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A Systematic Review of Research on Learning Writing Skills Using Gamification

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Abstract

Multimodal interactive text genres, such as games, have gained wide popularity, while the reading of written texts has decreased among today's young people, which has in turn affected their writing skills. In this systematic review, we explore how games can be beneficial in writing education. Through combining and analyzing the results of 11 academic articles on the gamification of writing education, we discuss how games can support pupils' writing processes while promoting transmedia skills. The immersive aspects of games can encourage young writers' sense of agency, fluency, and internal motivation. Games also encourage verbal rehearsal and collaborative creation. Additionally, games seem to promote idea generation, character development, and other narrative and personal-imaginative genre features, while in factual writing, games can also develop an incoherent writing attitude. While the results seem rather encouraging, there is a lack of discussion regarding how the transfer of learning can be supported.

Keywords: writing, writing education, gamification, multimodality, multiliteracies, basic education

Introduction

Multifaceted by nature, writing consists of various skills. A writer needs to set a problem and break up a task into parts as a writing process (Flower & Hayes 1981). A writer needs to identify their social context and audience-targeted communicative goal and use available language resources, such as genre features, to support their goal (Cope & Kalantzis 1993; Deane 2018). In addition, a writer needs topic skills. Writers draw from their imagination and experience or collect data from factual sources (Hayes 1996; Hayes 2001; Olinghouse et al. 2015). In general, writing is a mode of communication that is closely connected to an individual's meaning-making and thinking; therefore, writing learning needs both personal attachment and intensive practice.

With the rapid digital development of the past decades, textual environments have expanded and diversified, resulting in the increase in multimodal text genres and modes (Kress & van Leeuwen 2001). Interactive multimodal text genres, such as video games, have gained popularity among today's young people, while the reading of written texts has decreased (see, for example, Twenge et al. 2018, La Rosa 2023). This undoubtedly affects young people's writing resources, and many studies have shown that the amount and quality of reading are strongly connected to writing performance (see, for example, Graham et al. 2018). Writing teachers often consider that the playing of games and the use of social media cause their pupils' weak reading and writing skills since they are time-consuming and addictive (Pentikäinen 2023b). At the same time, research shows that video games could be beneficial in literacy learning (Gee 2008; Bacalja 2018). In writing learning, one needs involvement, agency, and community building (Bazerman et al. 2017; Graham 2018; Stornaiuolo & Monea 2023), and gaming seems to promote such skills by providing social contexts for joint efforts (Gee 2008). Therefore, it is worthwhile to ask how games could be used in writing learning, bearing in mind that the world around us may not change, but pedagogy can.

Research on writing learning is often intervention-based and thus provides knowledge that is relatable to the study setting, with its various contextual factors such as the student body, teacher-researchers interests and input, and the content and learning methods of intervention. Therefore, systematic reviews of conducted research combine and analyze findings so that the knowledge from these studies can be applied in practice and guide future research (Harden & Thomas 2010). Recent systematic reviews in writing learning have discussed, for example, how the writing-to-learn approach is used in school subjects, such as science, social studies, and mathematics, (Graham et al. 2020), literacy studies across disciplines (Scott et al. 2018), writing in secondary-level disciplines (Miller et al. 2018), and the use of technology in writing (Williams & Beam 2018). Some reviews have focused on studies on writing in a specific language area, such as Finnish studies on writing in basic education (Kulju et al. 2017).

However, to date, no systematic review has been conducted on the use of games in writing learning. To fill this research gap, we combined research on games in writing learning. This research paper aims to analyze and piece together the results of the conducted research to answer the following research questions:

R1: How does the use of games foster pupils´ writing learning in classrooms?

R2: Can the use of games support the learning of multimodal production skills?

With this analysis, we aim to discuss and combine some recommendations for the use of games in writing pedagogy for further applications.

