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Digital Gaming in L2 Teaching and Learning

Abstract

As digital gaming has increased in popularity and become a global practice, computer-assisted language learning (CALL) researchers and second and foreign language (L2) educators have begun reconsidering games as potential L2 teaching and learning (L2TL) resources. To provide an overview of this new field, this chapter surveys the history and theory of games in CALL and presents the origins of the field, rationale for the use of games in L2TL, games purposed for L2TL, and major research findings. The chapter then presents three useful heuristics for interpreting research on games in CALL: metaphor, research object, and research orientation. The chapter concludes with implications for future research and practice, focusing on a call for cooperation and collaboration among the stakeholders in the field—CALL researchers, L2 instructors, and the L2 educational gaming industry.

Keywords: Digital games in CALL, game-based applications, synthetic immersion environments, game-enhanced pedagogy, game-as-tutor, game-as-tool, game-as-ecology, game genres, game mechanics

Author Bio: Jonathon Reinhardt (PhD, Penn State University) is Associate Professor at the University of Arizona. His research interests lie in the relationship between technology and the epistemologies of CALL theory and practice, and focus on technology-enhanced second and foreign language pedagogy and learning, especially with emergent technologies like digital gaming and social media.

Introduction: A rekindled interest

Every day around the globe, millions of people play digital games (computer or video games—sometimes referred to as games in this article for brevity) in a growing variety of genres and titles in dozens of languages. Taking note of this trend, CALL researchers and L2 instructors have recently begun examining games as potential second or foreign language (L2) teaching and learning (L2TL) resources, as evidenced by a recent wave of journal special issues (Thomas 2011, Cornillie, Thorne, and Desmet 2012, Reinhardt and Sykes 2014), edited volumes (Reinders 2012), and monographs (Sykes and Reinhardt 2012, Peterson 2013). More accurately, it is a re-examination—CALL experts have been discussing the potentials of digital games as resources for L2TL since the 1980’s (e.g. Jones 1982, Phillips 1987, Meskill 1990, Hubbard 1991).
Reasons for this rekindled interest could be that some early negative findings were based on research that was anecdotal, or suffered from limited duration, low numbers, and lack of SLA theoretical grounding (Peterson 2013). It is more likely, however, that changes in technology, society, and pedagogy over the past few decades have led to something of a revival. Games used to be considered impractical because they were implementable only in computer labs (e.g. Jordan 1992), but today, the Internet, broadband, and mobile-based technologies (e.g. Holden and Sykes 2011) have increasingly afforded access, portability, and configurability. It was also argued that curricular integration of games was overly difficult because they were self-contained, inauthentic fantasy worlds that used only limited registers (e.g. Phillips 1987). Over the past few decades, however, thanks to the Internet, gaming culture and communities have grown to include a large variety of attendant discourses and paratextual practices (Apperley and Beavis 2011), the nature of which has become linguistically richer and more varied in genre and register (e.g. Thorne, Fischer, and Lu 2012). While curricular integration may still be difficult, it cannot be argued that it is because gaming is an isolated, self-contained practice.

It was once also argued that games appealed only to sub-sets of learners who are not part of mainstream culture. More recently, however, non-violent, social, and casual games have grown in number and players, appealing to broader, more non-traditional, and more global audiences than ever before. Interacting with, through, and about digital games has become an everyday, language-mediated activity, and for millions of players around the world has become a means to learn languages informally (e.g. Chik 2014). While some students still do not like games, it can be counterargued that the fact that some students do not like reading novels or watching films does not preclude their potential as effective L2 resources, if they are implemented appropriately. A final argument against games was that game-mediated interactions do not focus on form in quantities necessary for L2 learning. However, with the social turn in SLA (Block 2003) and growing interest in social-informed pedagogies like multiliteracies (e.g. Kern 2014, Lotherington and Ronda 2014), attention has shifted towards the situated qualities of game-mediated literacy practices, and how gameplay ecologically affords focus on both form and meaning. From a literacies-informed perspective, games are understood as multilingual cultural products as authentic as any other (Reinhardt 2013), and gaming is seen as a socio-literacy practice as real as any other everyday semiotic activity (Thorne 2008).

A survey of digital games in CALL

This section introduces games in CALL through a discussion of educational gaming and their benefits, digital games in L2TL, games designed specifically for L2TL, game-based CALL applications and research findings on the affordances of games.

