

DIGITAL GAMES, LITERACY AND LANGUAGE LEARNING IN L1 AND L2

A comparative systematic review

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Abstract

In this comparative systematic review, we analyse how the use of digital games inside and outside school settings might support primary and secondary students' literacy and language learning in relation to first language (L1) and second language (L2) educational contexts. Our findings indicate widely different patterns from utilising diverse game aspects, theories, and research methodologies in relation to the two different subject areas, which show that they are less convergent than what often is suggested in research that compares the two subjects in a globalised world. The L1 studies indicate positive findings with mainly commercial games in relation to writing, multimodal production, critical literacy, and, partly, to reading. The L2 studies report positive findings with educational games in relation to the investigated language skills (vocabulary, reading, and writing), though with an increasing number of studies conducted in out-of-school settings examining commercial gaming practices. We discuss the findings from the two K-12 subjects using a cross-disciplinary perspective, and we suggest directions for future research.

Keywords: digital games; literacy; language learning; comparative review; K-12

1. INTRODUCTION

Playing digital games is an important activity in many children's lives worldwide. A large-scale study on European children found that, among children ages 9–15, it is common for them to play digital games, on average, for more than two hours daily (WHO, 2016). Dovetailing with this vast amount of time being used to play video games is a growing body of research measuring how children's out-of-school game activities might be influencing their literacy and language learning, for example by linking children's game habits with their PISA reading performance (Borgonovi, 2016; Rasmussen & Åberg-Bengtsson, 2015) or their vocabulary acquisition (Sundqvist, 2019). Corresponding with this research, several studies have examined the educational value of using digital games within first language (L1) and second language (L2) classrooms.

In this review, we set out to analyse and compare extant research on digital games, literacy and language learning within the L1 and L2 education contexts. We refer to L1 education as first-language education in a country and focus specifically on the L1 school subject (e.g., the school subject English in England or the school subject Danish in Denmark). Different terms are used worldwide, with L1 known as *language arts* in the United States (Green & Erixon, 2020). Also included in our notion of the contexts of L1 education are assessments of reading, such as in PISA, because reading represents a core aspect of L1 education. In the present study, L2 refers to "additional language learning at any point in the life span after the learning of one or more languages has taken place in the context of primary socialization in the family" (Douglas Fir Group, 2016, p. 21). That is, we exclude bilingual first-language acquisition in which two languages (in this case, one being English) are learned from birth (De Houwer, 2009) and focus specifically on L2 English as a school subject and research within the context of L2 English education.

Our choice of a cross-disciplinary comparison involves the use of digital games both inside and outside school settings, and how this use might relate to students' literacy and language learning. Whereas the two K-12 school subjects (L1 and L2) are grounded in different disciplinary traditions and, thus, might differ across national borders based on each school subject's historical development and current school policy, they also display increased commonalities (Kabel & Svarstad, 2019). This applies in particular to non-English-speaking countries in which English is a prominent foreign language learned in school. Due to children's use of digital games and the present status of English as the *lingua franca* in a globalised world (Graddol, 2006), students might have developed a broad repertoire of English language skills already in their primary (ages 6–11) and secondary (ages 12–18) school years, and in some cases, even prior to formal schooling (De Wilde & Eyckmans, 2017). As such, digital game culture can act as a mediator of English as a spoken and written language. For example, in Scandinavian countries, the school subject English is now mandatory starting in the first school year, thereby giving it a prominent position. In this context, English may be characterised not as a foreign language, but as a second

language in many parts of the world (Byram, 2016). Generally, there are signs of slightly improved English proficiency scores worldwide (EF, 2019), and despite global differences, this has educational consequences. Thus, the differences between the L1 and L2 school subjects in primary and secondary education in non-English-speaking countries are becoming increasingly blurred, a cross-national development related to children's English skills (De Wilde & Eyckmans, 2017) and the prominence of the L2 English school subject (Byram, 2016). This indicates that the L2 English school subject has shifted from a basic communicative skills school subject (e.g., teaching students being able to participate in everyday dialogue) towards a text-oriented school subject that puts increasing weight on interpretative skills (e.g., teaching students to engage in interpretive dialogues about literature) and a more sophisticated text lexicon (e.g., reading and writing in diverse genres and modalities) (Kabel & Svarstad, 2019). A parallel curricular turn has been identified in the L1 school subject internationally towards a wider lexicon of texts, including not only print texts, but also multimodal texts and commercial games. In this systematic review, we examine research on how digital games might be used to influence K-12 students' literacy and language learning in the two school subjects. To achieve this aim, we examine classroom research on how digital games are utilised for educational purposes, as well as studies that link students' out-of-school gaming habits with their school performance in relation to reading, writing, multimodal production, critical literacy, and foreign language learning. Despite the close connections between first language and English as second language in many children's everyday lives, there is a clear lack of overview and comparison between existing research on the learning opportunities from digital games in relation to L1 and L2 school subjects at the primary and secondary education levels.

1.1 Defining digital games and game aspects

In this review, we use the term *digital games* as a common denominator for any type of game played on an electronic device (computers, phones, consoles, and handheld devices). In this way, the term, digital games, includes video games and computer games. Digital games are characterised by aims, interactive challenges, rules, feedback systems, narrative structures, and outcomes (Plass, 2015). We categorise all studies according to three overall game types that are found in extant research on games in relation to L1 and L2: (1) commercial games (Young et al., 2012), which are designed to entertain (e.g., the sandbox construction game *Minecraft*, the online role-playing game *World of Warcraft* and the life-simulation game *The Sims*); (2) educational games (Klopfer & Osterweil, 2009) that are designed to achieve specific learning goals (e.g., *GraphoGame* can be used to improve reading, and *Happy English Learning System* can increase students' foreign language vocabulary); and (3) game design tools (Almeida & da Silva, 2013), which might involve visual programming languages (e.g., *Scratch*) or game design tools (e.g., in the *Neverwinter Nights* game world). The different types of digital games are not simply neutral tools for

learning, but, rather, the digital games involve specific cultural norms and values that call for awareness in school domains. In this way, the use of commercial games in the L1 or L2 classroom might be experienced as either a legitimate or illegitimate learning resource. Similarly, educational games might be perceived as either an engaging way to learn or as a disappointing “school game” (Hanghøj, 2011, p. 30).

Digital game types can be grouped further within different genres that represent broad categories of similar games. We use the following *game genre* categories identified by Zou et al. (2019) within L2 research: tutorial game; role-playing game; adventure game; gamified digital book; simulation game; and strategy game. To this list, we add categories that can describe the many different commercial game genres: sandbox game; action game; open world adventure game; action-adventure game; sports game; and action role-playing game. Several studies have noted that learning through digital games depends on specific game affordances, as well as interactional variables, such as student collaboration, teacher facilitation, or game habits outside school (Clark et al., 2015). In this review, we analyse how specific *game aspects* in relation to L1 and L2 are researched within each of the included studies. The term *game aspect* deliberately is broad because some of the included studies focus on the learning potential of specific *game affordances* (e.g., how a specific reading game allows players to be rewarded and make progress by placing words in the right categories), whereas other studies examine broader *patterns of use* (e.g., how students work with different multimodal aspects of a commercial game or how they engage in different forms of game play outside school). Because the included studies focus on disparate game aspects within L1 and L2, and highlight different conceptualisations of literacy and language, we now will clarify key theoretical positions within the research field.

1.2 Conceptualising literacy and language learning

Literacy is a multi-faceted concept that has changed over the past few decades from primarily addressing isolated reading and writing skills to addressing the handling of and critical interaction with texts as intrinsic multimodal constructions. In an early formulation of New Literacy Studies, Street (1984) emphasised the need for a shift from an autonomous to an ideological model of literacy, thereby viewing literacy practices as social practices. He addressed not only the doing (or event), but also the cultural thinking about reading and writing (see also Maybin, 2000; Street, 1995). In this review, we included insights from New Literacy Studies and related sociocultural and social semiotic literacy research, and from cognitive approaches to reading (e.g., Snow et al., 1998) and writing (e.g., Hayes, 2012). This broad construct enabled us to identify the literacy aspects (e.g., reading or writing) and the theoretical grounding of the studies considered in the present review.

In line with New Literacy Studies, the plurality of the literacy construct is key, and we draw on the term’s shift from the singular *literacy* over the plural *literacies* (Street, 1984) and specifically relevant for this review to the notion of *multiliteracies*

set forth by the New London Group (1996). This means that meaning-making competencies related to the written word and to audio, visual, gestural and spatial modes were included. This extension addressed the reading and writing of *something*, particularly the reading and writing of multimodal texts or sign complexes (Bezemer & Kress, 2016). This also involves digital games that might be included along with the communication in and around game play. As highlighted by Mills (2010), among others, a lack of clarity exists as to what counts as literacy within New Literacy Studies and related literacy research. In the present review, we included not only reading and writing of primarily lettered texts as specific aspects of literacy, but also the production and reception of multimodal texts in their broadest form, including digital game design activities. Moreover, we reserved critical literacy (e.g., being able to interact through and reflect upon texts) as a central literacy dimension (Durrant & Green, 2000; Luke, 2012).

Turning to cognitive approaches to literacy, we also included insights from this tradition in our literacy construct. Here, attention is paid not to social practices, but, rather, to cognitive processes important for developing particular reading and writing skills. This includes skills required in digital reading in for example PISA, in which not only phonemic skills, but also more complex visual and spatial skills related to the multimodal nature of such reading play a role in finding a path through the text. In an influential comprehensive review by Snow et al. (1998), five components related to cognitive approaches were identified as important for the development of reading skills: phonemic skills; reading fluency; word knowledge; background knowledge and reading comprehension; and the mastering of strategies such as prediction and summarising (e.g., Block & Duffy, 2008). For developing writing skills, both lower-order processes (such as spelling) and higher-order processes (such as deciding on intentions and generating ideas) are identified as important (Hillocks, 1986). To sum up, writing can be viewed as an extremely complex skill, including, but not limited to, working and long-term memory, reading skills, and motivation (Hayes, 2012).