Games and learning writing

Research shows that games can increase learning outcomes when pedagogically applied (Clark et al. 2016). However, the essential requirement is that the games bring content or activities that support learning objectives. When appropriate, games can be applied to learning in multiple ways. In gamification, game elements such as timing or rewards are applied to learning activities to increase motivation (Kingsley & Grabner-Hagen 2018). According to Hamari (2019), the gamification of learning is the 'intentional process of transforming practically any activity, system, service, product or organizational structure into one that affords similar positive experiences, skills, and practices as found in games'.

Writing is a skill that one captures only through writing. Games might, however, contribute to the process by helping to create an environment that supports various elements and skills connected to writing. According to previous research, digital games can positively affect the development of writing skills in terms of language production (Bal 2019; El Tantawi, Sadaf, & AlHumaid 2018; Gee 2008). Hibbard (2015) also mentions that associating digital games with the writing process provides an active classroom environment and improves creativity. Games can simply motivate students to write (Gee 2013; Kingsley & Grabner-Hagen 2015; Lam Hew & Chiu 2018; Olson 2010). Gamification also develops problem-solving skills, which are necessary during the writing process (Gee 2013; Kapp 2012).

According to multimodality theory (Kress & van Leeuwen 2001), writing and gaming are connected because they are both modes of text. Writing often refers to the production of texts in written format, although the broad text comprehension that comes from multimodality theory implies that writing can also be understood as a production of texts in all modalities (see, for example, Pentikäinen 2023a). Games, however, convey meaning by combining various modes like images, sounds, animated movements, and other modes of representation and communication (Jewitt 2005, 2). The use of games in literacy learning means that the learning process also covers multimodal and interactive textual practices, which, implement both traditional and transmedia literacy skills that together expand the concept of literacy.

As Scolari et al. (2018) mention, transmedia literacy skills are a spectrum of competencies related to digital interactive media consumption, sharing, and production. These skills range from problem-solving processes in video games to content production and sharing on web platforms and social media. In the context of writing, it may mean, for example, that pupils also write

multimodal texts, practice collaborative writing processes, or use various digital technologies to produce text. It is worth noting that playing video games is one of the informal learning strategies that capture various competencies (Scolari et al. 2018; Kallionpää 2017.) In this systematic review, we combine the findings of relevant research to understand how games can be used in teaching writing, bearing in mind that writing can be understood as a multimodal activity, the production of texts in all modalities, and that applying gaming to writing learning also contributes to transmedia skills.

Data collection

Our research follows the principles of systematic review data collection and analysis. We searched for published research applying the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) approach (Page et al. 2021). First, we defined the search terms and selected the articles. Second, we evaluated the articles and eliminated those that did not fit our criteria (time period, age of the pupils). Third, we analyzed the articles according to their research choices and contribution to writing learning.

Our search settings were as follows: 1) The research was published between the years 2012 and 2022; 2) The pupils were in Grades 3–9 (basic education); and 3) The research discussed games and writing. When searching, we used combinations of the following terms: 1) writing/learning to write/writing learning; 2) gamification/learning games; and 3) school/middle school/elementary school/basic education. Before committing to the final search terms, we did preliminary searches with broader search terms (such as online learning platforms or literacy) and found that we had to narrow our focus. The databases used were Eric/CMMC, JykDok, and Scopus/Elsevier.

After removing duplicates in search results, 37 articles remained for closer evaluation. We excluded 26 of them as they did not focus on L1 writing. The excluded articles focused on L2 writing learning (1 article), scientific (4 articles) or ecological literacy (2 articles), literature reading skills (7 articles), thinking skills (1 article), information literacy skills (2 articles), argumentation skills (2 articles), or vocabulary, morphology or sentence structure (3 articles). A few articles were excluded because they consisted merely of theoretical discussions (3 articles) or included data from high school students outside of our age period (1 article).

We included 11 articles (see a list at the end of this article) that met the following criteria relevant to scientific research: includes empirical data (collected from the pupils), uses scientific methods and applies theory to discuss findings, and is peer-reviewed and published in an acknowledged research journal or as an academic monograph or thesis (see also Page et al., 2021). Although we did not delimit the language of the research articles, all the articles we included were published in English.

