



Potential Benefits and Challenges of Using Virtual Worlds in Saudi Arabia Secondary Schools

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Abstract

There are many potential benefits that virtual worlds may provide for improving learning, collaboration, motivation and therefore, the improvement of the academic performance of students. The virtual worlds may offer new experimental platforms through new interactions perceiving the changeable nature of technology. This study aimed to identify the challenges of using virtual worlds in schools in the Kingdom of Saudi Arabia. To achieve the objectives of the study, the researcher used the descriptive approach. The scale of challenges within the virtual world's environments was applied to a random sample of 420 secondary school teachers in Jeddah, and the arithmetic averages were used to calculate the degree of challenges in the environments of virtual worlds, and the study reached the following results. It was found that the study members agreed on the physical challenges of using virtual worlds techniques from the point of view of secondary school teachers for boys in Jeddah (mean 4.30) and that the study members agreed on the skill challenges facing the teacher in applying virtual worlds techniques with mean of 4.26. Also, the study members agreed on the financial and administrative challenges in applying the virtual world's techniques with a mean of 4.26. They agreed also on the possibilities of applying virtual worlds techniques with a mean of 3.47. Thus, the researcher recommended the provision of modern applications of devices that enable the application of the virtual world and the necessity of providing specialized courses in the field of virtual world's technologies, as well as providing an adequate budget and making a strong infrastructure that enables the application of virtual worlds in Saudi schools.

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1 Introduction

The virtual world is known as a computer-based environment for large numbers of users and it is based on a virtual reality environment (Burdea and Coiffet, 2003). One of the goals of modern learning theories is to provide the learner in the learning process with self-reliance and the use of technological innovations to create electronic environments that achieve educational goals and increase their effectiveness. Virtual learning environments is defined by Ehsanpur and Razavi (2020) as non-realistic learning environment in which learning and knowledge transfer occurs remotely using information technology platforms so that traditional teaching is replaced by online teaching methods. It can be identified as a simulation of reality by creating an imaginary environment that simulates the real educational environment so as to allow interaction between the teacher and the learner (Aichner and Jacob, 2015). It is a technology that enables the learner to enter an artificial electronic environment that simulates the real world, so that the learner integrates into this virtual world through dimensional displays, and interacts with its components as if they were real (Julie, 2011, Mills et al., 2009). Further, challenges are defined as developments, variables, problems, difficulties, or obstacles stemming from the local, regional or international environment. In response to the reasons for development and change, there has been a growing interest in employing virtual learning environments, which are a natural and logical extension of technological progress in the field of E-learning technology. The environment had a significant impact in encouraging many societies and educational institutions to overcome the problems of educational reality and rely on them as a source that has the ability to give the user a feeling that he is inside a real environment (Messinger et al., 2008, LimandLim, 2020). The use of simulation leads to quality in learning results due to the diversity in assessment methods and the use of their results as feedback. This means that the process of education in virtual worlds requires resources, capabilities, and occupancy of specific sites; hence the term simulation in a virtual world environment is an attempt to reproduce a process that is somewhat similar to natural conditions (Datta et al., 2012). From this point of view, most of the course ideas can be covered with virtual experiences, which is difficult to achieve in reality. Also, virtual worlds technologies contribute to raising the level of learning and developing thinking among students and is used in teaching a large group of learners through websites, and the educational process is no longer limited to the transfer of information and knowledge as in the past, but rather consists in changing the role of the teacher, but with the addition of renewable technologies (David et al., 2020).

