



Volume 22, 2023

## THE USE OF DIGITAL GAMES BY TEACHER EDUCATORS IN COLLEGES OF EDUCATION

Orit Avidov-Ungar	Achva Academic College, Open University of Israel	<a href="mailto:oritav65@gmail.com">oritav65@gmail.com</a>
Merav Hayak *	Ben Gurion University of the Negev, Israel	<a href="mailto:meravper22@gmail.com">meravper22@gmail.com</a>

\* Corresponding author

### ABSTRACT

Aim/Purpose	The current research examined the use of digital games in the fully online learning context imposed by lockdowns in response to the COVID-19 pandemic. In particular, we sought to understand the contribution that digital games made to teacher educators and how they used digital games in their remotely delivered courses.
Background	Teacher educators experienced in using digital games in their teaching were interviewed regarding the contribution digital games made to their pedagogy when they were teaching remotely during COVID-19.
Methodology	This qualitative study included 34 participants who taught four-year-degree programs in 13 teacher education colleges in Israel.
Contribution	This study sheds light on a sparsely researched area by examining the contribution of digital games to teacher educators' pedagogy. The study also suggests practical implications for implementing digital games for teacher educators.
Findings	Many participants used digital games. Some used them extensively as an integral component of the curriculum while others used them to break up the lesson and thereby retain their students' interest and attention. However, a small number reduced their use of digital games citing work overload.
Recommendations for Practitioners	This study suggests that education systems may be able to obtain post-pandemic-related gains to further advance the use of digital games as a pedagogic strategy in teacher education in the future.
Recommendations for Researchers	An additional study using a more representative sample of teacher educators would be very valuable to gauge the roll-on effects of the sudden shift to remote

Accepting Editor Ahmad Samed Al-Adwan | Received: July 23, 2023 | Revised: September 6, September 10, 2023 | Accepted: September 13, 2023.

Cite as: Avidov-Ungar, O., & Hayak, M. (2023). The use of digital games by teacher educators in colleges of education. *Journal of Information Technology Education: Research*, 22, 373-387. <https://doi.org/10.28945/5191>

(CC BY-NC 4.0) This article is licensed to you under a [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/). When you copy and redistribute this paper in full or in part, you need to provide proper attribution to it to ensure that others can later locate this work (and to ensure that others do not accuse you of plagiarism). You may (and we encourage you to) adapt, remix, transform, and build upon the material for any non-commercial purposes. This license does not permit you to use this material for commercial purposes.

	online learning on the use of digital games following the return to face-to-face teaching and learning.
Impact on Society	The findings have implications for how the use of digital games should be addressed in teacher education at teacher colleges.
Future Research	Future research can address possible contributions or challenges that teacher educators face when using digital games, for example, in a hybrid learning environment to enhance engagement and promote active learning.
Keywords	higher education, digital games, pre-service teacher education, COVID-19, active learning

## INTRODUCTION

---

COVID-19, which became pandemic in the early months of 2020, sparked economic, cultural, and social crises around the world and changed lifestyles in most countries. Alongside the many disruptions to normal life, more than 160 countries mandated temporary school closures. Nearly 1.6 billion children and youth were out of school during the peak closure periods of late March–April 2020 (Azorín, 2020; UNESCO, 2021). The various contingencies taken to alleviate this disruption dramatically impacted every facet of education: higher education research and teaching, staff, students, and all aspects of institutional operation. Two-thirds of the institutions of higher education shifted to online learning (Marinoni et al., 2020; Tang et al., 2021). In teacher education, academics face a new reality.

In Israel, all the educational institutions, including teacher education colleges and universities, had to face this new reality. In March 2020, with only two days' notice, they shifted to online learning (Donitsa-Schmidt & Ramot, 2020; Hadar et al., 2021). Faculty, staff, and students were compelled to adjust rapidly to new modes of teaching and learning, shifting from face-to-face teaching to technology-based synchronous and/or asynchronous remote online learning (Donitsa-Schmidt & Ramot, 2020). This new reality, which had caught everyone off guard, posed complex challenges to teacher educators. They were required to immediately adopt unplanned approaches to teaching and learning, and the curriculum changed dramatically in sequence, scope, and content (Hadar et al., 2021; VanLeeuwen et al., 2021). Those changes affected the teaching staff, irrespective of whether or not they had previously utilized online learning tools (Johnson et al., 2020).

Online learning is a form of distance education that involves using technology as the mediator of the learning process. Instruction is delivered entirely via the Internet (Moore et al., 2011; Siemens et al., 2015) and students submit their work and receive feedback online. Students can also connect and interact with their peers online, and sometimes a number of students will participate together in online classes with an instructor to work through their digital lessons, materials, or assessments (Stauffer, 2020).

The sudden change to exclusively online learning accelerated the use of digital tools and led to renewed thinking concerning their value in teaching and their contribution to meaningful learning (Crawford et al., 2020). It also caused faculty to change the nature of the assignments or exams they set, affected their expectations vis-à-vis students, changed how they graded their courses (VanLeeuwen et al., 2021), and served as the impetus for experimentation with various online learning delivery strategies and formats (Dietrich et al., 2020).

Among the many changes it induced, the COVID-19 crisis heightened interest in a learning model that was based on digital games. This model could be adapted to pandemic conditions and also create an enjoyable learning environment (Sánchez-Angulo et al., 2021; Wati & Yuniawatika, 2020). Digital games foster collaborative, interactive learning, that involves students in the learning process. This is

especially important for online learning, which demands more attention, involvement, and interest from the students. Games can offer an alternative to traditional teaching and learning.

While many studies have focused on the transition to online learning during COVID-19 (for example, Donitsa-Schmidt & Ramot, 2020; Marinoni et al., 2020; Tang et al., 2021), only a few studies have focused on the integration of digital games into online learning (e.g., Sánchez-Angulo et al., 2021; as well as Wati & Yuniawatika, 2020), and of those, most do not relate to their use by teacher educators. However, teacher educators serve as role models for the pre-service teachers they teach, and their attitudes regarding the integration of digital games into teaching and learning will influence the future teachers.