With this inclusive literacy construct, language learning relates both to language practices (Barton, 2007) and to a cognitive tradition that emphasises word recognition and comprehension as being important for reading fluency (see also National Reading Panel, 2000), and word knowledge—another component in itself—as being important for reading development. Apart from literacy aspects, language learning involves learning and acquiring linguistic rules and components of language, such as grammar (morphology and syntax) and vocabulary. Increasingly, acquisition of vocabulary is viewed as central to language learning in relation to supporting and enhancing reading, writing, speaking, and listening skills (Nation & Hunston, 2013). As such, vocabulary knowledge is viewed as a complex theoretical construct comprising aspects such as breadth (size of vocabulary), depth (quality of word knowledge in terms of phonological, orthographic, semantic, morphological, collocational, and pragmatic characteristics, and level of integration into the mental lexicon) and fluency (ease of access receptively, for listening and reading, and

productively, for speaking and writing (Daller et al., 2007, pp. 7–9). Moreover, the acquisition of grammar, morphology, and phonology—as well as semantics, pragmatics, and discourse structures—is central to L2 language learning, including communicative and interactional competence (Mitchell et al., 2019).

1.3 Existing reviews on digital games and learning in K-12

Our specific focus is on the educational value of digital games in terms of students' literacy and language learning. Several extant studies have examined how games can be used to increase learning outcomes and motivation generally in K-12 contexts, but many of these studies used small sample sizes, and relatively few were large-scale experimental studies with control groups. In one of the few meta-studies of game-based learning, Clark et al. (2016) found that the positive effects from using digital games in K-12 to increase learning outcomes are related to specific game affordances (e.g., narratives or audio-visual elements), as well as to the context-specific facilitation of games. These findings indicate that games can be used as valuable tools for teaching and learning, but that the positive effects tend to vary significantly, depending on several different parameters, including what games and what specific aspects of the games are being used, how the games are taught and evaluated, in what subjects the games are being used, and in relation to what specific curricular aims the games are being used.

Focusing specifically on the use of digital games in K-12 school subjects, a much-cited systematic review by Young et al. (2012) concluded that the use of games might be particularly valuable in relation to history, physical education, and language learning, with less-positive effects in science and mathematics education. An additional series of three interrelated systematic reviews focused on the use of computer games in primary education (Hailey et al., 2016) and secondary education (Connolly et al., 2012), with a follow-up review on secondary education by Boyle et al. (2016). These reviews found that “playing computer games is linked to a range of perceptual, cognitive, behavioural, affective and motivational impacts and outcomes. The most frequently occurring outcomes and impacts were knowledge acquisition/content understanding and affective and motivational outcomes” (Connolly et al., 2012, p. 661). In this way, most experimental studies on games in schools focus more on acquisition of knowledge and less on how to develop skills and competencies. The reviews found that only a few studies focused on using commercial games for learning due to difficulties in integrating them into the curriculum, and that more studies examined how learning games can be developed to address specific curricular objectives (Boyle et al., 2016). However, as we note in our analysis of studies that examine the use of games in L1 and L2, this finding is highly dependent on different subject-specific curricula and teaching traditions. Due to the broad scope of all the mentioned systematic reviews, not one of them goes into detail on how the use of digital games is linked to the specific aspects of literacy and language learning, which is our review's focus.

1.4 Overview of research on digital games and learning in L1

Even though research on digital games in relation to L1 has been going on for at least two decades, no systematic review of this body of work has been done. In fact, the research on digital games within L1 is not even mentioned in the systematic reviews mentioned earlier, possibly because most of the L1 studies are based on qualitative research methods and sociocultural theories on literacy that tend to be backgrounded in systematic reviews that often favour quantitative studies.

Research on the use of commercial games in L1 can be traced back to the 1990s, to an early study on how the action-adventure game *Prince of Persia* could be used to teach narratives in the English classroom (Beavis, 1998). Through a series of projects, articles, and books—which focus on reading, writing, and design activities related to games in English as L1—Beavis et al. provided evidence to support an expanded notion of literacy that builds on students' rich textual worlds, and the knowledge of fantasy, genre, narrative, and text that this generated (Beavis et al., 2012; Beavis et al., 2017). Their work developed by joining concepts from game research that emphasise games' interactive aspect (e.g., Juul, 2005; Galloway, 2004) and a theoretical model of literacy presented by Durrant and Green (2000) that conceptualises literacy as cultural, critical, and operational. In addition to this pioneering work, the research interest in using games for literacy development greatly intensified with the publication of Gee's seminal book, *What Video Games Have to Teach Us About Learning and Literacy* (2003). The book drew on theoretical inspiration from New Literacy Studies and argued that sociocultural literacy models are well-exemplified in the playing of digital games, in which reading is associated closely with social practices and domains, and with the building and exploration of social identities (Burn, 2016). By linking insights from New Literacy Studies to the experience of playing and interacting with games, this book influenced a whole generation of game and literacy researchers. However, Gee's work also has been criticised for being too celebratory and general in its approach to games and literacy development, pointing to a need for more empirical studies (Buckingham, 2013). Since the mid-2000s, there has been a steady stream of studies on the use of digital games in the L1 classroom, particularly in the Anglo-American countries. One of the obvious explanations for the dominance of research on games in L1 in English-speaking countries is that games often are designed with English-speaking narratives or are played online by players using English, which makes it easier to adapt the game to L1 in countries where English is the first language.

In contrast to the dominant research interest in the educational use of commercial games, a second and relatively new research interest concerns the links between students' gaming habits out-of-school and their in-school performance. This body of research often is informed by a public interest in the impact of children's extensive game activities on learning outcomes as measured through large-scale quantitative studies (e.g., students' grades or standardised test results from PISA; Borgonovi, 2016; Sletten et al., 2015).

1.5 Overview of research on digital games and learning in L2

Digital games, particularly educational games, have been used for several decades to teach foreign languages. Dovetailing with this, research on digital games and learning in L2 took off in the early 1980s (Reinhardt, 2019) and since has witnessed soaring growth (Cornillie et al., 2012), particularly at the tertiary level (Hung et al., 2018). Except for findings from a review conducted by Chiu (2013), there has been general agreement (e.g., Cornillie et al., 2012; Young et al., 2012; Zou et al., 2019) that digital games can be beneficial for language learning. However, in terms of game types, some studies suggest that commercial games are less suitable for young learners in the L2 school subject (Tsai & Tsai, 2018; Yudintseva, 2015).

Except for research specifically targeting the use of massive multiplayer online games (MMOGs), such as *World of Warcraft* (Jabbari & Eslami, 2019), research on digital games in L2 largely has been quantitative rather than qualitative. Moreover, only a few studies have a theoretical foundation (Cornillie et al., 2012; Peterson, 2013; Zou et al., 2019), and most primarily focus on how game design features can enhance language learning (Cornillie et al., 2012). As noted by Peterson (2013), most quantitative studies are conducted with small participant pools (i.e., large-scale quantitative research is lacking). Furthermore, longitudinal research is non-existent.

Several reviews have pointed out (Hung et al., 2018; Peterson, 2013; Yudintseva, 2015) that most studies on digital games in L2 learning focus on learner motivation and affective variables, and in relation to language learning, persistently on vocabulary acquisition. This strong focus on vocabulary learning likely mirrors a general emphasis on vocabulary learning in L2 learning research based on agreement that acquisition of a substantial vocabulary mass at an early age is critical to language learning (Nation & Hunston, 2013). However, several researchers specifically have called for a shift towards embracing other language skills (e.g., grammar, Peterson, 2013), as well as discourse and collaboration-oriented aspects (Hung et al., 2018; Reinhardt & Sykes, 2014), along with a focus on language socialisation (Hung et al., 2018).

Finally, reviews within the field suggest that a need exists for more research at the primary and secondary school levels because most research has been conducted at the tertiary level (Hung et al., 2018; Peterson, 2013).

1.6 Research aim

To sum up, we found no reviews related to research on games *across* L1 and L2 despite the aforementioned indications that the two subjects gradually are converging. Thus, this systematic comparative review aims to determine what empirical evidence exists concerning the use of digital games in relation to literacy and language learning within L1 and L2 in primary and secondary education. Moreover, we aim to compare this research from a cross-curricular perspective to provide valuable

guidance for researchers and educators on the impact and possible use of digital games in K-12 learning contexts, as well as suggest directions for future research.

2. METHOD

This paper is a systematic review, as described by Grant and Booth (2009), which aims to systematically search for, appraise and map the relationship between digital games and literacy and language aspects in L1 and L2 quantitative and qualitative research. We employed a two-phase search that combined searches in library databases with breadcrumb and journal searching. Our initial search surveyed the field using 10 library databases relevant to language learning, literacy, education, gaming, technology and psychology: Academic Search Premiere; ERIC; IEEE; Pro Quest; Information Science and Technology Abstracts; Linguistics and Language Behaviour Abstracts; ACM Digital Library; Science Direct; and PsycINFO. This search then was filtered to focus on peer-reviewed journals published between 2000 and 2020.

The search was conducted as a block search that involved search terms from four categories: (a) digital game type (e.g., commercial game); (b) context of game activities (i.e., within school or related to school); (c) literacy or language; and (d) notions of L1 and L2 (e.g., EFL or mother tongue education). The first game type category used the search term *gam**, which included games, gaming, digital games, video games, computer games, game design tools and learning games. The second category concerned the domain or context of activities that could be inside or outside school settings using these search terms: *learn**; *teach**; *educat**; *school*; *class**; *student**; *leisure*; *informal*; *pedagog**; and *K-12*. The third category's terms were *literacy* and *language*. Finally, the fourth category was related to more subject-specific aspects of L1 and L2, with these search terms used: *L1*; *L2*; *mother tongue*; *English*; *read**; *writ**; *curriculum*; *communication*; *EFL (English as a Foreign Language)*; *ESL (English as a Second Language)*; *SLA (Second Language Acquisition)*; *multi-modal**; *litera**; *fiction*; *paratext*; *narrative*; *grammar*; *vocab**; *critical*; *linguistic*; and *aesthetic*.

