As interactive, multimodal, immersive, and extremely popular environments, digital games have received increasing interest from educators in recent years for their potential to enhance the language learning experience, both inside and outside the classroom. Review studies from general education have confirmed that “playing computer games is linked to a range of perceptual, cognitive, behavioral, affective and motivational impacts and outcomes” (Connolly et al. Computers & Education 59(2):661–686, 2012) although this depends on the subject matter (Young et al. Review of Educational Research 82(1):61–89, 2012). Early studies in the area of language acquisition have demonstrated positive effects of game play on motivation, willingness to communicate, language socialization, and a range of other factors involved in the language learning process. As a relatively new field, however, there are significant gaps in the available literature, and many worthwhile areas remain yet to be explored. In this article, I will describe how research into digital games relates to earlier research on game-based learning, primarily with younger learners, before discussing the key areas in which studies have been carried out and their most important findings. The following sections discuss some of the challenges faced by the field and suggest future directions for research and development in this field.

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**Keywords**

Digital gaming - Game-based language learning
Digital Games and Second Language Learning

Hayo Reinders

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Digital gaming • Game-based language learning

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Introduction

As interactive, multimodal, immersive, and extremely popular environments, digital games have received increasing interest from educators in recent years for their potential to enhance the language learning experience, both inside and outside the classroom. Review studies from general education have confirmed that “playing computer games is linked to a range of perceptual, cognitive, behavioural, affective and motivational impacts and outcomes” (Connolly et al. 2012: 661), although this depends on the subject matter (Young et al. 2012). Early studies in the area of language acquisition have demonstrated positive effects of game play on motivation, willingness to communicate, language socialization, and a range of other factors involved in the language learning process. As a relatively new field, however, there are significant gaps in the available literature, and many worthwhile areas remain yet to be explored. In this article, I will describe how research into digital games relates to earlier research on game-based learning, primarily with younger learners, before discussing the key areas in which studies have been carried out and their most important findings. The following sections discuss some of the challenges faced by the field and suggest future directions for research and development in this field.

Early Developments

Game-Based Learning

Research in digital game-based language learning and teaching (DGBLLT) is linked to a much older interest in the role of play in language learning and in education in general. Before describing research on DGBLLT then, it is important to understand what is meant by “play” and how game play impacts development and language learning.

Play is a natural process of learning whereby children develop physically, cognitively, emotionally, and socially through problem-solving and perseverance. In an influential early study, Bruner (1972) showed that children who had opportunities to...
play with objects achieved similar to higher problem-solving skills than children who had not but also that they developed greater tolerance in trying to solve problems and, in dealing with difficulties in doing so, were more creative and had more positive attitudes. In addition to helping children’s general cognitive and social development, play also has an important role in the development of L1 language skills. Vygotsky’s work has been particularly important in recognizing how play allows children to make meaning based on resources (real or imagined) in their immediate context to express feelings and to share intentions and ideas with other children, even in the absence of fully developed language ability. For example, where a gap in children’s interlanguage exists, the use of physical objects or movement can make up for this. This not only allows for meaning to be expressed but for collaborative construction and scaffolding of language to occur (Weininger and Daniel 1992). As Widdowson (2001, p. 137) notes, “the playground culture is almost exclusively oral,” and this oral aspect requires children to seek ways to express themselves verbally. A good example of an oral play activity is a narrative, which, Seach (2007) argues, provides two key elements in children’s language development: context and meaningful communication. Play partners facilitate children to share their play experience with each other and implicitly acquire vital pragmalinguistic knowledge. Play activities allow children to transfer skills and knowledge to solve problems, discover, and analyze ongoing processes to develop language skills and strategies. Frost et al. (2001) show how children use metalinguistic ability when talking about their play. Language assists children in structuring and understanding the meaning of their experiences and emotions and recognizing and making sense of their sensory faculties; in other words, play, language use, language development, and children’s wider cognitive and social development are closely linked.