Given this lacuna, the current research set out to examine how teacher educators used and felt about using digital games in online learning during the COVID-19 pandemic.

## LITERATURE REVIEW

---

Traditional pedagogic strategies are constructivist, meaning that teachers transmit knowledge to their students, typically through a lecture framework (Freeman et al., 2014; Handelsman et al., 2004). However, today, higher education institutions around the world are increasingly trying to move away from reliance on the lecture format toward various forms of active learning (Mehanni et al., 2019; Rossi et al., 2021). One such alternative is learning through games, although efforts to encourage the integration of digital games into education was common well before the COVID-19 pandemic.

The term “digital game” refers to computer and console games that have been either adapted or specifically developed to further students’ grasp of desired learning objectives, such as knowledge acquisition, cognitive development, higher-order and critical thinking skills, and problem-solving ability (Hamari et al., 2016) while facilitating the learning of specific content, concepts, or strategies. They usually present in a stand-alone format (Gee, 2003; Kucher, 2021; Prensky, 2003). Digital games may also have a more indirect pedagogical purpose, such as refocusing student attention for better classroom management (Pinto & Leite, 2020; Xiao et al., 2018). It was also thought that the use of such games might also strengthen students’ social and collaborative skills as well as heighten their motivation and engagement in learning (Manesis, 2020; Vlachopoulos & Makri, 2017; Whitton & Langan, 2019). Previous studies have highlighted both the prominence of digital games and their importance for learning because of their ability to engage students and develop competencies, skills, and knowledge (De Grove et al., 2012; Fokides, 2020; Kaimara & Deliyannis, 2019).

Nevertheless, it was clear that integrating digital games into teaching does not necessarily make the teacher’s work easier. In addition to concerns about infrastructure and other technological issues, teachers must locate and test suitable games and determine if they can be easily adapted to their purposes. In class, they have to show the learners how to play the game, be ready to answer any queries students have as they play the game, and subsequently verify if and how the game’s activities are linked to the current learning content and objectives (Avidov-Ungar & Hayak, 2021; Feliciea & Egenfeldt-Nielsen, 2011; Hayak & Avidov-Ungar, 2020).

However, in order for teachers to accept digital games as valid tools for learning and overcome any prior misconceptions or negative beliefs they may hold about the general concept of the use of games in teaching, they must first fully understand the games’ potential for genuinely enhancing their students’ acquisition of knowledge and skills (Charlier & De Fraïne, 2012; Meredith, 2016). For this to occur, it is necessary to introduce digital games into pre-service teacher education, modelling their purpose and use so that these future teachers will feel completely comfortable about including them in their own classes in the future (Feliciea & Egenfeldt-Nielsen, 2011). The games modelled for pre-service teachers should, of course, be ones that enhance their teaching methods and enable up-to-date learner-oriented methodology (Gabriel, 2016). This entails providing the teacher educators themselves with adequate training (Hayak & Avidov-Ungar, 2020) as well as encouragement via clear

policies at the level of the college or university where the teacher education is taking place (Kaimara et al., 2021; Xu & Xu, 2020).

In 2020, when the COVID-19 pandemic forced an immediate and total transition to remote online learning, much greater emphasis was placed on the use of digital games. Since the pedagogical imperative was to maintain a high quality of education and ensure student engagement in the new learning format, the integration of digital games seemed to be an ideal solution, since it only required a smart handheld device or computer that most students have, and the games motivate learners because of their playful an/or competitive nature (Krouska et al., 2022). Furthermore, the use of digital games seemed to be a solution to the two most significant challenges for teacher educators, namely, students' difficulty in understanding major concepts due to the lack of active learning and their general lack of engagement in online lectures (Nuci et al., 2021; Sutton & Jorge, 2020). Thus, during the pandemic, digital games were considered to be a tool to help students maintain focus and engage with the study content in an academic university setting (Sánchez-Angulo et al., 2021).

One advantage of learning using digital games is that it encourages active learning. There is considerable interest in Israel, as in many other countries, in widening the use of active learning strategies (Apkarian et al., 2021; Du et al., 2020; Mehanni et al., 2019; Rossi et al., 2021). While the definition of active learning remains somewhat vague, it is, nevertheless, broadly associated with the notion of having students construct their own understanding through interaction, inquiry, participation, and engagement as opposed to the traditional constructivist format (Carr et al., 2015; Du et al., 2020; Handelsman et al., 2004). Young et al. (2009) suggest that active learning requires novel activities that can refocus attention. They further argue that digital games can provide such novel activity, and also enable cognitive and affective engagement with the learning task, as suggested by Marshall et al. (2008), even if they do not generate student interaction.

As mentioned, for teachers to be able to make effective use of digital games, they need to learn about them and how to use them, preferably while studying to be teachers. However, to the best of our knowledge, no study has examined the contribution of digital games to teacher educators' pedagogy and how teacher educators used digital games in their remotely delivered courses during the COVID-19 pandemic.

The current research thus comes to examine how teacher educators used digital games in the fully online context of the pandemic lockdowns. In particular, this study seeks to understand how digital games contributed to their pedagogy in their remotely delivered courses. This study is part of a broader study examining pre-service teacher education during the COVID-19 pandemic.

The specific research questions were:

- (1) What contribution to remote pedagogy do digital games offer to teacher educators?
- (2) How do teacher educators use digital games as a pedagogical strategy in their online teacher education courses?

## **METHODOLOGY**

---

### ***RESEARCH METHOD***

The research was qualitative in nature. We conducted semi-structured interviews with teacher educators to explore the contribution digital games made to their pedagogy and how they used digital games in their remotely delivered teacher education courses. We chose qualitative methodology because it would allow us to learn first-hand about the phenomenon from the personal viewpoint of the teacher educators themselves regarding their perception of how digital games contributed to their pedagogical strategy during remote teaching.

