



The Video Game as an Educational Resource: Study of Teachers' Attitudes in the Dominican Republic

El videojuego como recurso educativo: estudio de las actitudes de los docentes en República Dominicana

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Abstract

Video games are part of students' everyday lives. Nevertheless, they are not always considered as educational resources in the teaching process. The purpose of this study was to analyze the attitudes of teachers at the preschool, elementary, and secondary levels in the Dominican Republic regarding the use of video games as an educational resource. To do so, a quantitative, non-experimental methodology was used with an exploratory-descriptive design, applying an exploratory factorial analysis with SPSS and a confirmatory factor analysis with AMOS. The results show that younger teachers, who have used video games, are more willing to incorporate them into the classroom than those who have never used them or been trained in their use. This creates barriers that limit the incorporation of these games into classes, which implies that there is an urgent need for teacher training in the grades studied in this field.

Keywords: video games, attitude, training, teaching resources, technology, games for learning.

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Resumen

Los videojuegos forman parte de la vida cotidiana de los estudiantes. Sin embargo, no siempre se consideran como recursos educativos dentro de los procesos de enseñanza. El propósito de este estudio fue analizar las actitudes que tienen los docentes del nivel inicial primario y secundario de la República Dominicana en relación con el uso de los videojuegos como recurso educativo. Para ello, se empleó una metodología de tipo cuantitativo no experimental con un diseño exploratorio-descriptivo, aplicando un análisis factorial exploratorio con SPSS y uno confirmatorio con AMOS. Los resultados muestran que los profesores más jóvenes, que han usado alguna vez los videojuegos, presentan una mayor disposición a incorporarlos en el aula que aquellos que nunca los han usado ni se han capacitado en su uso. Lo anterior crea barreras que limitan la incorporación de estos juegos en el aula, lo que implica una necesidad urgente de formación de los docentes de los grados estudiados en este ámbito.

Palabras clave: videojuegos, actitudes, formación, recursos didácticos, tecnología, juegos para el aprendizaje

Introduction

Information and communication technologies (ICT) are part of the everyday lives of children, young people, and adults, and even more so at present during a time of pandemic (Díaz et al., 2020). The technological offerings include video games, which, according to the literature, represent significant possibilities for the development of competencies for children in the school context.

The logic justifying the use of video games in education is based on the idea that they help create an easier and more pleasant environment for learning (Jaramillo & Puga, 2016; Martínez, 2019). Video games are characterized as a support for artistic expression through which players attempt to achieve an objective in a specific space and time—often in collaboration—through their own decision-making and respecting established rules. Their impact on solving learning problems and improving motor and cognitive skills, and creativity has been studied (Roncancio-Ortiz et al., 2019). Video games are also seen as bridges to digital culture (Lion & Perosi, 2018) because players establish relationships with each other, creating communities on social networks.

In the same vein, Pujol et al., cited by Terrazas, state “it is estimated that, on average, a child between 7 and 11 years old who plays video games for up to two hours per week produces faster psychomotor responses to visual stimulation” (Terrazas et al., 2020). As a digital technology, video games represent an impactful experience that can develop significant learning in less time (Bell & Gresalfi, 2017), since video games adapt to the level of the player and challenge them to advance by levels (Fleer, 2018; Hinojal & Pirro, 2020).

On the other hand, video games make it possible to place people in a virtual reality of the actual world in which they live, which can be augmented in some cases, making it possible to experience situations that seldom exist normally. According to Díaz et al. (2020), this integrative capacity enables *gamers* to share, build, and create knowledge. Authors such as Tennant (2019) argue that this phenomenon is explained by the experience that using video games provides to students, which results in more real and complete learning, because “it interacts with mental processes in terms of perception and emotion, and enhances the skills and competencies that are necessary in today’s digital society” (Díaz et al., 2020, p. 97).