Overview of the data

Most of the research was conducted on students from Grades 3 (3 studies), 7 (4 studies), and 9 (3 studies), while none of the research investigated students in Grades 4 or 6. The most studied grade levels reflect transitional stages in writing learning. They discuss the age at which the pupils are often expected to start producing narrative or informational texts of multiple paragraphs (Grade 3) or the age at which they are expected to show literacy skills that enable further, academically more rigorous studying (Grade 9).

In terms of research design and approaches, this body of research is quite homogeneous, with all but one study taking the form of action research based on intervention. The analysis methods used in this body of research were rather even among purely qualitative (4 studies), purely quantitative (4 studies), and combined qualitative and quantitative approaches (3 studies). Only one study was a case study, and it applied a qualitative discourse analysis approach.

The sample sizes varied from two focus students in a case study to a group of 139 students. Most often, the research took place in classroom groups of 11–30 pupils (5 studies). This can be explained by the intervention research design, which is often teacher/researcher directed and takes place in a certain classroom. Studies that collect data from larger groups of pupils seem to be rarer. In our body of research, only one study collected data from more than two classroom groups of pupils. Most studies were designed as quasi-experimental, meaning that the results of the focus group were compared to a control group.

The duration of the studies reflected the nature of the interventions, with most lasting either around a month (5 studies) or 1–3 months (a term or a study module, 4 studies). Only one study took longer than six months, and only one was longer than one academic year. Generally, these studies did not discuss longitudinal development in writing learning but instead discussed whether the pedagogical approach tested brought short-term learning gains or other benefits, such as motivation or increased involvement within a specific writing task.

Regarding the use of games in writing learning, it is unsurprising that the genres of the written texts in interventions were mostly creative or fiction (8 studies) or personal-imaginative (3 studies). Game worlds invite agency, world-building and other types of imagination use, and these aspects lend themselves to creative, fictional text genres. Still, it is notable that relevant genres, such as argumentative, informative, and persuasive writing, as well as essay writing, are each studied in one piece of research only. This fact highlights the emergent need for further research on using games in writing learning, especially in genres other than fiction.

The studies applied different game types as follows: a commercial videogame selected using relevant criteria connected to learning objectives (5 studies), a digital interactive game developed for learning purposes (2 studies), a digital platform developed for writing (2 studies) and non-digital board games (2 studies).

Due to the small number of articles and the quality of the data, we analyzed the 11 articles using qualitative content analysis, a common approach in systematic reviews of writing research (Williams & Beam 2019).

Validity and reliability of the study

In order to increase the validity and reliability of the study, we used the following criteria for reflection according to the guidance from Lincoln & Guba (1985).

Credibility: The sample is relatively small (11), but the included studies took place over the past decade; thus, the results can be considered to correspond to the current situation in terms of writing learning research. The results of the studies were mostly positive, except for one that also provided critical notes. Such unambiguous results would require more extensive and comprehensive follow-up research.

Transferability: The progress of the study has been reported accurately and the research setting can be repeated by other researchers if necessary.

Trustworthiness: The original research designs and results of the articles are influenced by different geographical, cultural, and social contexts, particularly by teachers' contributions during the intervention. We also could not judge the subjective conclusions of the authors of the articles. However, all articles have been peer-reviewed in scientific publications.

Confirmability: The results of the study were cross-checked and double-checked by both researchers.

In addition to these general guidelines, we noted that the research articles mostly discussed creative genres and therefore not all findings might not be applied to factual genre writing. Also, the fact that all articles were written in English might limit the generalizability of the study.

Results

In the following, we analyze and discuss the main research findings from the 11 selected articles according to their contribution to writing learning. As many findings seem to be relevant in fictive and imaginative writing, we focus on those aspects first and address nonfiction writing separately after that. In the end, we broaden our perspective to multimodal skills in gaming and writing.

