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Digital games and foreign language learning

Context and future development

Mark Peterson and Nasser Jabbari

1.1 Introduction

The spread of digital gaming as a global phenomenon continues to accelerate. As is emphasized in the literature, the gaming industry is expanding at an unprecedented rate and its influence is increasingly felt not only in youth culture but also in the social, economic, and educational realms (Reinhardt & Sykes, 2014). In the sphere of education, digital games in their many manifestations are being increasingly deployed as a means to facilitate learning across a wide range of domains (Connolly et al., 2012). Influenced by this trend, in the field of CALL, researchers have highlighted the opportunities for language learning provided by digital games (Reinhardt & Sykes, 2012). These include extensive exposure to target language (TL) input, meaningful, challenging and motivating interaction involving languaging, problem solving, and participation in diverse and multinational game-focused online communities (Peterson, 2013). In this context, educators have explored the potential of a variety of digital games for language learning in a diverse and growing body of work. This effort incorporates two main approaches. One strand of research involves the implementation of learner-based studies that adopt qualitative, quantitative, and mixed methods. Moreover, in an effort to ~~be~~ better comprehend this complex phenomenon, researchers have also produced increasing numbers of reviews, meta-analyses, and theoretically informed position papers that draw on developments in contemporary second language acquisition (SLA) research. The emergence of this body of research in a relatively short period of time is testament to the growing interest in, and influence of, work in this area on the wider CALL research community.

As research in all its forms continues to expand, there is a need for publications that provide a window into developments in contemporary work and pedagogy, involving both the theory and application of contemporary digital games in second and foreign language learning. In this context, the current volume aims, in part, to enhance understanding of this promising field. Although no single publication can fully incorporate the broad range of work currently being undertaken, it is the authors' hope that this volume may assist in this important task. In addition, this publication is further designed to provide insights that may, going forward, support innovative and principled development in the future. The discussion in the following section focuses on providing an overview of the studies incorporated in this edited volume and will also examine some of their significant findings.

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1.2 An overview of this volume

As researchers emphasize, there is a pressing need for rigorous evaluative work in the field of CALL (Plonsky & Ziegler, 2016) and, in particular, expanding areas such as digital game-based language learning (henceforth DGBLL) (Xu et al., 2020). Moreover, a common theme in the research literature is the need for expansion in the types of review work that plays a central role in shaping the future research agenda (Peterson, 2021). The second chapter of this volume entitled *A Systematic Review of Theory-Informed Design and Implementation of Digital Game-Based Language Learning* by Rui Huang and Matthew Schmidt marks a significant contribution to work in this area. The authors acknowledge that review work is increasing. However, they draw attention to a research gap in the literature concerning the limited number of systematic reviews that focus on exploring the theoretical groundings that influence the design, implementation, and evaluation of empirical research. In an effort to address this issue, the authors of this chapter conduct a rigorous systematic review of 65 theory-informed studies involving both serious and commercial off-the-shelf (COTS) digital games undertaken during the period 2011–2020. The analysis of this peer-reviewed work reveals that the most frequently referenced body of theory was sociocultural research, followed by various cognitive theories. It was further found that in the majority of studies, theory was utilized to inform the research design. Research projects where theory influenced evaluation and implementation were less frequent. The authors draw attention to the limited number of theory-informed studies in the current research base and argue that going forward, there is a need for additional learner-based work in which SLA theory places a central role in informing design, evaluation, and implementation.

A growing trend in contemporary CALL research is the attempt to maximize the potential for learning provided by many COTS digital games by adapting them to better meet the needs of the language classroom. Work in this area has focused primarily on the adaption of massively multiplayer online role-playing games (MMORPGs) and has produced some encouraging results (Chotipaktanasook & Reinders, 2018). In this context, recent developments in end-user authoring tools have made it feasible for CALL practitioners to create digital games specifically designed to facilitate foreign language learning. Research in this area is therefore set to expand. However, to date, no reviews have been reported in the literature that could contribute to principled development work in this area. The third chapter of this volume *Use of Digital Game Creation Tools in Computer Assisted Language Learning: A Systematic Literature Review* by Anke Berns and Iván Ruiz-Rube addresses this issue. The authors report on the findings of a systematic review that investigated 12 peer-reviewed research studies on the application of these tools. The analysis shows that research focused on the use of three authoring tools: Scratch (<https://scratch.mit.edu>), App Inventor (<http://appinventor.mit.edu>), and CoSpaces (<https://cospaces.io/edu/>). It was found that Scratch was the most frequently implemented tool and that the majority of studies were carried out in primary education contexts. The authors further note that the majority of the research focused on designing games that enhance oral skills. Other areas of interest included writing and vocabulary learning. Although the studies reported positive learning outcomes, the discussion in this chapter draws attention to limitations including the small number of participants and relatively brief durations of the majority of the projects. Based on the results of their analysis, the authors note the need for more research and highlight the importance of teacher training in this area.