*Educational gaming and the purported learning benefits of games*
Digital gaming was one of the first uses of computer technology in the 1960s, with the game industry for entertainment beginning in the 1970s and most all familiar game genres having prototypes by the 1980s (Malliet and de Meyer 2005). Educational applications, like the simulation games Lemonade Stand and Oregon Trail, developed by the Minnesota Educational Computing Consortium in 1973, were some of the earliest videogame innovations. Game developers and educators observed that games motivated players to learn often highly complex rules and detailed narratives with seemingly little effort and high levels of engagement. As early as 1981, Malone (1981, in Baltra 1990) observed that digital games built intrinsic motivation by promoting curiosity, evoking fantasy, and offering challenges with clear goals and constant feedback. He added the caveats that games needed to provide for both success and failure, and on occasion seem unpredictable and random to the player.

These observations have been reiterated in work by educational gaming scholars like Marc Prensky, James Gee, and others. Although aspects of Prensky’s (2001) digital natives argument have been refuted (Bennett, Maton, & Kervin, 2008), there is some concord with his notion that most young people today, having been raised playing digital games, may be attuned to the experiential, discovery-based pedagogy designed into games. He contrasts this approach with the top-down didacticism found in traditional pedagogy, and argues that schools will fail unless the differences are rectified. Gee (2003, 2004, 2007) also maintains that well-designed games incorporate learning principles that make them highly effective learning spaces. He maintains that games are designed as situated learning spaces, where players learn through embodied, simulated experiences that scaffold opportunities for practice and mastery. Squire (2006, 2008) and Steinkuehler (2008) have built the conceptualization of gaming as a socio-literacy practice and show that social gameplay can develop considerable negotiation and interpersonal skills, multimodal and genre literacies, and computational and critical abilities.

While some early educational games were highly successful, like the adventure-quiz game Where in the World is Carmen Sandiego, others failed, perhaps because they were what has been deemed “chocolate-covered broccoli” (Habgood and Ainsworth 2011). Early designers may have failed because in trying to make digital games that were logistically convenient for schools, authentic in content, aligned with curricular needs, and appealing to everyone, they lost focus on the idea that players play games in order to play, and not necessarily to learn (see Arnseth 2003). While the term “serious game” has been invented in response to this criticism, reflecting the perspective that the learning content and outcomes of educational games should be taken seriously by both teachers and students, the truth remains that games are by definition playful. As Hubbard noted early on (1991), player disposition towards a game, or whether he or she sees it as a game, is fundamental to whether a game retains its motivational capacity. This maxim is still key to the successful design and implementation of any game for learning.

*Digital games in L2 teaching and learning*
Early CALL authors were quick to recognize the L2TL potential of games, and many of their observations are still valid today. Baltra (1990) noted that adventure and simulation games in particular could promote language learning for several reasons: 1) they integrated all four skills 2) their goal was not to teach vocabulary or grammar but rather promote goal-oriented activity that required meaningful language use, and 3) they incorporated discovery-based pedagogical techniques, which could promote student-to-student cooperation and interaction. Perhaps because of the absence of games designed specifically for CALL, early instructors chose to work with commercial, off-the-shelf games, supplementing them with teacher-developed wraparound materials, a game-enhanced approach still practiced today (Reinhardt and Sykes 2012). For example, Meskill (1990) outlined a communicative approach to game-enhanced pedagogy that preceded gameplay with vocabulary, schema and strategy building, and discussion activities, and followed it with awareness building and writing activities. She noted that simulation games allowed the instructor to act as a language resource “standing on the sidelines”, while learners make “meaning in the new language for a very specific, engaging purpose.” (p. 458). In short, using games in CALL is not necessarily new.

Meskill’s statement reflects the “guide-on-the-side” constructivist pedagogy of the time, and since then, many have continued to argue for the consideration of games, going deeper into SLA and pedagogical theory for rationale. The use of games can align quite well with task, project, and discovery-based curricula (García-Carbonell et al. 2001, Purushotma, Thorne, and Wheatley 2005, Thorne and Reinhardt 2008), as well as multiliteracies and genre-based approaches (Reinhardt, Warner, and Lange 2014). Sykes and Reinhardt (2012) argue that several key principles of good game design, like goal orientation, interactivity, contextualized language use, and feedback systems have parallels in L2 teaching and learning. For example, goal or objective-oriented activity is fundamental in the design of both a game and of an L2 learning task. Interaction is understood as the sine qua non of L2 learning, just as interactivity is central to the experience of gameplay. Games teach and contextualize the rules and actions of play in narratives and integrated experiences, just as authentic L2 learning activities contextualize meaningful language use. Feedback systems in games are instructional and formative, and provide guidance to players just when, and in the amounts needed. Similarly, feedback in L2TL contexts is most effective when it is targeted, scaffolded, and noticed. Recognizing and leveraging these parallels is key to the design and successful implementation of games for CALL, both those that adapt commercial off-the-shelf games not originally intended for L2 learning, and those designed specifically for that purpose.