In view of the rapid changes in the field of technology, the accompanying increase in the number of students in the various stages of pre-university education and the pursuit of equal educational opportunities. There is a need to adopt and use technological innovations and advanced educational alternative methods to achieve and facilitate the desired learning processes inside and outside the scope of traditional education. It is characterized by its ability to adapt to global changes and bring about the required changes in the behavior of learners and provide

support and assistance to the difficulties facing the teacher and the learner based on the nature of the characteristics and the surrounding circumstances (Elessawi and Fawzy, 2018). Therefore, the stage requires consideration of the challenges in the environment of virtual worlds within schools. In the same context as the development of E-learning environments and systems, the use of virtual worlds to communicate with others emerged, and as a result of these changes, some interested and specialists began to think about the possibility of employing virtual worlds environments in E-learning and training teachers to reach learners outside traditional classrooms, where these environments serve to communicate between people in different areas. The use of modern technologies has proven in the education sector that it provides an effective tool for promoting and developing learning (Baragash and Alsamarraie, 2019). Many challenges of the virtual worlds exist because the teacher is the outlet and the cornerstone for this type of education, so efforts come and exploit the potential such as modern study plans, educational electronic platforms and supportive virtual applications, to employ them and create a creative learning environment (Gray, 2019). Therefore, many studies recommend the importance of using the virtual world environment for the development of many aspects of learning (Liarokapis and Anderson, 2014, Ehsanpur and Razavi, 2020 Aichner and Jacob, 2015). The current study aimed to recognize the technical, physical, financial and administrative challenges to know challenges of using the virtual world's environment. Then, shedding light on the possibilities and the extent to which they can be applied in the environment of virtual worlds.

2 Materials and Methods

This section deals with the study population and its sample, and the tool used to collect data in the study were defined. Also, the method used for calculating the reliability and validity coefficients of the study tool, in addition to the statistical methods used in the data were summarized

2.1 Study Type and Approach:

The current study belongs to the type of survey with a descriptive purpose. Starting from the field of this study and the nature of the questions and objectives that the study seeks to achieve, the researcher relies in his study on the descriptive approach, which is defined as a set of research procedures carried out by the researcher in an integrated manner to describe the researched phenomenon based on the collection of facts and data and their classification, treatment and analysis accurately to derive its significance (Obeidat and others, 2011).

2.2 Study Questions:

It is divided into the following sub-questions, what are the physical challenges, what are the skill challenges facing the teacher, what are the financial and administrative challenges and what are the possibilities for applying virtual worlds technologies?

2.3 The Study Sample:

The study sample is a subset of the study population that is selected in an appropriate manner for conducting the study (Obeidat and others, 2011). A random sample consisting of 420 teachers of the first stage at Secondary School for Boys in Jeddah was collected. Based on the nature of the data, and the method used in the study, the researcher found that the most appropriate tool to achieve the objectives of this study is to form a questionnaire with questions related to the study's area. Thus, the researcher designed the initial questionnaire and distributed it to the teacher sample to know the data that it seeks. This tool is to be collected, through an electronic questionnaire distributed through the electronic link so that teachers of secondary schools for boys in Jeddah can answer it quickly.

2.4 Validity and Reliability of the Study Tool:

The honesty of the tool means "the inclusion of the questionnaire for all the elements that must be included in the analysis on the one hand, and the clarity of its paragraphs and vocabulary so that it is understandable to everyone (Janelle et al., 2003, Obaidat et al., 2011). The description of the study tool includes the apparent validity of the tool and the stability and validity of the internal consistency of the tool.

2.5 Study Variables and Application Procedures:

There were two variables, the dependent variable which is the use of virtual worlds environments and the independent variable which is the challenges. The prepared questionnaire was sent to teachers of secondary schools for boys in Jeddah, and this was done during the current academic year 2021, where the researcher converted the questionnaire to electronic in order to collect the largest possible amount of the study sample. After that, the data was entered and processed statistically by the computer using the SPSS program, and then the researcher analyzed the data and extracted the results.

2.6 Statistical Processing Methods:

To achieve the objectives of the study and analyze the collected data, many appropriate statistical methods were used using the Statistical Package for Social Sciences (SPSS), after the data was encoded and entered into the computer.

