

# Digital Game-Based L1 Language Learning Outcomes for Preschool Through High-School Students: A Literature Review

Sotiris Kirginas, National and Kapodistrian University of Athens, Greece\*

## ABSTRACT

This paper presents a systematic literature review of research papers, examining (1) the impact of free-form and formally structured digital games on L1 language learning and (2) the methods that researchers and educators use to leverage free-form and formally structured digital games in L1 language teaching. The current literature review revealed that the use of formally structured and free-form digital games are based on different theoretical approaches and can be used to serve different purposes of language learning. Free-form digital games help students develop a higher level of thinking skills; they are used more in groups of older students and aim at the whole class population, as language learning becomes a dynamic process of meaning construction. Formally structured games help students to develop lower-level thinking skills, serve the behavioural or constructivist approach to language teaching, and aim at younger students or students with specific characteristics.

## KEYWORDS

Digital Games, First Language Learning (L1), Formally Structured Games, Free-Form Games

## INTRODUCTION

School aged children spend more time with electronic media than ever before due to the introduction of digital games in the middle of the 1980s. In 2009, 60% of children aged 8 to 18 played video games on a normal day, up from 52% in 2004 and 38% in 1999 due to a rise in the popularity of digital games (Rideout, Foerh, & Roberts, 2010). There has been more discussion regarding the potential of digital games for language learning as they become more realistic and interactive (Ranali, 2008). Much of the discussion has focused on their ability to provide engaging contexts in order to provide virtual worlds rich in opportunities for linguistic exposure and communicative practice (Ranali, 2008).

Digital games have been found in several recent studies to improve students' learning to enhance students' learning in a variety of disciplines, including language, art, maths, sciences, history, etc.

DOI: 10.4018/IJGCMS.320228

\*Corresponding Author

This article published as an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>) which permits unrestricted use, distribution, and production in any medium, provided the author of the original work and original publication source are properly credited.

In order to mention a few, Steinkuehler (2011) asserted that digital games seem to be a solution to the problem of teenage boys and reading rather than a cause of it. Reading is an important element of participation in digital game culture. Consequently, digital games and print discourses are not in competition with each other, but rather two essential, complementary elements of today's youth media ecosystem.

Karakoc et al. (2020) found that digital game-based learning has a positive impact on students' learning. A meta-analysis study conducted by Chen et al. (2018) investigated the efficacy of digital game-based vocabulary acquisition. Participants' vocabulary acquisition increased as a result of the data. According to McCarthy et al. (2018), students' early mathematics learning is impacted by digital games. Pre and post assessment results showed an increase in students' mathematical skills and comprehension. Chen et al. (2020) found that low and medium achievers learn chemical topics with significantly more confidence, satisfaction, and less frustration than their control group peers.

With so many students, researchers and teachers immersed in digital gaming, we try to examine the correlation between digital game and first language (L1) learning outcomes. According to the literature the vast majority of existing research focus on second/foreign language (L2) learning (Marlatt et al., 2021; Wu et al., 2020; Bolliger et al., 2015; Hung et al., 2018; Tsai & Tsai, 2018). Compared to the number of studies that focus on the use and exploitation of digital games for second/foreign language (L2) learning, the studies that explore first language (L1) learning with digital games are significantly fewer. According to Hung et al. (2018), who conducted a literature review on the use of games in language learning, out of a total of 42 relevant studies, only 6 (4%) were related to first language learning, while 36 (percentage 94%) were related to second/foreign language learning. This conclusion may be explained by the phenomenon of English as an international language in a more globally globalised world, which motivates speakers of different first languages to develop their English communication abilities. Another potential is that since most of the best-selling commercial games are offered in English, English teachers can modify these games to be used in the classroom. On the other hand, the lack of availability of L2 games for less commonly used languages creates new possibilities for DGBLL study in the future. On the other hand, the lack of research on the use of games in the first language may be due to the complexity of language teaching (writing, speaking, reading, spelling, dictation, grammar, vocabulary, text production, text comprehension, text summarization, etc.). Therefore, it becomes extremely difficult for game developers to design and develop games suitable for teaching language phenomena.

Digital games have developed rapidly over recent years. Nowadays, the combination of online education platforms and mobile or/and computer-accessible digital games have become a significant tool in language education. They are now used in classrooms both at school and at home. The main objective of using games in language learning is to make language learning more engaging and effective. As mentioned above, several studies have investigated the potential benefits of using video games for foreign language learning (Marlatt et al., 2021; Wu et al., 2020; Bolliger et al., 2015; Hung et al., 2018; Tsai & Tsai, 2018). At the same hand, this research has also questioned the ethics and effectiveness of using games for language learning. Compared to in-class learning, games help with language learning when it comes to learning languages online. This is because games provide an easier way to learn languages by allowing people to practice a new language anytime, anywhere. Games also help people with language learning by providing them with a platform to practice their new language skills while having fun at the same time. Games are also useful for practicing specific language skills such as listening or reading. People can also use games when practicing grammar or vocabulary skills. Despite this, there is skepticism around the usage and exploitation of games for learning purposes. Many people wonder how a game, which by definition is a non-serious and free activity, can be utilized for something as serious as students' learning.

In this context, this paper is an overview of the literature aimed at examining the use of digital games in educational settings (preschool, primary, secondary) that includes both major findings about the ways in which researchers and educators use the free-form and formally structured digital games in the first language (L1) learning process that that unfolds in the classroom.

Based on our theory, a broad distinction within Digital Game Based Language Learning is one that frames games either as games with rules, goals and structures, in recent years called formally structured digital games or as games with unstructured, spontaneous and free acts of play, called free-form digital games. Thus, we conducted an overview of research that evaluated quantitative and qualitative methodologies to provide insight into the world of these two types of digital gaming.

## FREE-FORM VS FORMALLY STRUCTURED DIGITAL GAMES

The contrast presented by Roger Caillois (2001) in establishing two types of play, *paidia* and *ludus*, is fundamental to the concept of freedom of play. Caillois proposes that any type of game or play form can be approached with frameworks, rules, goals, and restrictions (*ludus*), or with a more unstructured, spontaneous, and free act of play (*paidia*).

Gonzalo Frasca (2003) has further developed Caillois' concept by pointing out that some games are more obviously designed for formally defined *ludus* gameplay, as they often place a strong emphasis on winning and losing as well as accumulating points, and typically provide players with objectives that are clearly defined throughout the gameplay.