An important area of interest in current research on DGBLL concerns analysis of the particular linguistic environments provided (Thorne et al., 2012). This is clearly a significant issue, as a major motivation for projects that seek to engage learners with various genres of digital games is the potentially valuable exposure provided to the TL. However, there is a tendency to generalize

claims regarding learning outcomes to specific genres. This may be problematic, as is noted in the literature, there can be considerable variation in game mechanics and features within specific game genres (Reinhardt, 2021). The fourth chapter by Daniel Dixon *A Methodological Framework for Analyzing the Language in Digital Games* addresses this issue. In an attempt to better understand the specific linguistic environments presented by one class of digital game, namely, single-player role-playing games the author draws on two sources. Reinhardt's (2019) design informed approach to research in DGBLL and also the model of register analysis proposed by Biber and Conrad (2019). These approaches are incorporated into a comprehensive framework designed to facilitate the description, categorization, and analysis of the TL found in digital games. Analyzing the TL from four games of the above genre that share similar designs and mechanics, the author identifies six unique register categories specific to these games including two spoken and four written registers. This chapter concludes by noting the potential of this approach in identifying the specific nature of the linguistic input learners receive in different types of digital game. Moreover, the author further highlights the possibilities presented to evaluate the effectiveness of particular digital games for language learning and also the potential for enhancing the credibility of the generalizations made regarding the benefits of participating in DGBLL.

One of the hypothesized benefits of utilizing digital games lies in the opportunities they may provide for learners to engage in authentic, meaningful, and goal-directed interaction in the TL (Pasfield-Neofitou, 2014). As noted in the literature, many well-designed digital games incorporate these features that are a major element in task-based approaches to language learning that seek to facilitate language development (Reinhardt & Thorne, 2020). The fifth chapter in this volume *Direct Qualitative Assessment of Language Learning Outcomes in Digital Game-Based Interaction: An Exploratory Case Study* by Michael Hofmeyr, reports on research that investigated the use of the cooperative puzzle game, *Keep Talking and Nobody Explodes* by a group of EFL learners based at a university in Japan. In this research, the learners were required to cooperate in completing meaning-focused information gap tasks embedded in the game, such as, sharing information in the TL to defuse a simulated bomb before the timer reaches zero. The researcher focused on analyzing the TL output produced by the participants over four game sessions that were conducted over a one-month period. Discourse analysis of the data revealed that the above game's particular information gap format elicited the production of authentic and meaning-focused TL output. Data further showed preliminary evidence suggesting that participation in the research appeared to facilitate L2 vocabulary learning and grammatical knowledge. The researcher argues that the promising findings of this study highlight the potential of this type of game and draw attention to the need for further research.

A noteworthy strand of research on the use of digital games in foreign language education concerns the investigation of the informal online communities and interactive media associated with many of these games (Ryu, 2013). Researchers have drawn attention to the potential of game-focused communities, networks, and spaces that frequently operate outside the confines of traditional educational institutions (Reinhardt & Thorne, 2016). It is claimed that in these environments, users are not only exposed to TL rich contexts but are also provided with opportunities to engage in authentic TL use and to experience language socialization (Thorne et al., 2009). Due to these conditions, researchers assert that many online game-related communities provide access to contexts that may be conducive to aspects of second language learning (Vazquez-Calvo et al., 2019). Anecdotal evidence suggests that game-related online media and communities are very popular with players (SuperData, 2020) and given the global reach of digital gaming, it is reasonable to assume a considerable number of language learners participating in these online ecologies. However, research in this area is still in its infancy, and to date, few

learner-based studies have been implemented that investigate the potential of exposure to participation in these highly diverse internet-based online groups in language learning. The sixth chapter in this volume entitled, *Let's Play Videos and L2 Academic Vocabulary*, by Liss Kerstin Sylvén and John Löwenadler, explores one aspect of this intriguing phenomenon, namely, web-based video game playthroughs. In order to explore the potential of these media, the authors utilized mixed methods to analyze the nature of TL produced by three of the most popular content creators in the well-known playthrough YouTube channel, Let's Play (<https://www.youtube.com/user/LetsPlay>). Data analysis revealed that Let's Play provides extensive exposure to TL of both an academic and colloquial nature. Findings further suggest that the genre offers contextual, text, visual, and explanatory support providing plentiful opportunities for vocabulary learning. The researchers concluded that the promising findings of their preliminary research indicate that further empirical work is needed in order to confirm the benefits of learner exposure to game playthroughs.

Immersive virtual reality technologies have long been of interest to CALL practitioners (Sadler & Dooly, 2013; Schwienhorst, 2002). Research work in this area has primarily focused on the investigation of desktop 3D virtual worlds such as the well-known Active Worlds and Second Life (Lan et al., 2016; Toyoda & Harrison, 2002). Although not conclusive, research studies involving diverse learner groups and conducted in a variety of contexts have produced findings indicating that these technologies may be employed to the benefit of language learners (Peterson et al., 2019). However, research that explores the use of digital games in combination with immersive virtual reality technologies in learner-based projects is limited. The seventh chapter in this volume, *Exploring ESL Students' Perceived Engagement in and Experience of Content Vocabulary Learning Through Virtual Reality Games* by Muleyke Sahinler Albayrak, Julian Chen, and P. John Williams, adds to the literature in this area. In this exploratory case study, the authors implemented a suite of digital games, focusing on a variety of content areas using a Google headset at a school in Australia. Participant feedback data indicated that playing the VR-based games was enjoyable, and the immersion provided enhanced engagement with the content and motivation to learn. Although technical factors were highlighted as limitations, the learners further claimed that playing the games enabled them to acquire and retain significant amounts of content-based vocabulary.