Games and the pupils´ writing processes

Games in the pre-writing phase: Tools of preparation

Idea generation

The writing process consists of three phases -- pre-writing, actual writing, and post-writing. The pre-writing phase is an important part of the writing process because it lays the foundation for textual production, and previous research has shown that pre-writing preparation improves writing performance (Graham et al. 2023, p. 1025). The pre-writing phase consists of the following parts: understanding the nature of the writing assignment, collecting ideas, and selecting, developing, and organizing them (Flower & Hayes 1981). These time-consuming activities demand abstract thinking skills and effort. In addition, previous research has shown that writing instruction that promotes the use of creativity and visual imagery improves writing performance (Graham et al. 2012, p. 891). Writing beliefs affect how one commits to a task, uses available resources, and evaluates the overall attractivity of writing (Graham 2019, p. 285). It is possible to assume that gaming can raise more positive beliefs about writing.

The largest study in our data, with 139 pupils, 106 in the control group, and a study duration of one year, used an intervention in which focus group pupils could construct virtual islands on the gaming platform (Liao et al. 2018). In the construction and management simulation game genre, players plan, build, and manage their units as well as run fictional communities with the resources provided (Misfeldt 2015). In the intervention of Liao et al. (2018), the pupils planned and constructed their virtual worlds and wrote ”personal-imaginative” (invented stories from a person´s life or experiences) texts using their experiences from virtual play. Through constructing islands of their own choice, the pupils’ commitment to the writing process increased, as did the length of their compositions.

Commercial construction games can produce similar outcomes when pedagogically applied. A study that used a commercial digital construction ‘sandbox’ game (Minecraft) showed that gaming can support writers in creating virtual worlds as a pre-writing activity (Ellison & Drew 2020). This study focused on boys’ writing, presupposing that gender is a factor in underperformance in writing and that games can motivate boys. At the beginning of the intervention, the boys lacked self-esteem as writers and did not understand the expectations of good writing. With the interactive stimulus, they collected some preliminary ideas for their writing, which resulted in more fluent production, and the post-tests showed learning gain.

Also, other studies noted that the use of games can encourage pupils to develop and test ideas through game activities, which also increases their interest in writing and improves writing performance (Bacalja 2018; Barab et al. 2011; Arfé et al. 2021). Accordingly, we propose that games can strengthen the playful generation of ideas as well as encourage the visualization of thoughts.

Oral rehearsal in groups

While construction and management games may appear as a design tool for forthcoming practice, other kinds of games encourage interactions that promote expression in forms other than the written form. The origin of writing, a mode of communication in a scripted form, lies in oral storytelling (Goody 1987). In the form of shared play, some games may create a space for writing practice by promoting oral forms of expression before actual writing. In addition to 'thinking aloud', which models the thinking process needed in writing, oral practice allows pupils to create and examine a relationship with an audience, a crucial element in all writing (Myhill & Jones 2009).

A study that applied 'intelligence and mind games' in a traditional format using printed word cards and wooden story cubes found that players were able to first produce sentences orally to each other and that the activity helped them compose better texts later (Kuzu & Durna, 2020). Intelligence and mind games comprise a game genre that aims to support the development of cognitive, affective, and self-regulation skills by providing problems and tasks to be solved (Bottino & Ott 2006). In the intervention (Kuzu & Durna, 2020), a group of pupils were asked to develop sentences by using word cards and visual advice from story cubes. In addition to the actual performance in writing, students developed their ability to act in accordance with the instructions. Some writers struggle to understand the abstract language of writing assignments. Oral interaction during the game helped weaker students decode the writing task to fit their own thinking (Kuzu & Durna 2020; Ellison & Drew 2020).

Another study that involved an intervention in which small teams of fifth and ninth graders played card and linguistic games as a pre-writing activity found somewhat comparable results (Arfé et al. 2020). Oral language production during gaming improved the mental translation of ideas into written language. According to the study, written sentence generation, sentence reformulation, text quality (macrostructure and language) and text writing fluency improved. The ninth graders improved their text macrostructural quality, while improvements in sentence level were significant only for the younger 5th graders.

