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Abstract

The integration of play into educational frameworks has long intrigued educators, especially in language learning. One contemporary approach gaining traction is the use of Massively Multiplayer Online Games (MMOGs). This entry discusses the potential of MMOGs as educational tools for language learning and teaching. It begins with an overview of digital games and their growing popularity, then reviews the specific attributes of MMOGs that make them promising media for language education. The entry also highlights practical applications of MMOGs in educational settings, demonstrating how their affordances can be leveraged to foster student engagement and improve language learning outcomes. Additionally, it addresses potential challenges that educators may encounter when integrating MMOGs into their curriculum and provides recommendations for effectively navigating these challenges. By examining the affordances and limitations of MMOGs, this entry aims to offer some insights into their role in modern language education and suggest best practices for their implementation.

Keywords: Massively Multiplayer Online Games, Language Learning, Language Teaching

Introduction

The gaming market has experienced remarkable growth, with the industry projected to generate nearly $282.30 billion in 2024 (Statista, n.d). This surge is largely attributed to the increased demand for online games following the COVID-19 pandemic in 2020, which saw a significant rise in the popularity of mobile games as people stayed home. Even in the post-pandemic period, interest in online gaming continues to rise, with approximately 1.1 billion online gamers worldwide (Clement, 2024). Forecasts indicate that the gaming industry will

sustain a compound annual growth rate of 12% from 2020 to 2025 (Linares et al., 2021). Within this expanding market, Massively Multiplayer Online Games (MMOGs) have attracted considerable attention, particularly for their potential applications in language learning and teaching.

MMOGs are networked video games featuring highly graphical three-dimensional fantasy worlds. Accessible on personal computers, gaming consoles, and mobile devices, MMOGs allow thousands of players across the globe to explore the game world, compete, collaborate, and socialise simultaneously in real time within the game's persistent virtual world. This entry focuses on commercial or 'vernacular' (Reinhardt & Sykes, 2012) MMOGs that are developed solely for entertainment purposes (see DGBLLT and Entertainment Games), with some adopting a free-to-play version supplemented by paid features. "Scalability, fast response time, and low cost are of utmost importance in designing a successful massively multiplayer online game" (Yahyavi & Kemme, 2013, p. 1). This business model has resulted in the proliferation of MMOGs in recent years, with numerous games experiencing exponential and widespread growth (Ghobaei-Arani et al., 2019).

MMOGs have transformed the gaming industry by enabling the simultaneous participation of thousands of players from diverse geographical, social, linguistic, national, gender, and age backgrounds. This innovation within the entertainment industry, and more broadly within social media platforms (Kaplan & Haenlein, 2010), has facilitated global connectivity and interaction within virtual gaming environments (Tay, 2005). The design, storyline, audiovisual effects, aesthetic features, social interaction opportunities, immersive environments, regular content updates, and competitive elements of MMOGs have all contributed to their global popularity. Released with various scenarios, game features, and mechanics, these games have attracted players of diverse tastes worldwide, making them commercially successful (Griffiths et al., 2003).

Given their increasing popularity, it is crucial to examine the impact of MMOGs on various aspects of gamers' lives, including language and culture learning (Zhong, 2011). This entry aims to explore the potential applications of MMOGs in language learning and teaching. It begins with an overview of MMOGs, discussing their characteristics and popularity. Next, it examines their practical applications in classroom settings and discuss how these games can facilitate language learning and enhance intercultural understanding. Finally, this entry discusses the challenges and considerations associated with integrating MMOGs into language education. It offers language teachers some insights to comprehend both the potential benefits and inherent limitations of MMOG-enhanced language teaching as an innovative pedagogical approach.