As was noted at an earlier stage of this discussion, research on aspects of contemporary DGBLL is expanding. However, there are many areas that remain under-researched (Peterson et al., 2020). One area of promise where there is limited research at present concerns the implementation of digital games in combination with websites and social media to create distributed online learning environments (Cui et al., 2021). In the eighth chapter of this volume entitled *Becoming a Resourceful Language Learner in a Narrative-Driven Participatory Game* by Zeyu Cui, Jin Dong, Yang Liu, Michaela Nuesser, Huaiqing Zhang, Dongping Zheng and Yuanqing Zuo report on the findings of a pilot study that investigated the above area. In this exploratory mixed methods research, the researchers implemented an original bilingual interactive digital book (Bizhuwanshang) that incorporates game features and a theme that is set in China (environmental degradation). This digital book was implemented in combination with relevant websites, videoconferencing (Zoom), and social media (Facebook and Web Chat) to investigate relational dynamics between learners. The participants were Chinese EFL learners based at a university in the Pacific. The researchers found that the interactive narrative-driven features of the game and use of the online communication resources elicited the use of the TL as a resource and mediating tool. Moreover, the analysis further revealed that the affordances provided fostered participation, translanguaging, role play, linguistic embodiment, and cross-cultural collaboration.

One significant area of research on the application of digital games in CALL concerns the role of effective factors. Studies have been undertaken that examine areas such as learner beliefs, anxiety, willingness to communicate and motivation (Peterson et al., 2020). An examination of the

research carried out to date shows that although the majority of studies are small scale in nature and scope, they suggest that participation in gameplay involving a variety of game genres elicits positive learner feedback in the above areas (Lee, 2019; Liu & Chu, 2010; Reinders & Wattana, 2015). However, few studies have attempted to explore these affective variables in the context of large-scale projects that combine the use of digital games with online communication tools and that are intercultural in nature. The ninth chapter in this volume entitled *Interaction Games to Boost Intercultural Communication in Virtual Worlds and Video-Communication: A Case Study* by Kristi Jauregi-Ondarra and Silvia Canto attempts to fill this gap in the literature by examining the application of three games in the above context. This large-scale research involved a total of 80 learners of Spanish based in two universities in the Netherlands and United Kingdom. The researchers utilized mixed methods including analysis of recordings of learner gameplay, dairies, and semi-structured interviews. The findings of this project indicate that participation elicited positive learner feedback indicating that motivation and engagement were enhanced by playing digital games in a multimodal intercultural communication context.

1.3 Future implications

The chapters in this volume highlight a number of important findings and influential areas in contemporary research on the use of digital games in language learning. The findings further raise a number of important issues relevant to the nature, scope, and conduct of future research studies. The remainder of this chapter will now focus on providing a discussion of these areas.

1.3.1 The role of theory

One area of importance relevant to future research highlighted in this volume concerns the role of theory. As has been observed in the literature on CALL, the implementation of theory-informed studies that draw on developments in SLA research is of central importance (Chapelle, 2009; Chun, 2016). Although researchers acknowledged that there is no generally accepted theoretical framework for pursuing research, they nonetheless emphasize that such work contributes to the conduct of credible and productive development work in the field (Huh & Hu, 2005; Levy, 2000). However, in the context of DGBLL, it is noteworthy that while learner-based research work is increasing, theoretically informed studies are limited. In this context, researchers assert that there appears to be a need for further work that draws on SLA research both at the conceptual level and also in terms of implementation (Jabbari & Eslami, 2019; Jabbari, 2021). As the second chapter in this volume shows, of the SLA theories currently employed in research, work influenced by sociocultural conceptions of SLA predominates. This finding is unsurprising, given that the bulk of theory-informed research to date has involved role-playing games that are frequently designed to facilitate real-time social interaction and the development of online communities. Although such work predominates, it is clear the research base as a whole would benefit from the perspectives provided by studies that draw on alternative strands of SLA theory. The recent study by Scholz and Schulze (2017) provides a useful exemplar of this type of approach.

1.3.2 Research foci

A noteworthy feature of the current research base is its emphasis on particular areas of foreign language development. An examination of the literature reveals that there is a preponderance of studies that explore vocabulary learning and affective factors (Peterson et al., 2020). These areas have

attracted considerable attention, as research to date has shown that participation in DGBLL involving commercial role-playing and simulation games has produced broadly positive findings in regard to these areas. However, in addition to these areas, as research continues to expand, there is a need for more work that investigates other aspects of L2 learning with digital games. At present, work in this area is limited. In this context, learner-based studies focusing on the role of gaming in the development of the four skills would represent a welcome addition to the research base. Moreover, work focusing on the role of participation in digital gaming on pragmatic and syntactic development would also enrich understanding of how language development may be facilitated. Furthermore, as contributions to this volume show, the impact of gaming on learners' intercultural knowledge and skills represents another promising area for investigation in future research projects.