On the other hand, there are critical perspectives regarding the use of video games in education. Some refer to the belief that they have a negative influence on students’ attention and performance; for example, use of video games is compared with television, but they have a different impact on academic performance (Badia et

al., 2015; Bell & Gresalfi, 2017). Another criticism is related to the fact that use of video games in adolescence is limited to enjoyment, ignoring the educational possibilities that the activity offers (Clark et al., 2016; Ricoy, 2016). However, Restrepo et al. (2019) contend that, when comparing the time in hours per week that students spend watching television or playing video games with their academic performance, there were no significant differences between using video games and the grades obtained.

Other criticisms of the use of video games in childhood refer to the claim that they can distract children from their daily tasks, as well as creating harmful habits. According to Carbonell (2020), internet gaming disorder, known as video game addiction, is characterized by a pattern of persistent and recurrent gaming behavior. This disorder, as declared in the International Classification of Diseases – 11th Revision (ICD-11), is a pathology that leads to clinically significant distress or impairment for a period of at least 12 months. The negative aspects occur when gamers suffer addiction and substitution of reality, because they move away from healthy activities, consuming their free time with gaming (Quesada-Bernaus & Tejedor-Calvo, 2016).

Despite the risks we have described, the studies reviewed assert that video games can feasibly be used for education, although there are learned predispositions that can be modified (Hernández & Torrijos Fincias, 2018). At present, there is an evident lack of consensus on universal factors that affect attitudes toward video games. Essentially, views of the risks are not exclusively limited to the use of video games, but to behaviors that generally occur due to a lack of personal guidance and responsibility.

It is necessary to study the integration of technology into educational processes based on the understanding and experiences of teachers in order to consider the use of video games that goes beyond mere entertainment or as a bridge between generations of adults and young people, and to position them in the framework of development of meaningful, comprehensive, and contextualized learning (Moncada & Chacón, 2012).

Considering this, the aim of this research is to determine the attitudes of preschool, elementary, and secondary school teachers in the Dominican Republic toward the use of video games as an educational resource in order to contribute to teacher training on the integration of video games into their pedagogical practices.

Methodology

The study followed a quantitative, non-experimental methodology with an exploratory-descriptive design. To analyze the data, an exploratory factor analysis (EFA) with SPSS was used, in addition to a confirmatory factor analysis (CFA) with AMOS v.24. These statistics were used to analyze the relationships and margins of error of the instrument between the variables used, as well as to define the factors studied, including the variables: attitude toward the use of video games in the classroom, age, modality, gender, school level, and socioeconomic status. The instrument was composed of 37 items organized into two dimensions: contextual aspects and attitudes toward the use of video games.

The population of this study is made up of teachers from 291 educational centers belonging to each of the five districts that make up Regional 15, Santo Domingo (Dominican Republic), selected on the criterion of having 500 students or more. The total number of teachers working at the preschool, elementary, and secondary levels is 16,998. The random sample was made up of 168 educational centers and a confidence level of 5% was established, which gives a constant of 0.57, for a total of 4,212 teachers who were asked by the data collection team to complete the questionnaire. The final sample is composed of 1,783 teachers, who accepted and answered the questionnaire in a timely and voluntary manner. Of these teachers, 6.8% were between 22 and 29 years old; 28% were between 30 and 39 years old; 38.1% were between 40 and 49 years old; and 27.2% were over 50 years old. With respect to gender, 75% were female and 25% were male. In terms of academic training, 76%

had a bachelor's degree, 12.8% a master's degree, 10.4% other postgraduate degrees, and 7% had a doctorate. Meanwhile, 7.1% worked at the preschool level, 39.8% at the elementary level, and 53.1% at the secondary level. Finally, 79.7% worked at public education centers and 20.3% at private ones.

Data collection techniques and instrument

The research used a cross-sectional survey technique with a scale to assess teachers' attitudes to the use of video games as an educational resource. The instrument was initially created with 86 items grouped into five dimensions and 12 sub-dimensions: 1. Purpose: reasons for the use of video games (function, contribution, learning assessment); 2. Management of teaching with video games (management of resources, modality of video games); 3. Players (training, selection); 4. Practices (problem-solving, ways of using video games); and 5. Perceptions (meaning, barriers, and interactivity). After cleaning up the instrument by means of apparent content and construction validations, a final version was produced with 37 items, organized into two dimensions. The first refers to contextual aspects and includes sociodemographic elements, and the second involves aspects of the attitude toward the use of video games in the classroom, linking cognitive, action or behavioral, and affective components.