Overview of MMOGs

At the onset of a game, MMOG players select and customise their avatars—fictional characters within the game's virtual world—and subsequently control their actions throughout the gameplay (Zhong, 2011). Players get involved in various quests (or missions), which are assigned by computer-controlled or non-playing characters (NPCs). Quests involve a range of different activities such as collecting a specific number of items or resources (e.g., herbs and lost artifacts) from the game world, eliminating a specific number of monsters in a region, and solving riddles and deciphering clues to unlock a treasure chest. Quests grow more challenging and thus require more collaboration and active communication among gameplayers.

Another key feature of MMOGs is their rewards system. Upon completing quests, players receive rewards such as experience points (XPs), which help gameplayers to level up their characters and unlock new skills; in-game currency (e.g., coins, gems, or tokens), by which they can purchase equipment or services within the game world; special titles or

badges, which signify their achievements or completion of specific challenges; and mounts and pets, which gameplayers can ride or keep as companions. The pursuit of rewards, quests and storylines, customised characters, persistent and expansive game worlds, progression systems throughout the gaming experience, and immersive audio-visual features are among a plethora of different key features that help immerse players in the game's virtual world (see also Game Mechanics and Design Features for DGBLLT).

MMOGs' increasing popularity can also be attributed to their significant social features that can contribute to various aspects of language learning (see also Game-related Social Practices). MMOGs foster a sense of community among players participating in guilds and alliances to collaborate towards shared goals, e.g., completing quests and winning battles (Ma et al., 2019). Such behaviours create an "affiliative bond" (Thorne, 2008, p. 321) among gamers and promote socially supportive gaming environments (Cole et al., 2020). Partaking in social events and in-game celebrations can further enhance MMOG players' communal experience and make the game's virtual world feel lively and socially interconnected. MMOGs facilitate extensive interactions among players, thereby fostering cooperation and social support akin to the dynamics observed in socially and culturally bonded groups in the real world (Cole et al., 2020).

The provision of a persistent world is another crucial factor that distinguishes MMOGs within the gaming industry. In these games, the games' virtual world remains continuously active, regardless of player presence, and the game data is maintained even in the event of server failures (Zhang et al., 2008). Persistence is highly valued, as it mirrors real-world dynamics where objects change over time (Gustafsson et al., 2020). For example, in *Player Unknown Battleground* (PUBG), aspects of the game such as seasons, climate, and calendar events get constantly updated, creating a real-world impression.

Another notable aspect of MMOGs is their capacity to enable real-time embodied interactions through avatars, utilising both text and voice chat channels. These interactions closely simulate real-world dynamics, allowing players to effectively communicate within the game environment. In these settings, players are required to collaborate with teammates to complete various in-game tasks. Sustained connectivity and attentiveness during gameplay are crucial for optimal interaction, including responding to immediate changes, updating teammates, adapting tactics and strategies, and issuing new instructions (Jabbari & Eslami, 2023).

MMOGs come in different genres and types, each offering unique gameplay experiences, mechanics, and player interactions (Reinhardt, 2021), which accommodate diverse preferences within the gaming community. Some of the most popular genres include Massively Multiplayer Online Role-Playing Games (MMORPGs), First-Person Shooters (MMOFPS), Third Person Shooters (MMOTPS), Real-Time Strategy Games (MMORTS), Simulation Games (MMOSG), Sandbox MMORPGs, and Battle Royale games.

In MMORPGs (e.g., *World of Warcraft* and *Final Fantasy XIV*) players customise avatars, complete quests, and gain experience points to advance. These games feature expansive worlds where players explore, interact, and engage in various challenges, developing skills and acquiring equipment along the way. MMOFPS games (e.g., *Call of Duty: Warzone and Planetside 2*) feature large-scale, real-time battles where players compete in expansive environments, using various weapons and tactics to achieve objectives. MMOTPS games (e.g., *Destiny 2*) involve players engaging in competitive and cooperative gameplay from a third-person perspective. These games offer expansive worlds where players navigate missions, battle enemies, and participate in large-scale events. The third-person viewpoint allows for a broader field of vision and tactical awareness, enhancing strategic combat and teamwork in both player-versus-environment (PvE) and player-versus-