3 Results

The selected study sample consisted of 420 teachers of the first stage at the Secondary School for Boys in Jeddah. The characteristics of the study members were summarized in Table 1 which showed the distribution of study members according to the degree variable. The distribution of study members according to the number of years of experience was represented in Table 2. To ensure the validity of the internal consistency, the correlation coefficient (Pearson) was calculated between the degrees of each of the questionnaire phrases with the total score of the axis to which the phrase belongs (Table 3).

Table 1: The characteristics of the study members

Educational level	Frequency	Ratio (100%)
Diploma	26	2.6
Bachelor	311	0.74
Master	66	7.15
Ph.D	17	0.4
Total	420	100

Table 2: The distribution of study members according to the years of experience

Years of service	Frequency	Ratio (100%)
Less than 5	43	2.10
From 5 years to less than 10 years	175	7.41
From 10 years and over	202	1.48
Total	420	100

Table 3: Pearson correlation coefficients for the axes expressions for the study tool

Phrase number	Parameter link	Phrase number	Parameter link	Phrase number	Parameter link	Phrase number	Parameter link
Physical challenges in the use of virtual worlds technologies		The skill challenges facing the teacher in applying the techniques of virtual worlds		Financial and administrative challenges in the application of virtual worlds technologies		The possibilities of applying virtual worlds technologies	
1	852.0	1	784.0	1	879.0	1	855.0
2	591.0	2	593.0	2	575.0	2	701.0
3	621.0	3	616.0	3	607.0	3	729.0
4	609.0	4	563.0	4	723.0	4	690.0
5	501.0	5	557.0	5	661.0	5	751.0
6	517.0	6	575.0	6	888.0	6	847.0
7	848.0	7	830.0				

The frequencies and percentages were calculated to identify the personal and functional characteristics of the study sample members and to determine their responses to the key phrases included in the study tool, and then the statistical measures were calculated. The mean is to find out the extent of the high or low responses of the study members to the study questions, knowing that it is useful in arranging the study phrases according to the highest weighted average. The Person Correlation coefficient was used to find out the degree of correlation between each question of the study and its items. Cronbacha Alpha coefficient was used to test the stability of the study tool. The responses of the study sample to the questionnaire were by answering the questions, then calculating the averages, standard deviations and ranks of the responses of the sample members to the questionnaire questions.

The first question was about physical challenges in using virtual world technologies (Table 4), it is clear that the study members agree on the physical challenges in using virtual worlds techniques (mean 4.30 ± 0.70). There is homogeneity in the approval of the study members where the averages ranged from 4.43 to 4.13. The opinions of the study members about the challenges in using the virtual world's techniques are summarized according to their averages. The lack of equipment needed in classrooms was ranked first among the paragraphs, then the lack of devices

specific to virtual worlds technologies ranked second. One of the reasons for not using the virtual world's technology is the lack of hardware for virtual world technology. The absence of operational requirements for software ranked third among the paragraphs with a mean of 4.32 ± 0.83 . The lack of wireless technologies for communication ranked fourth among the paragraphs with a mean of 4.28 ± 0.82 . Weak Internet infrastructure that hinders the use of virtual and augmented reality technology ranked fifth among the paragraphs with a mean of 4.26 ± 0.96 . The result explains one of the reasons why virtual and augmented reality technology is not used in secondary schools is the poor Internet infrastructure. The inflexibility of some devices used in virtual world technology ranked sixth among the paragraphs with a mean of 4.17 ± 0.88 . Difficulties to obtain GPS signals in the classroom ranked seventh among the paragraphs with a mean of 4.13 ± 0.88 .