This search generated 3,055 results after all duplicates and studies outside the review's scope were removed. All the abstracts from the search results then were read and categorised into three groups (green, yellow and red). The green group comprised studies that met our criteria for inclusion and were subjected to a close reading. The yellow group comprised studies that might be relevant and needed further reading to determine their relevance (e.g., several studies did not report in their abstracts whether they used analogue or digital games). Similarly, other studies had to be read to determine participants' ages and education levels, as well as determine whether they were K-12. The red group comprised studies that did not meet our criteria. Several of these excluded studies were conducted outside the education context (e.g., within the areas of library science, media studies, visual arts or computer science) with no explicit links to L1 or L2 teaching. For example, we

excluded studies conducted in an out-of-school setting with an emphasis on game play and English proficiency skills without relating to the L2 school context.

Because we were interested in exploring the possible convergence among research on games, literacy, and language learning in the L1 and L2 education contexts, we excluded L2 studies that did not focus on learning English as a foreign language in the L2 context (e.g., using games to learn German or Chinese as a foreign language, or English as a second language as a bilingual student; Pepler et al., 2015). Overall, articles were selected if they examined how digital games could be used to further literacy or language learning in relation to L1 and L2 education. These encompassed studies that used qualitative research methods (e.g., design-based case studies or ethnographic approaches), as well as quantitative research methods (e.g., experimental interventions or large-scale assessments of academic performance).

The exclusion criteria also applied to articles presented as reviews or reports, research studies conducted in pre-primary and higher education settings (e.g., Peterson, 2012), studies that did not determine or report participants' ages, and studies that did not focus on the use of digital games, but instead focused on analogue games or virtual worlds. Moreover, we excluded studies that mainly were theoretical discussions on games' assumed learning potential without empirical research (e.g., Gee, 2003). We also excluded studies that only addressed motivational or affective aspects of using games for learning if there was no focus on specific aspects of literacy (e.g., writing) or language learning (e.g., vocabulary acquisition). Finally, we did not include several articles published on the same empirical study, but only focused on articles from the same study that presented the most relevant findings for purposes of the review.

This procedure generated 48 selected studies for close reading. In the next phase of our search, we conducted a breadcrumb search on all the included studies (i.e., following references from one article of interest to additional articles). Moreover, we conducted additional searches in selected journals that related explicitly to the L1 and L2 research fields. This was necessary because we found that some of the relevant research journals, such as *L1—Educational Studies in Languages and Literature*, were not indexed through the general databases. The breadcrumb search and focused journal search provided an additional number of studies that met our criteria, giving us a total of 77 peer-reviewed studies for further analysis. All the included studies were read closely and coded using the following criteria:

- Country: Where the study was conducted. Some studies related to several countries (e.g., data from the PISA studies).
- L1 or L2: Whether the study was conducted within the context of L1 or L2, or both.
- Education level and age: We categorised the studies according to primary (ages 6–11), lower secondary (ages 12–15) and upper secondary (ages 16–18) education.

- Context: This indicates whether the game activities described in the study took place in school (e.g., as part of a teaching unit) or outside school (e.g., a leisure activity at home).
 - Game type: We distinguished among three different game types (educational game, commercial game, or game design tools), as previously described.
 - Game title: This refers to actual games played (only mentioned in some studies).
 - Game genre: This describes the game type (e.g., tutorial game or role-playing game), which is only mentioned in some studies.
 - Game aspects: The game affordances addressed in the study (e.g., specific game mechanics for interaction, as well as game activities inside or outside school settings).
 - Literacy or language aspect: Each study is coded in relation to specific literacy aspects (e.g., reading or critical literacy) or language aspects (e.g., vocabulary acquisition).
 - Theoretical framework: Describes theoretical perspectives or constructs for each study.
 - Research methods: Quantitative methods (e.g., surveys or experimental studies), qualitative methods (e.g., ethnographic studies), or mixed methods research approaches.
 - Key findings: This refers to learning outcomes (e.g., results from interventions or correlations between out-of-school game activities and school performance).
- In Table 1, we present an overview of all the studies in relation to education level, context, game type and research methods. See the online appendix (<https://doi.org/10.21248/l1esll.2022.22.2.363>) for more detailed information on the included studies.

Table 1: Overview of included studies (*Two studies refer to both L1 and L2).

	L1 studies	L2 studies
<i>Educational level</i>		
Primary	11	17
Lower secondary	31	8
Upper secondary	12	5
<i>Gaming context</i>		
In-school	35	18
Out-of-school	18	10
<i>Game type</i>		
Educational game	12	18
Commercial game	31	10
Game design tool	12	0
<i>Research methods</i>		
Qualitative	32	1
Quantitative	16	19
Mixed methods	2	4
<i>Total studies*</i>	49	28

3. RESULTS

In what follows, we provide an in-depth presentation of our results based on our coding and analysis of the included studies. The results are structured in two sections wherein we first present the analysis of the L1 studies and then the L2 studies. Each section will focus on dominant literacy or language aspects that we identified in the included studies. Consequently, the section analysing the L1 studies focuses on four aspects: (1) reading; (2) writing; (3) multimodal production and game design; and (4) critical literacy. Similarly, the section analysing the L2 studies focuses on four aspects: (1) vocabulary learning; (2) multiple language skills; (3) writing; and (4) language practices.

3.1 Use of digital games in L1

Altogether, 31 of the 49 included L1 studies related to lower secondary school, and most of these (25) examined the use of commercial games, a pattern that underscores the prioritised education level and attraction of commercial games in L1 research, thereby confirming a dominant research interest since the 1990s within the field. However, when it comes to particular game genres and game aspects attended to in the studies, the landscape is highly diverse. In Table 2, we present an overview of all the included L1 studies according to different literacy aspects (reading, writing, multimodal production and critical literacy). In terms of research methods, most of the L1 studies involve qualitative approaches (see Table 2), which applies particularly to the studies conducted in relation to game play in school settings. Whereas most of the studies conducted within the L1 classroom context focused on writing (11) or multimodal production and game design (9), most of the studies outside school focused on reading (11). Seven of the included studies focused directly on how digital games can be used to foster students' critical literacy.

In the next four subsections, we present the most significant tendencies in all the L1 studies in relation to their findings on reading, writing, multimodal production and game design, and critical literacy. Some of the included studies focused on more than one literacy aspect (e.g., broader aspects of bridging students' game activities outside school with literacy practices in the L1 classroom). In these cases, we grouped the studies according to the most dominant aspects of literacy examined. The research interest in bridging opportunities is, itself, an important tendency across the studies.

Table 2. Overview of L1 studies according to literacy aspects.

Literacy aspect	Frequency	Source
Reading	16	Adams (2009), Borgonovi (2016), Burn (2003), Drummond & Sauer (2020), van Gorp et al. (2017), Hartanto et al. (2018), Holmes (2011), Homer et al. (2014), Khan & Reed (2011), Maine (2017), Martin & Steinkuehler (2009), Rasmusson & Åberg-Bengtsson (2015), Seok & DaCosta (2017), Smith (2012), Steinkuehler & King (2009), Stufft (2018)
Writing	14	Allen et al. (2014), Beavis (2007), Berger & McDougall (2013), Gilje & Silseth (2019), Hanghøj (2011), Hanghøj et al. (2018), Hanghøj et al. (2020), Liao et al. (2018), McClay et al. (2007), Mendez et al. (2014), Owsten et al. (2009), Robertson & Good (2003), Sletten et al. (2015), Warren et al. (2008)
Multimodal Production and Game Design	12	Abrams (2009), Beavis & O'Mara (2010), Burn (2007), Carroll (2016), Elliot (2014), Gerber et al. (2014), Marcon & Faulkner (2016), Marlatt (2018), Merkel & Sanford (2011), Robertson (2012), Toomey (2017), Walsh (2010)
Critical Literacy	7	Altura & Curwood (2015), Apperley & Beavis (2011), Apperley & Beavis (2013), Bacalja (2018), Beavis & Charles (2005), Burwell (2017), Sanford & Madill (2007)

3.3.1 Reading

Altogether, 16 studies examined relations between students' digital game play and L1 reading. They were very diverse in terms of game types and particular game genres, and in terms of education level, context, and chosen methods. One-third of the reading studies focused on educational games, specifically on tutorial games (Holmes, 2011; Khan & Reed, 2011; van Gorp et al., 2017) and gamified digital books (Homer et al., 2014; Smith, 2012). They were conducted at both the primary and secondary levels, both inside and outside school settings. Except for one study (Holmes, 2011), they all employed a quantitative research design. Standing out is a study by Smith (2012) that demonstrated how game elements in a gamified digital book supported struggling secondary school readers' immersive visualisation of the story setting, and their reading comprehension in general, as examined through subsequent questions. Thus, this study indicated how educational games might be designed to promote reading through immersion into a fictional world. In line with this study, Holmes (2011) suggested how tutorial games played at home with parents can foster positive experiences for struggling primary school readers. In so doing, this study balanced between emphasising both game-specific aspects and social aspects related to the use of tutorial games as being beneficial for student reading skills.