On the other hand, games designed with exploratory goals, experimentation and improvisation in mind tend to encourage a *paidia* style of spontaneous, joyful behaviour.

According to MacGregor (2008), the spectrum between *paidia* and *ludus* in relation to digital games moves between *paidia* as a free-form type of activity with undefined goals and undefined but implicit rules, and *ludus* as a structured, goal-directed type of activity with clearly defined or formalised rules.

In their book *Rules of Play: Game Design Basics*, Kate Salen and Eric Zimmerman (2004) describe play as a particular kind of structured subset of actions within numerous "ludic activities" that are classified under the even broader category of "being playful" (Salen & Zimmerman 2004).

Around the same time, Jesper Juul (2005) claimed in his book *Half-Real: Video Games Between Real Rules and Fictional Worlds* that most digital games exist on a scale between emergence and progression and that their game instructions therefore consist of a mixture of step-by-step instructions and strategy guides.

Konstantin Mitgutsch (2008) pointed out that there are other digital games that focus on the play dimension of game play, such as unstructured, spontaneous and free act of play (referred to as *paidia* by Caillois (2001), while a number of digital games focus on the game- dimension of game play, such as rules, goals and structures (referred to as *ludus* (Caillois, 2001).

Mystakidis (2021) examined the impact of playful learning experiences or playification in social virtual reality (SVR) for distance and open education from a different perspective. According to the findings of this study, such technologies can increase academic interest, intrinsic motivation, levels of engagement, satisfaction, and completion rates.

On this basis, it is possible to conclude that digital game categories may be thought of as lying at various points on an axis between totally free activity and structured goal-driven activity.

The axis's "free-form" end focuses on the play-dimension of game play, such as unstructured, spontaneous, and free acts of play. To this end, there are "free-form" digital games that allow players to choose the challenges they wish to overcome or not, as well as the order in which they confront challenges. Players can overcome challenges in a variety of ways. There is no agenda in free-form games, and the player's aims are purely intrinsic and personal.

The "formally structured" end of the axis is concerned with game-dimensions such as rules, goals, and structures. This includes "formally structured" digital games with "win" states as well as rules that structure the play and ensure fairness by being implemented clearly and fairly to all players. Moreover, formally structured games provide unique solutions to challenges and provide players with a predetermined series of challenges; players must follow a specific path to one objective, with no other paths or techniques for achieving this objective.

## RESEARCH METHODOLOGY

### Formulation of the Problem

The objective of this study was the extensive literature review for existing studies comparing language learning with free-form and language learning with formally structured digital games in order to answer to the following research questions:

- (a) Which is impact of free-form and formally structured digital games on first language (L1) learning?
- (b) How do researchers and educators use free-form and formally structured digital games in first language (L1) teaching?

### Criteria for Sorting the Games Used in the Studies into Two Categories

In the present study, the games used by different researchers in first language (L1) learning have been divided into two main categories: free-form digital games and formally structured digital games. This is not to say that all games can be placed strictly in one of the two general categories. In fact, very few digital games can be strictly classified as free-form or formally structured games. Most games lie closer or further away from these two ends on the axis of freedom of choice.

Based on the clarification above, but important to avoid any misunderstanding, games have been classified into these two categories based on the following set of criteria (Table 1), which are thoroughly analyzed in our previous studies (Kirginas and Gouscos, 2016a, 2016b, 2017; Kirginas et al., 2021):

- (a) Nonlinear gameplay vs. linear gameplay

A non-linear game environment offers the player different choices and ways to move from one point to another, from the beginning to the end of the game. Unlike linear gameplay, in a linear gameplay players must take a single path to reach a goal, with no alternative routes or methods. This way, players learn new things in the right order and the developers can make sure that everything works as planned.

- (b) Multiple solutions to challenges vs. unique solution to challenges

A free-form game allows for many different solutions to the challenges and many different paths to success. There will be different ways in which players approach a challenge, and since these alternative solutions are reasonable, it is reasonable to expect that players will be able to overcome almost any challenge in more than one way. Formally structured games offer unique solutions to challenges (every player overcomes a challenge in the same way) and this does not allow players to come up with different ways to proceed in the game.

Table 1.  
Criteria for sorting the games used in the studies into two categories (Kirginas et al., 2021)

Free-form digital games	Formally structured games
Nonlinear gameplay	Linear gameplay
Multiple solutions to challenges	Unique solution to challenges
Free sequence of challenges	Fixed sequence of challenges
Selection of challenges	Pre-defined set of challenges

(c) Free sequence of challenges vs. fixed sequence of challenges

In a free-form game, players choose the order in which they face the challenges. Providing players with different challenges, they can put one challenge aside and focus on another. Once players have overcome the second challenge, they may feel satisfied and less stressed or better focused, which can increase their chances of overcoming the first challenge. Formally structured games, on the other hand, provide structured, designer-generated challenges that players must complete in a predetermined order. In fixed-sequence games, players can only complete one challenge at a time. First, players must complete the first challenge before they can move on to the next. The situation is particularly frustrating when players cannot overcome an obstacle and cannot do anything else until the obstacle is overcome.

(d) Selection of challenges vs. pre-defined set of challenges

In free form games, players can decide for themselves which challenges they want to overcome. The enjoyable and attractive learning environment that such games provide, often in contrast to traditional learning environments, can greatly enhance children's learning. In contrast, formally structured games have structured activities that present players with a set of predefined challenges, all of which must be overcome.

## Data Collection and Selection

Our literature review employed a three-phase search. The initial search included academic journal articles, dissertations, thesis papers, and research reports on the use of digital games in the language learning classrooms using library databases (Scopus, Web of Science, ERIC, PsycINFO and ProQuest Dissertations & Theses Global) and databases of five international journals for language learning such as ReCALL, Computer Assisted Language Learning (CALL), International Journal of Computer-Assisted Language Learning and Teaching (IJCALLT), Computer Assisted Language Instruction Consortium (CALICO), Language Learning & Technology (LLT) as well as searches from the reference lists of gathered articles (i.e., following the references from one article of interest to additional articles, etc.). The keywords included (edu\* OR serious OR learn\*) AND (digital game OR video game OR computer game OR electronic game) AND (first language learning OR first language acquisition). This resulted in a list of 1265 unique studies.