The use of games in foreign language teaching goes back many decades (Lee 1979; Rixon 1981), both for younger learners as well as adults, with some going so far as to see a vital role for games in the language classroom: “If it is accepted that games can provide intense and meaningful practice of language, then they must be regarded as central to a teacher’s repertoire. They are thus not for use solely on wet days and at the end of term!” (Wright et al. 1984, p. 1). The fact that non-digital games are still popular can be seen from the fact that the latter book is now in its third edition (2005) and from the many websites dedicated to ideas for language games for teachers. The role of physical games in second language acquisition also continues to be explored (Tomlinson and Masuhara 2009).

The advent of gaming consoles and games designed for personal computers certainly increased interest in game play by people of all ages and hence by educators in general. As a result, games are now no longer seen as only appropriate for children or in private settings but incorporate the wide range of genres found in adult forms of communication, including ones unique to the gaming environment. However, despite vast differences between games, they share a number of characteristics. Prensky (2001) argues that most games involve the following:
1. Rules
2. Goals and objectives
3. Outcome and feedback
4. Conflict, competition, challenge, and opposition
5. Interaction
6. The representation of a story.

These are also characteristics of many successful language teaching environments and indeed (perhaps with the exception of the “representation of a story”) of task-based language teaching, in particular as related to the use of technology (see Thomas and Reinders 2010, for a collection of papers on technology in task-based language teaching).

Another characteristic of many commercially produced recreational digital games is their complexity, with many games including extremely elaborate story lines, multiple characters, complex problems to solve, and plot twists. This complexity was initially not found in games designed for use in education (sometimes referred to as “edutainment”). Often limited to simple vocabulary exercises with the addition of a points system, many such games do not meet the criteria proposed by Prensky and others.

As for the theoretical underpinnings of DGBLLT, sociocultural theory has played a particularly important role in the implementation of games in education (Ma et al. 2011) and specifically in the area of language education (Lantolf and Thorne 2006; Thorne 2008). In particular, collaborative games such as massively multiplayer online role-playing games (MMORPGs), in which people play with and against others online, and simulation games, in which players create and communicate in virtual worlds, create many opportunities for collaboration and competition and rich opportunities for exposure to L2 input as well as opportunities for L2 output and interaction, all of which have rich theoretical bases in second language acquisition research (e.g., Krashen on L2 input, 1982; Swain on output, 1985; Long 1981). Another aspect of games in education is the additional control they give learners over the learning process (Butler et al. 2014), for example, by allowing players to choose different levels, avatars, scenes, and so on. Such control has been linked to (the development of) learner autonomy, which in turn has been linked to language acquisition (Benson 2013). A final theoretical basis comes from the fields of embodied and grounded cognition (Clark 2001; Gibbs 2006), which highlight the importance of our body, either virtual or real, in cognition. New developments in virtual reality are likely to increase interest in this area in the future.

**Major Contributions and Work in Progress**

**The Affordances of Digital Games**

In order to understand the benefits of digital games in language learning and teaching, it is helpful to consider existing research in terms of the ways in which it attempts to draw on the affordances (or: context-dependent potential benefits (Van
Lier (2004) that digital games offer. In Gee’s view, digital games are “problem
solving spaces that use continual learning and provide pathways to mastery through
entertainment and pleasure” (Gee 2009, p. 65). Gee (2003) argues that good digital
games incorporate learning principles and have a variety of design features that “are
particularly relevant to language learning” (Gee 2012, p. xiii). In his 2003 book, the
list of 36 of these principles, including, to name a few, “the active, critical learning
principle,” which argues that all aspects of the learning environment are set up to
courage active and critical, not passive, learning, and the “psychosocial morato-
rion,” which describes an environment in which learners can take risk and where
real-world consequences are lowered. The “practice principle” holds that learners get
a great deal of practice in a context where that practice is not boring. Gee found these
and other principles to be common in most of the digital games he looked at, and
they provide a helpful lens to investigate the potential benefits of games.

Reinhardt and Sykes (Reinhardt and Sykes 2012; Sykes and Reinhardt 2012)
propose a framework for understanding the different roles that games can play in
language research and practice, as game-enhanced, game-based, or game-informed,
where the former uses games designed for entertainment purposes, game-based
involves the use of educational games, and game-informed uses game play princi-
bles only. Each of these may raise different learning and teaching questions, such as
how game-enhanced learning happens in informal language learning or how certain
game designs afford particular learning behaviors (see also Reinhardt and Thorne
2016).