This point is examined further in research on a widely used educational game platform in L1 contexts, *GraphoGame*, invented in Finland to address reading difficulties among young readers. The platform aims to support phonological skills in particular and can adapt to learner performance, provide specific feedback, and has

been distributed widely and studied in more than 20 countries. Synthesising a series of single studies that otherwise would have been included in the present review, McTigue and Uppstad (2019) concluded that *GraphoGame*, despite its designers' intention, elicits no significant effect on young learners' word-reading skills. The result was based on 28 studies on the use of *GraphoGame* worldwide. Primary students might learn something from using the platform, but no transfer was measurable. Three moderating factors were considered: language complexity; intervention duration; and adult interaction. The meta-study found that adult interaction seemed to be the only significant mediator and concluded that this contextual factor is crucial when using *GraphoGame* as part of early literacy instruction. As such, the studies on educational games and reading pointed in different directions. Although it appears to be possible to support reading comprehension through visual elements (Smith, 2012), game designs based on training isolated skills in line with cognitive approaches to literacy and the component of reading do not appear to improve students' reading. As such, McTigue and Uppstad (2019) indirectly called for a new take on reading games' design beyond isolated game features, as well as for research of contextual factors, such as teacher interaction and scaffolding, to aid students' learning.

Most of the reading studies (11) examined the use of commercial games, and most (10) also paid attention to secondary school. A group of qualitative studies examined a range of game genres in relation to reading as a situated practice in line with a sociocultural literacy tradition as set forth by Street (1984), among others. The focus was on reading texts both in and around games. Moreover, the qualitative studies all argued for an extended notion of literacy in the L1 classroom that welcomes students' out-of-school reading experiences (e.g., Adams, 2016; Martin & Steinkuehler, 2010; Stufft, 2018). The game genres that primarily were considered included role-playing, adventure, and action-adventure games, such as *Harry Potter and the Chamber of Secrets* (Burn, 2003). Generally, the choice of commercial games exemplifies specific popular games among young people at the time (i.e., when the studies were conducted). Martin and Steinkuehler (2010) examined the massive multiplayer online game, *World of Warcraft*, as well as students' information literacy practices in relation to this game, in a two-year ethnographic study conducted in an informal afterschool learning lab. Data included video, audio, interviews, photos, in-game chat logs, and multimodal field notes, with the results indicating that the activities of seeking and disseminating information were salient and distinguishable as collectively accomplished activities. This suggests that information literacy should be conceptualised in a way that accounts for "the collaborative nature of online spaces" (Martin & Steinkuehler, 2010, p. 365). The results also indicated that students' reading competencies in relation to multiplayer games should have implications for an otherwise traditional conceptualisation of literacy as an individual practice in school. The authors asserted that students' gaming practices might be a solution to, and not a cause of, boys' reading struggles.

Similarly, Stufft (2018) argued that an extended concept of literacy in the L1 classroom would be valuable to account for the competencies that students develop when they engage with digital gaming activities. In Stufft's study, seven sixth-graders' figured worlds of literacy were examined, as these were activated in two book group discussions. One of the books was about the sandbox game, *Minecraft*. The elicited discussions indicated that whereas the participating students clearly referred to their own gaming literacy practices, such as production and reception of paratexts in relation to *Minecraft*, they did not understand such text work as having anything to do with academic literacy, or as being valued in the L1 classroom. Stufft (2018) concluded that educators are "better able to support students in their literacy practices and foster their development of identities as expert readers and writers by recognising and welcoming their identities as gamers into the classroom" (p. 207). This group of studies mirrors how digital game play has become an important activity in many secondary students' lives outside school, and they also exemplified a research interest in examining bridging opportunities that inevitably involve a discussion of the construct of reading at school.

The last group of reading studies comprises large-scale quantitative studies that focused on the links between adolescents' digital gaming in out-of-school contexts and their academic performance, specifically their reading performance (Borgonovi, 2016; Drummond & Sauer, 2020; Hartano et al., 2018; Rasmusson & Åberg-Bengtsson, 2015; Seok & DaCosta, 2017). Taken as a whole, they point to a complexity of correlations without causality between game play and reading performance. Comparing student performance in the paper-based and computer-based reading assessment in PISA 2012 with self-reported gaming habits, Borgonovi (2016) found that boys underperformed girls, particularly in the paper-based assessment, a result also recognised by Rasmussen and Åberg-Bengtsson (2015). Both studies found that the gender gap was wider among low-achieving students than high-achieving students. Borgonovi further found that extensive time spent on collaborative online games had a significantly negative association with students' reading performance, particularly for those low-performing boys who played extensively, whereas moderate playing of single-player games had a positive association with reading skills. Both studies argued that navigational and spatial skills in digital game play can make a positive impact on the digital reading factor, as measured by PISA 2012, corresponding with findings by Smith (2012). None of the large-scale PISA studies provided details on game genres and game play context, but they drew attention to game format (single-player vs. collaborative multi-player games) and the time spent on gaming as significant factors in students' reading performance.

Hartano et al. (2018) contributed with further nuances to the links between adolescents' gaming and their academic performance, finding significant differences between weekday and weekend digital gaming habits. Data comprised self-reported gaming habits and results from standardised assessments of math, reading and science. A moderately negative relationship was found between weekday gaming and academic performance, contrasted by a positive relationship between weekend

gaming and academic performance. The study questioned the advantages of game play, namely the cognitive abilities that might be related to digital game play, particularly visual and spatial skills, and the fostering of important navigational reading strategies (see Seok & DaCosta, 2017) that should be viewed in the light of the negative associations between extensive weekday gaming and academic outcomes (Hartanto et al., 2018). Simultaneously, the study found a more complex relation between digital gaming and reading performance, highlighting the importance of different gaming environments and the need for more research into gaming environments' role in research on links between digital game play and academic performance. These results were strengthened further by a recent study (Drummond & Sauer, 2020) that analysed PISA 2015 data. The study compellingly demonstrated how playing games in the morning before going to school played a bigger role than extensive game play after school or during weekends as such in explaining negative impact on reading performance. This finding calls for further research on other background factors such as *laissez faire* parenting, students' lack of impulse control, and psychological issues concerning lack of student engagement.

To sum up, the L1 reading studies involving educational games focused on specific game affordances, but the results from both the qualitative and quantitative studies suggest that contextual factors play a key role in students' literacy development, going beyond specific game features. Whereas the large-scale studies did not examine specific game genres, the qualitative studies on commercial games primarily examined and discussed the need for an extended or transformed notion of literacy that builds on students' game experiences. Taken together, the studies call for more research into contextual or gaming environment factors, as well as into the effects from reading in relation to using commercial games in school settings.

3.1.2 Writing

The 14 writing studies are remarkably alike. Except for two studies on educational games (Liao et al., 2018; Warren et al., 2008) and one on game tools (McClay et al., 2007) at the primary level, they were conducted at the secondary level and employed primarily qualitative methods. Half the writing studies examined the use of commercial games in the L1 writing classroom in a way that put forth an expansion of the L1 text lexicon, both in terms of the use of a variety of commercial games as objects of study in the classroom and in terms of the variety of student text genres promoted. The studies examined the use of action-adventure games, role-playing games and sports games that students write about in different genres, from journalism (Gilje & Silseth, 2019; Hanghøj, 2011; Hanghøj et al., 2020) to instructional texts, such as game guides (Beavis, 2007; Hanghøj et al., 2018), and across analytical interpretations of characters (Robertson & Good, 2003) and fictional writing (McClay et al., 2007).

This extension of the traditional L1 text lexicon—stimulated primarily by integrating commercial games as objects of study in line with, for example, written

fictional texts and films—is reflected upon explicitly in Berger and McDougall's (2013) qualitative intervention study, conducted in four upper secondary L1 English classrooms at four different schools in the United Kingdom. The study examined the possibilities of reading the action-adventure game *L.A. Noire* as a text with the analytical 'lens' of English by, among other methods, asking students to write about intertextual references and genre on a game play blog. The study found that it was more challenging for the teachers than for the students to view this game as a legitimate L1 literary text. Furthermore, it found that the use of digital games might support student engagement in the literature classroom. As such, the study exemplifies a research interest in the included L1 studies in using commercial games to support engaged participation in the writing classroom by widening the concept of what might count as legitimate L1 texts, hereby accounting for students' out-of-school digital game experiences (see also Gilje & Silseth, 2019).

The studies on educational games are, to some extent, in line with the studies on commercial games. They combined open educational game worlds with writing journalism (Hanghøj, 2011; Warren et al., 2008) and fictional writing (Liao et al., 2018). Taking a comprehensive quantitative approach, the latter study detracted from the otherwise primarily ethnographic or qualitative case studies. Liao et al. (2018) compared the effects from a game-writing environment to an online writing environment, namely third-grade L1 Chinese in Taiwan. The game-writing environment was constructed around an island with different regions representing different writing themes, and with student players as island builders. Three aspects were assessed: Writing participation, writing performance, and interest in writing. Students in the game-writing environment seemed to be more capable of generating writing ideas and longer articles than students in the online writing environment, identified as a sign of stronger participation and recognised as important within a cognitive approach to writing (e.g., Hayes, 2012; Hillocks, 1986). Students in the experimental group also produced more sophisticated words and combined sentences into longer compositions than students in the control group. Moreover, the study found that whereas all participating students exhibited the same interest in writing during the first semester, only students in the game-writing environment increased their interest during the second semester. Shedding further light on the links between digital games and writing performance, another comprehensive quantitative study (Sletten et al., 2015) found that extensive game play (more than three hours per day) is associated negatively with Norwegian young people's grades in written Norwegian at the lower secondary level. However, the negative association is offset partly by weekly training in sports clubs—a result, however, that might be related more to socioeconomic factors than to sports.

To sum up, the L1 writing studies are compelling. Together, they examined a wide variety of commercial game genres and argued for an extended L1 text lexicon. Most of the studies—on both commercial and educational games—involved open game worlds that students can explore and write about. The few findings from the primary level are promising, as are those from secondary L1 classrooms in terms of raised

student engagement. Only one study investigated links between students' game activities outside school and their writing performance, with results parallel to the large-scale reading studies: It found a negative association between extensive game play outside school and academic performance in L1, and it simultaneously emphasised that no clear unidirectional relationship exists.