In the second phase, we developed the following explicit criteria for specifying which studies would be included in the review: (a) study must relate directly to the first language learning (research studies that describe the impact of digital games on the area of foreign or second language learning were excluded as they are regarded beyond the scope of our study), (b) study should relate to school-aged pupils (research studies that refer to adult or university students were excluded as they are regarded beyond the scope of our study), (c) the study must be based on empirical research (either experimental or non-experimental research), (d) the methodology of the research on which the study is based must be explicitly stated (e.g. sample size, games, instruments, analysis), and (e) the results on which the study is based must be valid and reliable, taking into account the type of the study, to the extent possible. The process described above resulted in a shortlist of 28 research studies.

## Data Analysis

We examined the selected studies from various perspectives. First, we analyzed the characteristics of the tested populations: sample size, minimum and maximum ages of the subjects, and specific characteristics of the subjects. We then analyzed the methodology used in the studies: type of empirical research (experimental design, quasi-experimental design, and case study), duration of training with the game, degree of integration. Finally, we analyzed the results of the empirical studies in the light of the research.

## RESULTS

### Populations' Characteristics

The populations tested in the selected studies ranged from 12 (Taanila, 2004) to 1274 subjects (Rosas et al., 2003), with an average of 149 (sd = 104) subjects for each of the eighteen selected studies.

As far as the age of the studied populations is concerned, the subjects were aged between 5 (Van Daal & Reitsma, 2000; Din & Calao, 2001; Jere-Folotiya et al., 2014) and 18 years (Kim, et al., 2013). Almost all of the studies used a mixed population of subjects with the exception of Kim et al. (2013), who tested only 59 males within a well-balanced design, with the exception of Van Daal and Reitsma (2000), who tested 3 females and 11 males.

In some of the studies, the population was selected on the basis of specific characteristics. The subjects in Kim et al. (2013) study were addicted online gamers, those in Van Daal & Reitsma (2000) were very poor at spelling, subjects in Van Gorp et al. (2017) were very poor at reading, subjects in Taanila (2004) and Alanko and Nevalainen (2004) were no-readers and the subjects in Rosas et al. and Din & Calao (2001) were students from lower socio-economic backgrounds.

### Methodology Used in the Studies

Of the methodologies used in the studies presented in the selected papers, experimental designs were the most frequent (50.0%), followed by systematic quasi-experimental designs (25.0%), qualitative design and case studies (21.5%) and an ethnographic study (3.5%), as can be seen in Table 2.

The experimental study was the methodology most commonly used in the articles analyzed. We can infer that this is due to the fact that experimental studies allow the researcher to draw conclusions about one variable causing change in another. Quasi-experimental study (demonstrating the rigor and greater generalizability of the results, compared to other methodologies) and case studies (allow a lot of detail to be collected that would not normally be easily obtained by other research designs) were also quite frequent methodologies.

**Table 2.**  
**Most frequent study methodologies in the research**

Methodology	N	%
Experimental study	14	50.0%
Quasi-experimental study	7	25.0%
Qualitative – case study	6	21.5%
Ethnographic study	1	3.5%
Total	28	100%

**Table 3.**  
**Degree of integration**

Degree of integration	N	%
Preschool education	4	14.3%
Primary school	18	64.3%
Secondary school	6	21.4%
Total	28	100%

According to the study, the amount of time spent playing varied. Some of the groups studied played for at least five minutes a day, while others played for several weeks or months (one or two sessions of 1 or 2 hours a week).

As about the degree of integration the following three settings were examined: (4) preschool education, (18) primary school and (6) secondary school. The overwhelming majority of studies were conducted in a primary school setting and that preschool and secondary school appear to be underrepresented in DGBLL research.

## **Results of the Empirical Studies in First Language (L1) Learning**

In the experimental and quasi-experimental research of this review, the effect of first language (L1) learning was measured by calculating the differences between pre-test and post-test scores on the questionnaires or pre/post tests. Respectively, in the case and ethnographic studies the effect of language learning was presented as a progress in writing skills.

To sum up, the 27 of the 28 studies had a positive effect on learning compared with other types of training or no training at all. These included 18 free-form games (Dungeon & Fighter, Ghostwriter, Quest Atlantis, Zoo Tycoon 2, Guitar Hero, Nintendogs, Gardening Mama, Poisson Rouge, Endless Ocean, Minecraft, *The Elder Scrolls Arena* and *Daggerfall / Myst / Riven*, World of Warcraft, Call of Duty, FIFA) and 10 known formally structured games (Leescircus, Magalu, Hermes, Tiki-Tiki, Roli, Hagman, Literate, Robinson Crusoe: The gameWord Score, GraphoGame, Reading Race) plus a number of games focused on Italian language. The results from one research (Rosas et al., 2003) revealed no significant differences in Reading Comprehension and Spelling between the experimental groups and the internal control groups.

Overall, the research findings on learning outcome are positive and promising. Nonetheless, some scepticism is justified since some studies fail to adequately address issues including researcher bias, weak evaluation tests, and short exposure times.

### ***First Language (L1) Learning with Formally Structured Digital Games***

Van Daal and Reitsma (2000) used Lesscircus to promote independent learning of reading and spelling in precocious kindergarten readers. Results showed that the experimental group was able to recognize letters and read more non-words and words than the control group.

The same researchers conducted a study with three girls and eleven boys in a special education school, selecting children with serious motivational problems and poor spelling skills. For half a year, 14 children participated in computer-assisted spelling exercises at least five minutes a day, three times a week. A standardized dictation test and CASES system were used to assess levels of motivation and learning effects. Results showed that children with low motivation and feeling uncertain about their abilities tend to behave more positively when they are practicing with a computer than when they are learning in the classroom.

Din and Calao (2001) found that 47 preschool children, aged 5–6, from lower socioeconomic backgrounds and all of whom were Afro-American who use Playstations acquire spelling and reading more quickly than their peers without access. However, the sample size was too small to draw general conclusions about the population.

Rosas et al. (2003) used digital games specifically developed to satisfy first and second year educational objectives for reading comprehension in research with a sample of 1274 pupils from economically disadvantaged schools in Chile. The sample was separated into three groups: experimental groups (EG), internal control groups (IC), and external control groups (EC). During the course of three months, students in the EG groups played experimental video games on average for 30 hours. Both their reading comprehension and spelling were graded. The results indicate substantial differences in reading comprehension and spelling between the EG and IC groups and the EC group, but not significant differences between the EG and IC groups.