Whitton distinguishes between eight roles for games, i.e., learning with enter-
tainment games, learning with educational games, learning inspired by games,
learning within games, learning about games, learning from games, learning through
game creation, and learning within game communities (2014, p.4–5). Another
distinction can be made between studies that investigate primarily the effects of
game (-enhanced, -based, -informed) learning on either L2 acquisition or on affec-
tive factors involved in L2 learning. We use this broad distinction below to report on
some of the key studies in the field.

Research on the Effects of DGBLLT: Language Acquisition

Studies on the effects of game play on language acquisition are somewhat limited.
One of the reasons is that the use of digital games is usually a complement to existing
courses, and as such, it is difficult to control for all the variables that can have an
effect on learning outcomes. Most studies attempting to investigate acquisition have
instead (at least in part) focused on opportunities that games afford for exposure to
and interaction in the target language, on the assumption that these underlie language
acquisition. For example, a pilot study by Rankin et al. (2006) investigated interac-
tion between four ESL students in the MMORPG “EverQuest II” in an attempt to
determine if participation in the game could foster students’ English language
proficiency and knowledge of new vocabulary. In this study, students participated
in eight gaming sessions held over a period of 4 weeks. The findings demonstrated
that students increased target language vocabulary output by 40% as a result of interaction with non-player characters and produced a remarkable 100% increase in target language chat messages during social interaction between players. The social interaction among players in EverQuest II was further examined by Rankin et al. (2009). The authors took a closer look at the in-game dialogues between eight native and 18 non-native speakers and language socialization in MMORPGs. The findings revealed that ESL students significantly increased their target language output by interacting with their native speaker interlocutors. The findings also suggested that EverQuest II, and possibly MMORPGs in general, encouraged L2 interaction as the players must be active learners and engage with other learners within the environment.

These findings were partly borne out by a recent study by Scholz (2016), who used the popular MMORPG “World of Warcraft” in an extramural setting with 14 learners of German as a foreign language in Canada, to determine the impact of game play on language development. Data was derived from both in-game experiences and out-of-game conversations over a period of 4 months, without any instruction or intervention on the part of the researcher other than three focus-group meetings with other learners over this period, held in German. This is therefore one of the few studies that were carried out in an informal setting and that took place over a (relatively) long period of time. It was found that the game environment was beneficial to the participants’ language development and that in particular the process of transferring linguistics constructions encountered in the game environment to a non-game environment (during the focus-group sessions) played an important role in this.

Whether active engagement associated with gaming activity has downsides was one of the concerns of de Haan et al. (2010), who investigated the effect of using a music video game on vocabulary recall. In their study, 80 Japanese university undergraduates were paired with one student playing a music game for 20 min while the other simply observed. A vocabulary recall test and a measure of cognitive load, followed by a delayed vocabulary recall test 2 weeks later, showed that all participants had learned some of the targeted vocabulary but the players significantly less so than the observers. The authors attribute this to the greater cognitive load imposed on the players. A similar study by Mohsen (2016), however, found the opposite: players outperformed observers.

A feature of much game-based learning is that it takes place in out-of-class settings. Sundqvist and Sylvén have produced multiple studies describing the ways in which Swedish learners make use of various media and games in non-formal extramural settings and how this impacts on their acquisition of English vocabulary. The first of these studies (Sylvén 2004) was a longitudinal study into the effects of content and language integrated learning on vocabulary development among upper secondary school learners. One of the main factors found to affect acquisition was the use by students of digital texts and environments outside of school. To investigate what types of texts were most beneficial, a second study was conducted among secondary school learners (Sundqvist 2009, 2011). In this study, it was found that out of school activities were positively correlated with L2 acquisition
and that in particular, more “active” types of activities such as use of the internet and playing video games were more strongly correlated than more passive activities such as watching TV or listening to music. Boys were found to engage more in the former, girls more in the latter. A jointly authored third study focusing on 12-year-olds (Sylvén and Sundqvist 2012) confirmed these findings, and a fourth study with 10-year-olds showed broadly similar findings (Sundqvist and Sylvén 2014).