player (PvP) scenarios. MMRTS games (e.g., *StarCraft 2*) require players to build bases, gather resources, and command armies in real-time to defeat opponents and achieve strategic objectives. MMOSGs (e.g., *Eve Online*) simulate real-world activities and systems, offering an immersive experience by allowing players to engage in complex economic, social, and political interactions within a persistent virtual world. Sandbox MMORPGs (e.g., *Black Desert Online*) allow gamers extensive freedom to explore vast game worlds and engage in various activities. Players can pursue diverse interests, from crafting and trading to combat and exploration, without being restricted by predefined paths. In Battle Royale games (e.g., *PUBG* and *Fortnite*), numerous players are dropped into a shrinking play area where they fight until only one player or team survives. This variety in game genres has attracted a diverse range of players with various gaming motivations (e.g., interacting and socialising, competing and achieving, and immersing in and discovering the game world) (Yee, 2006) and experiences around the globe.

MMOGs and Language Learning

MMOGs have emerged as a new genre of play culture that evolves through real-time users' interaction, blending communication and entertainment within a computer-mediated setting (Freeman, 2018). MMOG players immerse themselves in linguistically rich and semiotically complex environments (Thorne et al., 2012), where language is used along with other modes of communication (Jabbari & Eslami, 2023) to complete various in-game tasks. In these settings, MMOG players are highly engaged, constantly participating in meaningful collaborations to accomplish collective in-game goals. Considering MMOGs' immersive and interactive nature as well as their popularity, accessibility, and affordances for providing opportunities for contextualised language use, many language teachers and second language

(L2) acquisition scholars have been curious to know how these games can serve as an effective tool for enhancing language learning experience and teaching effectiveness.

MMOGs have been widely recognised as valuable tools that can facilitate language learning (e.g., Chotipaktanasook & Reinders, 2018; Dixon & Christison, 2021; Jabbari & Eslami, 2023; Jabbari & Peterson, 2023; Peterson et al., 2020; Rankin et al., 2009). For instance, Rankin et al. (2009) showed that ESL students improved their vocabulary knowledge as the result of playing *Ever Quest II* collaboratively with native English speakers. They highlighted the role of language socialisation in L2 learning. Chotipaktanasook and Reinders (2018) also found that playing MMORPGs significantly increased L2 interactions, which encompassed a broader range of discourse functions compared to those typically observed in classroom-based English language interactions. Dixon and Christison (2018) also concluded that MMORPGs benefit L2 acquisition by prompting target language interactions during collaborative problem-solving tasks within the game. Their study highlighted that playing *Guild Wars 2* fosters modified language output and provides opportunities to negotiate language input to complete in-game tasks. In the same vein, Jabbari and Eslami's (2023) microanalyses of L2 gamers' interactions also revealed many instances of successful negotiations for meaning, which are considered beneficial in SLA research from the interactionist perspective to language learning (Long, 1996). In a longitudinal study, Jabbari and Peterson (2023) investigated the question whether playing *World of Warcraft* could improve English-as-a-foreign-language (EFL) gamers' speaking performance over time. The results suggested that playing the game collaboratively with peers and native English speakers could improve some aspects of the gamers' speaking performance in terms of complexity, accuracy, and fluency. In a scoping review, Jabbari and Eslami (2019, p. 92) concluded that

> MMOGs provide socially supportive and emotionally safe (i.e., low-language anxiety) environments that afford multiple opportunities for L2 learning and socialization, which, in turn, help L2 learners to enrich their L2 vocabulary repertoire and enhance their communicative competence in the target language.

Despite some scepticism regarding the effectiveness of massively multiplayer online games (MMOGs) as tools for language acquisition, these "unorthodox language-learning tools" (Rankin et al., 2009, p. 162) are widely regarded as promising venues for both language learning and instruction.