Table 4: The responses of the study members to the first axis phrases arranged in descending order according to the averages

No.	Factors	Mean	SD	Serial	Degree
1	Failure to provide operational requirements for software and physical augmented reality technology	32.4	83.0	3	Strongly Agree
2	The inflexibility of some devices used in the virtual world technology	4.17	88.0	6	Agree
3	Lack of equipment needed to use augmented reality technology in classrooms	43.4	76.0	1	Strongly Agree
4	Unavailability of VR devices, Smart devices, vertical display glasses	39.4	84.0	2	Strongly Agree
5	The weakness of the Internet infrastructure hinders the use of virtual and augmented reality technology	26.4	96.0	5	Strongly Agree
6	Sometimes GPS signals cannot be obtained in the classroom	13.4	83.0	7	Agree
7	Unavailability of wireless technologies for communication (the main factor in simu	28.4	88.0	4	Strongly Agree
Mean \pm SD (4.3 ± 0.7)					

The results of the second question are about skill challenges facing the teacher in applying the techniques of virtual worlds. To identify the skill challenges facing the teacher in applying virtual techniques, percentages, mean and ranks were calculated (Table 5). The study members agree on the skill challenges in using virtual techniques with a mean of 4.26 ± 0.62 and through the results, it is clear that there is homogeneity in the approval of the study members where the averages of their approval of the trends ranged between 4.38 to 3.94 which located in the fifth and fourth categories of the five-scale categories and it is clear that the opinions of the study members about the skill challenges facing the teacher in applying the techniques of virtual worlds. The weakness of teacher workshops on the use of augmented reality technology ranked first among the paragraphs related to the axis of skill challenges facing the teacher with an average of 4.38 ± 0.73 , and the most important challenge facing the teacher is the weakness of providing workshops. The lack of professional teachers in designing content for virtual world technologies ranked second among the paragraphs with a mean of 4.31 ± 0.80 . The lack of specialized training courses in the application of virtual techniques ranked third among the paragraphs with a mean of 4.30 ± 0.77 and the result explains that one of the challenges that teachers face in applying virtual worlds technologies is the lack of specialized training courses. The lack of the working mechanisms of the

virtual world's technologies ranked fourth among the paragraphs with a mean of 4.21 ± 0.85 . This explains the teacher's lack of the working mechanisms of the virtual world's technologies. The need for virtual worlds programs for specialized technical skills ranked fifth among the paragraphs with a mean of 4.14 ± 0.81 . The teacher's lack of the skills necessary to operate and employ virtual world technologies ranked sixth among the paragraphs with a mean of 4.00 ± 0.97 which explained the teacher's lack of skills to operate virtual world technologies. The teacher's weak awareness of the importance of simulation of virtual worlds ranked seventh among the paragraphs with a mean of 3.94 ± 1.02 which explained the weak awareness of teachers of the importance of simulation and virtual world technology.

Table 5: The responses of the study members to the phrases of the second axis, arranged in descending order according to the averages

No.	Factors	Mean	SD	Serial	Degree
1	Weakness in providing workshops for the teacher on the use of augmented reality technology	38.4	73.0	1	Strongly Agree
2	The teacher's lack of the working mechanisms of virtual worlds techniques	21.4	85.0	4	Strongly Agree
3	Lack of specialized training courses in the application of virtual and augmented reality techniques	30.4	77.0	3	Strongly Agree
4	Lack of professional teachers in designing content for virtual worlds technologies	31.4	80.0	2	Strongly Agree
5	Poor teacher awareness of the importance of simulation and virtual worlds techniques	94.3	02.1	7	Agree
6	The teacher's lack of skills to operate and employ virtual worlds technologies	00.4	97.0	6	Agree
7	Virtual worlds programs need specialized technical skills	14.4	81.0	5	Agree
Mean \pm SD (4.26 \pm 0.62)					