**Game-based CALL applications**

The earliest uses of games for CALL were game-enhanced, that is, they involved adaptation of existing games not specifically intended for L2 learning. While there are many reasons for research of game-enhanced pedagogy and learning both in and outside of the classroom (Reinhardt and Sykes 2012), much interest and investment
has also been directed at game-based applications, or games designed specifically for the purpose of L2TL. Since the 1970s there have been many educational games for learning history, math, geography, and science, but there have been few digital games designed specifically for L2TL, except for a few, relatively new simulated immersion environments (SIEs) (Sykes, 2008). These new SIEs are being developed by teams of game developers, publishers, language pedagogy specialists, financiers, government agencies, and universities. For example, the game developer Muzzy Lane worked with Middlebury College to develop MIDDWorld Online, and with McGraw-Hill to develop Practice Spanish: Study Abroad. In both games, players create avatars and engage in a variety of gamified role-play tasks similar to what they might experience in a study abroad situation, in realistic looking but non-specific European or Latin American villages. Game mechanics include quest-like storylines and point systems for health, knowledge, and achievements. A similar SIE for Chinese, Zon was developed by Michigan State University and the Confucius Institute, and an SIE for learning Iraqi for military purpose, Tactical Iraq, was developed by Alelo for the US Dept. of Defense. The purpose of SIEs is to simulate real-world experiences an L2 user might actually encounter with the purported motivational and learning benefits of game elements like goal orientation and targeted feedback. As “immersive” experiences, SIEs are designed with clear underpinnings in L2 pedagogical approaches compatible with game-based learning principles, for example, the design of MIDDWorld is advertised as mirroring “MIL’s unique formula of using engaging and authentic cultural experiences to reinforce language learning in real-world context, rather than by simple memorization drills” (Muzzy Lane 2014).

Most recently, inexpensive online language learning applications, like Duolingo, Babbel, Busuu, LingQ, and LiveMocha, have marketed themselves as game-based, incorporating gamification mechanics like leveling, point, and badge systems into their designs, often combined with social networking mechanics. These applications often reflect a range of sometimes questionable L2 pedagogical approaches, including grammar-translation and memorization drills, and may not necessarily leverage principles of game-based learning beyond the motivational capabilities of gamified feedback and assessment. While they may be effective as memorization tools for highly motivated users, most have yet to be adequately evaluated by the CALL community.

Peterson (2013) and others argue that research on all games in CALL, and development of game-based L2 learning applications, should proceed from a theoretical base of SLA theory. While there are advantages to this deductive approach, as findings can thus serve to support or challenge the theory, in practice it is difficult because of the definition of “game” and how games are produced. It is difficult to create a game that remains a game in implementation when starting from an SLA theory or L2 pedagogical approach, especially if its outcomes are used directly for high stakes assessment, because of learner-player perception and the “broccoli” problem. Moreover, game development usually takes a design-based approach, where design iterations are tested and used to inform re-designs in a
rapid deductive-inductive cycle of development and testing. This is not without implication for CALL and SLA theory research, however. Luis Van Ahn, the founder of DuoLingo, claims that he can use algorithms and user data from its 15 million users in one day to determine the best time and order in which to introduce particular linguistic elements in a syllabus, whereas the “offline education system would have taken 15 years to figure (it) out” (Gannes 2014). These sorts of statements, and the flooding of the market with games sometimes based on discredited SLA and L2 pedagogical theories, makes it clear that there is a need for more collaboration between developers, CALL and SLA researchers, and L2 instructors.

**Findings: Affordances for L2TL**

The new research wave on games in CALL has led to several notable, common findings on the affordances, or potentials (van Lier 2004), of games for L2TL. First, games offer sheltered contexts for controlled exposure to, and practice with, input that may be repetitive and redundant. For example, deHaan (2005) followed a young adult L2 Japanese learner playing a sports game and documented how the learner-player manipulated the game in order to control and repeat the audio and visual input for learning purposes. Piiranen-Marsh and Tainio (2009) showed how two adolescent players of an adventure role play game, through multiple play sessions, developed repertoires and fluencies in L2 English by anticipating, repeating, and playing with the language used by non-player characters. This same sheltered quality can also contribute to increased confidence and willingness to communicate and take risks. To illustrate, Reinders and Wattana (2012) found that ten young adult EFL learners who found face-to-face interaction difficult, especially with native speakers, were far more comfortable trying new language in task-based game contexts with fellow learners.