There is a close relationship between oral and written language. Both speaking and writing demand comparable pragmatic and rhetorical capacities, such as the sense of a communication goal and audience and the application of appropriate rhetorical resources (Graham et al. 2020). Speaking, being the original mode of verbal expression, serves as a practice platform for writing improvement. In a study that used a gender approach, experiences of fluency seemed to promote boys' writing identity and self-esteem as writers (Ellison & Drew 2020).

It might be too straightforward to consider that traditional or digital games, whether through their popular content, form, or visuality, are the advancing factor for the learning benefits. Instead, the learning gain comes from the activities the games make possible. In these studies, the accessibility to the task, playful 'easiness', and inspiring problems promoted the learner's activity and engagement, leading to agency. With supporting pedagogy, these gains can be transferred to the

act of writing. The transfer of learning concerns the use of previously acquired knowledge and skills in new learning or problem-solving situations (Steiner 2001).

Collaborative support and feedback

In the pre-writing phase, writers benefit from actual peer support, a change of ideas, and constructive feedback on their plans (Graham et al. 2023, p. 1006). Some games in the interventions were selected based on their options for gaming modes that allowed both individual and multi-player play (Bal 2019, Bacalja 2018, Ellison & Drew 2020). Multiple game genres can support social interaction in writing. In the intervention with intelligent and mind board games, team play-by-word cards and story cubes helped pupils collaborate when constructing stories and making choices accordingly (Kuzu & Durna 2020). The construction of virtual islands on a shared platform allowed the pupils to visit each other's islands and comment on them. Game-based feedback mechanisms like this facilitate the exchange of ideas and other social sharing that can potentially help pupils also later when composing their texts (Chang, Liao & Chan 2021).

Other studies have discussed the group work and roleplaying that games allow but did not broaden the study setting to the analysis of actual texts. An intervention that used Storium, an online application that integrates the digital writing process with digital gamification, supported collaborative work, as the gamers constructed stories using asset cards in groups (Bal 2019). They practiced letting their characters meet various obstacles while participating in collaborative story creation, and they later resolved relatable problems in their writing processes. The benefit of the intervention stemmed from its playful simulation of the writing process.

Games and the re-construction of imaginative worlds while writing

Immersion and transfer

The experience of gaming can help writers create and immerse themselves into imaginative and fictive worlds when writing. The actual writing phase, when the writer aims to produce full sentences and connect them to paragraphs, demands focused concentration on the writing task at hand and likely does not support the involvement of gaming at the same time. However, the research shows that the imaginative worlds developed while gaming can be kept in mind and re-constructed while writing. During the actual writing, pupils were able to draw textual elements, such as character traits or story plots, from their immersive gaming experience (Bacalja 2018; Barab et al. 2011; Arfé et al., 2021).

The power of gaming is in its capability of granting gamers access to virtual worlds and immersing themselves in characters' minds and story plots through action. According to Bouvier (2014, p. 494), immersion in gaming refers to the 'stimulation of player's senses to replace the perception of the real environment by the rendering of the game world', with players' responses and experiences referring to, for example, attachment to or psychological absorption in the game.

In a game world, the various technological and multimodal features of the game aim to provide an intense experience for the gamer. On the contrary, a creative writer's task is to develop and communicate imagery that may invite their audience to immerse themselves in a fictive world (Udelson 2019). It is crucial to determine whether the immersive experience and new knowledge from gaming transfer into writing activities and what kind of pedagogical arrangements would enhance it. In the transfer of learning, new knowledge needs consolidation. One needs to consider how non-cognitive aspects, such as social, emotional, and motivational factors, affect learning in both areas—gaming, and writing—and how their transfer could be supported (Steiner 2001).

Studies have shown that virtual reality (VR) can promote the 'multiplicity of literacies' through play and interactivity, and this expands writers' content skills in complex and meaningful ways (Bacalja 2018). In this intervention, pupils learned literature concepts, such as theme, character, and plot, through video games, and they were able to make connections between the virtual world and the world of written text. The study found that pupils' gaming capital, meaning their practical experience and knowledge acquired through gaming, can actually enrich their textual comprehension.

