elt.v12n7p12>
- Ravyse, W. S., Seugnet Bignaut, A., Leendertz, V., & Woolner, A. (2017). Success factors for serious games to enhance learning: a systematic review. *Virtual Reality*, 21, 31-58. <https://doi.org/10.1007/s10055-016-0298-4>
- Reinders, H., & Wattana, S. (2015). Affect and willingness to communicate in digital game-based learning. *ReCALL*, 27(1), 38-57. <https://doi.org/10.1017/s0958344014000226>
- Rueda, R., O'Neil, H. F., & Son, E. (2016). The role of motivation, affect, and engagement in simulation/game environments: A proposed model. In *Using games and simulations for teaching and assessment* (pp. 230-253). Routledge.
- Ryan, R. M., & Deci, E. L. (2017). Self-determination theory. *Basic psychological needs in motivation, development, and wellness*. The Guilford Press, New York. <https://doi.org/10.1521/978.14625/28806>
- Ryan, R. M., & Rigby, C. S. (2019). Motivational foundations of game-based learning. *Handbook of Game-Based Learning*, 153-176.
- Scholz, K. (2016). Online digital game-based language learning environments: Opportunities for second language development. UWSpace. <http://hdl.handle.net/10012/10108>
- Scholz, K. (2017). Encouraging free play: Extramural digital game-based language learning as a complex adaptive system. *Calico Journal*, 34(1), 39-57. <https://doi.org/10.1558/cj.29527>
- Smith, S. P., Stibric, M., & Smithson, D. (2013). Exploring the effectiveness of commercial and custom-built games for cognitive training. *Computers in Human Behavior*, 29(6), 2388-2393. <https://doi.org/10.1016/j.chb.2013.05.014>
- Song, C., Shin, S. Y., & Shin, K. S. (2023). Optimizing foreign language learning in virtual reality: A comprehensive theoretical framework based on constructivism and cognitive load theory (VR-CCL). *Applied Sciences*, 13(23), 12557. <https://doi.org/10.20944/preprints202309.2101.v1>
- Susi, T., Johannesson, M., & Backlund, P. (2007). Serious Games: An Overview. <https://urn.kb.se/resolve?urn=urn:nbn:se:his:diva-1279>
- Tang, X., & Taguchi, N. (2020). Designing and using a scenario-based digital game to teach Chinese formulaic expressions. *Calico Journal*, 37(1), 1-22. <https://doi.org/10.1558/cj.38574>
- Van Eck, R. (2009). A guide to integrating COTS games into your classroom. In: Ferdig, R. E. (ed.), *Handbook of research on effective electronic gaming in education*. Hershey, PA: Information Science, 179-199. <https://doi.org/10.4018/9781599048086.ch011>
- Van Eck, R. & Hung, W. (2010). A taxonomy and framework for designing educational games to promote problem solving. *Teaching, Leadership & Professional Practice Faculty Publications*, 17. <https://commons.und.edu/tlpp-fac/17>
- Vu, N. N., Hung, B. P., Van, N. T. T., & Lien, N. T. H. (2022). Theoretical and instructional aspects of using multimedia resources in language education: A cognitive

- view. *Multimedia Technologies in the Internet of Things Environment*, 2, 165-194. https://doi.org/10.1007/978-981-16-3828-2_9
- Wen, X. (2023). The effect of gamification learning on primary school students' second language learning. *Journal of Education, Humanities and Social Sciences*, 22, 492-501. <https://doi.org/10.54097/ehss.v22i.12510>
- Whitton, N. (2014). *Digital games and learning: Research and theory*. Routledge. <https://doi.org/10.4324/9780203095935>
- Xiao, X., & He, G. (2023). Subjective experiences and perceptions of learning a second language through digital games: A case study of Chinese college students. *Frontiers in Psychology*, 13, 1109370. <https://doi.org/10.3389/fpsyg.2022.1109370>
- Yamazaki, K. (2018). Computer-assisted learning of communication (CALC): A case study of Japanese learning in a 3D virtual world. *ReCALL*, 30(2), 214-231. <https://doi.org/10.1017/s0958344017000350>
- Yang, Q. F., Chang, S. C., Hwang, G. J., & Zou, D. (2020). Balancing cognitive complexity and gaming level: Effects of a cognitive complexity-based competition game on EFL students' English vocabulary learning performance, anxiety and behaviors. *Computers & Education*, 148, 103808. <https://doi.org/10.1016/j.compedu.2020.103808>
- Yassine-Diab, N., Hartwell, L. M., & Dejean, S. (2021). Professionalization tools: impact of the game-based website 'Check your Smile' on specialized terminology acquisition. *CALL and professionalisation: short papers from EUROCALL 2021*, 1, 302-306. <https://doi.org/10.14705/rpnet.2021.54.1350>
- Young, M. F., Slota, S., Cutter, A. B., Jalette, G., Mullin, 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*, 82(1), 61-89. <https://doi.org/10.3102/0034654312436980>
- Zacharski, R. (2003). A discourse system for conversational characters. ed. by In Alexander Gelbukh (Eds.), *Proceedings of the Fourth International Conference on Intelligent Text Processing and Computational Linguistics* (pp. 492-495). Springer. https://doi.org/10.1007/3-540-36456-0_51
- Zhang, Y., Song, H., Liu, X., Tang, D., Chen, Y. E., & Zhang, X. (2017). Language learning enhanced by massive multiple online role-playing games (MMORPGs) and the underlying behavioral and neural mechanisms. *Frontiers in Human Neuroscience*, 11(95). <https://doi.org/10.3389/fnhum.2017.00095>