The dimension on attitude toward the use of video games as an educational resource includes three components. The first, called cognitive, refers to the knowledge that people have or believe they have about the use of video games as an educational resource. This component involves three aspects: reasons for using video games, the contribution of video games to the development of the educational environment, and how teachers learn to use video games in the classroom. The second component refers to the willingness to respond to the use of video games as an educational resource: resource management, modality of video game, selection, problem-solving, and modes of use. Finally, the affective component is expressed in terms of sympathy or antipathy, activating emotions toward the use of video games as an educational resource, referring to: meaning, interpretation given by teachers to what their students learn when using video games, and barriers to the use of video games in the classroom.

Validation of the data collection instrument

First, a content validation was carried out by experts, establishing the levels of sufficiency, relevance, and clarity of each item assessed. In order to evaluate the criteria, a rubric was used with a scale of 1 to 4, where 1 signified that it did not meet the criterion and 4 meant that it had a high level of compliance. Items with a score lower than 2.7 were excluded from the instrument. The apparent validity was confirmed by means of guided application to teachers belonging to the population of the preschool, elementary, and secondary levels, the same in which the study was conducted. The resulting instrument was read by people belonging to the population but who were not included in the sample.

For the purpose of construct validity, an exploratory factor analysis (EFA) was used to determine the principal components with Varimax rotation. Bartlett's test of sphericity, with Chi-square parameters (435) = 7066.160, $p < 0.01$ and the Kaiser-Meyer-Olkin statistic = 0.935 suggest that the EFA method is adequate for the definitive data. With this, factorial weights were generated for each item for each factor, considering a minimum of 0.40 to be included in the factor. The internal consistency of the complete scale was subsequently examined using Cronbach's Alpha, which resulted in total Alpha = 0.909. Bartlett's test of sphericity, with Chi-square parameters (435) = 7066.160, $p < 0.001$, and the Kaiser-Meyer-Olkin statistic (=0.935) suggest that the factor analysis method is adequate for the data collected. Following the Kaiser criterion (Guttman, 1954), factors with eigenvalues greater than 1 were selected. These first three factors explain 56.87% of the total variance. There is a structure in the data that is represented by the following factors. Factor 1: favors the use of video games; factor 2: experience in the use of video games; and factor 3: rejects the use of video games.

Table 1
Factors shown by the structure of the data

Factor 1: Favors use of video games	Load	Commonalities
I believe that video games can be used to motivate students to learn.	0.822	0.684
I believe that video games could be used for classroom assessment.	0.758	0.628
I believe that video games are a free activity, independent of educational planning.	0.663	0.484
I believe that video games can help to better understand curricular content.	0.812	0.705
I believe that video games allow the development of thinking skills.	0.856	0.746
I believe that the class schedule should include time for the use of video games.	0.689	0.506
I believe that including video games on a regular basis can introduce innovative resources to the classroom.	0.785	0.62
I believe that video games could be used within the classroom as an assigned activity.	0.804	0.666
I believe that anyone who uses video games should properly learn the instructions on how to use them.	0.785	0.73
Video games allow the player to teach themselves how to use them.	0.684	0.549
Teachers can learn and update their knowledge by using video games.	0.778	0.791
I believe that video games help develop problem-solving skills.	0.814	0.838
I believe that by using video games students could learn to lose or win without fear of failure.	0.79	0.788
I believe that video games promote the development of concentration.	0.802	0.722
I believe that video games are related to curricular subjects.	0.687	0.496
I believe there is a lack of administrative support to include video games in the classroom.	0.577	0.411
I think video games are useful for managing group discipline in class.	0.527	0.446
Factor 2: Experience in using video games	Load	Commonalities
I have used video games to teach new content in class.	0.824	0.714
I have used video games to assess the learning process.	0.799	0.715
I have used video games as a reward after a classroom learning activity.	0.854	0.75
I have used video games as homework.	0.738	0.576
I learned how to use video games with a tutorial.	0.572	0.462
I have received training in video games from my students or my children.	0.56	0.344
Factor 3: Rejects the use of video games	Load	Commonalities
I think video games are distracting to students.	0.495	0.248
I think that students are wasting time when they are playing games.	0.585	0.37
I don't think there is time to work with video games in the classroom.	0.568	0.328
I don't know how to integrate video games into the classroom.	0.559	0.334

* In this table, factor 1: favors the use of video games, is related to the table and commonalities.