Another common finding is that games of certain designs can serve as environments for peer and expert collaboration that lead to increased linguistic and cultural competence. For example, Massively-multiplayer online roleplaying games (MMORPGs) are designed to promote player-player collaboration and interaction through role specialization, so that a warrior player, who can give and take damage but cannot heal, and a priest player, who can heal but cannot take much damage, are encouraged to combine forces to defeat enemies. Noting this jigsaw-like design, Rama, Black, van Es, and Warschauer (2012) showed how a college age player with high game expertise and low language proficiency leveraged his expertise in World of Warcraft (WoW) group play to develop language skills, while another player with high language proficiency but lower game expertise had a harder time learning to play. Thorne (2008) showed that the massively multiplayer aspect of the design of WoW, which allows strangers to team up, can lead to interpersonal linguistic interactions that are polylingual and transcultural.

Research has also found that the kinds of player-to-player interactions afforded by games can involve negotiation, languaging and alignment, both in and outside of
gameplay. For example, Zheng, Wagner, Brewer, and Young (2009) showed that two Americans and two Chinese players, in an educational MMORPG, negotiated meanings and understandings by embodying joint actions and aligning activity of their in-game avatars. In her qualitative study of ten college age Chinese college students, Chik (2014) found that many use games for foreign language practice informally, developing both autonomy and social collaboration skills by researching and discussing in-game language online, outside of the game.

Finally, it has been found that because non-educational games have didactic qualities, they may function as informal or implicit learning environments. As a caveat, however, research shows that pedagogical mediation, built either around or into a game, is key to its explicit use for L2TL, and that mediated game environments can afford development of lexical, genre, pragmatic, and narrative competences. To illustrate, Coleman (2002) showed that simulation games can serve as resources for development of register awareness among low proficiency ESL learners. Working with 18 adult ESL learners, Miller and Hegelheimer (2006; see also Ranalli, 2008) showed that life simulation games can be used effectively as resources for vocabulary learning activities, when supplemented with well designed supporting materials. Sykes (2009) showed how pragmatic competence could be developed in an SIE for college age Spanish learning, and Reinhardt, Warner, and Lange (2014) showed how 12 advanced college age German learners developed genre and game literacies through critical and reflective play of casual strategy games.

To summarize this survey section of the chapter, the study of games in CALL has origins in educational gaming research, which has claimed that well designed games incorporate sound learning principles, although many educational games have not been particularly popular or successful. CALL educators, developers, and researchers have long noted the potential of games for CALL, and that the design of games has parallels in SLA principles and L2 pedagogical design. While many have adapted commercially available games for L2TL, there are a growing number of games intended for L2 learning which tend to simulate language immersion experiences or gamify social networking dynamics, although they may or may not be grounded in current SLA and L2 pedagogical theory. Research on games in CALL has found that they can offer sheltered context for input, afford player collaboration, promote interactions involving negotiation and languaging, and be pedagogically mediated to develop a variety of competences and literacies.

**Interpreting research on games in CALL**

The second section of this chapter steps back from common findings to consider how the research might be interpreted, an important undertaking for researchers, instructors, and developers alike. Research to date has been highly diverse in research parameters like theoretical framework, object of investigation, and researcher stance or perspective. This diversity may be due to the vernacular origins of game-enhanced L2TL practices or the non-academic origins of game-
based L2TL application development. It may also be that research is still in a
descriptive (Blyth 2008) or “false dawn” stage (Peterson 2013), and so publishers
are still accepting “bandwagon” pieces that are not rigorously empirical.