Taanila's (2004) pilot study divided twelve 6- to 7-year-old kindergarten children into two equal groups. The groups changed games and after one or two weeks an intermediate test was administered. A computerised test from HepsKups Land was used to assess the students' competence in blending. The result revealed that blending performance did not increase during the control play period, while the blending performance of both groups increased during the "Literate" play period.

Children (N=124) from five first-grade classrooms in three schools took part in different pilot research projects carried out by Alanko and Nevalainen (2004) throughout the first three months of the academic year. Almost half of the non-readers (N=41) took part in the intervention, with the other third acting as a control group. Initially, comparisons were made between well matched sets of six kids each. A timed, standardised reading exam called "Lukilasse" (Hayrinen, Serenius-Sirve, & Korkman, 1999) was used to evaluate reading skills. It has 90 words with varying degrees of difficulty that are all presented in lowercase letters. The findings demonstrated that kids who played "Literate" for one to three hours outperformed those who just got standard school support.

DANT - "Didactics assisted by New Technologies" (Wastiau et al., 2009)) was an experimental project funded by the European Social Fund and private partners, with 10,000 students participating in four years. Results showed that students in the experimental groups performed better than those in the control groups. The difference between the two groups was statistically highly significant for both age groups (7- to 8-year-olds and 9- to 10-year-olds) in the Italian tests, among others.

Fisser, Voogt & Bom (2013) conducted a study of "Word Score", a serious game designed to increase vocabulary of upper primary school pupils in the Netherlands. Results showed a significantly greater learning effect for the condition in which digital game and instruction were integrated, and the experience of both students and teachers was positive.

In the multilingual capital of Lusaka, Zambia, Jere-Folotiya et al. (2014) examined how a computer-based literacy game (GraphoGame™) could improve the literacy skills of first graders. Randomly selected participants were divided into two groups: a control group (N = 314) and different intervention groups (N = 259).

Students had access to GraphoGame on their mobile phones in their schools while it was monitored. Each student played the game in six short sessions, each lasting between seven and nine minutes, with breaks of one to ten minutes in between.

The larger increase in mean scores from pre-test to post-test as a function of engagement with GraphoGame showed that GraphoGame significantly improved student performance.

Van Gorp et al. (2017) reported the unique benefits of a word identification digital game compared to traditional reading instruction. They applied a word identification digital game to Dutch children with reading difficulties in second grade over a period of 5 weeks. In contrast to traditional reading instruction, which mostly improved reading performance on trained words, the children in the experimental group were found to improve their reading performance on untrained words more than the children in the control group.

### *First Language (L1) Learning with Free-form Digital Games*

At a Scottish public elementary school with two primary seven classes and one primary six classes, Robertson and Good (2003) performed research. 42 students participated in the study and were randomised into one of two groups: the experimental group or the control group. The control group wrote stories under normal classroom conditions, while the experimental group was administered to pairs of pupils who are friends. Results revealed improvement in relationships but not in mood and personality.

Rylands utilised the well-known computer game "Myst" to enhance pupils' reading and descriptive writing abilities (quoted in Entertainment and Leisure Software Publishers Association, 2006). Ryland led a group discussion about the game's sounds and graphics by projecting them onto a whiteboard in the classroom. The game's challenges were tackled together, and the teacher noted an improvement in negotiation techniques. The pupils' gaming exploits were also documented to help them hone their creative writing abilities.



**Table 4.****First language (L1) learning with formally structured digital games**

	Researchers	Games	Samples	Method	Outcomes
1	Van Daal & Reitsma, 2000	Leescircus (FS)	22 aged 5-6	EG-CG pre & post-test	Letter knowledge, Word reading, Nonword reading
2	Van Daal & Reitsma, 2000	Leescircus (FS)	14 students aged 8-12	EG pre & post-test	spelling
3	Din & Calao, 2001	Lightspan	47 students aged 5 to 6 years old	EG-CG pre & post-test	Spelling, decoding of grammar
4	Rosas et al., 2003	Magalu, Hermes, Tiki-Tiki, Roli, Hagman	1274 1st & 2nd elementary grade students	Experimental group, Internal control group, External control group Pre and post test	spelling, reading comprehension
5	Taanila, 2004	Literate	12 students aged 6 to 7 years old	EG-CG pre & post-test	reading
6	Alanko & Nevalainen, 2004	Literate	124 1st elementary grade students	EG-CG pre & post-test	reading
7	Wastiau et al. 2009	Various games focused on Italian language	10,0007 to 8 year-olds and 9 to 10 year-olds	EG-CG pre & post-test	Italian Language
8	Fisser, Voog & Bom, 2013	Word Score	206 4 <sup>th</sup> - 6th elementary grade students	ISG-IPG-SG pre & post-test	Vocabulary
9	Jere-Folotiya et al., 2014	GraphoGame	573 1st grade students 5–9 years old	EG-CG pre & post-test	Orthography, spelling, vocabulary,
10	van Gorp et al. (2017)	Reading Race	62 poor-reading 2nd graders students	EG-CG pre & post-test	Word repetition, corrective feedback, semantic retrieval

In their research Warren, Dondlinger, and Barab (2008) conducted a quasi-experimental, pretest-posttest comparison design with a total of 44 fourth-graders in order to measure the effect of Anytown, a zone in Quest Atlantis, on student standardized writing achievement. The experimental group demonstrated statistically substantial improvements in motivation and performance on language arts-based standardised tests, while their teachers reported statistically significant reductions in the amount of time they spent outlining and reinforcing instructions. Nevertheless, language learning gains were not consistent between people or themes; rather, they seem to be the outcome of a complicated contextual interplay between the learner, the game, and the setting.

Wastiau et al (2009) used Zoo Tycoon 2 in the classroom to encourage language skills and teamwork skills. They found that playing the game in small groups facilitated the learning of social and communication skills.

Groff et al. (2010) describe a various studies organized by Learning and Teaching Scotland. Games such as Guitar Hero and Let's Get Growing are used to create rich learning experiences that connect to project objectives. Game-play time is intermixed throughout the school week, with less than 5% of class time consumed. To enhance collaboration, students are paired in each class per DS unit. This project was designed to focus on literacy and international education, with the focus on Australia and the Great Barrier Reef. Literacy and English, Social Studies, Expressive Arts and Technology, Numeracy and Health & Well-Being were the key curriculum focus areas chosen by the educator. To access these objectives, the class completed rich activities such as creating their own Dive Shop, research diving equipment, creating a multimedia display, creating a report to a biologist, and producing a travel brochure

for Australia. Each student had the chance to dive throughout the day or throughout the week, with their dive partner, and then describe what they found in their “diving diaries”.