Source: Prepared by the authors.

Confirmatory factor analysis (CFA)

Using the AMOS software, we obtained the indices to compare the proposed structure with the saturated and independent models. The χ^2 has significance > 0.05 , NFI = ≥ 0.95 , TLI = ≥ 0.95 , and CFI = ≥ 0.95 ; with PNFI close to 1. This indicates that the model meets the required statistical criteria, where χ^2 represents the Chi-square, NFI is the normed fit index, TLI is the Tucker-Lewis index, CFI is comparative fit index, and PNFI is the parsimonious normed fit index.

The model was first tested with three latent variables. Since it is significantly lower than 2.346, it is clear that this model is over-identified. Because there is no correlation between the residuals, a recursive model can be observed. The first model for the exploratory approach uses the relationship between the sociodemographic profiles of teachers, according to sector, educational level at which they work, area of residence, socioeconomic status in relation to their attitude toward the use of video games (factor 1), experience in the use of video games in the classroom (factor 2), and rejection of the use of video games (factor 3).

In factor 1, compliance was observed with two of the fundamental principles for performing a confirmatory factor analysis for structural equations; the level of internal consistency of the construct formed by 15 variables is excellent, with a Cronbach's Alpha of 0.947. Unidimensionality was verified in this factor, since the variables explain approximately 65% of the variance of the dependent variable. Factor 2 also showed a very high internal consistency of the construct with a Cronbach's Alpha of 0.86. This factor also meets the criterion of unidimensionality, because the variables explain 59.2% of the variance. Finally, factor 3 also showed a high consistency and internal validity of the construct, with an Alpha of 0.663; unidimensionality could also be inferred in this factor.

Results

The comparisons made show that teachers in the younger age ranges favor the use of video games more than those in the older age ranges. Teachers in the 22-29, 30-39, and 40-53 age ranges show differences as their age increases; those who have used video games sometimes show greater willingness to incorporate them into the classroom than teachers who have never used them or have not been trained in them. Those who teach in the medium and high socioeconomic sectors are more willing to use video games. In this scenario, only these variables showed a significant relationship, as well as the non-significance of the other variables resulting from the first model.

The model in Figure 1 shows the relationship between the factors produced by the analysis of teachers' attitudes toward the use of video games in the classroom. Factor 1 shows that teachers favor the use of video games in the classroom, since they assume that video games motivate learning, are a tool that allows the assessment of learning, help with classroom discipline, are a means to enable the understanding of content, contribute to the development of skills, can be adapted to available schedules, are an indicator of innovation, update classroom activity, and promote self-learning as an instructional means of cognitive development and the relationship with a competency-based curricular model.

Meanwhile, factor 2 shows how teachers feel about the need to develop experience in order to take advantage of using video games in the classroom by introducing new content, serving as an assessment tool, providing strategies as a reinforcement for learning, and for assignments. Finally, factor 3 reveals which barriers prevent greater teacher contact with video games as an educational resource. The standouts are aspects referring to administrative measures, which indicate a lack of support for this initiative, as well as the lack of instructions or the necessary training to promote the use of video games, highlighting problems in the context to integrate them.

When analyzing the coefficients of the descriptive variables with respect to factors 1 and 2, we observe that, in the first relationship, teachers who have used video games are generally more willing to incorporate them into the classroom; in the case of the second latent variable, we observe that the less training or experience the teacher has in video games, the less willing they are to incorporate them into the educational process.