The results of the third question, financial and administrative challenges in the application of virtual world technology were recorded in Table 6 whereas the study members agree on the financial and administrative challenges in applying virtual worlds techniques with a mean of 4.26 ± 0.77 , located in the fifth category, indicating the dispersion of the answers to the study vocabulary. Also, there is homogeneity in the approval of the study members where the averages ranged between 4.31-4.04 which is located in the fifth and fourth categories. Lack of financial allocations ranked first among the paragraphs related to the axis of financial and administrative challenges with a mean of 4.31 ± 0.81 , and the result is explained the most important challenge facing the application of virtual worlds technologies is the lack of financial support. The high cost of modern devices (computers, smart devices) ranked second among the paragraphs related to the axis of financial and administrative challenges (strongly agree) with a mean of 4.30 ± 0.86 which explains that one of the challenges facing the implementation of the virtual world's technologies is the high cost of modern devices. The relatively high financial cost of projects using virtual and augmented reality patterns ranked third among the paragraphs related to the axis of financial and administrative challenges with a mean of 4.25 ± 0.80 . The high costs of technical support for the software and physical components of virtual and augmented reality ranked fourth (mean 4.22 ± 0.85). The high cost of virtual worlds devices and tools ranked fifth among the paragraphs

(mean 4.21 ± 0.89). This result explains that one of the challenges facing the implementation of virtual world technologies is the high cost of virtual world devices. The high costs of connecting to the Internet ranked sixth among the paragraphs (mean 4.04 ± 0.99), and the result is explained one of the challenges facing the implementation of virtual worlds technologies is the high costs of connecting to the Internet. The results of the fourth question are the possibilities of applying virtual world technologies (Table 7). The study members agree on the financial and administrative challenges in applying virtual worlds techniques with a mean of 3.47 ± 1.12 which is located in the fourth category of the five-grader categories and there is homogeneity in the approval of the study members. The adoption of virtual and augmented reality technology by decision-makers ranked first among the paragraphs related to the axis of the possibilities of applying virtual worlds (mean 3.73 ± 1.30). The most important possibility of applying virtual worlds is the adoption of virtual and augmented reality technology by decision-makers. The high cost of modern devices ranked second related to the possibilities of applying virtual worlds techniques (mean 3.30 ± 1.34).

Table 6: The study members to the third axis phrases, arranged in descending order according to the approval averages

No.	Factors	Mean	SD	Serial	Degree
1	The high cost of modern devices (computers, smart devices, AR glasses)	30.4	86.0	2	Strongly Agree
2	Unavailability of funds	31.4	81.0	1	Strongly Agree
3	High internet connection costs	04.4	99.0	6	Agree
4	The relatively high financial cost of projects using virtual and augmented reality patterns	25.4	80.0	3	Strongly Agree
5	High technical support costs for hardware and software components of virtual and augmented reality	22.4	85.0	4	Strongly Agree
6	The high cost of virtual worlds hardware and tools	21.4	89.0	5	Strongly Agree
Mean \pm SD (4.26 ± 0.77)					

The result showed that it may be possible to implement virtual worlds with the availability of modern applications and devices. The presence of a strong infrastructure ranked third among the paragraphs related to the axis of the possibilities of applying the virtual world's techniques (mean 3.21 ± 1.33). The result explains virtual world's implementation must have a strong infrastructure. The availability of human cadres specialized in the field of virtual world technologies ranked fourth among the paragraphs (mean 3.20 ± 1.35). It was possible to apply virtual worlds to the availability of human cadres specialized in the field of virtual world technologies. The availability of specialized courses in the field of virtual worlds technologies ranked fifth among the paragraphs (mean 3.11 ± 1.40), and the result explained that it may be possible for the application of virtual worlds to provide specialized courses in the field of virtual worlds technologies. The high costs of connecting to the Internet ranked sixth among the paragraphs related to the axis of the possibilities of applying virtual worlds techniques (mean 3.10 ± 1.40), and the result explains that it may be one of the possibilities of implementing virtual worlds is the high costs of internet connection.