3.1.3 *Multimodal production and game design*

Another group of 12 L1 studies took a step further in examining digital games and students' text production by focusing on students' development of multiliteracies when authoring game design or game-related multimodal texts. These solely qualitative studies focused on commercial games, on game design tools or on both, and they all were conducted at the secondary level. Action games, role-playing games, and the sandbox game *Minecraft* dominated the chosen genres. Theoretically, the studies relied on a broad notion of literacy as addressing not only lettered reading or writing, but also the reception and production of multimodal texts. Except for two studies (Abrams, 2009; Carroll, 2016), they were conducted within the L1 classroom.

With a key focus on the creation of digital games, several studies touched on the boundaries of the school subject and discussed the notion of literacy. As an early example, Burn (2007) reflected upon discrepancies between print literacy and what he coins "game-literacy", which involves "both the 'reading' and 'writing' of computer games" (p. 48). Using a primarily social semiotic framework, Burn analysed two digital games created, or 'written', by two eighth grade (ages 12–13) students, and one written proposal for a game produced by another student. He argued that game literacy encompasses five elements: (1) cultural experiences with games; (2) access to technological tools; (3) operational literacy (i.e., fluency in the use of the provided software tools for game design); (4) familiarisation with the grammar of the considered game, including principles of a narrative; and (5) skills in handling a variety of modalities. By developing a notion of literacy that accounts for multimodal game design processes, Burn (2007) discussed whether and why such text production should be part of L1 education.

Walsh (2010) pursued the same kind of questions and advocated both for the recognition of new literacy practices enabled by the incorporation of digital games into the English curriculum, and for the importance of using digital games in terms of raised student engagement, a point also emphasised and explored by Marlatt (2018). Both studies took as their points of departure student disinterest in traditional print literacy, including literature. On the basis of two different units of work on digital game research and multimodal text production on digital game design, Walsh (2010) described 'systems-based' literacy practices that involve the navigation and handling of an interplay between the openness of games in terms of movement and action, and rule-based operations. Thus, the study suggested that the use of digital games in the L1 classroom is not solely a question of student engagement and new kinds of student writing; it also transforms the notion of literacy because such

work requires and develops new additional competencies alongside more traditional reading and writing competencies. In line with this, Merkel and Sandford (2011) examined how gaming literacies disturb linear thinking and involve a collective understanding of complex systems.

Taken as a whole, several of these studies emphasised how game design activities involve new ways of participating in and rearranging learning environments that call for extended or transformed literacy notions. In a study by Gerber et al. (2014), a game-based curriculum was designed to promote students' self-directed learning and engagement in relation to reading, writing, and game design. The authors found that the game-based curriculum enabled students to engage in a "constellation of connections" among digital media, traditional texts, peers, and teacher guidance (p. 19). Similarly, Beavis and O'Mara (2010) described two case studies on how analysing and designing games require an orientation towards students' multiliteracies.

3.1.4 *Critical literacy*

This last subsection addresses studies that examined how students develop critical literacy in relation to digital games (i.e., how students can develop critical understandings through analysis and interpretation of different norms and representations in games; Luke, 2012). There is a general interest in students' critical literacy in the included L1 studies (e.g., Berger & McDougal, 2013; Walsh, 2012); however, the studies in this subsection concern themselves directly with literacy's critical dimensions.

The seven included studies only involved commercial games and game design tools, and they all were conducted at the secondary level. The focus was on key critical aspects of playing and designing games, e.g., in relation to gender roles or commercial aspects of game culture. An important example is Beavis and Charles' (2006) study on how secondary students positioned themselves when playing *The Sims* in the classroom. The students used the simulation to create and play games that focused on domestic spaces with strong social norms and consumer values. Based on their observations, the authors found that students' practices resisted categorisation into neat oppositional camps marked by "uncritical acceptance" and "outright rejection" (Beavis & Charles, 2006, p. 365). This finding indicates that it is problematic to focus only on the representational aspects of games when developing critical literacy, as students tend to create a wide variety of different meanings when they explore, experiment with and reflect on values in games.

Several of the included studies emphasised shifts between letting students produce games or game-related texts and critically reflecting on their production. This point was developed in a study by Apperley and Beavis (2011, 2013) through the notion of *paratext* (Consalvo, 2007), which relates to different types of texts surrounding games. Apperley and Beavis emphasised how the incorporation of digital games as both texts and action challenges a traditional notion of literacy in the

L1 classroom, and also noted that such incorporation is best done across subject boundaries.

Inspired by Apperley and Beavis' work, Burwell (2017) suggested how students might analyse and produce Let's Play game videos to develop their critical literacy. Children are frequent consumers of Let's Play videos on YouTube, which led Burwell to argue that Let's Play videos "extend a playful invitation to commentary, creativity and critique" (p. 47). In noting the potentials of working with paratexts, which do not necessarily involve actual digital game play in the classroom, she is in line with Stufft (2018), mentioned in the section on reading studies, who stressed the educational value of recognising and welcoming students' experiences with digital games and their textual ecologies.

3.1.5 Overall summary of L1 studies

The manifest interest in commercial games, particularly in lower secondary school, reflected in the L1 studies is striking. However, the research also is characterised by a great diversity in terms of game genres and game aspects addressed. Although qualitative methods and sociocultural frameworks dominated the L1 studies, the few comprehensive large-scale studies, in a compelling way, examined and questioned the relationship between young people's game play outside school and reading and writing performance in school. Consequently, these studies point out directions for future research in terms of the need for greater knowledge about game genres and the use of games to examine links between game play and academic performance further. Moreover, the L1 studies, taken as a whole, indicate a lack of experimental research conducted on digital games within the L1 classroom, as well as studies that have examined oral language as an aspect of literacy—as suggested within research on multiliteracies (e.g., New London Group, 1996)—or in relation to academic literacy development.

3.2 Use of digital games in L2

Some general trends stand out in relation to L2 digital game research. Two-thirds of the 30 studies were conducted in primary education and, in general, predominantly involved educational games, with tutorial games as the dominant genre. Moreover, the studies primarily were quantitative, confirming a general methodological preference in L2 research (Cornillie et al., 2012). Research on writing was a notable exception with more methodological variation. Furthermore, in line with quantitative methodology (i.e., employing operational variables), the identified studies primarily targeted specific language skills, such as, vocabulary acquisition (the main focus of interest) rather than broader literacy aspects and practices as discussed in the L1 field, e.g., critical literacy, and literacy development through multiple modalities. Only a few studies (Hannibal Jensen, 2019, 2010; Zheng et al., 2009), took an ethnographic approach in examining children's engagement with games in peer-relevant

communities of practice outside school. Commercial games were mainly investigated in the out-of-school context, primarily in relation to vocabulary learning, whereas the school context was the main focus in the studies on educational games. Generally, all studies either implicitly or explicitly viewed the motivational element of games as a predictor variable for language learning thereby confirming a pronounced emphasis on motivation as a key variable in L2 learning research.

In the next two sections, we present the most significant tendencies in the examined L2 studies in relation to vocabulary learning, multiple language skills, writing and language practices—see Table 3 for an overview of how many studies were conducted in relation to each language aspect.

Table 3. Overview of L2 studies according to language aspects.

Language aspect	Frequency	Source
Vocabulary learning	18	Aglahara & Tamjid (2011), Al-Elaimat (2013), Butler et al. (2014), Cobb & Horst (2011), Ebrahimzadeh & Alavi (2017), Hannibal Jensen (2017), Hwang & Wang (2016), Kocaman & Cumaoglu (2014), Kuppens (2010), Muhanna (2012), Sandberg et. al (2014), Sundqvist (2019), Sundqvist & Sylvén (2014), Sundqvist & Wikström (2015), Sylvén & Sundqvist (2012), Tsai et al. (2017), Utku & Dolgunsöz (2018), Vasileoradou & Makrina (2017)
Multiple language skills	7	Dourda et al. (2014), Jalali & Dousti (2012), Mifsud et al. (2013), Sletten et al. (2015), Suh et al. (2010), De Wilde & Eyckmans (2017)
Writing	2	Allen et al. (2014), Hung et al. (2015)
Language practices	2	Hannibal Jensen (2019), Zheng et al. (2009)

Although vocabulary learning, in some cases, lies at the nexus of vocabulary learning and writing (i.e., some vocabulary studies rely on learners producing words), studies that do not explicitly test for other language skills (e.g., writing competencies) are treated as vocabulary studies. In each of the following sections, we include studies that focused on in-school gameplay in relation to the L2 context.

3.2.1 *Vocabulary learning*

The 18 studies that examined relations between digital games and vocabulary learning were strikingly homogeneous in terms of game types and game genres in question, as well as in terms of education level, context and methods employed. More than half these studies (11) examined educational games, specifically tutorial games. Altogether, 13 studies were conducted at the primary school level mirroring a general preference towards the use of educational games at this level in L2 research (Yudintseva, 2015) and also reflecting a general emphasis on the importance of building vocabulary knowledge at the primary school level (Elgort & Warren, 2014). Only one in-school study examined the use of a commercial game (Ebrahimzadeh & Alavi, 2017), whereas in the outside-of-school setting, eight studies focused on

commercial games (five at the primary school level). Except for three mixed methods studies (Hwang & Wang, 2016; Sundqvist, 2019; Vasileoradou & Makrina, 2017), all studies exclusively used quantitative methods underscoring the general methodological preference for quantitative research in L2 research. In the next two sections, we present the most significant tendencies in the examined L2 studies in relation to vocabulary learning, multiple language skills, writing and language practices—See Table 3 for an overview of how many studies were conducted in relation to each language aspect. L2 learning research.

