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Teachers' perception and willingness towards educational video games: case of young Moroccan physics teachers

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ABSTRACT

Recent studies have shown that teachers 'perception and attitudes about digital tools play a crucial role in how they integrate and use technology in the classroom. The purpose of the present study is to investigate physics teachers' perception and willingness towards educational video games (EVGs). Based on the literature review, a questionnaire was developed and employed in data collection, and statistic results were generated for data analysis. A sample consisting of 91 teachers participated in this survey. The result shows that the majority of teachers know about the use of EVGs in teaching physics and expect that the use of this tool in the classroom will have an added value to learners, especially in terms of motivation, simulating physical phenomena, and comprehending concepts. Moreover, more than three-quarters of the young teachers, who polled, reported an interest in using EVGs and a willingness to receive training in this area. Finally, we conclude with some recommendations about future use of EVGs in teaching physics.

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1. INTRODUCTION

Morocco, like the majority of other countries, is engaged to integrating and incorporating information and communication technology (ICT) into its educational system with the aim of improving quality of learning [1], [2]. Indeed, one of latest forms of technological tools used in the teaching process is educational video games (EVGs) which is a particular type of serious games that combines educational and fun elements [3]. These games are available and accessible online or via digital devices such as computers, smartphones, and tablets [4].

The video game industry made a veritable leap forward, both young and old people around the world enjoy playing video games. Globally, there were nearly 3.24 billion players in 2021 [5]. On the other hand, several studies show the advantages of using video games in teaching [6]. Indeed, when compared to traditional learning approaches, EVGs represent a potential tool for motivating, engaging, maintaining learner's interest and improving learning achievement [7], [8]. Furthermore, previous research confirmed that the majority of learners have a positive perception of EVGs, they express their willingness of benefiting from the use of this pedagogical tool in the classroom as they believe that this may lead to making learning much more enjoyable and exciting [9]–[11], mainly because of their intrinsically motivating character [12]–[14].

Another important point worth noting is that the use of video games can promote competencies as problem-solving skills, collaboration skills [7], communication skills [15], and teamwork skills [16]. At the

same time, we note that there is a growing interest in using EVGs to teach physics as various games have been used in lessons, including Supercharged, Kirchhoff's Revenge, Surge, Angry Birds, and Mekanica. As a result, there is an improvement in cognitive development, learning attitudes, and conceptual change [17]–[20]. In fact, these games provide a virtual environment where learners can practice their scientific knowledge and use complex strategies according to the situation dealing with during each game level [21].

Despite all the advantages mentioned above, the integration of EVGs into teaching practice poses a major challenge for teachers, particularly for those who are unfamiliar with digital resources or have a negative perception of learning through games. Earlier research has indicated that teachers may face obstacles when it comes to incorporating technological innovations in their classrooms. These challenges can be attributed to many factors like stress or anxiety and the ambiguity of the learning outcomes [22], [23].

Indeed, teachers play a pivotal role in improving the quality of education [24]. For this reason, teachers' attitudes toward changes in teaching process and their desire to become highly engaged in the implementation of innovative technologies is considered as a crucial success factor [25]–[27]. Likewise, the resistance of change could be one of the primary causes leading to failure in the education system [28], [29]. Additionally, it is crucial for teachers and learners to adopt innovative teaching and learning tools especially in the era of digitalized world [30], a plethora of studies have been conducted to assess teachers´ perceptions of EVGs [31]–[38], however, within the Moroccan context, most researchers focus on learners' motivation [39]–[43], with very little importance given to teachers' perceptions [44], hence the importance of studying this subject.

2. METHOD

2.1. Research design

This study aims to explore teachers' perceptions of EVGs and their willingness to adopt this new teaching tool in teaching physics. The research sample consists of Moroccan high school physics teachers with a total of 91 participants. To achieve the research objectives, a quantitative approach was adopted based on an online questionnaire. Indeed, this kind of methodology is thought to be appropriate for describing participants' points of view and capable of producing reliable, objective, and valid results [45]. Furthermore, questionnaires, one of the most commonly used quantitative tools, can be distributed to many people [45].

2.2. Participants

As previously stated, the survey population included 91 teachers. The sample was very heterogeneous consisting of 73 males and 18 females who were composed mainly of young teachers with less than 10 years of seniority. This demographic diversity guarantees that the survey findings reflect a wide range of experiences and perspectives within the teaching profession. Table 1 provides a more complete breakdown of the participants' demographic information. Table 1 shows that the majority of teachers who respond to the questionnaire are aged bellow forty years (38.5%+42.9%). It is a youthful population; this point should be considered when analyzing results. Furthermore, we see that (83.5%) of teachers had an experience of less than 10 years, which is completely reasonable to expect that many of them have relatively fewer years of teaching experience.