Another study compared pupils' persuasive writing performance in learning through video games anda written story (Barab et al. 2011). The researchers found that different texts produce different positions of ownership in the narrative. The research paper mentions that 'students playing the game were (through their avatar) first-person protagonists in the unfolding narrative, collecting evidence to justify their emerging thesis, with their particular choices changing the direction of the unfolding story. In contrast, in the story-based unit students could only observe the action from the perspective of an outside reader' (Barab et al. 2011, p. 511). After gaming, pupils were able to create fictive worlds through the perspective of their characters.

Agency and autonomy

A writer needs trust in their expressive voice and sense of autonomy to be able to communicate their thoughts authentically (Johnston et al. 2020). Popular digital games are widely acknowledged for their potential to develop gamers' autonomy and agency (Beavis et al. 2015). The general sense of 'mastering' an assignment in whatever format can develop a sense of agency, and it is, again, possible to assume that such agency-building strategies may transfer to writing with relevant pedagogical support and scaffolding. Senses of agency and autonomy are, although often individually manifested, socially constructed phenomena that develop and take place in social settings (Fisher 2010). Writing, however, is often considered 'solitary', and quite often, writers work alone. Gaming can serve as a collaborative platform that encourages social activity and joint agency.

A study by Palaiogiannis (2014) found that playing a commercial off-the-shelf (COTS) videogame can promote a variety of strategies to develop vocabulary, the writing process, and the construction of story elements such as plot. The combination of all of these helps pupils

experience autonomy and independence. COTS videogames are commercial videogames that are generally purchased and played for enjoyment. Depending on the content and the modes of activities the videogames offer, their educational benefits vary. The videogame in Palaiogiannis's (2014) intervention tells a murder mystery based on Agatha Christie's famous novel *Murder in the Orient Express* (1934). The gamers were encouraged to dwell in mystery solving in groups, and for their writing assignment, they were asked to individually write a letter as the main character. In the letter, they were supposed to describe the process of murder mystery investigation, identify the potential suspects, and support their claims with proof. Playing in small cooperative teams encouraged individual performance in writing.

Another study (O'Donnell 2015) discussed an intervention that used a networked, multi-user digital video game *Mars Colony: Challenger* (2014). The study found that gaming gave pupils a high level of engagement and inspiration as well as enabled them to produce better texts compared to the pupils in the control group. The purpose of the game is to establish a sustainable human colony on Mars. This intervention integrated science and language teaching, and the pupils produced both informational and personal-imaginative narratives, first about the scientific possibilities of human life on Mars and then about the first-person experience of a settler in the form of a diary entry. To survive in such a video game, a gamer needs to develop an interest in both individual and group survival, promoting personal and collaborative agency. Accordingly, the qualitative analysis of the written texts shows that the writers were able to present their avatar's identity and social relationships after group gaming.

Games in supporting nonfiction writing

While the benefits of games in fictive and personal-imaginative writing are notable, only a few studies paid attention to factual genres, posing also some possible concerns. Mainstream nonfiction genres, such as argumentative, informative, and persuasive writing as well as essay writing, were each studied in only one research paper. Factual writing assumes a different relationship to the outside world, presupposing a fact-based, socially appropriate, and reliable connection to the real world. In other words, disciplinary writing refers to 'the knowledge of and skill with the specialized linguistic codes, technical vocabularies, and discourse practices that draw from and reproduce the epistemic understandings and routine practices of a discipline' (Moje 2015, 257). In school, disciplinary writing takes place in school subjects and builds on the knowledge-building textual practices of various disciplines (Routarinne et al. 2023). The question of the socially constructed validation of textual practices makes the question of transfer more complex, as the knowledge-construction and activities in games do not necessarily relate to such presuppositions, norms, and standards. Although the number of studies in our analysis is low, it is possible to derive some preliminary findings on the use of games in nonfiction writing.