The studies' uniformity also is also echoed in the common language aspects in focus, with a clear orientation towards a cognitive learning view and a predominant orientation towards the theoretical affordances of specific game designs based on notions of "good" vocabulary learning (see also Cornilie et al., 2012). Similarly, motivation figured as a strong background variable building on the recognition that vocabulary learning is a laborious process that many learners view as boring (Nation, 2010). The perceived theoretical affordances of game designs, present in all studies examining tutorial games, included the possibilities for repetitive encounters with the target language, often through listening, as well as through using the language, e.g., through matching exercises (Aglahara & Tamjid, 2011; Al-Elaimat, 2013; Butler et al., 2014; Kocaman & Cumaoğlu, 2014), filling the gap exercises, crosswords, puzzles and multiple-choice exercises (Tsai et al., 2017; Utku & Dolgunsöz, 2018). Some studies left types of exercises unspecified on the premise that merely engaging with the target language will lead to learning (e.g., Vasileoradou & Makrina, 2017).

Although most findings related to the use of tutorial games were positive—many in contrast to traditional classroom instruction (e.g., Al-Elaimat, 2012; Kocaman & Cumaoğlu, 2014)—some critically questioned this genre's suitability for vocabulary learning. A pertinent example was Cobb and Horst's (2011) theoretically driven study on the tutorial game *My Word Coach*, a detailed tutorial game with language features designed to offer cognitively relevant language learning affordances, such as, word repetition (designed for players' level of expertise assessed through in-game placement tests), a focus on form-meaning associations, and receptive and productive use of words. However, learners found the genre format and, in turn, the embedded language aspects, such as recycling of words boring, leading to relatively rapid decreases in playing time. Thus, in questioning the tutorial game genre's usefulness for language learning, the researchers proposed using more contextualised "immersive narrative" genres (p. 657). Sandberg et al. (2014) made a similar point. Another study (Hwang & Wang, 2016), theoretically based on situated learning, specifically highlighted the importance of embedded learning features providing for authenticity and the application of knowledge across contexts. By comparing two different ways of playing an unnamed educational role-playing game—(1) encountering vocabulary through cloze items (the gaming context must be examined for answers), and (2) choosing between multiple choice items (a set number of fixed choices are supplied)—Hwang and Wang (2016) found that the first option led to more gains through more mental operations. As such, the cloze item mode, offering no

candidate set of answers, prompted the students to explore the gaming context and fitted the role-playing genre well, offering a rich context for exploration. Importantly, this exploration placed a higher cognitive burden on the students resulting in significantly better vocabulary scores for this group.

A study by Ebrahimzadeh and Alavi (2017) also placed importance on the affordances of specific genres (offering rich language features) in supporting players' exploration of the gaming context. This was a rare example of an in-school L2 study focusing on a commercial game, namely *Warcraft III*. The rationale for using a commercial strategy game was based on the embedded, cognitively oriented features of the game, such as noticing the language, through for example, repetition and use. Also, commercial games' authenticity, the possibilities for interaction and, by extension, the potential for affording cultural awareness were mentioned, thereby extending the emphasis on the game's affordances to include a broader focus on the wider social context and on communication. Indeed, the study found that playing, as opposed to watching or reading about, *Warcraft III* significantly enabled, quantitatively, better retention of the target vocabulary, lending further evidence to the affordances for language learning through exploration in a multimodal universe. Moreover, as "gamers learn the vocabulary to play rather than playing the game to learn the vocabulary" (Ebrahimzadeh & Alavi, 2017, p. 56), the game provided for rich and meaningful engagement with the target language. This engagement resembled leisure gaming which indicates the potential for language learning.

The out-of-school research focus is grounded in the global nature of English and children's increasingly digitised lives, leading to much L2 engagement outside school. The identified studies all found a link between children's engagement with commercial digital games and vocabulary test results or grades. A notable example was Sletten et al. (2015) who identified a positive association between engagement in leisure time gaming and English grades but also found a negative association between leisure time gaming and written Norwegian grades. As with the in-school game studies, the research on playing commercial games outside school highlighted various cognitive payoffs as providing affordances for learning: abundant (meaningful) input; repetition of input; noticing language features; and putting input to use through interaction though most without distinguishing between different genres in the research. Many studies also drew on sociocultural theory inspired by Vygotsky (e.g., scaffolding), whose approach relied on a more socially oriented framework. Grounded in the argument that the potential for L2 learning is exponential to the amount of afforded social interaction, Sundqvist (2019) examined the affordances for interaction of different game format by proposing a scale of social interaction ranging from massive multiplayer online games, (MMOGs; maximum interaction), to multiplayer games (MPs; less interaction), to single player games (SPs; the least amount of interaction). However, conclusions on game format's significance could not be drawn as the time spent on gaming correlated with game format (i.e., only little time was spent on SPs whereas the opposite was the case with MMOGs and MPs). The author called for more research on the topic, acknowledging

the importance of interaction for language learning. As such, research on commercial games indicated a greater emphasis on the importance of interaction—in contrast to the identified studies on tutorial games which largely were preoccupied with the affordances of input and non-interactive output.

Aside from the largely cognitive learning focus, gender also figured as a topic of interest in some studies, pointing to specific gender preferences in terms of game type, as well as to different strategy use in engaging with the language (Kocaman et al., 2014). Gender was significant mainly in the outside school context, in which boys in particular demonstrated stronger vocabulary gains from playing games, not only owing to their quantitatively greater engagement than girls in gaming (Hannibal Jensen, 2017), but also grounded in their different game genre preferences (Sylvén & Sundqvist, 2012). In Sylvén and Sundqvist's study (2012), they found that boys engaged in multiplayer games with high potential for social interaction, such as *Call of Duty*, *Counter-Strike*, and *World of Warcraft*, whereas girls engaged in games with less potential for interaction, such as *The Sims* and *Restaurant City*. Thus, specific genres might be more apt for language learning given the embedded game format.

To sum up, most vocabulary studies employed a common learning view in which the game's design features were viewed as enhancing learning by providing affordances for cognitive operations. This was reflected in the predominance of tutorial games in which language features can be strictly designed and controlled. A few studies extended the cognitive view and embraced social factors, but these studies primarily focused on the informal context outside school and investigated the use of commercial games.

3.2.2 Multiple language skills

Eight studies focused on an extended number of language skills, such as grammar, reading listening and writing. Five were conducted at the primary level and involved a broad mix of game genres and two studies investigated the use of games for learning vocabulary and grammar (Jalali & Dousti, 2012; Mifsud et al., 2013). In contrast to Jalali and Dousti, who found no significant difference in language gains between playing tutorial games and receiving classroom instruction, Mifsud et al. (2013) found that the use of an adventure type game significantly enhanced vocabulary and grammar learning compared with traditional classroom instruction. Importantly, apart from requiring reading and problem-solving, the game was found to afford extensive communication through team collaboration, dovetailing with the interactional focus primarily discussed in relation to commercial games. An interactional focus was also found in Suh et al.'s (2010) quantitative study on Korean primary school learners playing the educational online role-playing game *Nori School*. The game required them to build an avatar and save a village through various quests that afforded the utilisation and practice of various skills, such as reading, listening, writing and communicating with team members. Students in the experimental group

significantly outperformed the control group in listening, reading and writing, whereas no significant differences were found in speaking skills, a result that the authors did not address directly. Aside from the cognitive benefits of playing the game, several contextual and learner individual factors were highlighted as important for learning outcomes, namely, prior knowledge, motivation for learning and network speed.

Dourda et al.'s (2014) study also successfully utilised the role-playing genre. The game, *Whodunnit*, a geographical detective story, offered a variety of cognitive and social affordances for language learning. Students in teams solved mysteries and analysed clues while travelling around the globe. The students encountered the target language in oral and written form, and practised the language by writing (e.g., emails, and so-called clue logs) and speaking (e.g., student produced video progress reports and mobile phone reports). Significant learning gains were made in terms of content knowledge, receptive and productive vocabulary, reading and writing. Moreover, although speaking was not tested per se, but rather observed through qualitative analyses, several interactional benefits were observed, namely that students progressively relied less on translating from their native language and utilised several cognitively beneficial interactional strategies more, such as asking clarifying questions and providing peer feedback. Moreover, collaboration was highlighted as a positive factor that seemingly led to greater learner autonomy and agency.

Concerning the identified studies on commercial games played in the outside school context, De Wilde et al. (2020) demonstrated how commercial games show potential for supporting many language skills aside from vocabulary, namely, speaking, reading, and writing. Notably, many children reported that they spoke English while gaming. The focus was on children's learning of English prior to formal instruction and, how this poses important pedagogical implications reminding teachers to acknowledge and build on children's home literacies—a general point to be addressed in the out-of-school studies on commercial games.

To sum up, these studies, to a certain extent, extended the cognitive learning view found in the reviewed vocabulary studies by placing a greater emphasis on the affordances of teamwork and communication, which might lead to greater language gains as well as foster more learner autonomy and agency.

3.2.3 Writing

Two studies focused on writing: one at the primary school level (Hung et al., 2015) and one at the upper-secondary level (Allen et al., 2014). Both studies focused on tutorial games, one employing a purely quantitative research design (Allen et al., 2014) and the other (Hung et al., 2015) a mixed-methods design. Hung et al.'s study indicated an orientation towards the affordances of game-enhanced communication and collaboration in fostering writing skills, and as such was preoccupied with the social context surrounding the games.

More specifically, Hung et al.'s experimental study grounded in both cognitive and social notions had students develop word maps together in groups through an instructional game interface. The game was found to enhance interaction and collaboration greatly, seemingly promoting a greater sense of agency (compared with the paper-and-pencil control group). Low achieving students in particular experienced a greater sense of inclusion and respect from team members, pointing to added benefits of using games with at risk students.