## ***PARTICIPANTS***

To recruit the research population, we contacted senior academic staff at colleges of education by phone or email and asked them to recommend teachers who tended to integrate digital games in their online learning courses. The responses led to the 34 participants that eventually took part in this study. These teacher educators taught in 13 teacher education colleges in Israel. Of them, 28 were women and 6 men. They were 31–67 years in age (mean age, 48.5 years), and their teaching experience ranged from 1–28 years (mean: 16 years). The participants represented diverse socioeconomic backgrounds (periphery vs. center) and were representative of the population breakdown in Israel (70% Jewish; 30% Arab). As such, Israeli studies are interesting because they reflect a wide variety of populations.

In Israel there are 21 academic institutions that offer four-year B.Ed. degrees, 19 of which provide instruction in Hebrew. Thus, our sample represents about 68% of the colleges of education in Israel that provide instruction in Hebrew, making participants representative of the population of teacher educators in colleges of education.

The participants taught pre-service teachers in a variety of disciplines, including special education, English, mathematics, language, literature, and science.

It should be pointed out that, prior to the pandemic, the participants had no experience in delivering entire courses remotely, although they had had some relevant experience with online learning.

## ***RESEARCH TOOLS***

The semi-structured interviews consisted of open-ended questions that asked the participants how they had used digital games in their online teacher education courses and to describe the contribution that digital games made to their remote pedagogy (see Appendix).

## ***RESEARCH PROCEDURE***

The research began only after approval was received from the institutional ethics committee, and the teacher educators had expressed their willingness to be interviewed and had signed an informed consent form to that effect.

During January and February 2021, the participating teacher educators underwent the semi-structured interviews via Zoom. Each interview lasted 40–60 minutes. The interviews were recorded and transcribed and then underwent thematic analysis (Shkedi, 2004), as detailed below.

## ***DATA ANALYSIS***

The interview transcripts were analyzed and interpreted according to the categorial content analysis method (Lincoln & Guba, 1985), which is one of the basic approaches used in qualitative analysis (Shkedi, 2004, 2019).

The analysis was carried out in several stages. The first stage was open coding, which involved extracting recurring motifs from the interviews, interpreting and conceptualizing the emerging themes, tracing and examining repeated themes, and coding them into categories of relevance to the research questions (Stuckey, 2015). During this stage, each researcher worked separately and read each interview transcript line by line in order to divide it into segments and delineate units of general meaning of the main ideas and points in each interview. The main idea in each segment was identified and given a title. Following this, segments with similar titles were grouped together and given a common title, thus becoming a “category”. The categories at this stage were preliminary and temporary and were based on the descriptions given by the teacher educators.

The second stage involved axial coding. The researchers worked collaboratively to examine the similarities and differences in their preliminary coding in order to uncover repeated patterns of meaning

and categories. The categories identified in the previous step were arranged by grouping similar ones, refining them, breaking them down into subcategories, and finding connections between them (Shkedi, 2019). As a result, for the first question, two main categories were defined: how digital games enhance the pedagogical strategy of active learning and relevance to the digital age. For the second research question three main categories were found: extensive use of digital games, reduced use of digital games and digital games used to break up the lesson. Thus, the theoretical model was constructed gradually, based on the data collected and interpreted at each stage of the analysis (Shkedi, 2019).

In cases of disagreement between the researchers, the interviewees were contacted again to gain a deeper understanding.

In the last stage, the researchers performed selective coding to clarify the key concepts and main themes of the study and subsume the main clusters of meaning into general and theoretical coherence.

## FINDINGS

The teacher educators described using a variety of digital games during their online teaching. The game platforms that were particularly widely mentioned were Quizlet, Kahoot!, and QUIZ. The results, based on each question, are described below. The findings for each research question are presented in Table 1, below, divided into the themes and categories that were found for each.

**Table 1: Main Themes and Categories**

#	Themes	Categories
1	The contribution of digital games to teacher educators' teaching in online remote pedagogy	<ol style="list-style-type: none"> <li>1. Digital games enhance the pedagogical strategy of active learning (18/34).</li> <li>2. Relevance to the digital age (16/34)</li> </ol>
2	The uses of digital games as a pedagogical strategy in teacher education courses delivered remotely online	<ol style="list-style-type: none"> <li>1. Extensive use of digital games (16/34)</li> <li>2. Reduced use of digital games (10/34)</li> <li>3. Digital games used to break up the lesson (8/34).</li> </ol>

### ***THE CONTRIBUTION OF DIGITAL GAMES TO TEACHER EDUCATORS' REMOTE ONLINE PEDAGOGY***

All the participants agreed that digital games enhanced active learning and were relevant to the pre-service teachers' future students. Two main categories were found: digital games enhance the pedagogical strategy of active learning and relevance to the digital age.

#### **Digital games enhance the pedagogical strategy of active learning**

Teacher educators related directly and indirectly to active learning (18/34). Those who related directly noted that the use of digital games in a remote online setting engaged students actively in the learning process (9/34). The others related to key aspects of active learning, noting that digital games served their online pedagogy by encouraging greater student motivation and involvement (9/34). For example: *"I want students to be involved ... to generate this kind of involvement I have to give them some kind of motivation and, as far as I am concerned, that is the essence of the digital game."*

Similarly, other teacher educators noted, *“It stimulates motivation, encourages enjoyment, and arouses curiosity about what is going to come next,”* and that, in the online environment, teacher educators *“start looking for ways to make lessons interesting and digital games are one of the best ways for that.”*