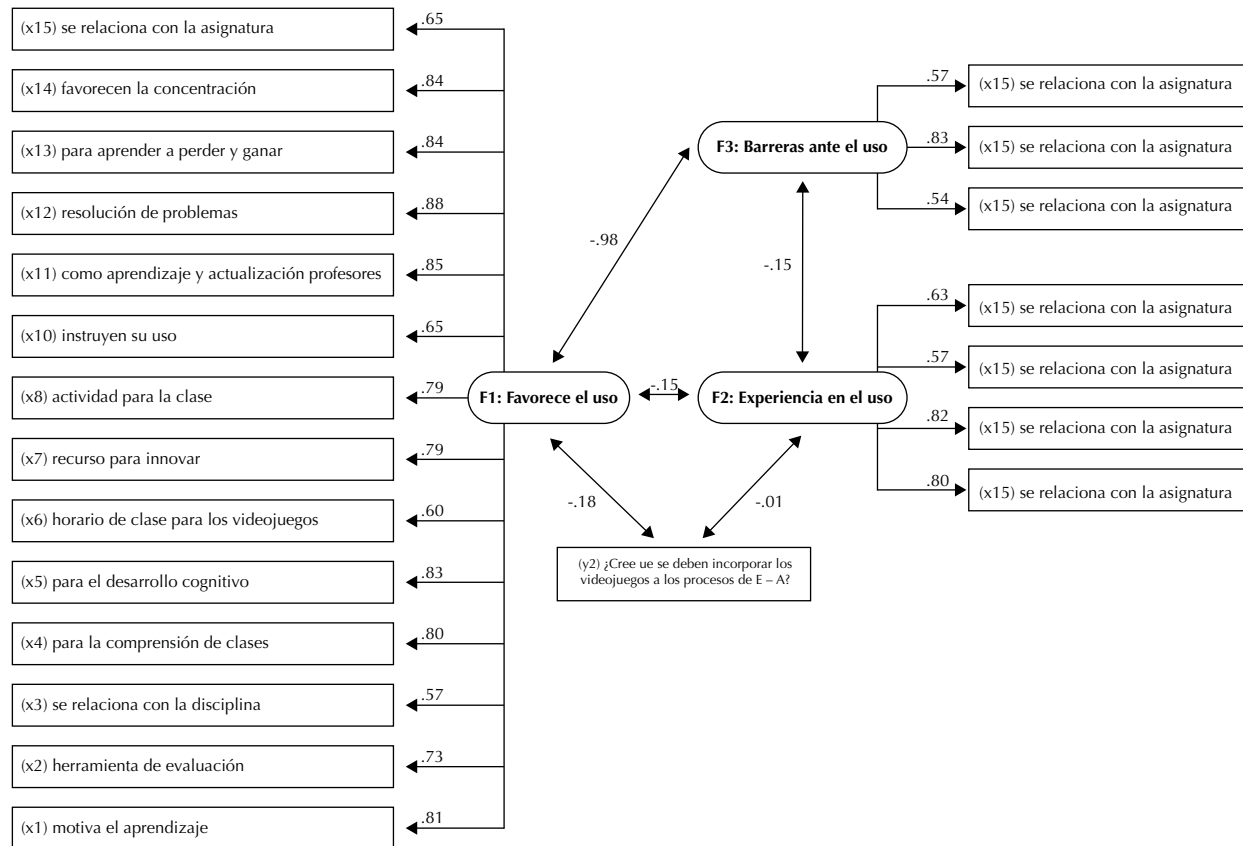


Figure 1. Model of teacher attitudes to the incorporation of video games into their classes

Source: Prepared by the authors.

Analysis of differences between factors and grouping variables

The relationship between the sociodemographic profiles of teachers was analyzed according to sector, the educational level at which they work, the area of residence, socioeconomic status, and their attitude toward the use of video games (factor 1), teacher’s experience in the use of video games in the classroom (factor 2), and rejection of the use of video games (factor 3). The results show that there is a highly significant correlation of .963 between factor 1 (favoring the use of video games in the classroom) and factor 3 (on the barriers to implementation). On the other hand, when analyzing the coefficients with respect to factors 1 and 2, we found that teachers who have used video games are generally more willing to incorporate them into the classroom. Meanwhile, the less training or experience they have with video games, the less willing they are to incorporate them into the educational process.