In contrast to the above study, Allen et al. (2014) investigated the affordances of L1 instructional writing games for advanced L2 learners, and as such, questioned the need to treat the two groups of learners differently. Specifically, the study investigated the affordances of the so-called W-pal, which offers a suite of instructional games that allow students to work with "explicit writing strategy instruction and practice" (p. 1), e.g., revising and paraphrasing. Both groups improved their writing skills. However, an interesting difference between the groups was the importance of game enjoyment for the L2 group as a significant predictor of their motivation and perceived improvement of writing skills. However, the researchers concluded that L1 educational games also can be utilised for advanced L2 learners, considering the importance of motivation for L2 learning. They called for further studies to identify which specific parts of the gaming environment that students find motivating, and like many other L2 studies, the study was preoccupied with motivation and game design features, presenting a cognitive learning perspective.

To sum up, as in the group of studies on multiple skills, Hung et. al.'s study on writing extended the focus from a strictly cognitive language learning view to encompass social and contextual factors that affect learning offering contexts for agency and empowerment.

3.2.4 *Language practices*

A final group of two studies concerned how games might develop L2 language practices through, for example, socialisation into communities of practice and how such engagement affords agency and investment in language practices. One qualitative study by Hannibal Jensen (2019) aimed to examine which type of engagement games afford. A key finding was that the positive status associated with English by the participants led most of them (13 out of 15) to willingly and actively engage with the language not only out of need (i.e., most games are mediated in English) but also out of interest. Such engagement, among other things, included seeking out English-language games and game-related entertainment rather than Danish, using Google for word and topic searches, and watching YouTube videos for advancement of game play or for sheer entertainment. Moreover, compared to the English the participants encountered outside school, school English was judged to be somewhat inauthentic. Another important finding was how the use of games was interrelated with other activities such as being social with other gamers. Importantly though, the study also showed how not all children engaged actively with the language of the games,

finding the language an obstacle rather than a benefit highlighting the importance of looking at children's engagement rather than game design. The study thus focused both on the sociality of gaming through children's engagement with the game-related affordances and discussed some of the cognitive affordances related to this engagement. Employing a sociocultural perspective, Zheng et al.'s (2009) in-school ethnographic study examined the affordances of dyadic interactions between four upper secondary-age girls (two native English speakers and two mainland Chinese speakers) playing the educational open adventure game *Quest Atlantis*. The game offers an immersive environment in which players (as avatars) complete various quests. The researchers found that learner interactions in the game afforded much language and cultural learning, e.g., through discussions about cultural issues, elaborations on utterances, engagement in small talk and greetings. Moving beyond the affordances of game design, Zheng et al. (2009,) noted that "[q]uests themselves will not afford language learning by being in the virtual world. It is the interplay of QA culture, quest goals and the culture the two dyads brought with them to the collaboration that defined the language used by the dyads. Their actions, in return, defined the context" (p. 504). The authors recommended that the SLA field look to New Literacy Studies, (i.e., beyond a narrow focus on linguistic skills).

3.2.5 Overall summary of L2 studies

To sum up, the general focus of the L2 studies was on educational mainly tutorial, rather than commercial, games. This mirrors a general pattern at the university and college level, with L2 studies on commercial games being conducted in informal, rather than educational, contexts (Hung et al., 2018). However, all the included studies found that commercial games have the potential to facilitate language learning even with primary-level learners. The L2 studies primarily used quantitative research methods, with studies on writing and language practices being notable exceptions. Many studies focused on specific game designs' affordances, particularly within a cognitive framework, rather than focusing on, for instance, multimodal production and critical literacy, as seen in the field of L1 research. The ethnographic studies demonstrated how language learning was afforded by socialisation between children rather than through specific design features in the games. Thus, the reviewed L2 research seems to suggest that both game type and learner engagement with different games need to be considered. Motivation figured as an important background variable informing children's engagement and, as a consequence, influencing good game design. Only a few studies examined social factors in language learning, such as learners' engagement in various communities of practice, and primarily studies outside the vocabulary category focused on games' affordances for fostering communication and agency, notably also for low-achieving students.

4. DISCUSSION

As stated in our research aims, this systematic review set out to identify empirical evidence concerning the use of digital games in L1 and L2 education, as well as compare this research in a cross-curricular perspective. In relation to the first aim, our analysis identified several important trends that mainly suggest positive (but also negative) findings in terms of using digital games in L1 and L2 education, which differ across the identified literacy and language aspects. We also found it difficult to make cross-curricular comparisons across the empirical findings from the included L1 and L2 studies, as they focused on differing language and literacy aspects, with limited overlap. Writing was the only overlapping category across the two research fields.

Moreover, we found striking differences between the theoretical and methodological approaches, as well as preferences for different game types across the two research traditions. Initially, we expected possibilities for convergence between L1 and L2 research on games, literacy, and language, given the global status of English as the *lingua franca* in many parts of the world (e.g., Byram, 2016; Graddol, 2006). However, we found limited convergence between the two research fields. In this way, the review suggests possibilities for mutual inspiration concerning ways of studying the use of digital games for developing literacies and language learning, as well as possibilities for rethinking relations between L1 and L2 education.

In the following sections, we unpack important similarities and differences across the two subjects. We also point out implications from which we believe the L1 and L2 research fields might benefit when studying the use of digital games for developing literacies and language learning. The discussion is structured around four themes across the approaches to and outcomes from using digital games in L1 and L2: (1) theoretical and methodological differences; (2) different aspects of literacy and language learning; (3) game aspects; and (4) student engagement.

4.1 *Theoretical and methodological perspectives across L1 and L2*

The analysis revealed significant differences between theoretical traditions within L1 and L2 research. We found that L1 research on games mainly (34 out of 49) is inspired by sociocultural and multiliteracy theories, while the L2 research (27 out of 30) had a stronger theoretical foundation in cognitive theories on motivation and language learning. These differences also were reflected in the researchers' choice of games and pedagogical approaches, as the L2 studies focused mainly on using games as learning resources to achieve specific learning goals, whereas the L1 studies often involved open-ended exploration of complex game worlds, in which the students were given more freedom in relation to defining and pursuing their own goals. To sum up, our review points out how researchers working with digital games, literacy and language learning in the context of L1 or L2 education could benefit from employing a broader range of methodological and theoretical approaches. For example, a need exists for more detailed qualitative and practice-oriented studies on

how to use games in the L2 classroom, particularly for vocabulary learning, as does a need for more experimental studies on what can be learned by using games for L1 teaching. Both fields could benefit from studies involving more longitudinal research methods.

Although many quantitative L2 studies were small-scale studies, we also found some examples of large-scale studies that examined links between game habits and academic performance in relation to L1 (mainly focusing on reading) and L2 (mainly on vocabulary acquisition). However, most of the large-scale studies did not provide details on specific game titles or genres, but simply categorised all children's gaming habits as 'playing games'. This is problematic because children have differing game preferences, and different game genres might involve different learning affordances, e.g., playing action games is related positively to developing spatial abilities (Quaiser-Pohl et al., 2006). In this way, a need exists for more variables on specific game preferences (as elicited in Sundqvist, 2019). Moreover, the large-scale studies mostly rely on children's self-reported data on game play frequency, which might be problematic in terms of validity (Johannes et al., 2021).

4.2 Literacy and language learning through games in L1 and L2

Another key finding concerns different learning potentials and outcomes when using games in L1 and L2. The positive findings from the large number of qualitative L1 case studies on commercial games call for more comprehensive and focused research in terms of assessing students' game-related literacies. In a working paper beyond this review's scope, Steinkuehler (2011) conducted a study on boys who were low-performing readers and found that they were able to read texts up to eight grades above their diagnosed reading abilities when they read self-selected texts related to *World of Warcraft*, which the boys played extensively. In this way, measuring the effect from linking specific game preferences with reading texts related to the same game seems to be a promising area for further research.

The large-scale studies that examined broad links between digital game play outside school and traditional literacy skills in L1, such as reading and writing, provided somewhat mixed results. Despite several experimental studies, no compelling evidence has been found that indicates tutorial games are an efficient tool when learning to read (McTigue & Uppstad, 2019). Similarly, several studies pointed to negative links between extensive game play outside school and students' reading and writing performance in relation to grades or standardised tests. Simultaneously, other studies' results indicated positive links between information skills in relation to online game play (Martin & Steinkuehler, 2010), as well as between specific gaming habits and digital reading skills (Borgonovi, 2016; Rasmussen & Åberg-Bengtsson, 2015). However, the large-scale studies found no simple causal links between time spent playing different games and academic performance in reading, which calls for more detailed research that accounts for specific games and game genres, as well as

broader contextual aspects of children's gaming practices. This point was also made by Drummond and Sauer (2020).

By comparison, the L2 studies primarily focused on the overall theme of vocabulary learning (18), reflecting a greater focus on the acquisition of basic skills for language use and learning at an early age. A key finding here is that the use of commercial games does not seem to exert a less positive impact than educational games, which contradicts the findings in a review from Yuditseva (2015). However, despite the positive results from employing games to enhance vocabulary acquisition, findings from the out-of-school context may challenge the focus on basic skills for young learners. Given that many children acquire a great number of language skills (including reading, writing, speaking and vocabulary) outside school, researchers (and educators) may benefit from drawing and building on children's literacy experiences outside school (i.e., their encounter with English as a *second* rather than foreign language), and extending the focus from vocabulary development to broader literacy development and practices. A finding that seems only strengthened by the positive link between gameplay outside school and English grades (e.g., Sletten et al., 2015; Sundqvist & Wikström, 2015) and in the positive results on gameplay in the classroom as a way to enhance cooperation, communication, and agency. In relation to this and at a broader level, our findings seem to point to an interesting suggestion, namely that in research on English as a school subject, English seems to be viewed predominantly as a foreign language (i.e., in the primary research focus on basic skills); thus, its status as a second language seems primarily, research-wise, to be reserved for English beyond the classroom. Moreover, as the reviewed L2 studies have yielded promising results that suggest games are catalysts for communication (e.g., Hung et al., 2015; Sundqvist, 2019; Zheng, 2009) and socialisation (Hannibal Jensen, 2019), these areas could be examined further in the classroom. Finally, writing seems to be another literacy skill that might be examined further in the L2 field, alongside the work on commercial games as multimodal texts in the L1 classroom.