Miller et al. (2010) conducted an empirical study of the use of Nintendo, a commercial off-the-shelf game, in primary schools (n=74 children aged 5-7 years) in Northeast Scotland, with four preschool classes. A total of 23 sessions were observed, with each observation typically lasting 60 to 75 minutes. Based on observational data, teacher feedback, and informal discussions with children, one of the main benefits has been in writing. In short, children wanted to write about their experiences in play, with their puppies, and other related activities.

Kim et al. (2013) conducted an experiment with 59 male high school students who were addicted to online gaming. The experiment consisted of 21 sessions lasting 2 hours per day over a period of 2 months. Results showed that participants in the experimental group improved their writing and speaking ability far more than those in the control group. Busuttil et al.'s (2016) set of activities incorporating Minecraft was able to stimulate students to write detailed sentences about the place where the Graffalo lives.

Toomey & Kitson (2017) conducted a survey in which students, after playing games such as The Elder Scrolls Arena and Daggerfall, The Myst and Riven, formed groups to create new digital game concepts, develop a design brief for their game and produce promotional posters, video trailers and game reviews to promote their game idea. The results showed that this process provided students with opportunities for rewarding and innovative work that cannot be given in a traditional classroom.

Stuftt (2018) describes a study in which seven 6th grade students participated in video game book club and share their knowledge, expertise, and experiences. The first book was based on Minecraft, while the second used a lot of references from popular culture video games. As a result of their shared experiences playing Minecraft, these students were able to build connections with others and work together to further help their literacy understanding.

To explore the potential and limitations of critical literacy by utilizing digital games in language classes, Bacalja (2018) conducted a four-week qualitative study with eight Year 10 Middle-school students in Melbourne, Australia. He found that critical literacy activities could be used effectively by the student to build new understandings.

In a high school in the United States, Marlatt (2018) used Minecraft as part of a literature class. After reading *The Outsiders* by Hinton, the students recreated scenes and analyzed the book's deeper meanings with Minecraft. To explore how this popular technology can facilitate literary analysis at the secondary level, she used observations, interviews, and student-created artifacts as qualitative research tools.

Hanghøj et al. (2018) conducted a survey with 35 students from five classes (two Grade 7, one Grade 8 and two Grade 9 classes). The aim of this survey is to explore how students can use their daily experiences and attitudes towards games to develop journalistic discourse during language classes. After writing journalistic texts based on their experiences with games, the selected texts were analysed. As the students showed a high level of engagement in writing and adopted a wide range of possible selves, we concluded that games and game culture are an ideal topic for transforming students' everyday experiences and attitudes into journalism.

In order to examine the efficacy of two methods of writing in the language classroom of a primary school, Liao et al. (2018) describe an experiment. Over the course of a year, the experiment involved 245 third-grade children. Although 106 students were in the control group and were taught using an online writing environment, the experimental group of 139 students learned using a game-based writing environment. The empirical findings indicate the efficacy of the game-based writing environment in increasing students' writing performance, interest in writing, and perceptions of utilising self-directed educational games.

Gilje & Silseth (2019) conducted an ethnographic study that allowed them to analyze the literacy practises of lower secondary students (aged 14-16) over three years, which could be related to the wide variety of game-related literacy practises they found among students outside school. Consequently, this study added a perspective on how we can understand participation and literacy outside of formal schooling, as we examined one particular game practise: FIFA players in their childhood and early teenage years.

Finally, Kirginas (2022) conducted research with 128 Year 6 Primary school students. a study involving 128 Year 6 Primary school pupils was done. Students were first assigned to three groups. An educational intervention program was used in all three groups. Each student was required to write a narrative discourse (pre-test) on Crusoe's survival on the mysterious island at the conclusion of this phase. Students from each group then participated in activities using various digital resources. In order to assess if there had been an improvement in the narrative discourse created by the students in the three groups, each student was asked to write a post-test narrative discourse that was compared

**Table 5.**  
**First language (L1) learning with free-form digital games**

	Researchers	Games	Samples	Method	Outcomes
1	Robertson & Good, 2003	Ghostwriter	42 students 6 <sup>th</sup> & 7 <sup>th</sup> Primary grade	EG-CG pre & post-test	Foster Characterisation in Stories
2	Rylands, 2006	Myst	Year 4 literacy classes	Experimental groups	Speaking, reading, descriptive writing
3	Warren et al., 2008	Quest Atlantis	44 students 4 <sup>th</sup> Primary grade	EG-CG pre & post-test	Improvement on writing tasks
4	Wastiau et al. 2009	Zoo Tycoon 2	25 students aged 12	Case study	writing
5	Groff, Cranmer, Howells, 2010	Guitar Hero, Nintendogs, Gardening Mama, Endless Ocean	students 1 <sup>st</sup> , 2 <sup>nd</sup> , 4 <sup>th</sup> , 7 <sup>th</sup> Primary grade	Experimental groups	Writing, collaboration skills
6	Miller et al., 2010	Nintendogs	Primary 1-3 grade students	Experimental groups	Writing, collaboration skills
7	Kirginas et al., 2010	Poisson Rouge	20 Preschool students	Experimental groups	Vocabulary
8	Barab et al, 2012	Quest Atlantis	65 students 7 <sup>th</sup> Primary grade	EG-CG pre & post-test	Improvement on writing tasks
9	Kim, et al., 2013	Dungeon & Fighter	59 male high school students	EG-CG	Writing, speaking
10	Busuttill et al., 2016	Minecraft	one year 4 classroom	Experimental groups post-questionnaires, authors' observations, analysis of artefacts	Creative writing, problem- solving skills, teamwork, communication skills
11	Toomey & Kitson (2017)	<i>The Elder Scrolls Arena</i> and <i>Daggerfall / Myst / Riven</i>	Year 9 students	Experimental group	Writing
12	Stuftt (2018)	Minecraft	seven 6 <sup>th</sup> grade students	Experimental group	Reading, teamwork, communication skills
13	Bacalja (2018)	World of Warcraft, Call of Duty	eight 10 <sup>th</sup> grade students	Experimental group	Text production, critical literacy
14	Marlatt (2018)	Minecraft	High school	Experimental group	Text production, critical literacy
15	Liao et al. (2018)	Island-construction environment	245 students 3 <sup>rd</sup> Primary grade	EG-CG	Writing
16	Hanghøj et al. (2018)	-	35 students from five classes (two Grade 7, one Grade 8 and two Grade 9 classes)	Experimental group	Writing
17	Gilje & Silseth, (2019)	FIFA	190 students in two lower secondary classrooms	Ethnographic study	Writing
18	Kirginas, 2022	Minecraft	120 students 5 <sup>th</sup> Primary grade	EG-CG pre & post-test	Improvement on writing tasks

to the pre-test discourse. The findings indicated that students who participated in the freeform digital game's narrative discourses quantitatively