In addition to increasing student motivation and involvement, digital games were seen to improve communication and foster student efforts to construct knowledge. For example, the digital game *“fosters interpersonal communication [and] constructive dialogue between the students, since some of the digital games are team games and they learn together.”* Similarly, another said that *“it creates greater interest; it activates the learners more ...”* Active knowledge construction was also emphasized by another teacher educator, who said, *“After being taught the knowledge, there is ... another very important stage ... Using it ... the whole issue of thinking performance ... the whole issue of delving deeper into the learning processes.”* Giving specific examples, another participant added, *“If you are teaching how to summarize material with a digital game, they create things and are active and you know ... that they learned.”*

In the opinion of the participants, games enable the involvement of learners in the specific context of online learning. For example, one participant said, *“Online learning is via Zoom, so the way to maintain student involvement is by means of integrative digital games.”* Similarly, another teacher educator said, *“The more I integrate digital games, the more they will want to be active. It is very easy to be superficial in a Zoom lesson. Just turn on the screen. But in a game, they all have to participate.”* Other teachers emphasized that games counteract the distancing effects of online learning. For example, *“Some students turn off their cameras, so if I do not see them and they do not want to participate ... It is possible to exert pressure in a pleasant way...the game encourages them to participate, which is harder with Zoom.”* Exploring this point at greater length, another participant commented:

Online learning neutralizes many things that are present when meeting in [an actual frontal classroom setting] and then that [situation] creates another matter and there’s something boring in sitting in front of squares [referring to the frame around each participant in a Zoom meeting] and [digital games] bring in involvement, engagement, partnership in the class, which maybe can happen more easily in reality.

### **Relevance to the digital age**

Many of the teacher educators (16/34) mentioned that online learning (including the use of digital games) brought their pedagogy closer to the world of their students. For example, one mentioned that *“we must teach pre-service teachers to use digital tools taken from the world from which their pupils come; we must be more relevant, up-to-date, closer to the pupils’ world.”* Another pointed out, *“This is the way they will [pre-service teachers] must teach. So really, what am I supposed to do? Teach them on a board when they should be learning online?”* Similarly, another said that she used games, *“to prepare the teachers for the field, so that they will know what a game is, how it can serve their teaching, why this is worthwhile. They will have modelling that they can learn from.”*

### ***THE USE OF DIGITAL GAMES AS A PEDAGOGICAL STRATEGY IN TEACHER EDUCATION COURSES DELIVERED ONLINE***

Analysis of the data gathered yielded three main pedagogical strategies for using digital games: extensive use of digital games (16/34), reduced use of digital games (10/34), and digital games used to break up the lesson (8/34).

#### **Extensive use of digital games**

The use of digital games as an essential part of teaching was mentioned by nearly half the teacher educators (16/34), who saw them as an integral component of their teacher education curriculum. Interviewees in this group said that they used digital games consistently and frequently and saw them as a way to attain many learning and lesson management objectives in the online or “flipped” classroom

formats. For these teachers, online teaching and digital games share a common space. These teachers typically saw benefits to the online learning framework. For example, one said, *“In online learning, a computer is, by default, available, because the learning is done on computer, so there’s a greater possibility to integrate digital games than in a classroom, which might not always have a computer available.”*

This group of teacher educators often structured their lessons around digital games. For example, one participant said:

A digital game. We start with and create something with it .... At the beginning, it creates a kind of trigger for the whole session. In the middle, it is part of the learning process, [where it] can create a great deal of interest in the online learning processes.

Another teacher commented:

From my perspective, it was actually some sort of tool that I used as an integral part of my teaching also remotely...It is more to try and get them to take an interest, to add some variety so they will be more active in the course.

Although this teacher educator used digital games to generate interest (similar to teacher educators in the third group), she clearly regarded digital games to be directly intrinsic to her pedagogy rather than a means of maintaining student focus. Some teachers viewed the integration of digital games as part of a values-based commitment to maintaining relevant teaching methods. For example, *“Our students are the screen generation and games are part of that.”* In a similar vein, another said, *“I must have [integration of digital games] because otherwise I will fail in my role as a teacher trainer, because that’s how they will need to teach.”*

### Reduced use of digital games

About a third of the teacher educators (10/34) claimed that they required all their attention to cope with the sudden shift to online learning which, in Israel, meant teaching over the unfamiliar Zoom platform while using similarly unfamiliar Google Classroom and/or Moodle digital learning management systems. Consequently, they scaled back digital games in the online learning context. As one participant explained, *“The stage of [using] games is something more advanced. First one needs to understand how to do it optimally over Zoom. It is still complicated to do it...”* Similarly, another teacher educator who had integrated games she had created before COVID-19 said, *“...to say I prepared games? Much less. After all, we were in a race against ourselves.”*

### Digital games used to break up the lesson

About a quarter of the teacher educators (8/34) noted that they used digital games as a way to break up the lesson. For example, one teacher explained her use of digital games thus:

Our job as teacher educators is to break the routine of the lesson. How do we break a routine? I use digital games, brainstorming, all these things. Games such as “Wheel of Fortune.” Anything you want can lead me to exactly the same thing.

Others described using games as *“an activity that breaks the routine”* and to regenerate interest because *“it arouses motivation, it encourages enjoyment, it creates curiosity regarding what will come next”* and as *“an activity for in between the lessons.”*

## DISCUSSION

---

The COVID-19 pandemic forced schools, colleges, and universities to shift from traditional face-to-face teaching to remote online teaching. This gave rise to challenges due to lack of teacher-student interaction, students’ difficulty focusing on major concepts resulting from lack of active learning, and lack of engagement in lectures (Nuci et al., 2021). These challenges, in turn, give rise to the use of



tools and methods to encourage active learning and student engagement online, which opened the door to the increased use of digital games as a pedagogic strategy.

The transition to online learning has raised concerns that teacher educators will transfer their traditional teaching methods to online learning. One of the ways to lead a change in this context is to integrate digital games into online learning. But the literature mainly focused on the transition to online learning in teachers' colleges (Donitsa-Schmidt & Ramot, 2020; Sánchez-Angulo et al., 2021; Wati & Yuniawatika, 2020) and less on the integration of digital games in online learning by teacher educators. Therefore, the current research sought to examine teacher educators' views on the contribution of digital games to their online learning.

