

The Role Of Virtual Reality Technologies In Enhancing Distance Learning In Light Of The Coronavirus Pandemic

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Abstract:

The increasing spread of the COVID-19 has severe effects on the educational process in various countries of the world, has expelled many students from their schools and universities. These conditions forced governments, states, and educational institutions to adopt measures and solutions to ensure the continuity of the educational process, including the use of remote education through digital platforms and virtual reality technologies, to stop the educational process completely in light of this global pandemic.

As this study aims to identify the role of virtual reality techniques in promoting distance learning of the COVID-19 pandemic, by relying on the descriptive approach to reach the results of this paper, we have concluded that virtual reality techniques in various means were the main goal of serving science, learners and teachers, it is considered a means that will transfer the educational environment to a new and advanced level, as it forms interactive simulations using the computer that sense the user with the place and the actions, these operations are supported by feedback from one or more senses that feel the user is integrated into the scene.

Keywords: Coronavirus, COVID-19, Virtual Reality, Virtual Reality technologies, Distance Learning.



الملخص:

كان للانتشار المتزايد لـ COVID 19 آثار خطيرة على العملية التعليمية في مختلف دول العالم ، فقد طرد العديد من الطلاب من مدارسهم وجامعاتهم. أجبرت هذه الظروف الحكومات والدول والمؤسسات التعليمية على تبني إجراءات وحلول لضمان استمرارية العملية التعليمية ، بما في ذلك استخدام التعليم عن بعد عبر المنصات الرقمية وتقنيات الواقع الافتراضي ، لإيقاف العملية التعليمية تمامًا في ظل هذا الوباء العالمي.

حيث تهدف هذه الدراسة إلى تحديد دور تقنيات الواقع الافتراضي في تعزيز التعلم عن بعد لوباء -COVID 19 ، من خلال الاعتماد على النهج الوصفي للوصول إلى نتائج هذه الورقة ، فقد خلصنا إلى أن تقنيات الواقع الافتراضي بوسائل مختلفة كانت الأساس. هدف خدمة العلم والمتعلمين والمعلمين ، فهو يعتبر وسيلة تنقل البيئة التعليمية إلى مستوى جديد ومتقدم ، حيث تشكل محاكاة تفاعلية باستخدام الكمبيوتر الذي يشعر المستخدم بالمكان والإجراءات ، وهذه العمليات مدعومة من خلال ردود الفعل من واحد أو أكثر من الحواس التي تشعر أن المستخدم مندمج في المشهد.

الكلمات المفتاحية : COVID-19 ، Coronavirus ، الواقع الافتراضي، تقنيات الواقع الافتراضي، التعلم عن بعد.



Introduction:

In 2019, the Coronavirus (COVID-19) appeared in Wuhan, China. This virus represents a new strain that was not previously identified in humans, COVID-19 is a large family of viruses known to cause illnesses ranging from colds to more severe diseases, such as the Middle East Respiratory Syndrome and Severe Acute Respiratory Syndrome (SARS). The COVID-19 has left its mark on all aspects of life, as there are entire countries paralyzed, borders closed, global economies slowed down, destroyed, and schools have closed (Hollander, J. E., & Carr, B. G., 2020).

The COVID-19 threatens the progress made in the field of education around the world through two major shocks, namely the near-global closure of schools at all levels, and the economic recession resulting from measures to combat the pandemic (Fauci, A. S., Lane, H. C., & Redfield, R. R., 2020).

The global panic over the spread of the COVID-19 has led the governments of different countries to take plans to limit the spread of this epidemic. Among these plans are the suspension of universities and schools, and the use of e-learning and (remote) education plans during the ban period (Rubin, E. J, 2020).

Unless great efforts are made to counter these effects, the shock of school closures will cause learning losses, increase dropout rates, increase inequality, and the economic shock will exacerbate the damage, by reducing the supply and demand sides of education, given the damage to households (Rubin, E. J, 2020).

The need for remote learning tools has become urgent in light of the measures taken by schools around the world to confront Coronavirus (Covid-19) to facilitate the transition to a distance learning experience, by developing resources, training activities and educational guides that help schools, teachers, students and their families benefit from the distance learning experience (Setiawan, A. R., 2020).