In these gaming environments, players exhibit strong motivation to accomplish various in-game tasks to advance their avatars and achieve higher levels (see also Motivation and Affect in DGBLLT). This intrinsic drive underscores the necessity for heightened awareness of any changes and updates within the game context (Jabbari & Eslami, 2023). For instance, players must remain vigilant regarding the positioning of enemies and availability of gaming resources in battle royale games, identifying crewmates and imposters in *Among Us*, and coordinating attacks on other villages in *Clash of Clans*. As such, effective communication becomes essential as players engage in eliciting and disseminating information, strategising future in-game actions, and assessing their collaborative outcomes. Consequently, these interactions foster a dynamic and immersive communication milieu wherein language use is authentically contextualised and serves distinct meaningful purposes.

MMOGs are usually multinational, multilingual, and multicultural communication settings (Thorne, 2008; Ryu, 2011; Zheng et al., 2009), where English or other languages can serve as a *lingua franca*. In such settings, an L2 gamer is exposed to different languages and probably different dialects and diverse micro- and macro-cultures. These natural communication environments offer what language educators have long sought to provide in the instruction of oral and aural skills: authentically contextualised language input and output

that accurately reflect the reality of language use today. Moreover, engaging in such communication contexts allows L2 gamers to develop their intercultural awareness and L2 communicative competence (Johnson, 2009; Peterson, 2010) – the other two competencies highly sought after in formal educational contexts (see also DGBLLT and Culture).

It is well-documented that motivation and affective variables play critical roles in language learning behaviour and ultimately determine language learning achievements (Dörnyei, 2003). Researchers (e.g., Reinders & Wattana, 2014, 2015) have strongly argued that playing MMOGs help language learners develop some positive affective and motivational drives toward L2 learning and socialisation. Reinders and Wattana (2015) revealed that reduced communication anxiety, heightened self-efficacy beliefs regarding L2 competence, and increased motivation to engage in L2 communication were the primary factors contributing to learners' greater willingness to use English during gaming activities. They stated that playing the game seems to have started "a virtuous cycle of lowered anxiety, resulting in more L2 production, leading to greater self-satisfaction, and resulting in more motivation, which in turn led to a further lowering of affective barriers" (Reinders & Wattana, 2015, p. 50).

Applications of MMOGs in the Classroom

Prior to incorporating any resources or instructional tools, including technological advancements, into our classroom, it is essential for us, as language educators, to address several fundamental questions. Our answers to these inquiries determine both the extent and the method of utilising such tools in our educational setting; questions such as: Why should we use this tool or resource in the class? For what purpose(s)? Under what circumstances? When? How? What would be our roles as language teachers? What would be the role of our students? How can using this tool enhance our students' language learning experiences? How

can we design our lessons around this tool? How can we monitor and assess our students' progress and engagement in the language learning activities mediated by this tool? Additional questions should be considered before integrating MMOGs into our teaching endeavours. These questions highlight the interplay among four fundamental elements that form the complex dynamics of a classroom: the student, the teacher, the content, and the teaching method. MMOGs present promising, albeit unconventional, opportunities for language learning due to their capacity to engage students in diverse, meaningful interactions within a highly immersive environment (Peterson, 2010; Reinhardt & Kirby, 2022). However, their implementation must be carefully aligned with the specific characteristics of students, teachers, content, and teaching methods. The following example elucidates this point.

Imagine an English for business communication teacher who utilises an MMORPG to enhance students' engagement and provide opportunities for practising various language functions, including negotiating, persuading, and presenting. To create an engaging learning environment, the teacher selects *Eve Online*, a spacefaring MMORPG known for its complex social interactions and compelling narrative. Within *Eve Online*, players participate in authentic communication tasks, affording them numerous opportunities to practice meaningful language use. The teacher, who has a positive attitude towards incorporating MMOGs in language instruction, undergoes training to become well-versed in the game's mechanics and affordances for providing language learning opportunities. This preparation enables the teacher to effectively guide students through the game's virtual world, address any technical challenges, and ensure the achievement of educational objectives.