A noteworthy aspect of contemporary research is that the majority of studies focus on two particular game genres, namely, simulation and role-playing games. Although research involving these games has produced some positive findings, studies have also produced evidence indicating that other game genres are also worthy of investigation. Recent technological advances have witnessed the emergence of a new generation of virtual reality-based games and tools that offer a higher degree of player immersion than is possible with conventional desktop environments (Godwin-Jones, 2016). In an example of this approach, researchers have implemented location-based augmented reality games in a number of exploratory learner-based studies. The promising reported results suggest that these games, if implemented carefully, and in consideration of learner needs, may provide access to conditions in which learning can occur (Sydorenko et al., 2019; Zheng et al., 2018). These encouraging findings suggest that additional work involving this type of game is justified. A further application of recent VR technologies with potential in future research concerns the use of head mounted VR headsets such as Oculus Rift in gaming. Although work in this area is preliminary in nature, studies have produced evidence indicating that immersion and engagement are supported by the technology. There is also evidence that vocabulary learning, enjoyment, and intercultural knowledge can be enhanced by the use of this technology (Cheng et al., 2017; Lai & Chen, 2021).

1.3.3 Methodology

In a related area, the findings reported in this volume draw attention to the important role that developments in methodology play in advancing research. Early work on DGBLL tended to reflect the quantitative research paradigms that predominated at the time (Peterson, 2013). However, as studies in this volume demonstrate, the expansion of SLA research that incorporates qualitative approaches to data analysis has increasingly influenced contemporary work in DGBLL. The learner-focused studies in this volume mirror this trend. As these studies show, researchers are increasingly employing innovative qualitative research approaches and the use of mixed methods in an effort to better understand the complex nature of learning with digital games. In the authors' view, this trend represents a positive development as it provides a welcome means to broaden the research base. Although it should be acknowledged that work in this area presents a number of challenges relating to, for example, data collection and observation (Reinders, 2017), it is also significant in that it offers the prospect of obtaining potentially valuable insights into the nature of language learning with digital games.

1.3.4 Evaluation

A further area that will likely be of interest in future research concerns the evaluation of primary studies. Reflecting an influential trend in SLA research in recent years, CALL researchers have increasingly carried out review and analysis work (Boulton, 2015). Reviews, research synthesis,

and meta-analysis studies have been carried out into learning outcomes in expanding areas of CALL research with relevance to DGBL including computer-mediated communication (Lin, 2014; Sauro, 2011) and virtual worlds (Peterson et al., 2019). As has been observed in this volume, an increasing number of studies have also analyzed the results of learner-based DGBLL research. Although subject to limitations, this body of work has reported broadly positive results across studies (Thompson & von Gillern, 2020; Tsai & Tsai, 2018). In terms of evaluation, the pursuit of further meta-analysis studies into the application of specific game genres in DGBLL offers the prospect of providing potentially valuable insights into effectiveness. Moreover, as work continues to advance, there remains a need for the pursuit of not only meta-analysis but also a wide range of rigorous evaluative work including narrative reviews and research synthesis. Research of this nature will play an important role in raising awareness of significant issues in the field, drawing attention to areas with potential for future investigation.

1.3.5 *Replication*

Replication is another avenue of research on DGBLL that would appear to be ripe for investigation in future work. The need for more replication studies is a long-running theme in the CALL literature (Bikowski & Schulze, 2015; Porte, 2013). The considerable constraints facing researchers in the educational sciences dictate that exact replication is, in most cases, not feasible (Chun, 2012). Nonetheless, possibilities exist to conduct conceptual replication studies relating to many areas of CALL. In the context of DGBLL research, a number of small-scale conceptual replication studies have been reported involving the use of role-playing and simulation games. This research has reported some positive findings related to the areas of vocabulary learning and the role of affective influences on language development such as willingness to communicate (Ranalli, 2008; Reinders & Wattana, 2015). In an effort to enhance the validity and generalizability of research and facilitate systematic development of the field, the conduct of additional conceptional replication studies in these and other areas appears to be warranted.

1.3.6 *Educator roles*

As research advances, a further area of interest in future studies lies in the role of the teacher. A great deal of the current literature on DGBLL focuses on conceptional issues and speculation, but it is striking that there are far fewer studies concerned with teacher roles. This is a somewhat surprising as early work highlighted the benefits of combining gameplay with teacher-designed supplementary materials and scaffolds (Miller & Hegelheimer, 2006; Ranalli, 2008). However, relatively few recent studies that have followed up on this promising line of research (for a noteworthy recent exception, see Wang, 2019). This situation has led to calls for a move away from research that focuses primarily on games themselves to studies that place a greater emphasis on investigating the role of the teacher in facilitating learning outcomes (deHaan, 2021). Areas of possible investigation relating to pedagogy-orientated work are numerous. For example, in addition to the area noted above, studies that carry out an in-depth exploration into the nature of active teacher intervention in learner-based projects and the role of debrief in supporting learning could be of particular value, as may research that investigates teacher attitudes and the many factors that influence selection of particular game genres for classroom use. The effort to better understand teacher roles in learning with digital games has clear implications for the future of the field. If DGBLL is to move from the margins to the mainstream of language education, in other words, to become normalized (Bax, 2003), then there is a pressing need for more research that demonstrates its benefits in terms of praxis.