Distance learning is done by transferring learning to the learner at his place of residence or work instead of the learner moving to the educational institution itself, on this basis the learner is able to combine learning with work if he wants to do so, and to adapt the curriculum and the speed of progress in the academic subject in accordance with conditions and circumstances, with the aim of delivering the educational material to the learner through various technical means or methods of communication, as the learner is far away and separate from the teacher (Simpson, O., 2018).

As distance learning includes all forms of study that teachers do not care about in the classroom, as it is supported and strengthened by supervisors and an institution far from the learners. It depends on employing educational technologies, whether in



preparing the educational system based on self-study, in preparing educational materials based on self-learning, in using modern technical means or methods, in evaluating educational curricula or evaluating learners' achievement (Perraton, H. D., 2000).

In principle, distance learning is based on not requiring the simultaneous existence of the learner with the teacher or the person in charge of the educational process in the same location, as the necessity arises for a mediator between them. Mediation needs technical, human and organizational aspects, in addition to that the learner is able to choose the learning time in proportion to his own circumstances, without being bound by regular and predetermined schedules to meet with the teacher (Traxler, J., 2018).

Distance learning, which is public learning, is based on a philosophy that affirms the right of individuals to access available educational opportunities, meaning providing learning and training opportunities to everyone who wants at the time and place who wants without being restricted to the usual methods and means used in the normal learning process (Traxler, J., 2018).

Distance learning requires the use of several technologies such as virtual reality techniques, so that virtual reality refers to a computer representation that creates a perception of the world that appears to our senses similar to the real world, through virtual reality the information and experiences can be transferred to the minds in a more interactive way (Harfouche, A. L., & Nakhle, F., 2020).

Virtual reality can be defined as a method consisting of interactive computer simulations that sense the user with the place and actions, and these processes are supported by feedback to one or more of the senses that feel the user is integrated into the scene, the virtual reality modeling language is the language through which 3D computer graphics are converted into virtual environments that can be viewed by multiple browsers (Burdea, G. C., & Coiffet, P., 2003).

Given the conditions in which we live now in light of the Covid-19 pandemic, we must adapt to it, especially in the field of education. Hence, the key objectives of this study to demonstrating the role of virtual reality technologies in enhancing distance learning in light of the Covid-19 pandemic.

Research Problem:

The countries of the world today at all levels are moving to develop and modernize their educational system, using the latest and technological innovations, in order to provide an effective type of education that all parties to the educational process respond to and participate in to increase its efficiency and effectiveness. Especially since the interdependence between education and information technology is one of the



most important issues raised in the twenty-first century (Abdelmalak, M., & Trespalacios, J., 2013).

The study problem also focuses because the Coronavirus (COVID-19) pandemic has caused the interruption of more than 1.6 billion children and youth from education in 161 countries, i.e. nearly 80% of students enrolled in school worldwide. This came at a time when we are already suffering from a global educational crisis, as there are many students in schools, but they do not receive the basic skills they need in working life. The World Bank's index of "learning poverty" appears - Or the percentage of students who cannot read or understand at the age of ten - that the percentage of these children in low and middle-income countries before the outbreak of the virus reached 53%. If we do not act, this pandemic may make that outcome worse (Jaime Saavedra, 2020).

Consequently, the delay in the start or interruption of the school year will lead to complete disruption in the lives of many students, their parents, and their teachers. There is a lot that can be done to reduce these impacts, at least, through distance learning strategies is one of the best solutions.

Research questions:

We seek through this study to answer the following main question

What is the role of virtual reality technologies in promoting distance learning in light of the Coronavirus pandemic?

Through the previous main question, several sub-questions emerged, the most important of which are:

- 1. What is virtual reality?
- 2. What is distance education?
- 3. What are the type of virtual reality?
- 4. What are the application of virtual reality?
- 5. What are the goals of distance learning?
- 6. What are the characteristics of distance learning?
- 7. What are the main factors for spread of distance learning?

Research aims and objectives:

Through this study, we seek to achieve a basic goal, which is to explain the role of virtual reality technologies in enhancing distance learning in light of the COVID-19 pandemic. Hence the sub ideas of the study, and the most important of them are:



- 1. Identify the virtual reality
- 2. Identify the distance education
- 3. Identify the type of virtual reality
- 4. Identify the application of virtual reality.
- 5. Identify the goals of distance learning.
- 6. Identify the characteristics of distance learning.
- 7. Identify the main factors for spread of distance learning.