Upon entering the game, students select specific roles, such as miners, manufacturers, traders, and pirates, each requiring different language skills and strategies. These roles align with the course content, which focuses on relevant language functions, including negotiating, persuading, and presenting information. The teacher guides students through creating in-

game corporations and getting engaged in simulated market transactions. This in-game task allows students to practice negotiating prices, trade deals, and delivery terms using in-game chat and email templates. The teacher also encourages students to collaborate in groups, create advertisements for their player corporations, and persuade other gamers to join by highlighting specific benefits of joining. This task involves crafting persuasive messages underlining the corporation's missions, vision, achievements, and training opportunities. To improve students' written and oral presentation skills, the teacher also asks students to collect in-game market data and generate a report, analysing trends, potential investment opportunities, and resource availability. Then, the teacher prepares students to present their reports in class. This task simulates briefing sessions for investors in real-world business settings.

The teacher actively monitors the students' language learning behaviour and progress by participating in the game's virtual world, providing real-time feedback and scaffolding as needed. The teacher also implements a blended learning approach, supplementing the students' in-game experiences with classroom activities. The teacher encourages students to document their in-game interactions and discuss examples of successful negotiations, persuasive arguments, or well-delivered presentations. By reinforcing and expanding upon traditional teaching methods, this approach ensures that the game becomes an integral part of the learning process. This method not only enhances language learning but also offers some "positive impacts" (Chapelle, 2001, p. 57) beyond language skills. These positive impacts include fostering critical thinking, promoting collaboration, and encouraging learner autonomy. This example exhibits how an MMOG can be effectively implemented in a language-learning context to create engaging and relevant learning experiences for language learners.

Challenges and Considerations

Engaging in MMOGs in a target language offers numerous advantages for L2 learners. Notably, they enhance L2 vocabulary knowledge and retention (Peterson, 2023) and help learners develop communicative strategies (Dixon & Christison, 2021; Jabbari & Eslami, 2019) through getting involved in L2 interactions (Reinhardt, 2021) and negotiations of meaning (Jabbari & Eslami, 2023). MMOGs offer non-threatening social environments that can significantly boost L2 learners' self-confidence and willingness to communicate in the target language (Reinders & Wattana, 2015). This enhanced confidence can facilitate L2 socialisation and, in turn, improve cross-cultural awareness among L2 learners within multicultural and multilingual gaming contexts (Jabbari & Eslami, 2023). Nevertheless, despite these advantages, MMOGs present several challenges.

Technical requirement can be a serious challenge. Accessing MMOGs requires technological devices such as PCs, mobile phones, or tablets, along with stable internet connection and headsets for communicating while gaming. Not everyone can afford to buy these devices. Besides, insufficient technology can lead to lags during gameplay, negatively impacting the gaming experience and causing frustration, anxiety or stress among players. Related to this challenge is the expertise teachers and students require when engaged with MMOGs. Lack of teachers' or students' expertise can also affect the efficacy of MMOG-enhanced language lessons. Both sides should be trained and equipped with the skills and knowledge necessary to use MMOGs as mediums of instruction or avenues for language learning.

It can be difficult to manage a classroom in which students are engaged with individual or group activities within an MMOG. To enhance learning through gaming, teachers should be competent in monitoring students' in-game activities to ensure they are focused on language learning objectives rather than playing the game frivolously just for fun

(Baierschmidt, 2013). Monitoring presents significant challenges, particularly because MMOGs frequently encompass extensive and often evolving virtual environments—due to periodic updates by developers—where language use and interactions may not consistently align with educational objectives. Additionally, educators have limited control over these contents and interactions. Moreover, balancing game time with more focused instructional activities presents an additional challenge. It is essential to ensure that students do not allocate excessive time to MMOGs at the expense of other critical language learning tasks. Another challenge related to classroom management pertains to novice players, or "noobs," who lack basic skills in playing MMOGs. Noobs are often not welcome by other gameplayers, as they can negatively impact the entire team's performance. Grouping noobs with skilled gameplayers can be a challenge for a teacher, as it can promote negative feelings such as anger and frustration among gameplayers (Barnett et al., 2010).