2.3. Survey instrument

The questionnaire was designed particularly for this survey and was based on a conducted literature review study about EVGs including a previously published research study entitled "a quantitative approach to pre-service primary school teachers' attitudes towards collaborative learning with video games: previous experience with video games can make the difference" [46]. Prior to initiating the survey, the questionnaire was sent to 5 teachers who were not participants in the study in order to validate the adapted instrument and confirm its suitability. Their valuable suggestions and recommendations have improved the structure of our search tool. As the French language is one of the most widely spoken languages in Morocco, the questionnaire was written in French.

Table 1. Characteristics of the respondents

Item (N=91)		Frequency	Percentage (%)
Gender	Male	73	80.2
	Female	18	19.8
Age	21 to 30 years	35	38.5
	31 to 40 years	39	42.9
	41 to 50 years	13	14.3
	More than 51 years	4	4.4
Teaching experience	Less than 5 years	48	52.7
	5 to 10 years	28	30.8
	11 to 20 years	9	9.9
	More than 20 years	6	6.6

2.4. Data collection

An online questionnaire using the Google Forms tool was used to collect data in order to have a large number of responses from teachers. Indeed, the online Survey takes less time, less expensive [47], useful in the case of pandemics as COVID 19 and easy to be transmitted. In addition, the data become easy to be retrieved from this type of surveys. The questionnaire containing four parts, namely participants' demographic information, teachers' knowledge of EVGs, teachers' perceptions on the potential of using EVGs in teaching physics and teachers' willingness to use EVGs.

A 5-point Likert scale has been used in third and fourth sections to measure teachers' perceptions and willingness. Multiple-choice questions were utilized in the first section, while dichotomous (yes-no) format was adopted for the questions in the second section. Regarding the reliability of the internal consistency, the Cronbach's alpha value was found to be 0.794, indicating adequate reliability [48].Teachers were invited to complete the questionnaire via e-mail and social media platforms such as Facebook and WhatsApp. The total number of responses received was 91, with 72 completed questionnaires returned.

2.5. Data Analysis

Data were stored and analyzed using the statistical package for the social sciences (SPSS). Various statistical measures were calculated from the survey results, such as percentage distributions, frequency, mean values, and standard deviations. This research provided a comprehensive overview of the data, facilitating a thorough examination of trends within the dataset. The research used the Cronbach's alpha test to evaluate the reliability of the results obtained.

3. RESULTS AND DISCUSSION

The study's findings are separated into three parts: Knowledge about the existence of EVGs and its use by physics teachers, teachers' perceptions regarding the effectiveness of using EVGs in teaching physics and their willingness to integrate it into their teaching practices. The first segment focuses on teachers' awareness of EVGs and their integration into the educational process as a contemporary and innovative tool. The second segment investigates how teachers perceive the influence of EVGs on learner motivation, engagement and comprehension. The third segment explores teachers' readiness to use EVGs, highlighting potential benefits as well as any reservations they may have.

3.1. Teachers' knowledge of EVGs

Pedagogical tools are evolving under the influence of technology and new pedagogic approach in order to motivate learners. Unfortunately, as indicated in Table 2, a significant portion (20.9%) of teachers is failing to keep pace with technological advancements and exhibit disinterest towards the latest developments in technology. Overall, a significant percentage of participants (79.1%) indicated that they were already familiar with EVGs including (98.6%) in teaching physics. As a result, we can say that the large majority of teachers are aware of the presence of the EVGs as a pedagogical tool. This is not a surprising finding as the most teachers who participated in responding to the questionnaire are young and grown up with new technologies.

Additionally, according to the Table 1 it can be observed that the overwhelming majority of teachers (97.2%) have never used EVGs in the classroom as well as (88.9%) have never experienced the use of these tools even outside the classroom. This can be explained by several factors, first, the curricula and pedagogical guidelines are not explicitly mentioning the utilization of EVGs in teaching physics. It is worthy to note that mentioning the EVGs implementation would be important and determinant factor for encouraging physics teachers to use them. Second, there is lack of training in the field, especially at the level of educational game scenarios.

As to the end, analyzing the responses to the questions (part 1) have revealed that teachers were familiar with the concept of EVGs. This finding is consistent with the results reported by Spieler and Degonda [49]. Furthermore, the limited usage of these tools in teaching physics is not only in the Moroccan but in other contexts as shown in the study conducted by Ray *et al.* [50].