Research significant:

This study is particularly useful in the field of optimal investment of information technology in the educational process, as the distance education represent one of the most important alternatives that the educational system can rely on to develop its components through the development of its quantitative and qualitative processes and outputs, through the use of virtual reality technologies, a clear change will be made in the concept of the educational process to achieve better performance and an effective contribution to solving problems effectively and in depth.

Research methodology:

The accuracy in scientific research requires the researcher to provide an accurate description of the procedures in a study of the phenomenon, and the method is considered the basis in designing research because it contains steps for defining concepts, explaining procedural meanings, and how to apply the study within a series of systematic and sequential steps.

The study of the strategy of virtual reality techniques in distance learning requires the use of sample surveys, as the descriptive approach will be relied upon to obtain the required results.

As the descriptive approach is considered a way to study scientific phenomena or problems by doing the description in a scientific way, then access to logical explanations that have clues and proofs that give the researcher the ability to set specific frameworks for the problem, and this is used in determining the results of the research as it was done by relying on books, research studies, master's and doctoral theses, journals, and websites. etc.



Distance learning:



Figure 1: Distance learning

The term of distance learning has generally achieved wide popularity, especially since the late 1960s of the twentieth century when UNESCO began to pay attention to adopting new formulas in the field of adult education and continuing education. Distance learning has many names, so we find that it has many names. Sometimes it is said Learning Distance, at other times Teaching Distance, and at other times, distance education (Tony, 2005).

There are also many viewpoints of specialists in their definition of the concept of distance learning, distance education, or distance teaching, as there is agreement that the previous terminology performs the purpose in relation to that there is a distance between the teacher and the learner, so the term Education Distance is used to express the teaching and learning process that includes Transfer and acquire knowledge and skills across multiple media (Perraton, H. D., 2000).

The spread of distance learning is due to three main factors (Tony Kaye, Greville Rumble, 2004):

1- increasing in demand for this type of education.

2- The need to reduce the economic costs of education, as it does not require a large number of employees and requires less educational equipment than traditional education.

3- The conquest of modern communication and media technology in all areas of life, including education, through which many social strata could be reached and could not study in the traditional pattern.

Distance education goals:

There are many goals for distance education that can be summarized as follows (O'Neil, H. F., 2005):



- 1- Providing educational services to those who have missed educational opportunities; this is because distance education restores hope to many who wish to be educated due to its flexibility and educational systems that allow them to learn in addition to carrying out the professions and jobs they practice.
- 2- Providing educational cultural programs; Distance education is provided to large segments of society, and continuous education or lifelong education, through various technical means such as television, the Internet, radio and others.
- 3- Education of women; it is clear that some developing countries do not encourage women's education a lot, as distance education removes obstacles to leaving the home and becomes the best way to remove these obstacles.
- 4- Contribute to literacy and adult education; Many of the illiterate and the elderly are unable to enroll in school despite their desire to do so due to geographic, social, economic and other obstacles, the distance education offers them the best solution to eliminate these difficulties.
- 5- More knowledge and technology developments; The past century has witnessed, but this century will witness more cognitive developments, scientific and technological advances, it has become difficult to track these developments with traditional methods of education that depend on memorizing facts and memorizing them when examining.
- 6- Taking into account learners' educational conditions; Distance education is a public education in view of the great potential it provides to take into account learners' conditions.

It is clear to us from the above that distance education provides an opportunity for everyone to provide knowledge, whatever their circumstances, as if its motto, in short, is "Education is open to all."

Characteristics of distance education:

Distance education has several characteristics that help many institutions to employ it appropriately and according to the needs of the institution, with the possibility of modification in some of its components to suit the nature of the institution's work. Among the most important advantages of distance education are (Melton, R. F., 2004):

1- Flexibility; It gives the student the option to participate as desired.

2- Effectiveness and effectiveness; Research conducted on the distance learning system has shown that it equals or exceeds the impact and effectiveness of the traditional education system when these technologies are used efficiently.

3- low costs; Many forms of distance learning do not cost a lot of money.



4- Overcoming barriers; Distance education is not linked to a specific place and time.

Virtual reality technologies:

Online education, especially interactive educational programs, has achieved good results at the global level, its positive impact has been shown in strengthening the educational system and raising its efficiency, achieving the principle of continuous education and easily accessing sources of knowledge. Therefore, virtual reality learning has become an urgent necessity in the Arab world, with the increase in students seeking to obtain university degrees, the great shortage of holders of higher degrees, and the limited support provided to education.