1.3.7 Curricular integration

Future research that focuses on teacher roles may also encompass studies that examine the role of effective curricular integration. This is an important issue, as many educators must work within established curricula and institutional constraints (Ott et al., 2013). Recent quantitative and mixed methods studies involving role-playing and simulation games have produced findings indicating that when these game types are carefully integrated into the regular curriculum positive learning outcomes related to vocabulary learning and learner attitudes can be achieved (Franciosi et al., 2016; Hitosugi et al., 2014; Reinders & Wattana, 2015). Although this work represents a step forward, the limited number of current studies in this area highlight that these findings are not definitive. At present, many aspects of this complex phenomenon remain under-researched. In this context, there is still considerable scope for additional studies to explore this issue (Godwin-Jones, 2014). One approach to the study of game integration involving learners of advanced levels of language proficiency that appears of particular promise is the pedagogical framework proposed by Thorne and Reinhardt (2008), known as *bridging activities*. This is designed to enhance learning and critical awareness through facilitating the analysis of learner texts produced in new digital media such as multiplayer games. In this framework, the instructor plays a central role as learners experience guided exploration focusing on the areas of interactional features, genre, and grammar. The ultimate aim of this model is to assist learners in bridging their in-class and technology-mediated language use and literacy practices.

1.3.8 Game creation

In the view of the editors, authoring represents an area of great promise and is likely to be the subject of increasing attention in future research. In an effort to better meet the needs of their learners, practitioners have long engaged in the creation of CALL software using authoring tools (Otto & Pusack, 2009). However, in the past, this effort was hampered somewhat by the limitations of the available content creation tools. As the discussion in this volume shows, the emergence of a new generation of powerful, highly accessible, and scalable authoring tools provides language educators with unprecedented opportunities to design learning activities that better meet the needs of their learners, overcoming many of the limitations of generic commercial software packages. The findings of learner-based studies have demonstrated that many COTS games have great potential as learning environments in CALL, particularly for learners of advanced levels of language proficiency (Thorne et al., 2009). However, research shows that some COTS games may also have limitations, including a steep learning curve, complex in-game cultures, and the prevalence of TL registers that are of limited application outside the game context. These factors coupled with the cognitively demanding nature of the gameplay may make such games unsuitable for certain learner groups (deHaan et al., 2010). In this context, contemporary game authoring tools offer new opportunities to overcome these limitations, providing access to tailor-made games that are designed to focus on meeting specific learner needs. The application of user-end development tools to design engaging, motivating, and effective educational games remains a challenging endeavour that involves careful consideration of an interplay of factors including proficiency levels, task design, feedback, and curricular goals (Purushotma et al., 2009). Although these factors require acknowledgement, there can be little doubt that the current generation of tools open up new avenues for research with the potential for a wider application than has been the case in the past.

1.3.9 Gaming in informal contexts

Contemporary digital games form part of a spectrum of continuously evolving digitally mediated activity that has now penetrated many spheres of everyday life (Reinhardt & Thorne, 2016). A great deal of this online activity is informal in nature and occurs in the digital wilds, that is, outside the confines of formal educational institutions (Sauro & Zourou, 2019). Researchers note that digital games, particularly those that are designed to support social interaction such as many role-playing games, have elicited the creation of extensive online ecologies that are frequently international in nature and incorporate game-related texts, fan sites, strategy guides, gameplay videos, and discussion boards (Thorne et al., 2012). The discussion in this volume emphasizes that these online resources and forums have the potential to support foreign language learning as they provide extensive exposure to authentic TL and opportunities for purposeful social interaction. As this area remains under-researched, there is considerable scope for future studies to investigate the potential of these resources. Areas of possible interest could include vocabulary learning and the development of intercultural knowledge and skills. Furthermore, the online communities that have evolved in and around social games represent another area that would benefit from the conduct of additional learner-based studies. There is speculation in the CALL literature that the in-game social groups that are found in some role-playing games represent arenas where learners encounter TL rich contexts for intercultural interaction and language development (Sykes et al., 2010). It is further asserted that in these online groups language learners may engage in beneficial forms of peer-based interaction and participate in communities of practice that provide opportunities for language socialization (Thorne et al., 2009). Although research in this area remains at an emergent stage, a number of learner-based studies have produced findings suggesting that participation in out-of-school gaming and associated online game communities may lead to positive learning outcomes, particularly in terms of vocabulary acquisition, the development of intercultural skills, and learner attitudes (Ryu, 2013; Sundqvist, 2019). These promising findings indicate that more research in this area can shed new light on language learning in online game communities.