Table 7: The responses of the study members to the fourth axis phrases, arranged in descending order according to the approval averages

No.	Factors	Mean	SD	Serial	Degree
1	Having a strong infrastructure	21.3	33.1	3	neutral
2	Provides human cadres specialized in the field of virtual worlds technologies	20.3	35.1	4	neutral
3	Provides specialized courses in the field of virtual worlds technologies	11.3	37.1	5	neutral
4	Availability of modern applications and devices	30.3	34.1	2	neutral
5	Availability of sufficient budget to support virtual worlds environment technology	10.3	40.1	6	neutral
6	Adoption of virtual and augmented reality technology by decision makers	73.3	30.1	1	Agree
		Mean \pm SD (47.3 \pm 12.1)			

4 Discussion

Virtual learning environments is an interactive system for distance learning that is provided to the learner according to demand and depends on an integrated electronic digital environment aimed at building courses and delivering them through electronic networks, guidance and direction, organizing exams, managing resources and processes and evaluating them (Janeh et al., 2017, Marzouk, 2020). Shonfeld and Resta, (2019) indicated that the virtual world's environments enable learners to study subjects, interact and help the learner to achieve the desired level of skill with high accuracy. Since the research aims to reach the challenges in the use of virtual worlds, the researcher dealt with five main axes as follows: e-learning and its applications, the concept of virtual worlds and its emergence, the difference between virtual reality technology, augmented reality and mixed reality, the importance of using virtual worlds in education, learning theories related to education. Also, this study was carried out to identify the challenges in using the environment of virtual worlds in the Kingdom of Saudi Arabia from the point of view of teachers of secondary schools in Jeddah.

It contributes to identifying the challenges and the possibility of employing technical skills in the educational process. The results of the study contribute to identifying the obstacles that teachers face in using virtual worlds (Charles, 2015, Wang, 2016). It provides researchers and interested parties with the opportunity to learn about teachers' perspectives on the challenges of using the virtual world in the Kingdom of Saudi Arabia. The difficulties can be compensated by relying on virtual worlds technologies by providing appropriate tools that are used in technology in many fields, especially in education (Mountain, 2007, Abilleira et al., 2021). The teachers indicated the lack of instructions in the use of distance education technology by their institutions, during the Covid 19 pandemic and the personal feeling of technical inefficiency, hence the need to train on the employment and benefit of technology in solving the various problems facing the education process of teachers. Several studies also recommended the importance of paying attention to teacher preparation programs to raise the performance level and evaluation of teacher preparation programs (Cahill, 2009, Johnson, 2011, Chien et al., 2013, Kasnawi, 2020). They reported the

necessity of training teachers in the technical skills necessary to use augmented reality technology and urged them to design and publish electronic content. Connell et al. (2016) pointed out that one of the most important challenges facing teachers is the rapid development of virtual worlds technologies and models, and this is what makes keeping pace with developments in the virtual worlds environment not easy.

The recommendations of ICSLT (2019) stated the need to employ virtual learning environments in the field of teaching while Abilleira et al. (2021) indicated that the teachers who suffered from the negative effects of technology were the old teachers who had many years of teaching experience. Badilla et al. (2017) indicate that it has several characteristics, sharing experiences and sharing learning which allows learners to share the same file or document at the same time.

Many studies focused on the application of virtual reality and augmented reality techniques in the educational process (Harasim, 2017, James, 2017, Garcia et al., 2022). Those studies confirmed the effectiveness of virtual world technologies in education and there are many benefits of using virtual worlds in developing teacher performance in the educational process. It focuses on the learner's positivity in the educational process by defining clear, achievable goals in light of the learners' abilities and skills, with immediate feedback on the learner's progress towards achieving the goal (Bower, 2001, Christopher et al., 2004, Bruner, 2017). It was concluded that the technology of virtual worlds depends on the educational design where virtual and augmented reality when used in education includes the diversity of digital content, as well as the use of different sources to display content, the use of stereoscopic teachers, peer learning and social participation.

5 Conclusion

The study determined the possibility of employing virtual world environments in e-education and the possibility of employing technical skills in the educational process. Also, the results of the study contribute to identifying the obstacles that teachers face in using modern technologies and it provides researchers and interested agencies with the opportunity to learn about teachers' perspectives on the challenges in using the virtual world's environment in the Kingdom of Saudi Arabia.

6 Availability of Data and Material

Data can be made available through the corresponding author.

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