We found that the majority of participating teacher educators saw digital games as a means of enhancing active learning. They associated digital games with student involvement, greater motivation, improved communication and dialogue, and creativity, concepts that are widely associated with active learning (Carr et al., 2015; Du et al., 2020; Handelsman et al., 2004). Teacher educators also perceived digital games as a means of making their lessons more relevant to their students by modeling the technologies that the pre-service teachers will need in their future roles as professional teachers. This is important because teachers often do not know how to use games in learning environments and how to connect games and their content to curricular topics and/or competencies. Before thinking about how to integrate digital games into lessons, teachers first of all need to know that these games might be a possible resource to use in class (Gabriel, 2016). One of the ways to expose pre-service teachers to games is by having teacher educators model their use. This has been found to be a factor in pre-service teachers' decisions to use digital games in their own classrooms (Sardone & Devlin-Scherer, 2010).

Our findings indicated that the teacher educators made widespread use of digital games as a pedagogical strategy. It was clear from their comments that some of them used digital games to anchor their entire lesson. This may suggest the beginning of a shift from viewing digital games as a discrete pedagogical strategy to viewing them as an inherent part of the curricula, that is, as a technological and pedagogical area suited to many approaches (Foster & Shah, 2020). This possibility should be explored in future research.

The findings also showed that the teacher educators used digital games as a way to maintain student focus. This is consistent with studies that have shown that varying the level of stimulation during lectures can offset wandering thoughts and restore attention levels (Young et al., 2009).

Nevertheless, the findings showed that some participants (all of whom were regarded by their colleges as leaders in the use of digital teaching tools) actually reduced their use of digital games following the shift from a brick-and-mortar to a virtual classroom, citing the tremendous demands associated with adapting to the new learning environment. Previous studies have, indeed, noted that adjusting to online learning led teachers to feel an initial decrease in their effectiveness and a need to reduce their feeling of burnout (Pellerone, 2021). Having to "also deal" with searching for appropriate games seemed too much of a challenge for them. Future research should explore whether they adapted to the new situation and returned to including digital games in their pedagogy or whether perhaps the online distance format increased their burnout.

The need to use new technology to incorporate active learning, foster learner agency, and personalize learning requires supportive professional development frameworks (Archambault et al., 2022). In other words, teacher educators need ongoing support and preparation programs that consider their technological, pedagogical, and content knowledge and how these may align with the challenge of adjusting to online learning that they faced during the pandemic.

## CONCLUSION

---

The COVID-19 pandemic led to the sudden adoption of online learning. This was a change that drastically disrupted the colleges of education in Israel and around the world.

The shift to online learning accelerated the use of digital tools, and teacher educators used digital games in their online lessons as a way to provide knowledge and enhance students' interest and collaboration during social distancing. Digital games were viewed as an option to engage and motivate students to be active and become engaged in the online learning setting. With games, students are also more enthusiastic and active in learning. One might say, therefore, that online learning led to the potentially increased use of digital games as a pedagogic strategy.

This research offers a unique survey that sheds light on a less researched area regarding teacher educators' views on the contribution of digital games to their online pedagogical strategies and how they use them to deliver their courses to pre-service teachers.

### *PRACTICAL IMPLICATIONS OF THE RESEARCH FINDINGS*

During the COVID-19 crisis, teacher educators with experience in the use of technology in education made varied use of digital games. Our findings indicate that the use of digital games in a face-to-face setting does not necessarily imply similar use in a remote setting. This fact can potentially be leveraged by the post-pandemic education system in the future to advance the use of digital games (Daniela, 2020). This will need to be taken into account as education systems strive toward hybridizing traditional and remote learning models (Fullan et al., 2020).

Teacher educators need professional development and training to guide them in how to integrate digital games into online learning, since this requires a myriad of skills (Avidov-Ungar & Hayak, 2023). First of all, they must have mastery of the digital game itself and the ability to operate the game in an online learning environment. They also require skills in choosing a suitable game based for the subject being taught and planning how to integrate it into the lessons (e.g., should each student play individually or should the entire class play together). In addition, they must know how to evaluate their students' achievements with the game and also be able to reflect upon and evaluate their teaching (Hayak & Avidov-Ungar, 2023). Hence the importance for policy makers in teacher training colleges to outline a comprehensive policy that provides teacher educators professional training in online learning that includes how to integrate digital games.

This finding suggests that education systems may be able to build on pandemic-related gains to further advance the use of digital games as a pedagogical strategy in teacher education in the future.

### *RESEARCH LIMITATIONS AND SUGGESTIONS FOR FURTHER RESEARCH*

The current study recruited teacher educators that were known to have experience using digital tools in their pedagogy, and thus the findings reflect the attitudes of the forefront of the technology-integration wave. An additional study would be very valuable to gauge the roll-on effects of the sudden shift to remote learning on the use of digital games by a more representative sample of teacher educators, following the return to in-person formats or in post-COVID-19 hybrid learning.

### *FUNDING*

The study was funded by the Open University (Research Grant Number 3400/41182).

### *DATA AVAILABILITY*

The datasets are not publicly available due to participant privacy but are available from the corresponding author on reasonable request.

## DISCLOSURE STATEMENT

The authors report there are no competing interests to declare.