## DISCUSSION AND CONCLUSION

The focus of education has extended from the teaching of distinct grammatical structures to the development of communicative capacity during the past 40 years, with language instruction typically existing in a sphere of constant change (Kern & Warschauer, 2000). Recent developments in language education often prioritise conversation and the socialisation of meaning above structural language exercises as a result of these instructional modifications, among other factors. Furthering this, Kern and Warschauer define the changes in language learning methodologies as structural, cognitive, and socio-cognitive (Kern & Warschauer 2000, 3). The transition of these three stages of technology-based language teaching and learning may be summed up by the assertion that the use of digital games in language learning has shifted away from contexts that are communicative in nature and integrate task-based, project-based, and content-based approaches. According to Kern and Warschauer (2000), language instruction has grown both more sophisticated and “exciting” over this process (*ibid.*)

According to our theory, there are two types of games: a) Formally structured games b) Free-form games. Formally structured games are environments with clear, predetermined goals and predefined paths; they enable students to construct knowledge and skills in a short time. Free-form games, on the other hand, are more open environments that put students at the centre of learning and actively involve them in the learning process, the acquisition of 21<sup>st</sup>-century transferable skills, such as discovery and collaborative learning, decision-making process, creative thinking, problem-solving skills, etc.

In conclusion, we would propose that the current literature review shows that research which use formally structured and free-form digital games are based on different theoretical approaches and can be used to serve different purposes of language learning, as shown by the following remarks:

- (a) Formally structured games help students to develop lower-level thinking skills. According to the findings of this review there are indications that the use of formally structured games achieves lower-level teaching objectives (knowledge, comprehension, application). Alternatively, to express it better, the way of using such games promotes lower-level learning, probably due to their design and gameplay. On the contrary, free-form digital games help students to develop a higher level of thinking skills. The use of such games achieves a higher level of teaching objectives (analysis, synthesis, evaluation). Due to their design, teachers and educators can employ free-form digital games as cognitive tools rather than teaching tools (Busuttil et al., 2016; Stufft, 2018; Bacalja, 2018; Liao et al., 2018; Gilje & Silseth, 2019; Hanghøj et al., 2020; Kirginas, 2022).
- (b) Most of the studies that utilize formally structured digital games are designed to serve the behavioural or constructivist approach to language teaching. Based on the analysis of the selected studies, it becomes clear that teachers and researchers aim to use formally structured games to teach or train students/players in a specific area of language learning (word writing, spelling, vocabulary, reading, etc.). They use these games in such a way that students acquire language automated, through repetition and mechanical reaction without taking into account the communicational situation. In contrast, most of the studies that utilize free-form digital games are designed according to modern learning approaches (cognitive, socio-cognitive, socio-cultural), aiming to involve students/players in a process of discovering knowledge through the exploratory processes of problem-solving, grouping, drawing conclusions as well as in a process of building knowledge through transformations and reconstructions proceeding from the lower cognitive structure to the higher (Taanila, 2004; Alanko & Nevalainen, 2004; Wastiau et al. 2009; Fisser, Voog & Bom, 2013; Jere-Folotiya et al., 2014; van Gorp et al. (2017)). The usefulness of free-form games in language learning is not so much in their content as it is in how they are utilized so that new explorations trigger a new wandering in knowledge (Gee, 2003; Squire, 2004).

- (c) The methodological approach of the studies used formally structured games based on a combination of experimental and quasi-experimental research in contrast to the studies that used free-form games based primarily on case studies. In our opinion, this is due to the structure and the content of formally structured digital games, as they can give quantitatively measurable results, in contrast to free-form games, which due to their design involve students in more complex tasks that can yield learning outcomes which can be more easily measured by qualitative research.
- (d) In half of the research used formally structured games, the participants had specific characteristics (i.e., children from low socio-economic strata of society, non-readers, etc.) in contrast to free-form games, which are more applicable to general education students and the educational interventions are addressed to the whole class. This is by no means accidental, as formally structured games favour individualized and differentiated teaching, as there is the possibility of adapting to the personal learning rhythms and interests of each student. In addition, an educational environment is created for the student that motivates him/her to learn. In such games, even students with learning difficulties are motivated. In contrast, the open worlds of free-form games aim at the whole class population, as language learning becomes a dynamic process of meaning construction in classrooms that are learning communities, whose members interact, share a common goal, help one another and finally build new knowledge together. Even the weakest students can learn through collaborative activities, as good students are more likely to take on the role of the “more knowledgeable other” according to Vygotsky (1978), explaining or giving instructions to mediocre and weak students, supporting their efforts and raising the level of the group.
- (e) Finally, formally structured games are used more in groups of younger students (preschool- early primary school aged students) as opposed to free-form games that are used more in groups of older students. One explanation for this finding may lie in the fact that formally structured games favour mechanic learning through repetition, organizing instructional content in small steps, empowering students through instant feedback, personalized teaching, and therefore are considered more suitable for teaching students attending preschool and early school age. In contrast, free-form games are open worlds that favour the consolidation of a higher level of knowledge and skills and aim at the communicative dimension of language, and as such are considered to be able to find better application in language teaching to older students. As learning theories are constantly evolving more and more innovative digital environments should be developed to enhance language teaching and learning. We believe that digital games could provide important solutions in some areas of language learning and teaching, in particular in motivating students and improving their learning experience.

To the best of our knowledge no other relevant reviews have been undertaken in the past and this highlights the significance and originality of this paper. Based on the findings of the present research, it is necessary to conduct much more research comparing the effect of free-form and formally structured digital games on students’ acquisition of language skills before we can confidently claim that free-form games are more effective in language learning than formally structured ones.

## CONFLICT OF INTEREST

The author of this publication declares there is no conflict of interest.

## FUNDING AGENCY

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors. Funding for this research was covered by the author of the article.