In order to compare the differences between teachers according to their age, a Shapiro-Wilk test was used to assess the normality of the data, which produced a negative result, so nonparametric Mann Whitney U and Kruskall Wallis H tests were applied to the variables of age, gender, socioeconomic status, and academic level.

Table 2.
Kruskal-Wallis H test comparison of differences between factors and age, educational level and socioeconomic status

Grouping variable		Factor 1. Favors use of video games	Factor 2. Experience in using video games	Factor. 3 Rejects use of video games
Age	H de Kruskal-Wallis	9.014	8.894	5.221
	Asymptotic significance	0.029	0.031	0.156
Educational level	H de Kruskal-Wallis	2.010	3.252	8.804
	Asymptotic significance	0.366	0.197	0.012
Socioeconomic status	H de Kruskal-Wallis	7.405	13.051	4.956
	Asymptotic significance	0.116	0.011	0.292

Source: Prepared by the authors.

The table shows the significant differences between the subjects according to age with respect to factor 1 (favors the use of video games). As we can see, age clearly influences attitudes toward video games, with teachers between 22 and 39 years of age being those most favorable to experimenting with them as an educational resource. On the other hand, those over 53 years of age show higher levels of rejection to the use of video games in the classroom. Depending on the level of the educational center where the teacher works—preschool, elementary, or secondary—there are significant differences with respect to factor 3 (rejection of the use of video games as an educational resource). In other words, the teachers reject the use of video games as an educational resource, with the greatest difference observed at the preschool level. On the other hand, there is a significant difference between socioeconomic status and factor 2, referring to experience with video games, which is verified in the medium-high socioeconomic status.

We also analyzed whether there were differences between teachers according to the variables gender and type of educational center using the Mann-Whitney U test. As can be seen in Table 3, there are no significant differences between subjects when considering the three factors analyzed.

Table 3
Mann-Whitney U test comparison of differences between factors and type of educational and gender of teachers

Grouping variable		Factor 1. Favors use of video games	Factor 2. Experience in using video games	Factor. 3 Rejects use of video games
Type of educational center (public or private)	Mann-Whitney U	250985.500	65329.000	244978.000
	Wilcoxon W	1259895.500	387332.000	310319.000
	Z	-0.611	-1.206	-1.281
	Asymptotic significance (bilateral)	0.541	0.228	0.200
Gender	Mann-Whitney U	283935.500	88742.000	292710.500
	Wilcoxon W	383170.500	345428.000	391500.500
	Z	-1.419	-1.027	-0.414
	Asymptotic significance (bilateral)	0.156	0.305	0.679

Source: Prepared by the authors.

Discussion and conclusions

The aim of this study was to analyze the attitudes of a sample of preschool, elementary, and secondary school teachers in the Dominican Republic toward the use of video games as an educational resource. In response to this objective, we designed and validated a scale to support the analysis and begin a line of research in the field of using video games in Dominican classrooms.

The most important relationship demonstrated by the statistical analysis is that younger teachers show greater willingness to use video games in classes. This is expressed in the first and second factors used in the model, highlighting the value of the experience as opposed to the pedagogical possibilities or innovations proposed with this resource. They are described by means of indicators that value video games as a resource that can mediate learning of both conceptual and attitudinal content that is valuable for the educational process. Similarly, this enables possibilities for the inclusion of video games in class time, for assignments, and for teaching activities.

On the other hand, it is clear that there are barriers that limit the use of video games in the classroom, such as the lack of information and training provided to teachers, the scant administrative support offered, and the limitations of the social and school context.

Previous experience with video games makes teachers more willing to use them in teaching. In many cases this experience is related to using video games in their youth or with their children in adulthood, considering the relationship between this result and the age variable. Because of this relationship, it is more possible to revise certain myths about the potential risks of video games, such as those suggested by Anderson and Bushman (2001) or Quesada-Bernaus and Tejedor-Calvo (2016).