## REFERENCES

- Apkarian, N., Henderson, C., Stains, M., Raker, J., Johnson, E., & Dancy, M. (2021). What really impacts the use of active learning in undergraduate STEM education? Results from a national survey of chemistry, mathematics, and physics instructors. *PLoS ONE*, *16*(2), e0247544. <https://doi.org/10.1371/journal.pone.0247544>
- Archambault, L., Leary, H., & Rice, K. (2022). Pillars of online pedagogy: A framework for teaching in online learning environments. *Educational Psychologist*, *57*(3), 178-191. <https://doi.org/10.1080/00461520.2022.2051513>
- Avidov-Ungar, O., & Hayak, M. (2021). Teacher perception of the adoption and implementation of DGBL in their classroom teaching: Adoption and implementation of DGBL among teachers. *International Journal of Game-Based Learning (IJGBL)*, *11*(1), 17-30. <https://doi.org/10.4018/IJGBL.2021010102>
- Avidov-Ungar, O., & Hayak, M. (2023). Education and games: Teachers' professional knowledge in integrating digital games into instruction in school. In S. Branislav (Ed.), *Game theory: From idea to practice*. IntechOpen. <https://doi.org/10.5772/intechopen.109594>
- Azorín, C. (2020). Beyond COVID-19 supernova. Is another education coming?. *Journal of Professional Capital and Community*, *5*(3/4), 381-390. <https://doi.org/10.1108/JPCCC-05-2020-0019>
- Carr, R., Palmer, S., & Hagel, P. (2015). Active learning: The importance of developing a comprehensive measure. *Active Learning in Higher Education*, *16*(3), 173–186. <https://doi.org/10.1177/1469787415589529>
- Charlier, N., & De Fraine, B. (2012). Game-based learning in teacher education: A strategy to integrate digital games into secondary schools. *International Journal of Game-Based Learning (IJGBL)*, *2*(2), 1-12. <https://doi.org/10.4018/ijgb.2012040101>
- Crawford, J., Butler-Henderson, K., Rudolph, J., Malkawi, B., Glowatz, M., Burton, R., Magni, P. A., & Lam, S. (2020). COVID-19: 20 countries' higher education intra-period digital pedagogy responses. *Journal of Applied Learning & Teaching*, *3*(1), 1-20. <https://doi.org/10.37074/jalt.2020.3.1.7>
- Daniela, L. (2020). Concept of smart pedagogy for learning in a digital world. In L. Daniela (Ed.), *Epistemological approaches to digital learning in educational contexts* (pp. 1–16). Routledge. <https://doi.org/10.4324/9780429319501-1>
- De Grove, F., Bourgonjon, J., & Van Looy, J. (2012). Digital games in the classroom? A contextual approach to teachers' adoption intention of digital games in formal education. *Computers in Human Behavior*, *28*(6), 2023–2033. <https://doi.org/10.1016/j.chb.2012.05.021>
- Dietrich, N., Kentheswaran, K., Ahmadi, A., Teychené, J., Bessière, Y., Alfenore, S., Laborie, S., Bastoul, D., Loubière, K., Guigui, C., Sperandio, M., Barna, L., Paul, E., Cabassud, C., Liné, A., & Hébrard, G. (2020). Attempts, successes, and failures of distance learning in the time of COVID-19. *Journal of Chemical Education*, *97*(9), 2448–2457. <https://doi.org/10.1021/acs.jchemed.0c00717>
- Donitsa-Schmidt, S., & Ramot, R. (2020). Opportunities and challenges: Teacher education in Israel in the COVID-19 pandemic. *Journal of Education for Teaching*, *46*(4), 586–595. <https://doi.org/10.1080/02607476.2020.1799708>
- Du, X., Chaaban, Y., Sabah, S., Al-Thani, A. M., & Wang, L. (2020). Active learning engagement in teacher preparation programmes – A comparative study from Qatar, Lebanon and China. *Asia Pacific Journal of Education*, *40*(3), 283-298. <https://doi.org/10.1080/02188791.2020.1717436>
- Felicia, P., & Egenfeldt-Nielsen, S. (2011). Game-based learning: A review of the state of the art. In S. Egenfeldt-Nielsen, B. Meyer, & B. H. Sørensen (Eds.), *Serious games in education: A global perspective* (pp. 21–44). Aarhus University Press. <https://doi.org/10.2307/jj.608141>