1.4 Conclusions

The contributions to this volume reflect broader developments in the field of CALL and at the same time highlight some of the strengths of current research on the use of digital games. As research continues to expand, it appears likely that theoretically informed studies and replication work will become increasingly influential in shaping the future research agenda in this area. In this context, the increase in analysis and evaluative work offers potentially valuable insights that may positively inform many aspects of future work. Moreover, the growing use of case studies and other forms of qualitative research methodologies will contribute to supplying deeper insights into the nature of individual language development in and around games. At the same time, the findings reported in this volume draw attention to gaps and limitations in the current research base. The majority of current studies have focused on the activities of small groups of intermediate and advanced level EFL learners located in universities. As research efforts continue, it will become increasingly important to overcome the many challenges of conducting work in this area and broaden the research base to include additional large-scale longitudinal projects that involve more diverse theoretical approaches, learner groups, and contexts. As a great deal of recent work has focused primarily on role-playing and simulation games, there is clearly scope for more research that investigates the potential of other game genres. Moreover, as gaming in informal contexts continues to rapidly expand further research conducted in out-of-school

contexts will enhance understanding of this phenomenon. As noted at a previous stage of this discussion, current work remains limited in scope and is heavily focused on certain areas such as vocabulary acquisition and learner attitudes leaving other areas of potential interest under-researched. However, in the authors' view, studies that involve other areas of investigation such as curricular integration, game creation, and teacher roles will likely prove valuable in both broadening and deepening understanding of the nature of language learning with digital games.

References

Bax, S. (2003). CALL-past, present and future. *System*, 31(1), 13–28. [https://doi.org/10.1016/S0346-251X\(02\)00071-4](https://doi.org/10.1016/S0346-251X(02)00071-4)

Biber, D., & Conrad, S. (2019). *Register, genre, and style*. Cambridge University Press. <https://doi.org/10.1017/9781108686136>

Bikowski, D., & Schulze, M. (2015). Replication and evaluation in CALL. *CALICO Journal*, 32(2), i–v. <https://doi.org/10.1558/cj.v32i2.26981>

Boulton, A. (2015). From research to research thesis in CALL. In F. Helm, L. Bradley, M. Guarda, & S. Thouesny (Eds.), *Critical CALL- Proceedings of the 2015 EUROCALL conference, Padova, Italy* (pp. 84–90). Research-publishing.net. <https://doi.org/10.14705/rpnet.2015.000314>

Chapelle, C. A. (2009). The relationship between second language acquisition theory and computer-assisted language learning. *The Modern Language Journal*, 93, 741–753. <https://doi.org/10.1111/j.1540-4781.2009.00970.x>

Cheng, A., Yang, L., & Andersen, E. (2017). Teaching language and culture with a virtual reality game. In *Proceedings of the 2017 CHI conference on human factors in computing systems (CHI '17)* (pp. 541–549). Association for Computing Machinery. <https://doi.org/10.1145/3025453.3025857>

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>

Chun, D. (2012). Review article: Replication studies in CALL research. *CALICO Journal*, 29(4), 591–600. <http://www.jstor.org/stable/calicojournal.29.4.591>

Chun, D. (2016). The role of technology in SLA research. *Language Learning & Technology*, 20(2), 98–115. <http://dx.doi.org/10125/44463>

Connolly, T. M., Boyle, E. A., MacArthur, E., Hainey, T., & Boyle, J. M. (2012). A systematic literature review of the empirical evidence on computer games and serious games. *Computers & Education*, 59(2), 661–686. <https://doi.org/10.1016/j.compedu.2012.03.004>

Cui, Z., Dong, J., Yang, L., Tangiyev, D. M., Nokes, J., Nuesser, M., Tang, S., & Zhang, H. (2021). Design of a distributed language learning environment. In: Y. J. Lan & S. Grant (Eds.), *Contextual language learning* (pp. 39–70). Chinese Language Learning Sciences. Springer. https://doi.org/10.1007/978-981-16-3416-1_3

deHaan, J., Reed, W. M., & Kuwada, K. (2010). The effect of interactivity with a music video game on second language vocabulary recall. *Language Learning & Technology*, 14(2), 74–94. <http://llt.msu.edu/vol14num2/dehaanreedkuwada.pdf>

deHaan, J. (2021). Is game-based language teaching “Vaporware?.. In M. Peterson, K. Yamazaki, & M. Thomas (Eds.), *Digital games in language learning: Theory, development and implementation* (pp. 257–276). Bloomsbury.

Franciosi, S. J., Yagi, J., Tomoshige, Y., & Ye, S. (2016). The effects of a simple simulation game on long-term vocabulary retention. *CALICO Journal*, 33(2), 1–25. <http://doi.org/10.1558/cj.v33i2.26063>

Godwin-Jones, R. (2014). Games in language learning: Opportunities and challenges. *Language Learning & Technology*, 18(2), 9–19. <http://dx.doi.org/10125/44363>

Godwin-Jones, R. (2016). Augmented reality and language learning: From annotated vocabulary to place-based mobile games. *Language Learning & Technology*, 20(3), 9–19. <http://dx.doi.org/10125/44475>

Hitosugi, C. I., Schmidt, M., & Hayashi, K. (2014). Digital game-based learning (DGBL) in the L2 classroom: The impact of the UN's off-the-shelf videogame food force, on learner affect and vocabulary retention. *CALICO Journal*, 31(1), 104–124. <http://www.jstor.org/stable/calicojournal.31.1.19>

Huh, K., & Hu, W.-C. (2005). Criteria for effective CALL research. In J. L. Egbert, & G. M. Petrie (Eds.), *CALL research perspectives* (pp. 9–21). Lawrence Erlbaum.