Using MMOGs as instructional materials is also challenging, as they must be integrated appropriately into an existing language learning curriculum. Aligning various in-game tasks with the curriculum necessitates meticulous planning and a high degree of creativity (Liu et al., 2012). This complexity is heightened, considering Reinhardt's (2021) observation that each gameplay session presents a unique interaction between game design mechanics and player actions, and that these interactions result in varying dynamics regarding student engagement, in-game social interactions, and ultimately, language use and learning. Since MMOGs often feature open and dynamically changing environments, it is not easy to adapt them to fit a language curriculum. Ensuring that the contents within MMOGs are relevant and appropriate can be challenging, and modifying MMOGs to meet educational expectations requires careful consideration.

Assessing language learners' progress to evaluate the efficacy of MMOG-driven lessons is another challenge faced by teachers. Conventional language assessment methods,

which prioritise the linguistic aspects of language, are not efficient in capturing language learners' progress in MMOG settings. Consequently, there is a need to develop more effective assessment methods that align with the foundational principles and frameworks of game-based language learning. Creating such assessment methods requires substantial investment in time, expertise, and creativity.

Another significant challenge lies in motivating students to learn a language through playing MMOGs. Not all language learners have positive attitudes towards game-enhanced language learning practices. Some learners may not perceive gaming as relevant to their learning objectives or aligned with their learning styles. Additionally, certain content may be distressing or inappropriate, leading to disengagement from language learning activities. For example, shooter MMOGs, such as *Fortnite* and *Call of Duty*, frequently contain violent content that may be unsuitable for young players. Research suggests that exposure to violent video games can lead to increased anxiety and depression in some individuals (Chen et al., 2020). Ensuring all students are equally motivated and engaged with MMOG-enhanced language learning poses a continual challenge for educators. This challenge necessitates ongoing research and adaptation to integrate gaming principles into pedagogical practices effectively. Addressing these challenges will be crucial for advancing the efficacy of MMOGs in language instruction and achieving broader educational outcomes.

Cross References

⇒ DGBLLT and Culture
⇒ DGBLLT and Entertainment Games
⇒ Game Mechanics and Design Features for DGBLLT
⇒ Game-related Social Practices
⇒ Motivation and Affect in DGBLLT

References

Baierschmidt, J. (2013). A principled approach to utilizing digital games in the language learning classroom. *JALT Call Journal*, *9*(3), 307-315.

Barnett, J., Coulson, M., & Foreman, N. (2010). Examining player anger in World of Warcraft. *Online worlds: Convergence of the real and the virtual*, 147-160.

Chapelle, C. A. (2001). *Computer applications in second language acquisition*: *Foundations for teaching, testing, and research*. Cambridge University Press.

Chen, A., Mari, S., Grech, S., & Levitt, J. (2020). What we know about massively multiplayer online role-playing games. *Harvard review of psychiatry*, *28*(2), 107-112.

Chotipaktanasook, N., & Reinders, H. (2018). A massively multiplayer online role-playing game and its effects on interaction in the second language: Play, interact, and learn. In B. Zou & M. Thomas (Eds.), *Handbook of research on integrating technology into contemporary language learning and teaching* (pp. 367–389). IGI Global. https://doi.org/10.4018/978-1-5225-9618-9.ch023

Clement, J. (2024, February 29). *Topic: Online gaming*. Statista. https://www.statista.com/topics/1551/online-gaming/#topicOverview

Cole, D. A., Nick, E. A., & Pulliam, K. A. (2020). Are massively multiplayer online role-playing games healthy or not and why? Preliminary support for a compensatory social interaction model. *Computers in Human Behavior*, *102*, 57-66.