## REFERENCES

- Alanko, A., & Nevalainen, M. (2004). *Lukemispeli ensiluokkalaisten kouluopetuksen tukena* [Unpublished Master's thesis]. University of Jyväskylä.
- Bacalja, A. (2018). What critical literacy has to offer the study of video games. *Australian Journal of Language and Literacy*, 41(3), 155–176. doi:10.1007/BF03652016
- Barab, S., Pettyjohn, P., Gresalfi, M., Volk, C., & Solomou, M. (2012). Game-based curriculum and transformational play: Designing to meaningfully positioning person, content, and context. *Computers & Education*, 58(1), 518–533. doi:10.1016/j.compedu.2011.08.001
- Bolliger, D. U., Mills, D., White, J., & Kohyama, M. (2015). Japanese Students' Perceptions of Digital Game Use for English-Language Learning in Higher Education. *Journal of Educational Computing Research*, 53(3), 384–408. doi:10.1177/0735633115600806
- Busuttill, L., Gruppetta, C., & Camillieri, V. (2016). Minecraft Schooling: Digital Learning for Junior Years. In D. Russell & J. Laffey (Eds.), *Handbook of Research on Gaming Trends in P-12 Education* (pp. 481–501). Information Science Reference. doi:10.4018/978-1-4666-9629-7.ch023
- Caillois, R. (2001). *Man, Play, Games*. University of Illinois Press.
- Chen, M., Tseng, W., & Hsiao, T. (2018). The effectiveness of digital game-based vocabulary learning: A framework-based view of meta-analysis. *British Journal of Educational Technology*, 49(1), 69–77. doi:10.1111/bjet.12526
- Chen, S., Husnaini, S. J., & Chen, J. J. (2020). Effects of games on students' emotions of learning science and achievement in chemistry. *International Journal of Science Education*, 42(13), 2224–2245. doi:10.1080/09500693.2020.1817607
- Din, F., & Calao, J. (2001). The Effects of Playing Educational Video Games on Kindergarten Achievement. *Child Study Journal*, 31, 95–102.
- Entertainment and Leisure Software Publishers Association. (2006). *Unlimited Learning; Computer and Video Games in the Learning Landscape*. Retrieved from <https://www.org.id.tue.nl/ifip-tc14/documents/ELSPA-report-2006.pdf>
- Fisser, P., Voog, J., & Bom, M. (2013). Word Score: A serious vocabulary game for primary school underachievers. *Education and Information Technologies*, 18(2), 165–178. doi:10.1007/s10639-012-9231-y
- Frasca, G. (2003). *Simulation Versus Narrative: Introduction to Ludology*. Available: [http://www.ludology.org/articles/VGT\\_final.pdf](http://www.ludology.org/articles/VGT_final.pdf)
- Gee, J. P. (2003). *What Video Games Have to Teach Us About Learning and Literacy*. Palgrave/Macmillan.
- Gilje, Ø., & Silseth, K. (2019). Unpacking FIFA play as text and action in literacy practices in and out of school. *Learning, Media and Technology*, 44(2), 180–192. <https://doi.org/10.1080/17439884.2018.1563105>
- Groff, J., Howells, C., & Cranmer, S. (2010). *The impact of games in the classroom: Evidence from schools in Scotland*. Futurelab.
- Hanghøj, T., Lieberoth, A., & Misfeldt, M. (2018). Can cooperative video games encourage social and motivational inclusion of at-risk students? *British Journal of Educational Technology*, 49(4), 775–799. doi:10.1111/bjet.12642
- Hanghøj, T., Lützen, P. H., & Geer, S. L. (2020). Positioning students as game journalists: Transforming everyday experiences into professional discourse. *Nordic Journal of Literacy Research*, 6(1), 67. Advance online publication. doi:10.23865/njlr.v6.1991
- Häyrynen, T., Serenius-Sirve, S., & Korkman, M. (1999). *Lukilasse*. Psykologien Kustannus.
- Hung, H.-T., Yang, J. C., Hwang, G.-J., Chu, H.-C., & Wang, C.-C. (2018). A scoping review of research on digital game-based language learning. *Computers & Education*, 126, 89–104. doi:10.1016/j.compedu.2018.07.001

- Jere-Folotiya, J., Chansa-Kabali, T., Munachaka, J. C., Sampa, F., Yalukanda, C., Westerholm, J., Richardson, U., Serpell, R., & Lyytinen, H. (2014). The effect of using a mobile literacy game to improve literacy levels of grade one students in Zambian schools. *Educational Technology Research and Development*, 62, 417–436.
- Juul, J. (2005). *Half-Real: Video Games between Real Rules and Fictional Worlds*. MIT Press.
- Karakoc, B., Eryilmaz, K., Ozpolat, E. T., & Yıldırım, I. (2020). The effect of game-based learning on student achievement: A meta-analysis study. *Technology, Knowledge and Learning*. s10758-020-09471-5 10.1007/
- Kern, R., & Warschauer, M. (2000). Theory and practice of network-based language teaching. In *Network-Based Language Teaching: Concepts and Practice*. Cambridge University Press.
- Kim, C. M., Kim, M. K., Lee, C., Spector, M., & DeMeester, K. (2013). Teacher beliefs and technology integration. *Teaching and Teacher Education*, 29(1), 76–85. doi:10.1016/j.tate.2012.08.005
- Kirginas, S. (2022). Improving Students' Narrative Skills through Gameplay Activities: A Study of Primary School Students. *Contemporary Educational Technology*, 14(2), ep351. 10.30935/cedtech/11526
- Kirginas, S., Furon, E., Gouscos, D., Sfyroera, M., & Meimaris, M. (2010). Localization and application of Poisson Rouge in pre-school education. *Proceedings of International colloquium Challenges and Uses of ICT: Digital technologies and partnerships (EUTIC 2010)*, 103 - 122.
- Kirginas, S., & Gouscos, D. (2016). Exploring the Impact of Free-Form and Structured Digital Games on the Player Experience of Kindergarten and Primary School Students. In D. Russell & J. Laffey (Eds.), *Handbook of Research on Gaming Trends in P-12 Education* (pp. 394–420). Information Science Reference.
- Kirginas, S., & Gouscos, D. (2016, April-June). Development and Validation of a Questionnaire to Measure Perceptions of Freedom of Choice in Digital Games. *International Journal of Serious Games*, 3(2), 29–45.
- Kirginas, S., & Gouscos, D. (2017, October-December). Exploring the impact of freeform gameplay on players' experience: An experiment with maze games at varying levels of freedom of movement. *The International Journal of Serious Games*, 4(4), 53–69.
- Kirginas, S., Psaltis, A., Gouscos, D., & Mourlas, C. (2021). Studying children's experience during free-form and formally structured gameplay. *International Journal of Child-Computer Interaction*, 28. 10.1016/j.ijcci.2021.100248
- Marlatt, R., Pando, M., & Harvey, M. M. (2021). This Is Next Level: Combining Video Games With Literature to Promote Literacy. In C. Moran (Ed.), *Affordances and Constraints of Mobile Phone Use in English Language Arts Classrooms* (pp. 1-28). IGI Global. 10.4018/978-1-7998-5805-8.ch001
- McCarthy, E., Tiu, M., & Li, L. (2018). Learning math with curious George and the odd squad: Transmedia in the classroom. *Technology, Knowledge and Learning*, 23(2), 223-246. 10.1007/s10758-018-9361-4
- McGregor, G. (2008). Terra ludus, terra paidia, terra prefab: spatialization of play in videogames & virtual worlds, In *Proceedings of the 5th Australasian Conference on Interactive Entertainment* (pp. 31-38). New York, NY: ACM Press.
- Miller, D. J., Hudson, A., Miller, A., & Shimi, J. (2010). *Nintendogs project: Report for LTS*. University of Dundee.
- Mitgutsch, K. (2008). Digital Play-Based Learning. A philosophical-pedagogical perspective on learning and playing in computer games. *Journal for Information Technology Studies as Human Science*, 9(3).
- Mystakidis, S. (2021). Combat Tanking in Education - The TANC Model for Playful Distance Learning in Social Virtual Reality. *International Journal of Gaming and Computer-Mediated Simulations*, 13(4), 1–20. <https://doi.org/10.4018/IJGCMS.291539>
- Puolakanaho, A., Poikkeus, A. M., Ahonen, T., Tolvanen, A., & Lyytinen, H. (2003). Assessment of three-and-a-half-year-old children's emerging phonological awareness in a computer animation context. *Journal of Learning Disabilities*, 36, 416–423.
- Ranali, J. (2008). Learning English with The Sims: Exploiting authentic computer simulation games for L2 learning. *Computer Assisted Language Learning*, 21(5), 441–455.
- Rideout, V. J., Foehr, U. G., & Roberts, D. F. (2010). *Generation M2: Media in the Lives of 8-18-Year-Olds*. Henry J. Kaiser Family Foundation.