One way of enhancing participation is to involve the learners in the design of game-based activities. In this vein, Butler (2015) reports on a study that investigated the use of games with young learners. In her study, 82 learners of 11–12 years of age were asked first to identify vocabulary-learning elements in existing instructional games they found attractive and to then design story boards for computer games that could be used to teach vocabulary to their younger peers. Although this study did not investigate language acquisition per se, it does give insight into the process by which (young) learners identify useful features of games and the way they can incorporate them into building their own learning environments.

Research on the Effects of DGBLLT: Affective Factors

A meta-analysis of the effects of digital games in educational (but not language-learning-specific) contexts by Vogel et al. (2006) showed that its main benefits were in the affective realm. It is perhaps not surprising then that most studies in DGBLLT have investigated features such as student engagement, motivation, and anxiety. A further role has been identified in games helping to facilitate learners’ language socialization (e.g., Duff, 2007; Tarone, 2007) and the development of their social identity in and through games (Thorne and Reinhardt, 2008).

Anyaegeb et al. (2012) tested the above assumptions by investigating the effect of the game “Mingoville” on the motivation, engagement, and interest of young Chinese learners of English. The qualitative findings of the study indicated that the majority of the students were motivated to learn English with Mingoville because the game was fun for them and made them feel relaxed and avoided making them lose face. This was shown in the amount of collaboration the learners engaged in. However, there were some students who reported that the experience was demotivating because they either found playing the game boring or generally did not like games. This supports Whitton’s (2007, 2011) view that employing games for motivational purposes alone is not sufficient justification for their use because they might not be motivational for all students, particularly students in higher education.

Dalton and Devitt (2016) found a similarly positive attitude towards games in education with a group of 25 primary school learners of Irish. In their study, they developed a 3D game using the Open Sim platform that incorporated a number of collaborative storytelling tasks. An interesting finding from their study is that for these younger learners, goal orientation was one of the most important aspects of the experience, whereas many games (and in particular virtual worlds) give players a great deal of choice, the 9–11-year-old learners said they preferred more structure.
Taking a slightly different approach, and focusing on interaction in the L2, Peterson (2010, 2011) showed that the highly learner-centered nature of the interaction provided by network-based games, the anonymity and the reduced inhibition provided by personal avatars, and the reduction of paralinguistic cues in real-time chat are characteristics that may reduce anxiety and improve self-confidence. Subsequent studies by Peterson (2012a, b) focused specifically on learner interaction and attitudes in MMORPGs. In his qualitative study (Peterson 2012a) of the use of the MMORPG “NineRift,” six Japanese EFL university students participated in two gaming sessions, lasting approximately 90 min each, which were held 1 week apart. Peterson obtained data from learners’ chat messages exchanged during game play, researcher observations, filed notes, learner responses to pre- and post-study questionnaires, and interviews. The findings indicated that learners actively participated in the game, utilized different types of strategy to manage their interaction, undertook collaborative dialogues exclusively in the L2, and had positive attitudes, claiming that interaction in MMORPGs was engaging, motivating, and enjoyable and improved their fluency and discourse management practice. In a later study, Peterson (2012b) investigated the linguistic and social interaction and attitudes of four intermediate Japanese EFL university students in the MMORPG “Wonderland.” Participants were engaged in four sessions, lasting approximately 70 min each and held once a week over a period of 1 month. Similar to the findings from the earlier study, participants used a range of strategies and conducted their interaction exclusively in the target language. Moreover, participants provided largely positive feedback, claiming that interaction in MMORPGs, in combination with the anonymity provided by the use of pseudonyms and avatars, helped to reduce anxiety levels and encouraged opportunities for taking risks in using the target language and, thus, creative and extensive use of the language.

Zheng et al. (2009) investigated the role of the virtual environment “Quest Atlantis” in English language learning. The authors examined the interaction and collaborative construction of cultural and discourse practices between two native speakers and two non-native speakers of English. They were paired and were requested to work collaboratively over a 10-week period. Data was collected through participant observation, post-quest interviews, and an analysis of chat logs and emails. It was found that participation in the game allowed learners to engage in authentic and meaningful interaction with the native speakers while closely cooperating with each other to complete the quests, enabling them to gain knowledge from a more knowledgeable/experienced game player through action. That is, native speakers were able to share their linguistic knowledge with language learners, and language learners were able to share cultural information regarding the quests while chatting with the native speakers in the game. This interaction was conceptualized as negotiation for action and perceived as an extension of the concept of negotiation for meaning. The findings suggested that negotiation for action could contribute to the potential for greater cultural awareness as well as increased mutual collaboration and cultural identity as a means to successful quest completion. The learners who participated in this study recognized that negotiation of action was a
type of interaction that was unavailable in their learning experiences in the language classroom.