Dixon, D. H. & Christison, M.A. (2021). L2 gamers' use of learning and communication strategies in massively multiplayer online games (MMOs): An analysis of L2 interaction in virtual online environments. In K. B. Kelch, P. Byun, S. Safavi, & S.

Cervantes (Eds.), *CALL theory applications for online TESOL education* (pp. 296–321). IGI Global. https://doi.org/10.4018/978-1-7998-6609-1.ch013

Dixon, D. H., & Christison, M.A. (2018). The usefulness of massive multiplayer online role playing games (MMORPGs) as tools for promoting second language acquisition. In J. Perren, K. B. Kelch, J. Byun, S. Cervantes, & S. Safavi (Eds.), *Applications of CALL theory in ESL and EFL environments* (pp. 244–268). IGI Global. https://doi.org/10.4018/978-1-5225-2933-0.ch014

Dörnyei, Z. (2003). Attitudes, orientations, and motivations in language learning: Advances in theory, research, and applications. *Language Learning*, *53*(S1), 3-32.

Freeman, G. (2018). *Multiplayer online games: Origins, players, and social dynamics*. AK Peters/CRC Press.

Ghobaei-Arani, M., Khorsand, R., & Ramezanpour, M. (2019). An autonomous resource provisioning framework for massively multiplayer online games in cloud environment. *Journal of Network and Computer Applications*, *142*, 76-97.

Griffiths, M. D., Davies, M. N., & Chappell, D. (2003). Breaking the stereotype: The case of online gaming. *CyberPsychology & Behavior*, *6*(1), 81-91.

Gustafsson, V., Holme, B., & Mackay, W. E. (2020). Narrative substrates: Reifying and managing emergent narratives in persistent game worlds. In *Proceedings of the 15th International Conference on the Foundations of Digital Games* (pp. 1-12).

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.

Jabbari, N., & Eslami, Z. R. (2023). Negotiations for meaning in the context of a massively multiplayer online role-playing game. *Language Learning & Technology, 27*(1), 1-28. http://hdl.handle.net/10125/73517

Jabbari, N., & Peterson, M. (2023). Complexity, accuracy, and fluency improvements through massively multiplayer online gaming: A longitudinal mixed-methods case study. *The Language Learning Journal*, *51*(4), 416-450. DOI: 10.1080/09571736.2023.2219713

Johnson, W. L. (2009). Developing intercultural competence through videogames. In *Proceedings of the 2009 international workshop on Intercultural collaboration* (pp. 99-100).

Kaplan, A. M., & Haenlein, M. (2010). Users of the world, unite! The challenges and opportunities of social media. *Business Horizons*, *53*(1), 59–68. https://doi.org/10.1016/j.bushor.2009.09.003

Linares, M., Gallego, M. D., & Bueno, S. (2021). Proposing a TAM-SDT-based model to examine the user acceptance of massively multiplayer online games. *International Journal of Environmental Research and Public Health*, *18*(7), 3687.

Liu, K. Y., Yang, C. T., & Chang, K. H. (2012). Development of a multiplayer online role-playing game-based learning system for multiple curriculums. In *2012 IEEE Fourth International Conference on Digital Game and Intelligent Toy Enhanced Learning* (pp. 62-66). IEEE.

Long, M. H. (1996). The role of the linguistic environment in second language acquisition. In W. C. Ritchie & T. K. Bhatia (Eds.), *Handbook of second language acquisition* (pp. 413–468). Academic Press.

Ma, L., Feng, Z., Feng, J., & Wang, L. (2019). Research on the Factors Affecting Player Stickiness in Massively Multiplayer Online Game (MMOG). In *2019 16th International Conference on Service Systems and Service Management (ICSSSM)* (pp. 1-6). IEEE.