Robertson, J., & Good, J. (2003). Using a Collaborative Virtual Role-Play Environment to Foster Characterisation in Stories. *Journal of Interactive Learning Research*, 14, 5–29.

Rosas, R., Nussbaum, M., Cumsille, P., Marianov, V., Correa, M., Flores, P., Grau, V., Lagos, F., López, X., López, V., Rodríguez, P., & Salinas, M. (2003). Beyond Nintendo: Design and assessment of educational video games for first and second grade students. *Computers & Education*, 40(1), 71–94.

Rylands, T. (2006). *Myst “exile” in the classroom*. Retrieved from <https://www.teachingideas.co.uk/myst-exile-in-the-classroom-1>

Salen, K., & Zimmerman, E. (2004). *Rules of play: Game design fundamentals*. MIT Press.

Squire, K. (2004). *Bringing games into the classroom*. Presentation made at the annual meeting of the American Association for Teacher Educators, Chicago, IL.

Steinkuehler, C. (2011). *The mismeasure of boys: Reading and online videogames* (WCER Working Paper No. 2011-3). Retrieved from University of Wisconsin–Madison, Wisconsin Center for Education Research website: <http://www.wcer.wisc.edu/publications/workingPapers/papers.php>

Stuft, C. J. (2018). Engaging students in literacy practices through video game book groups. *Literacy Re-search: Theory, Method, and Practice*, 67(1), 195–210.

Taanila, M. (2004). *Tietokonepeli lukutaidon perusteiden oppim isymparts ton a esikouluiassa* [Unpublished Master's thesis]. University of Jyväskylä.

Toomey, M., & Kitson, L. (2017). Engaging the enemy: Computer games in the English classroom. *Literacy Learning: The Middle Years*, 25(3), 38–49. <https://search.informit.org/doi/10.3316/aeipt.218056>

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

van Daal, V. H. P., & Reitsma, P. (2000). Computer-assisted learning to read and spell: Results from two pilot studies. *Journal of Research in Reading*, 23(2), 181–193. <https://doi.org/10.1111/1467-9817.00113>

van Gorp, K., Segers, E., & Verhoeven, L. (2017). Enhancing decoding efficiency in poor readers via a word identification game. *Reading Research Quarterly*, 52(1), 105–123. <https://doi.org/10.1002/rrq.156>

Vygotsky, L. S. (1978). *Mind and society: The development of higher mental processes*. Harvard University Press.

Warren, D., Glor, R., & Turelli, M. (2008). Environmental Niche Equivalency versus Conservatism, *Quantitative Approaches to Niche Evolution. Evolution*, 62(11), 2868–2883. doi:10.1111/j.1558-5646.2008.00482.x

Warschauer, M. (2000). CALL for the 21st Century. *IATEFL and ESADE Conference*.

Wastiau, P., Kearney, C., & Van den Berghe, W. (2009). *How are digital games used in schools?* European Schoolnet. Retrieved from [http://games.eun.org/upload/gis-synthesis\\_report\\_en.pdf](http://games.eun.org/upload/gis-synthesis_report_en.pdf)

Wu, Q., Zhang, J., & Wang, C. (2020). The Effect of English Vocabulary Learning with Digital Games and its Influencing Factors based on the Meta- Analysis of 2,160 Test Samples. *International Journal of Emerging Technologies in Learning*, 15(17), 85–100. <https://www.learntechlib.org/p/218028/>

*Sotiris Kirginas is a post-doc researcher. He holds a Bachelor's degree from the Department of Primary Education, University of Athens, a master's degree in Information and Communication Technologies in Education from the Department of Early Childhood Education, National and Kapodistrian University of Athens and a PhD from the Faculty of Communication & Media Studies, National and Kapodistrian University of Athens. He currently teaches as adjunct lecturer at undergraduate and postgraduate level in the Faculty of Communication & Media Studies, the Department of Early Childhood Education and the Hellenic Open University. His research focuses on the influence of free/structured forms of digital games to the engagement and player experience of primary school children. He has (co)authored more than 30 publications in peer-reviewed conferences, journals, and edited volumes related to these fields.*