Willingness to communicate (WTC), or individuals’ “readiness to enter into discourse at a particular time with a specific person or persons, using a L2” (MacIntyre et al. 1998, p. 547) has received a great deal of attention in L2 research in recent years, and the effects of digital games on WTC have also been investigated. In a study of 30 Thai learners of English as a foreign language enrolled in a university language course, Reinders and Wattana (2016) took the “game-enhanced” approach one step by further by adopting a commercially available and very popular online role playing game called Ragnarok. The game was completed during six 90-min lessons playing Ragnarok. The game had been installed on a private server and was thus only available to participants in the study and modified to include special instructions or quests (missions that players are assigned to accomplish in order to get items and progress in the game) designed to encourage collaboration and communication. To gauge participants’ WTC, a series of questionnaires was designed, adapted from MacIntyre et al.’s (2001) WTC scale and previous studies on language and communication anxiety (Horwitz et al. 1986; McCroskey and Richmond 1982) and perceived competence (Compton 2004; MacIntyre and Charos 1996). These asked respondents about their (own perceptions of their) willingness to use English, as well as their confidence, anxiety, and perceived communicative competence in communicating in English. The questionnaires were administered at the start of the course and again after six gaming sessions. Results on the first set of questionnaires showed that students had low confidence, high anxiety, low perceived competence, and low WTC. The second set of results showed a marked and significant improvement, with participants feeling more confident, less anxious, more competent, and more willing to communicate. The authors argue on the basis of these results that the careful construction of tasks that draw on the affordances of games can have a positive effect on the language learning process.

Problems and Difficulties

The research on DGBLLT faces a number of challenges, which can broadly be categorized as operational, pedagogical, and methodological. In the first category fall issues related to privacy, safety, and security, as well as concerns by parents and other stakeholders about the appropriateness of games in educational settings. These concerns are not to be underestimated as they have a major impact on how, or if, games are used. Also in the category of operational challenges fall technical issues. Many teachers may not be familiar with game play and as such lack the skills and interest to play games, let alone coach others. A number of the studies described above involved some sort of manipulation of the game environment, which requires a level of technical skill that many teachers will not have. At a practical level, games can be expensive, either because they need to purchased or licensed and also because some
types of games (such as MMORPGs, or massively multiplayer online role playing
game) require fast processors and graphics cards, headphones and microphones, etc.

In the second category fall pedagogical challenges. In most of the studies reported
above, the researchers were also the teachers delivering the game-based instruction.
For most teachers, who may not be as interested in DGBLLT, the use of games would
be a significant learning experience and the integration of games into an existing
curriculum a considerable challenge. Advocates of “gamification,” or the use of
gaming principles in education, argue that many examples of the use of games are
merely add-ons to existing classes that do not challenge current practice. The impact
of these issues on the effects of DGBLLT has not yet been carefully documented.

Methodological challenges include ways in which researchers can control for the
novelty factor of introducing games in the classroom. Although it could be argued
that for most learners, games are not new, their use in an educational setting often is,
and this in itself may give rise to a (temporary) excitement, which may translate in
higher motivation and even greater learning outcomes.

Partly because of the operational and pedagogical issues described above, most
studies on game play are relatively short. Although this is an argument that could be
made against most of the research in language learning and teaching, in DGBLLT
research, it is all the more important to conduct longitudinal studies that can
minimize the novelty effect. In studies that look at game play in out-of-class settings,
it is important to monitor the amount of time learners interact in the target language,
as otherwise any benefits could be attributed simply to greater time-on-task rather
than game play itself (although it could be argued that if game play causes learners to
spend more time interacting in the target language, for example, because they enjoy
such language use more than other forms, then this is a worthwhile benefit in and of
itself).