Peterson, M. (2010). Massively multiplayer online role-playing games as arenas for second language learning. *Computer Assisted Language Learning*, *23*(5), 429-439.

Peterson, M., White, J., Mirzaei, M. S., & Wang, Q. (2020). A review of research on the application of digital games in foreign language education. In M. Kruk, & M. Peterson (Eds.), *New technological applications for foreign and second language learning and teaching* (pp. 69–92). IGI Global.

Peterson, M. (2023). Digital simulation games in CALL: A research review. *Computer Assisted Language Learning*, *36*(5-6), 943-967.

Rankin, Y., Morrison, D., McKenzie, M.C., Gooch, B., & Shute, M. (2009). Time will tell: In game social interactions that facilitate second language acquisition. In R. Michael Young (Ed.), *Proceedings of the 4th international conference on foundations of digital games* (pp. 161–168). ACM.

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

Reinders, H., & Wattana, S. (2014). Can I say something? The effects of digital game play on willingness to communicate. *Language Learning & Technology, 18*(2), 101–123.

Reinhardt, J. (2021). Not all MMOGs are created equal: A design-informed approach to the study of L2 learning in multiplayer online games. In M. Peterson, K. Yamazaki & M. Thomas (Eds.), *Digital games and language learning* (pp. 69-87). Bloomsbury.

Reinhardt, J., & Kirby, S. (2022). Second language acquisition and multiplayer gaming. In N. Ziegler, & M. González-Lloret (Eds.), *The Routledge handbook of second language acquisition and technology* (pp. 286-296). Routledge.

Reinhardt, J., & Sykes, J. M. (2012). Conceptualizing digital game-mediated L2 learning and pedagogy: Game-enhanced and game-based research and practice. In H. Reinders (Ed.), *Digital games in language learning and teaching* (pp. 32–49). Palgrave Macmillan.

Ryu, D. (2011). Non-native English speakers' multiliteracy learning in beyond-game culture: A sociocultural study. *MERLOT Journal of Online Learning and Teaching, 7*(2), 231–243.

Statista (n.d.). Video games - worldwide: Statista market forecast. https://www.statista.com/outlook/dmo/digital-media/video-games/worldwide

Tay, V. (2005). Massively multiplayer online game (MMOG)-a proposed approach for military application. In *2005 International Conference on Cyberworlds (CW'05)*. IEEE. doi: 10.1109/CW.2005.61

Thorne, S. L. (2008). Transcultural communication in open internet environments and massively multiplayer online games. In S. S. Magnan (Ed.), *Mediating discourse online* (pp. 305-327). John Benjamins. https://doi.org/10.1075/aals.3.17tho

Thorne, S. L., Fischer, I., & Lu, X. (2012). The semiotic ecology and linguistic complexity of an online game world. *ReCALL*, *24*(3), 279–301. https://doi.org/10.1017/S0958344012000158

Yahyavi, A., & Kemme, B. (2013). Peer-to-peer architectures for massively multiplayer online games: A survey. *ACM Computing Surveys (CSUR)*, *46*(1), 1-51.

Yee, N. (2006). Motivations for play in online games. *CyberPsychology & Behavior*, *9*(6), 772-775.

Zhang, K., Kemme, B., & Denault, A. (2008). Persistence in massively multiplayer online games. In *Proceedings of the 7th ACM SIGCOMM Workshop on Network and System Support for Games* (pp. 53-58).

Zheng, D., Young, M. F., Wagner, M. M. & Brewer, R. A. (2009). Negotiation for action: English language learning in game based virtual worlds. *The Modern Language Journal, 93*(4): 489–511. https://doi.org/10.1111/j.1540-4781.2009.00927.x

Zhong, Z. J. (2011). The effects of collective MMORPG (Massively Multiplayer Online Role-Playing Games) play on gamers' online and offline social capital. *Computers in Human Behavior*, *27*(6), 2352-2363.