Jabbari, N. (2021). Second language development in the context of massively multiplayer online games: Theoretical perspectives. In M. Peterson, K. Yamazaki, & M. Thomas (Eds.), *Digital gaming and language learning: Theory, development and implementation* (pp. 47–67). Bloomsbury. <http://dx.doi.org/10.5040/9781350133037.ch-003>

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>

Lai, K.-W. K., & Chen, H.-J. H. (2021). A comparative study on the effects of a VR and PC visual novel game on vocabulary learning. *Computer Assisted Language Learning*, 1–34. <https://doi.org/10.1080/09588221.2021.1928226>

Lan, Y. J., Kan, Y. H., Sung, Y. T., & Chang, K. E. (2016). Oral-performance language tasks for CSL beginners in second life. *Language Learning & Technology*, 20(3), 60–79. <http://llt.msu.edu/issues/october2016/lanetal.pdf>

Lee, S. (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>

Levy, M. (2000). Scope, goals and methods in CALL research: Questions of coherence and autonomy. *ReCALL*, 12(2), 170–195. <https://doi.org/10.1017/S0958344000000525>

Lin, H. (2014). Establishing an empirical link between computer-mediated communication (CMC) and SLA: A meta-analysis of research. *Language Learning & Technology*, 18(3), 120–147. <http://dx.doi.org/10125/44387>

Liu, T. Y., & Chu, Y. L. (2010). Using ubiquitous games in an English listening and speaking course: Impact on learning outcomes and motivation. *Computers & Education*, 55(2), 630–643. <https://doi.org/10.1016/j.compedu.2010.02.023>

Miller, M., & Hegelheimer, V. (2006). The SIMs meets ESL incorporating authentic computer simulation games into the language classroom. *Interactive Technology and Smart Education*, 3(4), 311–328. <https://doi.org/10.1108/17415650680000070>

Ott, M., Stanescu, I., Popescu, M. M., & de Freitas, S. (2013). Game-enhanced learning: Preliminary thoughts on curriculum integration. In S. de Freitas, M. Ott, M. M. Popescu, & I. Stanescu (Eds.), *New pedagogical approaches in game enhanced learning: Curriculum integration* (pp. 1–19). IGI Global. <https://doi.org/10.4018/978-1-4666-3950-8.ch001>

Otto, S., & Pusack, J. (2009). Computer-assisted language learning authoring issues. *The Modern Language Journal*, 93, 784–801. <https://doi.org/10.1111/j.1540-4781.2009.00973.x>

Pasfield-Neofitou, S. (2014). Language learning and socialization opportunities in game worlds: Trends in first and second language research. *Language and Linguistics Compass*, 8(7), 271–284. <https://doi.org/10.1111/lnc3.12083>

Peterson, M. (2013). *Computer games and language learning*. Palgrave Macmillan. <https://doi.org/10.1057/9781137005175>

Peterson, M. (2021). Digital simulation games in CALL: A research review. *Computer Assisted Language Learning*. <https://doi.org/10.1080/09588221.2021.1954954>

Peterson, M., Wang, Q., & Mirzaei, M. S. (2019). The use of network-based virtual worlds in second language education: A research review. In M. Kruk (Ed.), *Assessing the effectiveness of virtual technologies in foreign and second language instruction* (pp. 1–25). IGI Global. <https://doi.org/10.4018/978-1-5225-7286-2.ch001>

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. <https://doi.org/10.4018/978-1-7998-2591-3.ch004>

Plonsky, L., & Ziegler, N. (2016). The CALL-SLA interface: Insights from a second-order synthesis. *Language Learning and Technology*, 20(2), 17–37. <http://hdl.handle.net/10125/44459>

Porte, G. (2013). Who needs replication? *CALICO Journal*, 30(1), 10–15. <https://doi.org/10.11139/cj.30.1.10-15>

Purushotma, R., Thorne, S. L., & Wheatley, J. (2009). *10 key principles for designing video games for foreign language learning*. Paper produced for the Open Language & Learning Games Project, Massachusetts Institute of Technology, funded by the William and Flora Hewlett Foundation. https://www.academia.edu/3796735/10_Key_Principles_for_Designing_Video_Games_for_Foreign_Language_Learning_2009_Purushotma_Thorne_and_Wheatley_

Ranalli, J. (2008). Learning English with the sims: Exploiting authentic computer simulation games for L2 learning. *Computer Assisted Language Learning*, 21(5), 441–455. <https://doi.org/10.1080/09588220802447859>

Reinders, H. (2017). Digital games and second language learning. In S. L. Thorne & S. May (Eds.), *Encyclopedia of language and education* (pp. 329–343). Springer. https://doi.org/10.1007/978-3-319-02237-6_26

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>

Reinhardt, J. (2019). *Gameful second and foreign language teaching and learning: Theory, research, and practice*. Palgrave Macmillan. <https://doi.org/10.1007/978-3-030-04729-0>

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: Theory, development and implementation* (pp. 69–88). Bloomsbury.