- Fokides, E. (2020). Digital educational games in primary education: Revisiting the results of the research projects of the ETiE initiative. In L. Daniela (Ed.), *Epistemological approaches to digital learning in educational contexts* (pp. 54–68). Routledge. <https://doi.org/10.4324/9780429319501-4>
- Foster, A., & Shah, M. (2020). Principles for advancing game-based learning in teacher education. *Journal of Digital Learning in Teacher Education*, 36(2), 84-95. <https://doi.org/10.1080/21532974.2019.1695553>
- Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. In B. Alberts (Ed.), *Proceedings of the National Academy of Sciences of the United States of America*, 111(23), 8410–8415. <https://doi.org/10.1073/pnas.1319030111>
- Fullan, M., Quinn, J., Drummy, M., & Gardner, M. (2020). *Education reimaged: The future of learning*. A collaborative position paper between NewPedagogies for Deep Learning and Microsoft Education. <http://aka.ms/HybridLearningPaper>
- Gabriel, S. (2016). Why digital game based learning should be included in teacher education. *Reflecting Education*, 10(1), 26-36. [https://www.academia.edu/68304514/Why\\_Digital\\_Game\\_Based\\_Learning\\_Should\\_be\\_Included\\_in\\_Teacher\\_Education](https://www.academia.edu/68304514/Why_Digital_Game_Based_Learning_Should_be_Included_in_Teacher_Education)
- Gee, J. P. (2003). What video games have to teach us about learning and literacy. *Computers in Entertainment (CIE)*, 1(1), 20-20. <https://doi.org/10.1145/950566.950595>
- Hadar, L. L., Alpert, B., & Ariav, T. (2021). The response of clinical practice curriculum in teacher education to the Covid-19 breakout: A case study from Israel. *Prospects*, 51, 449-462. <https://doi.org/10.1007/s11125-020-09516-8>
- Hamari, J., Shernoff, D. J., Rowe, E., Coller, B., Asbell-Clarke, J., & Edwards, T. (2016). Challenging games help students learn: An empirical study on engagement, flow and immersion in game-based learning. *Computers in Human Behavior*, 54, 170–179. <https://doi.org/10.1016/j.chb.2015.07.045>
- Handelsman, J., Ebert-May, D., Beichner, R., Bruns, P., Chang, A., DeHaan, R., Gentile, J., Lauffer, S., Stewart, J., Tilghman, S. M., & Wood, W. B. (2004). Scientific teaching. *Science*, 304(5670), 521–522. <https://doi.org/10.1126/science.1096022>
- Hayak, M., & Avidov-Ungar, O. (2020). The integration of digital game-based learning into the instruction: Teachers' perceptions at different career stages. *TechTrends*, 64(6), 887-898. <https://doi.org/10.1007/s11528-020-00503-6>
- Hayak, M., & Avidov-Ungar, O. (2023). Knowledge and planning among teachers integrating digital game-based learning into elementary school classrooms. *Technology, Pedagogy and Education*, 32(2), 239-255. <https://doi.org/10.1080/1475939X.2023.2175719>
- Johnson, N., Veletsianos, G., & Seaman, J. (2020). U. S. faculty and administrators' experiences and approaches in the early weeks of the COVID-19 pandemic. *Online Learning Journal*, 24(2), 6–21. <https://doi.org/10.24059/olj.v24i2.2285>
- Kaimara, P., & Deliyannis, I. (2019). 'Why should I play this game?' The role of motivation in smart pedagogy. In L. Daniela (Ed.), *Didactics of smart pedagogy: Smart pedagogy for technology enhanced learning* (pp. 113–137). Springer. [https://doi.org/10.1007/978-3-030-01551-0\\_6](https://doi.org/10.1007/978-3-030-01551-0_6)
- Kaimara, P., Fokides, E., Oikonomou, A., & Deliyannis, I. (2021). Potential barriers to the implementation of digital game-based learning in the classroom: Pre-service teachers' views. *Technology, Knowledge and Learning*, 26(4), 825-844. <https://doi.org/10.1007/s10758-021-09512-7>
- Krouska, A., Troussas, C., & Sgouropoulou, C. (2022). Mobile game-based learning as a solution in COVID-19 era: Modeling the pedagogical affordance and student interactions. *Education and Information Technologies*, 27(1), 229-241. <https://doi.org/10.1007/s10639-021-10672-3>
- Kucher, T. (2021). Principles and best practices of designing digital game-based learning environments. *International Journal of Technology in Education and Science (IJTES)*, 5(2), 213–223. <https://doi.org/10.46328/ijtes.190>
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Sage Publications.

- Manesis, D. (2020). Digital games in primary education. In I. Deliyannis (Ed.) *Game design and intelligent interaction* (pp. 87–100). InTechOpen. <https://doi.org/10.5772/intechopen.91134>
- Marinoni, G., Van't Land, H., & Jensen, T. (2020). *The impact of COVID-19 on higher education around the world*. IAU Global Survey Report. International Association of Universities (IAU). [https://www.iau-aiu.net/IMG/pdf/iau\\_covid19\\_and\\_the\\_survey\\_report\\_final\\_may\\_2020.pdf](https://www.iau-aiu.net/IMG/pdf/iau_covid19_and_the_survey_report_final_may_2020.pdf)
- Marshall, S., Fry, H., & Ketteridge, S. (Eds.). (2008). *A handbook for teaching and learning in higher education: Enhancing academic practice* (3rd ed.). Routledge. <https://doi.org/10.4324/9780203891414>
- Mehanni, S., Wong, L., Acharya, B., Agrawal, P., Aryal, A., Basnet, M., Citrin, D., Dangal, B., Deukmedjian, G., Dhungana, S. K., Gauchan, B., Gupta, T. K., Halliday, S., Kalaunee, S. P., Kshatriya, U., Kumar, A., Maru, D., Maru, S., Nguyen, V., ... Schwarz, D. (2019). Transition to active learning in rural Nepal: An adaptable and scalable curriculum development model. *BMC Medical Education*, 19, Article No. 61. <https://doi.org/10.1186/s12909-019-1492-3>
- Meredith, T. R. (2016). Game-based learning in professional development for practicing educators: A review of the literature. *TechTrends*, 60(5), 496-502. <https://doi.org/10.1007/s11528-016-0107-7>
- Moore, J. L., Dickson-Deane, C., & Galyen, K. (2011). E-learning, online learning, and distance learning environments: Are they the same? *The Internet and Higher Education*, 14(2), 129-135. <https://doi.org/10.1016/j.iheduc.2010.10.001>
- Nuci, K. P., Tahir, R., Wang, A. I., & Imran, A. S. (2021). Game-based digital quiz as a tool for improving students' engagement and learning in online lectures. *IEEE Access*, 9, 91220-91234. <https://doi.org/10.1109/ACCESS.2021.3088583>
- Pellerone, M. (2021). Self-perceived instructional competence, self-efficacy and burnout during the COVID-19 pandemic: A study of a group of Italian school teachers. *European Journal of Investigation in Health, Psychology and Education*, 11(2), 496–512. <https://doi.org/10.3390/ejihpe11020035>
- Pinto, M., & Leite, C. (2020). Digital technologies in support of students learning in higher education: Literature review. *Digital Education Review*, 37, 343–360. <https://doi.org/10.1344/der.2020.37.343-360>
- Prensky, M. (2003). Digital game-based learning. *Computers in Entertainment (CIE)*, 1(1), 21-21. <https://doi.org/10.1145/950566.950596>
- Rossi, I. V., de Lima, J. D., Sabatke, B., Nunes, M. A. F., Ramirez, G. E., & Ramirez, M. I. (2021). Active learning tools improve the learning outcomes, scientific attitude, and critical thinking in higher education: Experiences in an online course during the COVID-19 pandemic. *Biochemistry and Molecular Biology Education*, 49(6), 888-903. <https://doi.org/10.1002/bmb.21574>
- Sánchez-Angulo, M., López-Goñi, I., & Cid, V. J. (2021). Teaching microbiology in times of plague. *International Microbiology*, 24(4), 665-670. <https://doi.org/10.1007/s10123-021-00179-9>
- Sardone, N. B., & Devlin-Scherer, R. (2010). Teacher candidate responses to digital games: 21st century skills development. *Journal of Research on Technology in Education*, 42(4), 409–425. <https://doi.org/10.1080/15391523.2010.10782558>
- Shkedi, A. (2004). Second-order theoretical analysis: A method for constructing theoretical explanation. *International Journal of Qualitative Studies in Education*, 17(5), 627-646. <https://doi.org/10.1080/0951839042000253630>
- Shkedi, A. (2019). *Introduction to data analysis in qualitative research*. Springer.
- Siemens, G., Gašević, D., & Dawson, S. (2015). *Preparing for the digital university: A review of the history and current state of distance, blended, and online learning*. Athabasca University Press. <https://research.monash.edu/en/publications/preparing-for-the-digital-university-a-review-of-the-history-and->
- Stauffer, B. (2020, April 02). *What's the difference between online learning and distance learning?* The Applied Education System (AES). <https://www.aeseducation.com/blog/online-learning-vs-distance-learning>
- Stuckey, H. L. (2015). The second step in data analysis: Coding qualitative research data. *Journal of Social Health and Diabetes*, 3(1), 7–10. <https://doi.org/10.4103/2321-0656.140875>