Table 2. Teachers' knowledge of EVGs

Item		Yes	No
		Frequency and Percentage (%)	
Have you heard about EVGs?	N= 91	72	19
		79.1%	20.9%
Are you aware of the use of EVGs in teaching physics?	N=72	71	1
		98.6%	1.4%
Have you ever played EVGs?	N=72	8	64
		11.1%	88.9%
Have you already used EVGs in teaching?	N=72	2	70
		2.8%	97.2%

3.2. Teachers' perceptions on the potential of using EVGs in teaching physics

The Table 3 presents teachers' perception on the use of EVGs in teaching physics. It shows that a percentage of 90.3% of teachers believed that the use of EVGs can enhance learner motivation in learning physics, almost 83.3% of respondents agreed or strongly agreed that employing video games can serve as a valuable tool for helping learners to actively participate in their learning process. Moreover, the learner can take responsibility for their own learning by using this tool.

In addition, more than half of the teachers interviewed (56.9%) agreed or strongly agreed that that the use of EVGs could lead to a better understanding of physical concepts. On the contrary, (33.3%) of teachers were unable to clearly judge the effectiveness of this tool which can be explained by the fact that the majority of teachers have never used these tools before to assess their efficiency for conceptual change. Indeed, understanding physical concepts is not dependent only on the tool used but also on several factors, including the learner's intellectual level and the teacher's skills.

On the other hand, it can be observed that the majority of teachers (76.4%) possess knowledge about the role that EVGs can play in simulating physical phenomena. Indeed, Simulation is the predominant part of EVGs utilized in science, as supported by research [51]. This result is consistent with the conclusion of a review paper which reported that a majority of teachers acknowledge the merits and benefits of incorporating simulations into EVGs for teaching science [51].

The findings related to the learning environment indicate that young teachers agreed (38.9%) or strongly agreed (37.5%) that the use of EVGs will create an environment conducive to friendly learning for learners. An additional survey item asked participants to express their views on the following proposal: "the use of EVGs will improve learners' performance." This item generated only (54.2%) agreement, with 35 participants agreeing and 4 strongly agreeing.

According to many researchers [30]–[34], the success of integrating EVGs into the teaching is significantly influenced by teachers' perceptions. Overall, it is confirmed that the vast majority of teachers were aware of the importance of EVGs and expresses positive perceptions regarding them. Indeed, the results in Table 3 showed that most participants (over 54.2 %) chose "strongly agree" or "agree" as their response on all items, while (5.6 %) chose "strongly disagree."

Among all items, the highest mean was item 2 (the use of EVGs will enhance learners' personal responsibility for their learning activities) (M=4.18; SD=0.969) followed by item 1 (the use of EVGs raises learners' motivation and passion for learning) (M=4.15; SD=0.763). These results are broadly in agreement with previous research outlined in the introduction section [9]–[11]. On the other hand, the lowest mean was item 6 (the use of EVGs will improve learners' performance) (M=3.32; SD=1.005). This appears logical given that several contributions indicate that various aspects of students' individual characteristics, such as their well-being, perception of the school environment, motivation, participation in school activities, gender and more, significantly influence academic performance [52].

Table 3. Teachers' perceptions regarding the benefits of EVGs

Cronbach's alpha .726	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	SD
	Number of items 6						
	Frequency (N=72) and percentage (%)						
The use of EVGs raises learners' motivation and passion for learning.	1 1.4%	2 2.8%	4 5.6%	43 59.7%	22 30.6%	4.15	.763
The use of EVGs will enhance learners' personal responsibility for their learning activities.	2 2.8%	3 4.2%	7 9.7%	28 38.9%	32 44.4%	4.18	.969
The use of EVGs will improve the learners' understanding of physical concepts.	2 2.8%	5 6.9%	24 33.3%	23 31.9%	18 25.0%	3.69	1.016
EVGs can be used as simulators for various experiences	3 4.2%	6 8.3%	8 11.1%	28 38.9%	27 37.5%	3.97	1.100
The use of EVGs will create an environment conducive to friendly learning for students.	2 2.8%	4 5.6%	12 16.7%	32 44.4%	22 30.6%	3.94	.977
The use of EVGs will improve learners' performance.	4 5.6%	12 16.7%	17 23.6%	35 48.6%	4 5.6%	3.32	1.005

The findings obtained from this research segment show that teachers have confidence and faith in the potential of EVGs. This is consistent with the results of some previous studies indicating that most teachers

believed that video games could be beneficial for teaching and learning tasks [32], [34], [35], [50]. However, a study conducted in Malaysia found that a considerable number of teachers were uncertain about the advantages of using video games for education purposes [53]. These varying results are attributed to several factors, including the teachers' familiarity with video games, their proficiency in ICT, their age, their teaching experience and disciplines. In our study, the age of the teachers played a critical role in the generated results.