Reinhardt, J., & Sykes, J. (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. https://doi.org/10.1057/9781137005267_3

Reinhardt, J., & Sykes, J. M. (2014). Digital game and play activity in L2 teaching and learning. *Language Learning & Technology*, 18(2), 2–8. <http://dx.doi.org/10125/44362>

Reinhardt, J., & Thorne, S. (2016). Metaphors for digital games and language learning. In F. Farr & L. Murray (Eds.), *The Routledge handbook of language learning and technology*, (pp. 415–430). Taylor Francis. <https://doi.org/10.4324/9781315657899-4>

Reinhardt, J., & Thorne, S. L. (2020). Digital games as language-learning environments. In J. Plass, R. Mayer, & B. Homer (Eds.), *Handbook of game-based learning* (pp. 409–435). MIT Press.

Ryu, D. (2013). Play to learn, learn to play: Language learning through gaming culture. *ReCALL*, 25(2), 286–301. <https://doi.org/10.1017/S0958344013000050>

Sadler, R., & Dooly, M. (2013). Language learning in virtual worlds: Research and practice. In M. Thomas, H. Reinders, & M. Warschauer (Eds.), *Contemporary computer-assisted language learning* (pp. 159–182). Bloomsbury.

Sauro, S. (2011). SCMC for SLA: A research synthesis. *CALICO Journal*, 28(2), 369–391. <https://doi.org/10.11119/cj.28.2.369-391>

Sauro, S., & Zourou, K. (2019). What are the digital wilds? *Language Learning & Technology*, 23(1), 1–7. <https://doi.org/10125/44666>

Scholz, K. W., & Schulze, M. (2017). Digital-gaming trajectories and second language development. *Language Learning & Technology*, 21(1), 99–119. <http://dx.doi.org/10125/44597>

Schwienhorst, K. (2002). Why virtual, why environments? Implementing virtual reality concepts in computer-assisted language learning. *Simulation & Gaming*, 33(2), 196–209. <https://doi.org/10.1177/1046878102332008>

Sundqvist, P. (2019). Commercial-off-the-shelf games in the digital wild and L2 learner vocabulary. *Language Learning & Technology*, 23(1), 87–113. <https://doi.org/10125/44674>

SuperData. (2020). The year in review: Digital games and interactive media. Retrieved from: <https://drive.google.com/file/d/19E0bXya2wX-tkuOIn4IhbE9Z2Z2EPKwi/view>

Sydorenko, T., Hellermann, J., Thorne, S. L., & Howe, V. (2019). Mobile augmented reality and language-related episodes. *TESOL Quarterly*, 53(3), 712–740. <https://doi.org/10.1002/tesq.507>

Sykes, J. M., Reinhardt, J., & Thorne, S. L. (2010). Multiuser digital games as sites for research and practice. In F. M. Hult (Ed.), *Directions and prospects in educational linguistics* (pp. 117–135). Springer.

Thompson, C. G., & von Gillern, S. (2020). Video-game based instruction for vocabulary acquisition with English language learners: A Bayesian meta-analysis. *Educational Research Review*, 30, 1–23. <https://doi.org/10.1016/j.edurev.2020.100332>

Thorne, S. L., & Reinhardt, J. (2008). “Bridging activities,” new media literacies and advanced foreign language proficiency. *CALICO Journal*, 25(3), 558–572. <https://doi.org/10.1558/cj.v25i3.558-572>

Thorne, S. L., Black, R. W., & Sykes, J. M. (2009). Second language use, socialization, and learning in internet interest communities and online gaming. *The Modern Language Journal*, 93(S1), 802–821. <https://doi.org/10.1111/j.1540-4781.2009.00974.x>

Thorne, S., 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>

Toyoda, E., & Harrison, R. (2002). Categorization of text chat communication between learners and native speakers of Japanese. *Language Learning & Technology*, 6(1), 82–99. <http://llt.msu.edu/vol6num1/toyoda/>

Tsai, Y., & Tsai, C. (2018). Digital game-based second-language vocabulary learning and conditions of research designs: A meta-analysis study. *Computers and Education*, 125, 345–357. <https://doi.org/10.1016/j.compedu.2018.06.020>

Vazquez-Calvo, B., Zhang, L. T., Pascual, M., & Cassany, D. (2019). Fan translation of games, anime, and fanfiction. *Language Learning & Technology*, 23(1), 49–71. <https://doi.org/10.1257/44672>

Wang, Q. (2019). Classroom intervention for integrating simulation games into language classrooms: An exploratory study with the SIMS 4. *CALL-EJ*, 20(2), 101–127.

Xu, Z., Chen, Z., Eutsler, L., Geng, L., & Kogut, A. (2020). A scoping review of digital game-based technology on English language learning. *Educational Technology Research Development*, 68, 877–904. <https://doi.org/10.1007/s11423-019-09702-2>

Zheng, D., Liu, Y., Lambert, A., Lu, A., Tomei, J., & Holden, D. (2018). An ecological community becoming: Language learning as first-order experiencing with place and mobile technologies. *Linguistics and Education*, 44, 45–57. <https://doi.org/10.1016/j.linged.2017.10.0>