Interpreting research requires the employment of heuristics, or cognitive
frameworks that helps one make sense of theoretical and methodological diversity.
One such heuristic associated with SLA theory and used in CALL from its
disciplinary beginnings, is constructing a metaphor—a figure of speech applied to a
concept that it is not by literal definition—for the sake of comprehension. In CALL,
metaphors have been used to make an analogy between a computer and another
entity for the purpose of making sense of the computer’s function in a particular
type of activity. Like computers, games can be understood metaphorically as tutors,
tools, or ecologies. A second useful heuristic is identifying a research focus or object
of investigation, that is, clarifying whether the research focuses on a genre, a title, or
specific game mechanics or behaviors. From this perspective, research can examine
genres, like MMORPGs, certain titles, like WoW, or mechanics, like feedback systems,
quest structures, or time pressures, that lead to particular behaviors. Finally,
another heuristic foregrounding research orientation is important to consider in
surveying research on games for CALL, because of the variety of stakeholders who
design, sell, teach with, and learn from them. Research has taken player-oriented,
pedagogy-oriented, and game-oriented perspectives, informing learning research,
curriculum development, and game design respectively.

**Metaphor: Games as tutors, tools, and ecologies**

Responding to calls to do so (Chapelle 1997), most syntheses of CALL research have
focused on SLA theoretical approach (e.g. Kern and Warschauer 2000, Bax 2003,
Warschauer and Grimes 2007), and games in CALL syntheses have followed suit. For example,
using parameters from psycholinguistic and sociocultural SLA approaches,
Peterson (2010) categorized research on L2LT in game and proto-game
technologies, namely MOO (multi-user object oriented) environments, simulation
games, virtual worlds, MMORPGs (massively-multiplayer online roleplaying games),
and educational games. He shows that the principles of both approaches are met in
the designs of a variety of game genres and types. Similarly, Filsecker and
Bündgens-Kosten (2012) show how three educational games reflect associativist-
behaviorist (Mingoville), cognitivist-constructivist (TILTS), and situated-legitimate
peripheral participation (Quest Atlantis) principles. These categorizations illustrate
that game designs can reflect a particular approach to SLA, especially if they are
designed purposefully as SIEs.

Categorizing research on L2LT in gaming according to metaphorical perspective on
the function of the game taken by the researcher can add to our comprehensive
understanding of the phenomenon. In broad terms, games can be understood as
metaphorical tutors, tools, and ecologies. The computer-as-tutor metaphor arose
out of the earliest identified benefit of computers, that because of their superhuman
information storage and processing capacities they could assume tutor roles and
provide constant and consistent input and feedback (Taylor 1990). Research taking
the metaphorical perspective of game as tutor includes studies that have used the
popular life simulation game series The Sims, where gameplay involves the
contextualized use of hundreds of everyday vocabulary items. For example,
Purushotma (2005) discusses the game as a resource for incidental vocabulary
acquisition and its modification potential for more explicit focus on learning. While
he focused only on his own use of the game for learning L2 German, his work
illustrates how adaptation of a commercial off-the-shelf game can serve a tutorial
role for L2 learning. In a similar way, Miller and Hegelheimer (2006) and Ranalli
(2008) created supplemental materials for classroom use of The Sims with adult ESL
learners, drawing explicit learner attention to vocabulary and thereby making the
game serve as a vocabulary tutor. DeHaan, Reed, and Kuwada (2010) had forty
pairs of Japanese undergraduate EFL learners play the dance game Parappa the
Rapper, one playing the game and one watching the other play, and found that the
players scored more poorly on vocabulary retention tests than the watchers. The
researchers speculate that the watchers were able to focus on the tutorial nature of
the game, while the players had higher cognitive load from having to focus on game
rules.

The tool metaphor emerged with socio-constructivist understandings that even as a
tutor, technology could be a magister who controls learning or a pedagogue who
facilitates learning (Higgins 1983), in both cases functioning as a tool from the
learner’s perspective. Many studies have examined games as tools for interaction,
and the MMORPG genre in particular has been recognized for its potential (Lai, Ni,
and Zhao 2012) as a space for interaction and negotiation. As might be expected,
theoretical frameworks focused on interaction, discourse, and collaboration are
employed in these studies. Peterson (2012), for example, illustrated how four
college age intermediate EFL learners were able to practice a variety of discourse
functions in the MMORPG Wonderland. Zheng et al. (2009) showed how four
adolescent learners of English and Chinese aligned and negotiated understandings
while playing an educational MMORPG, Quest Atlantis. Reinders and Wattana (2012)
found that the quantity of interactions among ten intermediate university age EFL
learners in a modified version of the MMORPG Ragnarok Online was considerable,
although much like findings on regular chat, that fluency was favored over accuracy
and complexity.