## The Use of Digital Games by Teacher Educators

- Sutton, M. J. D., & Jorge, C. F. B. (2020). Potential for radical change in higher education learning spaces after the pandemic. *Journal of Applied Learning and Teaching*, 3(1), 124-128. <https://doi.org/10.37074/jalt.2020.3.1.20>
- Tang, A. L. L., Walker-Gleaves, C., & Rattray, J. (2021). University students' conceptions and experiences of teacher care amidst online learning. *Teaching in Higher Education*. Online First. <https://doi.org/10.1080/13562517.2021.1989579>
- UNESCO. (2021). *Education: From school closure to recovery*. <https://en.unesco.org/covid19/educationresponse>
- VanLeeuwen, C. A., Veletsianos, G., Johnson, N., & Belikov, O. (2021). Never-ending repetitiveness, sadness, loss, and 'juggling with a blindfold on': Lived experiences of Canadian college and university faculty members during the COVID-19 pandemic. *British Journal of Educational Technology*, 52(4), 1306-1322. <https://doi.org/10.1111/bjet.13065>
- Vlachopoulos, D., & Makri, A. (2017). The effect of games and simulations on higher education: A systematic literature review. *International Journal of Educational Technology in Higher Education*, 14(1), Article no. 22. <https://doi.org/10.1186/s41239-017-0062-1>
- Wati, I. F., & Yuniawatika. (2020). Digital game-based learning as a solution to fun learning challenges during the Covid-19 pandemic. *Proceedings of the 1st International Conference on Information Technology and Education (ICITE 2020)* (pp. 202–210). Atlantis Press. <https://doi.org/10.2991/assehr.k.201214.237>
- Whitton, N., & Langan, M. (2019). Fun and games in higher education: An analysis of UK student perspectives. *Teaching in Higher Education*, 24(8), 1000-1013. <https://doi.org/10.1080/13562517.2018.1541885>
- Xiao, S., Liang, W., & Tang, Y. (2018). Classroom attention restoration using computer game rewarding mechanism. *Proceedings of the 13th International Conference on Computer Science and Education (ICCSE)* (pp. 781–786). Colombo, Sri Lanka: IEEE. <https://doi.org/10.1109/ICCSE.2018.8468797>
- Xu, D., & Xu, Y. (2020). The ambivalence about distance learning in higher education: Challenges, opportunities, and policy implications. In L. Perna (Ed.), *Higher education: Handbook of theory and research, Volume 35* (pp. 351–401). Springer, Cham. [https://doi.org/10.1007/978-3-030-31365-4\\_10](https://doi.org/10.1007/978-3-030-31365-4_10)
- Young, M. S., Robinson, S., & Alberts, P. (2009). Students pay attention!: Combating the vigilance decrement to improve learning during lectures. *Active Learning in Higher Education*, 10(1), 41–55. <https://doi.org/10.1177/1469787408100194>

## APPENDIX

---

### *INTERVIEW OUTLINE*

The research was undertaken during the COVID-19 pandemic about 10 months after all Israeli higher educational institutions closed their brick-and-mortar buildings and moved exclusively to online learning, with both teachers and students generally entering the lessons from their respective homes.

- (1) What does “digital games in education” mean to you?
- (2) What are your goals regarding the integration of digital games into your online teaching?
- (3) What drives you to integrate digital games into your online pedagogy?
- (4) Into what fields/courses/disciplines do you integrate digital games in online learning?
- (5) Please describe how you use digital games in your online lessons. Give examples.
- (6) What value do digital games in online learning have for pre-service teachers?
- (7) Is there anything else you would like to express about the topic?

### AUTHORS

---



**Prof. Orit Avidov-Ungar** is Dean of the Faculty of Leadership & Education, and we have B. Ed, M. Ed and MA programs to train teachers for the Educational System. Her research explores the empowerment and professional development of teachers and the leadership of organizational change in education systems with an emphasis on the implementation of innovative technologies in education systems.



**Merav Hayak** is a PhD student in the Department of Education at Ben Gurion University of the Negev and a lecturer at Achva Academic College. Her research focuses on the integration of digital games in teaching and learning. Her central tenets of research are educational change, innovation, and implementation of digital technology in education, such as digital games, VR/AR, and artificial intelligence (AI). She is a lecturer at the Achva Academic College, she teaches entrepreneurship and innovation in education; and the use of digital tools in teaching, including, digital games and VR/AR and AI.