An intervention studying persuasive writing found that gaming promoted understanding of the use-value of knowledge by allowing the pupils to identify themselves with a situation in which the knowledge was urgently needed (Barab et al. 2011). The intervention was based on the game *Plague: Modern Prometheus* (2007). This qualitative analysis showed that transformational play with video games promoted the positioning of person, content, and context and encouraged the

pupils to base their ideas on problem-based settings when writing persuasively. Somewhat comparable results were found by the research that used the *Mars Colony: Challenger* (2014) video game (O'Donnell 2015). The game allowed the pupils to evaluate the biological needs of human life, derive relevant information, and write informational texts accordingly. Such video games can simulate life challenges and argue for the need of actual information.

However, one discourse analysis study (Lawrence & Sherry 2021) encourages a more critical perspective. Nonfiction text writers need idea generation skills as well as critical reading skills to be able to identify social norms and appropriate content and language use within these genres. The sense of agency is connected to fact-based competence. As the discourse analysis shows, some game elements may even conflict with nonfiction writerly skills and attitudes (Lawrence & Sherry 2021). The study found that two struggling seventh-grade writers developed contradictory writing approaches in argumentative writing for environmental action after playing the digital online game *Quandary*. It seems that some game feedback effects, such as rewards or punishments, can encourage pupils to develop argumentation strategies that manifest simple two-fold, black-and-white choices (Lawrence & Sherry 2021). Such strategies may be less effective in more complex rhetorical situations, and the strategies may nurture an ineffective sense of competence, especially when the writer does not apply the socially appropriate text practices of the relevant discipline.

Games and multimodal writing skills

Lastly, we expand our perspective to multimodal production skills, emphasizing that the use of games in writing implicates a broadening approach to writing. It is likely that pupils do not have the innate ability to master the digital skills needed in today's world, and because of their varying backgrounds, they are in very different positions from each other. Therefore, diverse and formal school education is needed to provide all skills to everyone (Jenkins 2009). According to Scolari et al. (2018), video games can be an effective way to teach transmedia skills. Such skills include multimodal and collaborative writing skills, as well as the use of technology (Kallionpää 2017). In Bal's research (2019), the participants created digital texts through the web 2.0 tool called Storium. It encouraged pupils to write collaboratively on different topics without limiting one's imagination.

In the studies of this review, students learned how to use digital game environments and different applications as well as how to create digital context using several tools. These technical skills were acquired to some extent in most of the research discussed in this review, as most of the studies employed digital learning environments and video games (Liao et al. 2018; Ellison & Drew 2020; Bacalja 2018; O'Donnell 2015; Barab et al. 2011). Quite often, the pupils had to use different expression modes when they communicated with each other and created narrative content orally, visually, and textually. Creative skills, in the sense of transmedia production, were definitely needed as well (Liao et al. 2018; O'Donnell 2015; Barab et al. 2011; Bal 2019). In addition, the game itself can be seen as a multimodal text that promotes multimodal skills (Liao et al. 2018; Bacalja 2018). According to Bacalja (2018), the process of gaming is a literacy activity similar to writing, and literacy skills could—and indeed should—be developed and evaluated multimodally

and not just in the written text mode. In Bacalja's study, the pupils were also taught to understand the multimodal storytelling writing process.

According to earlier findings, participation seemed to play a special role in the development of traditional writing skills. While the students communicated and created ideas and content collaboratively, they developed social skills, which are also essential transmedia skills (Kuzu & Durna, 2020; O'Donnell 2015; Chang, Liao & Chan 2021; Bal 2019). In all the studies, learning environments consisted of both hectic game environments and writing phases requiring concentration, so the pupils learned both concentration and multitasking skills. (Kuzu & Durna 2020; Palaiogiannis 2014; Bal 2019). The success of this transition between multitasking and concentration is probably also relevant to the transfer of learning we discussed earlier.

Discussion

Our analysis shows, with some reservations, that games can be used in learning writing. Learning benefits come from many aspects, reflecting the layered nature of writing as well as today´s multimodal, interactive textual practices. At the same time, we emphasize the priority of pedagogical thinking and decision-making, informed by content understanding, learning objectives, and learners´ needs.