More recent conceptualizations of technology as environment, microworlds, or
ecologies (Lam and Kramsch 2003, van Lier 2004) align with new understandings of
media convergence and social or Web 2.0 uses (Warschauer and Grimes 2007), as
well as with multiliteracies-informed L2 pedagogies (Kern 2014). From this
perspective, technology-mediated L2TL activity is interconnected, dynamic,
multinode, and highly contingent on context. A game-as-ecology view considers how
games are part of larger, dynamic systems of game-related texts and practices,
where people play games, and thus potentially learn from them, at any time, at any
place, and with anyone. From this perspective, game playing may be fundamentally
incompatible with traditional notions of learning in school, from teachers and
textbooks, as knowledge transmission. For example, Thorne, Fischer, and Lu (2012) found that the practices and texts surrounding *World of Warcraft*, i.e. the in-game quests, online discussion boards, and online strategy guides, illustrated a much greater variety of linguistic register, genre, complexity, reading level, and function than many believe. Chik (2012) showed that gamers in Hong Kong were self-directed, socially engaged, and highly motivated in learning English and Japanese to play new game releases, but that their language teachers were dismissive, or entirely unaware, of any benefits the activities might provide. Reinhardt and Zander (2011) found that some college age, intermediate ESL students rejected social game-enhanced learning activities, because they were neither serious nor focused on TOEFL preparation. Holden and Sykes (2011) found that college age advanced Spanish learners’ awareness of the language ecologies in local neighborhoods was transformed by playing a mobile game that had the learners solve a local mystery in Spanish. Because the game situated language use outside traditional educational boundaries, learners developed new perspectives on the purpose of learning Spanish and their local linguistic landscape.

An ecological metaphor is congruent with the concept of digital multiliteracies (New London Group 1996, Knobel and Lankshear 2007, Thorne 2013), which recognizes that the development of socio-literacies is multifarious, dynamic, and complex. From this perspective, game playing affords “game literacy” (Gee 2007, Squire 2008), or the critical awareness that game systems, dynamics, and discourses are representative of reality (Bogost 2007), and that even non-playful human activity like learning and working can be game-like, or non-hierarchical and counter-hegemonic. Game literacy involves the capacity to participate in gameful practices (McGonigal 2011). Reinhardt, Warner, and Lange (2014) argue that the development of game literacy may afford the metacognitive awareness that language is systemic, playful, and socially constructed or designed.

**Research object: Game titles, genres, and behaviors**

Another useful heuristic for interpretation of research on games in CALL is to identify the object of investigation as not necessarily the game, but rather specific qualities of it, like its genre, its specific title, or the game mechanics that lead to player behaviors that entail language use. Game “genre” is an industry term referring to games that share similar game features, like levels or feedback types, and are associated with certain game mechanics. A game “title” is a specific game, like *World of Warcraft, The Sims*, or *Uncharted*, that falls into a certain genre, which for these three titles would be MMORPG, simulation, and action-adventure, respectively. Associated “mechanics” for these three titles and their genres would be questing, building, and killing, respectively.

Not all research is careful to make the distinction between genre, title, and mechanic, and some may assume generalizability of a finding from a behavior derived from a mechanic, to a certain title, to a specific game genre, or the other way around. Most single titles incorporate mechanics that are found in several genres,
and so unless a study isolates a mechanic effectively, it may not be clear with which particular behavior it is associated. Some researchers have responded to this problem by adapting or building their own games that test one particular mechanic, at the risk of sacrificing authenticity and making the game less engaging for players, since it is the emergent combination of features and mechanics that make titles uniquely fun and challenging. Ultimately, it is this combination of mechanics in a particular title that should be associated with affordances for language use and learning behaviors, more so than an ill-defined genre to which that title belongs.

Traditional game genres include action, adventure, role play, strategy, and simulation, each of which is traditionally associated with mechanics that may afford, to certain degrees, language use behavior like comprehension, production, and interaction, for example, in order to learn game rules, follow narratives, or collaborate with other players. Action game behaviors usually entail quick reaction time, physical dexterity, and eye-hand coordination, and traditionally involve mechanics like shooting, driving, and parcours-like acrobatics. While action game mechanics may not necessarily involve language use, they may allow players to physically embody game activity, thus affording agency and engagement perhaps more directly than other behaviors do, and the real time nature of action mechanics may drive fluent production by forcing players to act within time limits. Adventure game mechanics include following progressive storylines, finding clues, and solving puzzles, often enshrouded in narratives of mystery and discovery. Adventure behaviors, because they are built around narrative mechanics, most obviously afford language use, particularly comprehension, and clues and puzzles can sometimes be linguistic in nature. Role play games (RPGs) are typified by character customizability and completion of goal-oriented quests for rewards and experience points. RPGs, because they involve developing a character, may afford identity play of sorts, and completing quests usually demands language comprehension. Strategy game mechanics include planning, exploration, and resource management, and combat that does not require physical dexterity. Simulation mechanics are similar to strategy, but do not usually involve combat, and may instead involve management of a city, farm, business, or life. Strategy and simulation games may afford language use behaviors for comprehending game rules, which tend to be relatively complex and scaffolded for players, and turn-based or timed turn strategy behaviors may afford learners extra time for comprehension, unlike action mechanics.