4.3 *Game aspects: Affordances and contexts of use*

There are also important differences when comparing game aspects across the L1 and L2 studies. The L1 studies mainly focus on commercial games and involve wide variation in game genres, including simulation games (e.g., *The Sims*), open world games (e.g., *Minecraft*), games driven by narratives (e.g., *Neverwinter Nights*, *World of Warcraft*, *L.A. Noire*) and fast-paced action games (e.g., *FIFA*, *Torchlight II*). The commercial games are often complex and taught in relation to different curricular aims, ranging from reading texts in or about games, analysing and interpreting games as texts, writing about game experiences in specific genres (e.g., fiction, journalism or guides), designing or modifying games through various design tools, or developing critical literacy in relation to games. These variations demonstrate the wide range of possibilities for working with complex games in the classroom as valuable objects of study. A key finding is that most of the L1 studies examine how students develop

literacy by working in and around games as interactive texts and not through the assumed learning potential of isolated game affordances.

In contrast, the L2 studies mainly take an interest in educational games for language learning. Educational games, specifically instructional games for vocabulary learning, to a large extent focus on specific game affordances, such as repetitive input and putting the language to use through various non-interactive tasks, including matching sounds and words. As such, a striking difference between the L1 and L2 fields is the preoccupation in L2 with the assumed learning potential of specific game design affordances—most often embedded in cognitive theories. By utilising specific genres (e.g., adventure and role-playing), some educational game studies extend the focus to learner engagement by focusing on genres that foster engagement through exploration of game worlds. Although such studies are, to a great extent, also preoccupied with game-embedded affordances, they also view such affordances as providing a context for learners to examine. In relation to L2, research does seem to suggest that certain educational game genres are less apt for second language learning than others – a point made by, for example, Cobb and Webb (2011) who found that the repetitive nature of the tutorial game type offered learners little incentive to play. This point was also made by Sandberg et al. (2014). Thus, immersive game types seem more suitable for language learning (Cobb and Webb, 2011), a point also made by Ebrahimzadeh et al. (2017).

Moving further beyond the affordances of input and non-interactive output, some studies on educational games also incorporate the affordances of interaction and cooperation to include the larger social context, and by extension learner autonomy and agency. In the outside-of-school context, most L2 studies focus on commercial games. Generally, these studies do not discuss genre aspects (exceptions are Sylvén & Sundqvist, 2012; Sundqvist, 2019), but, rather, the studies hypothesise that commercial games afford both social (e.g., interaction) and cognitive (e.g., repetitive input) benefits, and as such, the affordances resemble those highlighted for educational game genres, such as adventure and role-playing games.

There might be several reasons why commercial games are adopted far more in L1 than in L2 contexts. The interest in using commercial games in secondary school should be viewed in light of the high proportion of children playing commercial games extensively within the secondary school age range (WHO, 2016). In this way, researchers and educators generally welcome and recognise students' experience with out-of-school game play, which they aim to bridge with L1-specific goals. The turn towards greater inclusion of multimodal texts since 2000 reflects digital developments and global cultural changes in the wider society in which new generations have grown up. In this way, digital games can be viewed as part of an ongoing tradition within L1 of introducing new digital text types, thereby expanding the text lexicon and exploring new types of literacy activities as new media formats emerge (Beavis et al., 2017; Buckingham, 2013). Moreover, several researchers have suggested revisions to the notion of school literacy to include multiple literacies or to introduce a new notion of 'game literacy'.

In L2, there might be a tendency toward avoiding the use of commercial games with younger learners for fear that such games might be too complex for this group (Reinhardt, 2019) or might provide less language learning potential (Yudintseva, 2015). However, our review did not find less language learning potential through commercial games. Several school studies demonstrated that K-12 learners profit from playing commercial games and suggested that bridging out-of-school literacies with school teaching shows promising potential. Connected to this, employing pedagogies that support team communication and collaboration seems particularly relevant (Sylvén & Sundqvist, 2012).

It may be argued that researchers' differences in preferred game type reflect broader differences between research traditions within L1 and L2. Both the small and large-scale studies found positive links between learning English as a second language and playing commercial games outside school (e.g., Sletten et al., 2015; Sundqvist, 2019). However, mixed results were reported concerning links between playing games outside school and performing well in relation to reading or writing in L1, which is quite interesting, as research has been limited on the use of commercial games in L2 K-12 education for developing students' English-language skills beyond focusing on vocabulary acquisition and motivational aspects. This gap in L2 research only becomes more striking when compared with research on language learning in higher education, which frequently focuses on using commercial games (Jabbari & Eslami, 2019).

To sum up, playing games outside school might exert positive effects on gaining 'fluency' in reading and speaking L2, while there does not seem to be similarly strong support in relation to L1 academic performance. One possible explanation might be that a close relationship exists between L2 skills required for playing online games and the curricular aims of the school subject (basic language skills) compared with L1, which is typically a more sophisticated text-oriented school subject. Again, this difference might be narrowing, as the two school subjects are converging on a global scale (Byram, 2016). Nevertheless, this calls for further large-scale research that compares results across English-speaking and non-English-speaking countries.

Regarding future research, L2 studies might benefit by ascribing less agency to the learning potential from specific game affordances and focusing more on interaction around games and their use contexts. Similarly, the L1 studies often fail to describe in detail which game affordances are being used, particularly in relation to commercial games, indicating the need for more understanding of specific game aspects and how the games are introduced and taught.

4.4 Student engagement through games

Supplementing our coding categories, we found that several studies focused on the use of games to engage specific groups of students within L1 and L2, and that both research areas have a strong interest in linking games with engagement, though they take somewhat different theoretical and methodological approaches. The L1 studies

indicated a strong interest in low-performing boys (Caroll, 2016), at-risk students (Hanghøj et al., 2018), disengaged students generally (Gerber et al., 2014) and *Minecraft's* appeal with girls (Marcon & Faulkner, 2016). These studies often are based on assumptions that students with out-of-school game experience become more engaged by learning language and developing literacy in relation to playing and working with games. Several of these L1 studies were conducted in secondary school, which might reflect students' lack of engagement at this stage, particularly their lack of engagement in more traditional print literacy practices and in the literature classroom (Burn, 2007; Marlatt, 2018; Stufft, 2018). However, the L2 studies mostly were conducted at the primary level and were related directly to out-of-school game play (e.g., Hannibal Jensen, 2019), bringing children's out-of-school L2 experiences into the classroom. These studies highlight the importance of examining learner agency and engagement, rather than game design features, which might vary according to a variety of complex factors.

Even though students' game experiences may benefit them when working with game-related literacy and language tasks, a few studies point to other conclusions. For example, Hanghøj's (2011) study on the educational adventure game *Global Conflicts* found that even though the teachers were certain that the game mainly would appeal to 'gamer boys', the educational game in fact appealed more to students who enjoyed becoming immersed in the narrative by reading the considerable amounts of text in the game. This finding indicates how students' interest in commercial games may not be directly transferable to educational games, creating clashes of expectations in the classroom. In this way, it is problematic to claim that certain game genres *per se* appeal to specific groups of students more than others, as this often depends on specific game features and the contexts in which the games are introduced and taught (Hanghøj et al., 2018; Marcon & Faulkner, 2016), as well as how students negotiate specific games' norms and values (Beavis & Charles, 2005). The important message here is that meaningful use of games in L1 and L2 is highly context-sensitive, as games may offer multiple participation and engagement options, yet still require teachers to enact purposeful and structured approaches that link games to educational aims.

5. CONCLUSION

Digital games are complex phenomena with many facets that offer a multitude of ways in which to communicate and develop literacies and languages. By systematically comparing K-12 research on digital games, literacy, and language learning across the L1 and L2 contexts, we found major differences in research foci on diverse literacy and language aspects, and in terms of preferred game types, gaming aspects and research methodologies, as well as theoretical perspectives. Consequently, we were surprised at the lack of commonalities across the two research fields, particularly considering the growing global similarities between first and second languages

in non-English-speaking countries, including between the L1 and L2 school subjects, even though they are rooted in different disciplinary traditions.

The findings presented in this comparative systematic review indicate that both L1 and L2 teaching might benefit from embracing children and adolescents' game-related literacy practices in the classroom. The findings particularly suggest that everyday gameplay affords English language learning and performances in the L2 school subjects for students in non-English-speaking countries. However, no one-way relationship exists between game play and academic performance in general, as positive results, to a large extent, depend on which nuances in gaming habits (e.g., playing games in the morning before going to school vs. playing with friends over the weekend), game formats (e.g., playing single-player games versus multi-player games), and when it comes to the classroom, for what purposes games are used and how they are included in education contexts.

Consequently, it is highly important that researchers working within the field of digital games, literacy and language learning can clarify why and how specific games, research methodologies and theoretical frameworks should be used to advance the research field. Simultaneously, L1 and L2 researchers need to start collaborating more closely together on comparing how digital games impact education and how they can be used within the two different education fields. In this way, we are excited about more recent tendencies, in which both research fields are beginning to adopt a broader variety of approaches when trying to understand the educational value of games for L1 and L2 learning. We believe that the L1 and L2 educational fields have much to learn from each other to advance more systematic and comprehensive research on the use of games for literacy and language learning. We hope that this review might serve as a starting point for such collaborative inquiry.

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APPENDIX

An overview of the included studies can be found here:

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