3.3. Teachers' willingness to integrate EVGs in teaching physics

Table 4 regroups all the results related to the willingness or intent to use EVGs. It indicates that most respondents are ready to use EVGs in teaching physics. Most respondents have expressed a positive feeling about video games (M=3.64, SD=0.983), think that EVGs is needed for the new generation of learners (M=3.69, SD=1.057) and are in favor of the official integration of EVGs into educational guidelines (M=3.67, SD=1.199) with a score of 49 (68.1%) agree or strongly agree. Moreover, the results obtained show there exists a genuine intent to use EVGs (M=3.67 SD=1.199) and make efforts to fully benefit from this technological innovation (M=3.67 SD=1.199), in that the majority of young teachers surveyed (72.50%) recognize the need of training on the use of EVGs and are ready to encourage their colleagues to explore and adopt EVGs (M=3.65 SD=1.023).

In fact, the unwillingness of physics teachers to use EVGs in their teaching can pose a significant obstacle to their integration the classroom. This reluctance may prevent learners from benefiting from these innovative tools. Despite increasing interest among teachers, a large number of researches has confirmed there is still resistance to involve serious games in the teaching and learning process [54]–[58].

The findings presented in this section indicate that young teachers are motivated and willing to integrate EVGs into their teaching methodologies. These results are consistent with earlier research that has also reported a similar tendency towards using such games [31], [49], [59]. However, it is important to mention that other studies have highlighted those teachers may reluctant to incorporate EVGs into their teaching. As an example, Ruggiero discovered that more than 50% of the surveyed participants reported that they do not currently utilize or have plans to use gaming in their classroom teaching [60].

The positive outcome we achieved can be largely attributed to the positive attitude of the teachers towards EVGs. This finding aligns with prior research conducted by Sánchez-Mena *et al.* [22], which also identified this correlation. Indeed, several studies have focused on the factors influencing teachers' willingness to use serious games, namely gender, age, teaching experience as well as educational level [4], [22], [61]. In our study, the determining factor is the youth of the target population. Despite this positive result, it is important to take into account other variables in future research with the aim of having clear understanding of the intention to use EVGSs in the Moroccan context.

Table 4. Teachers' willingness to use EVGs in teaching physics

Cronbach's alpha .918	Number of items 6						
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	SD
	Frequency (N=72) and percentage (%)						
I feel confident using video games.	3 4.2%	5 6.9%	19 26.4%	33 45.8%	12 16.7%	3.64	.983
I think EVGs is needed for the new generation of learners.	4 5.6%	6 8.3%	12 16.7%	36 50.0%	14 19.4%	3.69	1.057
I am in Favor of the official integration of EVGs into educational guidelines.	6 8.3%	7 9.7%	10 13.9%	31 43.1%	18 25.0%	3.67	1.199
I intend to use EVGs in teaching physics.	5 6.9%	8 11.1%	10 13.9%	33 45.8%	16 22.2%	3.65	1.153
I regularly attend workshops or training related to EVGs.	5 6.9%	9 12.5%	6 8.3%	37 51.4%	15 20.8%	3.67	1.151
I will encourage my colleagues to explore and adopt EVGs.	2 2.8%	11 15.3%	9 12.5%	38 52.8%	12 16.7%	3.65	1.023

4 CONCLUSION

The overall results indicate that the vast majority of teachers have a positive perception of using EVGs as a valuable tool in the teaching-learning process. They acknowledge that its adoption in teaching physics can improve learners' motivation and can be a valuable tool for simulating physical phenomena. Furthermore, young teachers have shown an initial acceptance of using EVGs, this is reflected by their willingness and

intention to use this innovative pedagogical tool, as well as their interest in participating in training courses. Consequently, the resistance to use EVGs from young teachers could be extremely minimal. However, it is important to note that these findings are based on a limited sample of a mostly young teachers and may not necessarily apply to all physics teachers in the Moroccan secondary school or in other contexts.

In light of this preliminary study, several recommendations can be made with regard to the EVGs; firstly, conducting a nationwide study on EVGs integration to understand challenges and best practices. As well as, encourage and support teachers in utilizing EVGs effectively. Secondly, formalizing the use of EVGs within the secondary school curriculum and establishing a curated collection of EVGs aligned with Moroccan school curricula.

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