Researchers have taken several approaches to examining specific game qualities as their objects of investigation. Most researchers start with a particular game title and design and implement a pedagogical or experimental study around it. For example, in their experiment around the music genre game Parappa the Rapper, deHaan, Reed, and Kuwada (2010) found that player attention was divided between game rules and the vocabulary of the game narrative, and associated the resulting behavior with the time pressure game mechanics that typify the music genre. Hitosugi, Schmidt, and Hayashi (2014) looked at vocabulary retention of Japanese-as-an-FL after students played the game Food Force, scaffolded with a series of supporting materials. They found students retained vocabulary from the game
better than from their textbook, a finding they attributed to the deep learning afforded by the game. However, while they identified the game as action-adventure, they did not specify how their behavioral outcomes were associated with particular game mechanics or other features of their intervention.

The simulation genre has traditionally received attention as an L2 learning resource (Coleman 2002, Miller and Hegelheimer 2006, Ranalli 2008), perhaps because the mechanics of game object manipulation align language comprehension and production with contextualized meaning, and game progression involves task completion (Purshotma 2005). As mentioned earlier, the MMORPG genre has also received considerable attention (Thorne 2008, Rama et al. 2012, Peterson 2012), probably because typical MMORPG mechanics like grouping and questing align with social interaction and goal orientation behaviors. However, because simulations and MMORPGs are highly complex game ecologies, it is difficult to associate particular features and mechanics to specific outcomes without isolating those mechanics and destroying the functional coherence and authenticity of the game. One solution to this dilemma is to modify the game, as Reinders and Wattana (2012, 2014) did with the MMORPG Ragnarok Online, so that its quests aligned with tasks in their business English curriculum. While this allowed for more research validity, it was only possible because all the players were in one class, and it required sacrificing the affordances that authentic massively multiplayer contexts allow for spontaneous interaction with others.

A third approach researchers take is to design a game that directly tests one or more game behavior by manipulating the game mechanic with which it is associated. For example, in her own SIE, Sykes (2008) examined how students learned Spanish pragmatics through perception of failure states, and how motivation and learning were affected when a player had a negative experience with an in-game character. Cornelillie, Clarebout, and Desmet (2012) designed and implemented a game experiment that measured players’ responses to and attitudes towards various sorts of in-game corrective feedback. They found that explicit, immediate feedback was preferred, especially by players with higher game game proficiency levels. While a mechanics-focused approach is perhaps the most promising with regards to implications for design, it is difficult to carry out because of the amount of effort and investment game development entails. And again, games created primarily to test designs may suffer the educational game “broccoli” problem if they are not authentic and geared towards play, especially with younger learners.

Research orientation: From the perspective of the game, player-learner, or pedagogy

L2TL researchers traditionally approach a research problem from the perspective of pedagogy, if its answer is to inform instruction and curriculum, or from the perspective of the learner or learning, if it is to inform understandings of SLA more directly. Research on games in CALL can also originate in the perspective of the player-learner or pedagogy, but in addition, may also start from the perspective of
the game or game designer. While a study may ultimately incorporate multiple orientations, its initially situated approach is important because it implicates choice of theoretical and methodological frameworks as well as the study’s primary purpose—for example, to inform learning research, curriculum development, and/or game design. Interpreting games in CALL research requires recognizing the strengths and weaknesses inherent to each perspective.

Game-oriented research is the primary approach taken by SIE and game-based L2TL application developers, and it aligns with approaches that manipulate specific mechanics through design. As an example of this orientation, Neville (2010) used a game design-based approach to explore how narrative structures share characteristics with SLA and game design theories, and then offers a design rubric that aligns game structures with L2 learning objectives. While his piece is conceptual, it offers a methodical approach to aligning mechanics with outcomes. A strength of this perspective is that it allows for game designs clearly aligned with learning objectives, but a weakness is that a game designed initially with an educational purpose may not function as intended if it is not played and received as a game by its players.