From this perspective we can conclude that use of these resources in teaching would be based on understanding the value of play in learning, since it is an innate human activity used as a learning strategy in the early years of life, but which endures in the essence of humans, as stated by Gil-Espinosa et al. (2018). The child remains active when playing, making observations, asking and answering questions, making decisions, and expanding their creativity and imagination. In addition to constituting a playful component, video games thus have an important instructional potential, particularly in the area of development of cognitive-spatial skills such as spatial visualization or hand-eye coordination. In this regard, Adams and Clark (2014) argue that that “the cognitive load for gameplay as well as game flow must be managed in order for students to take advantage of explanation functionality in educational tools designed to increase deeper, germane processing” (p. 149).

In this case, experimenting in preschool environments helps to understand the prejudicial nature of these myths and to identify possible uses in schools. This is how the teacher can build a proposal in the framework of an educational process that is planned and supported, where the risks are minimized and they can take advantage of the appeal of video games and the value of play to motivate students to learn in various areas. Accordingly, insofar as teachers have received training related to digital technologies, their work as a mediator of learning becomes significant, meaning that the school can continue to be a space for innovation (Berger & Wolling, 2019; Berger, 2020).

The potential value of video games includes providing resources that can be used by educational programs, such as their motivational capacity, the high degree of active involvement of the user, the continuous and immediate feedback between the video game and the player, and the stimulation of various skills and abilities that are particularly essential in problem solving (trial and error, creation of rules, testing of hypotheses, generalization, etc.) (Barab et al., 2010; Gresalfi & Barnes, 2016; Nolan & McBride, 2013).

The relationship highlighted in this study between the age of teachers and their willingness to use video games in classes is consistent with the research conducted by Takeuchi and Vaala (2014) with teachers from the United States. That study concluded that younger teachers tend to include video games more often in their teaching planning, reporting knowledge and practices that favor their use as an educational resource, as well as their contributions to language and other knowledge exercised in users.

These findings point to the need to consider the role of teachers in the use of video games for learning (Bell & Gresalfi, 2017). Their role is key, since their attitudes mean they can either be promoters or detractors of using video games in the educational system, either as a means for school improvement or as a limiting factor in learning (Correa García et al., 2017).

However, it is important to continue conducting research on video games as an educational resource in order to conduct a more in-depth examination of the attitudes of teachers toward their use in the development of competencies (Zagalo, 2010; Soto-Ardila et al., 2019), experimenting with real problems, exploring, discovering, and making decisions without fear of making mistakes by using them (Belloti, 2013; De Freitas, 2018). This places us at a crucial juncture considering the changes that new generations demand from educational systems, making it necessary to show which aspects enable the experience and work of teachers to be linked to the needs and interests of the current generations, their form of learning, and how they connect with the world. This study provides evidence, in the Dominican context, about what teachers think, believe, and feel about video games as resources, not only for entertainment, but also as an educational tool. Being aware of the attitudes of teachers is an important first step, which could allow greater integration of video games into teaching (Hong et al., 2009).

Finally, these results allow new possibilities to be opened up for teacher training programs, given that experience with video games is not only produced by having used them previously, as suggested by the relationship with the age of the teacher, but can also be generated by formative processes, where negative notions are clarified and the real pedagogical value of a resource that forms part of the everyday lives of students can be understood (Gil-Flores et al., 2017).

Accordingly, and considering the technological and scientific advances that make it possible to specify the academic objectives in the development of student competencies, it is clear that teachers are facing greater challenges. There is therefore an evident need for new research to support the creation and management of public policies to train teachers in preschool and elementary education in order to promote structural changes in which video games are considered as pedagogical tools, in an environment of educational innovation and care for children.

Finally, this study allows us to assert that it is necessary to design public policies that guarantee the use of ICT in teacher training, including video games for the development of new skills and academic competencies, and even more considering the conditions produced by the Covid-19 pandemic, where these technologies have proved to be indispensable in everyday life.

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