A challenge with much research on DGBLLT is that it takes place (either entirely,
or in part) outside of formal settings. This can make data collection difficult (both for
practical as well as privacy reasons). At the same time, this challenge is one that
needs to be taken up if language researchers are to get a full understanding of the
entirety of the language learning process.

Finally, relatively little research has been carried out on the effects of DGBLLT on
language acquisition. Most studies look at affective factors, such as motivation,
engagement, and willingness to communicate. Although these are fruitful and
important areas of inquiry, it is important ultimately to link these to better learning
outcomes. Many studies are able to make tentative predictions at best. For example,
Reinders and Wattana (2015) make the reasonable assumption, based on existing
literature, that an increase in WTC will be beneficial to language acquisition and that
because they were able to establish an impact of game play on an increase in
participants WTC, games are likely to have a positive role in language acquisition;
however, they did not prove this link. Similarly Turgut and İrgin (2009) showed
increased strategy use from game play, and again, although there may well be a
positive link between strategy use and language acquisition, this is not certain, and
no direct benefit to learning could thus be established. A final example is offered by
Lee and Gerber (2013), who conducted a digital ethnographic study in which
interactions between one of the researchers and a Korean ESL learner on a study abroad program in the United States in the online role-playing game World of Warcraft were recorded over a period of 1 year, using transcripts of in-game chat and screencast software. The researchers documented changes in the learners’ use of language over this period. It was evident from the transcripts that many of the in-game situations prompted interest in and a need for developing certain types of language in order to successfully compete in the game. In this sense, the game provided an environment for genuine communication, and this motivated the learner to develop his language. However, it is difficult to attribute such changes to game play per se, in particular in a second language situation. Clearly, significant challenges lie ahead for the field.

Critical Appraisal and Future Directions for Research

The current state of the field allows us to draw some early, tentative conclusions about the possible role of DGBLLT in language education and – to a lesser extent – its impact on language acquisition. It is clear from the above selection of studies that games play a role in affective aspects of language learning that have, in turn, been shown to be related to language acquisition. Games have been demonstrated to increase motivation, lower anxiety, and to increase engagement and willingness to communicate.

However, the learning experience through digital games is not yet fully understood. A key challenge for future studies is to make strong links with what we already know about (language) learning and teaching and the (potential) role of digital games in this. Reichle (2012), for example, advocates building on studies of memory processes, Jackson et al. (2012) on research into strategy instruction, and Reinders and Wattana (2012) on studies of interaction and willingness to communicate. Other potentially fruitful areas include the role of teacher and peer feedback, the occurrence of focus on form in informal settings, and the quality and quantity of input and opportunities for extended output in game settings. As Scholz (2016, p.268) argues, research that goes beyond learners’ reflections and that instead looks directly at learners’ experiences (including their linguistics experiences) is vital for a better understanding of the relationship between DGBLLT and acquisition.

Another challenge for the field is to better identify those aspects of games that influence the language learning process. As Garris et al. (2002) summarize: “there is little consensus on game features that support learning, the process by which games engage learners or the types of learning outcomes that can be achieved through game play” (p. 442). Wilson et al. (2009) argue:

Yet it is still under debate as to which particular aspects of a game lead to learning of any kind. Do the motivating aspects lead to active participation or does the active participation increase motivation? And what specific learning outcomes can be achieved? Without evaluation of the impact of games on specific learning outcomes, games will continue to be categorized largely as motivating and fun, but instructionally useless (p. 221).
Their call for a better understanding of the relationship between game attributes and learning outcomes has not yet been comprehensively taken up, at least not in the area of language education. Similarly, for such an effort to be successful, multiple research approaches are likely to be necessary. Despite these concerns, digital games offer a promising environment for language acquisition and deserve greater attention from researchers in the years to come. As games become more embedded in our lives, including those of teachers, their presence in the educational process is likely to grow. The challenge for teachers and researchers is to identify and build on the affordances they offer to best support the language learning process.

Cross-References

▶ Dialogicality, Ecology, and Learning in Online Game Worlds
▶ Educationally Designed Game Environments and Feedback
▶ Virtual Worlds and Language Education

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