When playing a game for L2 learning, a learner is in effect both a player and a learner whose experience is impacted by variables like gender, age, L2 proficiency, and game literacy. Research from a player-learner-oriented perspective examines how these variables effect individual and socio-collaborative learning in and through game-mediated interactions. Work in this vein includes Sylvén and Sundqvist’s (2012) examination of the positive correlations between age, gender, game proficiency, and L2 English proficiency among Swedish adolescent game players, and Thorne and Fischer’s (2012) exploration of the accounts given by WoW players in online forums regarding their use of the game for informal L2 learning. Ideally, learner-oriented research should inform the development of game-based SIEs and applications as well as game-enhanced pedagogy, and ultimately SLA theory and L2 pedagogy more broadly. One strength of research from this perspective is that it can be highly authentic and ecologically valid, especially when using vernacular games and focused on learning, while a weakness is in specifying which behaviors and outcomes are associated with which mechanics, titles, or genres.

A third orientation to games in CALL research is from the perspective of L2 pedagogy or instruction. Pedagogy-oriented research may focus on how instruction is integrated into a game, how a game is integrated into a curriculum, or the role of the instructor. For example, Lacasa, Martinez, and Mendez (2008) explored the design and implementation of a pedagogical unit meant to develop critical awareness of games as social practices in Spanish primary classrooms. Reinders (2009) offers a series of game wraparound learning activities that develop writing, discussion, and and multimedia authoring skills. DeHaan (2011) described two EFL classroom projects to develop media literacy skills that had learners design games and produce game magazines. Pedagogy-oriented research has the potential to
inform L2 pedagogical practice more broadly, and it should inform the work of game developers, although considering the challenges of integrating even L2TL purposed games into curricula, it is not clear that it has. One strength of this sort of research is that it attempts to integrate learning with teaching and thus inform practice, but a weakness is that it may not be rigorously empirical or generalizable beyond its context.

In sum, interpreting research on games in CALL entails consideration of traditional research parameters as well as the use of familiar CALL heuristics adapted to the unique qualities of games. Any interpretation should consider how games in CALL research treats games metaphorically—as tutor, tool, or ecology, how the research approaches its analytic object—as title, genre, or mechanic, and the primary perspective that orients the research problem—a game design, player-learner, or pedagogy-oriented perspective. It is also important that interpretation recognizes the potential strengths and weaknesses inherent to each research approach.

**Implications for future research and practice**

The growth and popularity of digital games worldwide has led to a rekindling of research on their use in L2TL that is diverse in perspective, parameters, and purpose—a healthy diversity as long as it is empirical and informed by SLA and L2 pedagogical theory. Considering the differences in their goals, researchers, instructors, and developers should acknowledge the potential for both tension and synergy in future research. Researchers might ask how player-learner variables—motivation, gender, age, proficiency, gaming experience, and gaming preferences—can be examined in an ecologically valid way, without players losing agency and a playful disposition. They might inquire how the social aspect of gameplay impacts learning, and what designs afford what kinds and qualities of social interaction. Instructors might examine the relationship between gaming literacies and other L2 literacies, both traditional and new, and inquire how gaming literacies develop through informal and pedagogically-mediated gameplay. Game developers might ask which game designs, rules, and narratives afford which sorts of L2 learning, and how, and question the role and nature of pedagogical mediation. Researchers, instructors, and developers alike might inquire as to the nature of the tensions between learning and playing, and how well games retain their motivational and educational capacities if not received as games.

While the questions lead in differing directions, if answers are not put in terms that speak to all stakeholders, the field will not move forward. The fact that both the digital game and educational publishing industries have identified L2TL as a potential growth area should be a clarion call for researchers to offer direction, consultation, and guidance, and become full partners in development whenever possible. For their part, L2 educators should develop the critical facilities to evaluate game-based L2 applications, and to enhance their L2 instruction with non-educational games and integrate them effectively into curricula. As practitioners, their experiences developing and implementing instruction and assessing L2
learning are valuable to researchers as well as developers. Researchers and instructors should ground their practices in playing games themselves, observing how L2 learners play games, how and what the games teach, and how and what people learn them—activities that will foster game literacies. Digital games have great potential to be among the main concerns of CALL and L2TL research into the future—a realization by CALL pioneers being recognized once again as people around the world increasingly discover, create, socialize, and make meaning through digital gaming.

References


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