The learning benefits of using games in writing can be roughly explained by various factors that are essential to efficient writing pedagogy. Games promote social sharing and collaborative interaction in writing learning. Writing has traditionally been regarded as an individual activity that emphasizes one's cognitive skills, although an inspiring social atmosphere can encourage better learning. Games can bring oral interaction (Kuzu & Durna, 2020; Ellison & Drew 2020), social interaction within problem-solving (Bal 2019), and collaborative story development (Bacalja 2018; Barab et al. 2011; Arfé et al. 2021).

Second, games encourage pupils' sense of competence and fluency. This is notable because writing is often considered hard, solitary, challenging, and frustrating work. Gaming brings immersive experiences concerning the story flow, leading to greater motivation, commitment, and experience of autonomy as well as agency when writing (Bal 2019; Arfé et al. 2021; Palaiogiannis 2014; Ellison & Drew 2020).

Third, games encourage self-expression and increase creativity. Young writers often struggle with developing their ideas into writing as they do not yet understand the process of going from initial ideas to finished text. Interactive stimuli in games provide writers with plenty of ideas for their own writing, and in the studies, the quality of the ideas also improved considerably (Liao et al. 2018; Ellison & Drew 2020). Playing promotes the development and identification of stories, themes, characters, and plots (Bacalja 2018; Barab et al. 2011; Arfé et al. 2021). The writers' language also grows more vivid (Ellison & Drew 2020; Kuzu & Durna, 2020).

These aspects seemed to have significantly increased pupils' writing motivation in most of the research articles (Liao. 2018; Ellison & Drew 2020; Chang, Liao & Chan 2021; Kuzu & Durna, 2020; O'Donnell 2015; Arfé et al. 2021; Bai 2019). According to the self-determination theory by Deci and Ryan (2000), one's internal motivation arises as the interaction of relatedness, competence, and autonomy. In gaming, encouragement of collaboration and competence increases creativity and the feeling of being able to express oneself, which, in turn, leads to a greater sense of autonomy. As the pupils in studies analyzed experienced internal motivation, it helped them relate and perform better in externally determined school writing assignments.

These findings align with earlier research that has found gaming as a prominent contributor to writing learning (Gee 2008, Gee 2013; Kapp, 2012; Hibbard 2015). The actual implementation remains a crucial question. As many studies we analyzed were conducted by teacher researchers and took the form of action research, it is possible to assume that the teachers in the interventions were qualified and motivated to experiment with their pedagogical ideas. It remains questionable whether these pedagogical innovations are repeatable and suitable for everyday learning practices in various classrooms. Our study does not provide clear answers to that question.

Instead, we note the crucial importance of the transfer of learning from gaming to actual writing. Only a few studies contributed to this discussion. However, almost all studies used a separate game or gaming platform, and writing took place on another platform. Games and writing were mostly separate activities: gaming first, then writing. When it comes to genres and their assumptions, the transfer seemed to be more fluent in fictive and imaginative genres. Such results cannot be applied to factual writing due to the different epistemological assumptions and social norms of adequacy. Instead, as one research noted, gaming can even provide an inaccurate sense of fluency, finally being a barrier to elaborate learning and foundation-building when writing.

While the results are promising, the study calls for further research, particularly in the context of nonfiction writing, and presented and published in languages other than English. Although the research was conducted on several continents (Europe, Asia, and the US) and in many languages, we need more diverse geographical and cultural contexts in future research to enhance the generalizability of the findings.

Even more, we emphasize the importance of a well-designed pedagogical approach when integrating games into writing education. The pedagogical challenge lies in ensuring the transfer of learning from gaming to writing, and vice versa; how can the intrinsic value of writing be maintained without seeing it merely as a reproduction of the gaming experience? On the other hand, the gamification of writing promotes the learning of a broad spectrum of transmedia skills in an integrated way instead of considering them separate learning areas. Overall, the use of games in writing education demonstrates significant potential for fostering creativity, engagement, and actual writing skill development.

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