Virtual reality education is a type of electronic learning that allows the learner to benefit from all elements of the educational process, including educational material, books, student services, and interaction with the teacher, in addition to what is provided by information networks on the Internet, where the learner can access the required information with little effort and a short time (Burdea, G., & Coiffet, P., 2006).

Virtual education is similar to traditional education, except that it uses electronic media to provide educational material (Sound and image) to the learner through virtual classes via the Internet. Virtual reality in education is real education in an interactive electronic environment (through specific software), it is a type of electronic learning via the Internet in which multimedia techniques were adopted that enabled the learner and the teacher to deal with scientific material in interactive forms (Boas, Y. A. G. V, 2013).

The use of virtual reality techniques makes the learner interact with the educational material, with his colleagues and the teacher in an interactive way that contributes to the acquisition of basic skills in any field of knowledge as if were in the traditional classroom., multimedia also allows the possibility of dealing with specialized software that helps the learner to understand the vocabulary of the educational material easily through explanatory films and various application cases (Kim, 2011).

Types of virtual reality

There are three types of virtual reality (or three type that a virtual reality system can create):

1- Virtual reality that requires full presence

The user is deluded that is really present in the environment of the virtual world without feeling sensitive to the existence of the system or the computer or even the real world around him, the user in this case only sees the virtual world in which



watches, moves and the overall sense of movements, that is, during illustrative films and different practical cases (Seo, J., & Kim, G. J., 2002).

The user feels that is part of the virtual environment that is trying, this is done through the most sophisticated devices through the use of a comprehensive and advanced system, a three-dimensional sound system, and advanced sensors.

2- Virtual reality limited in function and location

This system is used in simulation devices, in this case the user simulates certain characteristics within real reality, such as the effect of gravity, or the effect of high speed on some objects (Schuemie, et al, 2001).

3- Terminal virtual reality

In this case, regular screens are used to see the virtual world, which limits the feeling of a physical presence in the virtual world (Schuemie, et al, 2001).

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Virtual reality applications

By using virtual reality, humans have the ability to experience things that were remote, or of high costs, so astronauts can train on their space flights under conditions that are close to the truth by using the system, it also enables them to create multiple scenarios for what they might encounter on those trips. This is in addition to the multiple applications of virtual reality science in various fields, we mention the following (Sherman, et al, 2002):

- Training.
- Distance education and learning.
- Military matters.
- Engineering and construction.
- Urban and regional planning and urban design.
- Architectural Design.
- Medicine
- Trade, sales and marketing.
- Scientific display of information.
- Entertainment.
- Virtual interactive participation.



Conclusion:

Coronavirus disease (COVID-19) has spread rapidly all over the world; which caused billions of people to be confined in their homes, especially after what the World Health Organization announced that the Corona virus had risen to the level of a pandemic. The growing panic and anxiety about the pandemic affected all sectors, including education, which led governments of different countries to take plans to limit the spread of this epidemic. Among these plans are the suspension of universities and schools, the use of e-learning and (remote) education plans during the ban period.

Distance education is one of the most important modern educational tools, as classroom lessons and methodological information are transferred via technology means from the educational institution to the students. In light of the current circumstances of the spread of the COVID-19 virus, which has swept the whole world, the process of distance education has been activated in many countries and students have stopped attending schools as a precaution to achieve social distancing to prevent the spread of the virus. But there are challenges that face them to activate the educational process in a way that suits their circumstances.

Virtual reality technologies can also be used in distance learning, as it helps the learner to obtain data, information, communication, and training through the Internet in the form of audio, image, video, or electronic books. As education has become in the present day dependent on electronic means such as the use of computers and Internet networks, in addition to the traditional method.

Thus, it helps the decision-makers in the countries to provide educational opportunities by making use of modern technologies to provide specialized education of high quality at reasonable cost and available to all, by adopting this type of education after setting controls and conditions enabling the relevant authorities to ensure the quality of education and its outputs and link it with the needs of the local and regional community.

Recommendations:

The study reached many recommendations that must be paid attention to, the most prominent of which are:

- 1- Adopting distance learning programs and ensuring their implementation mechanisms, to reduce the risks that students are exposed to.
- 2- The necessity of using games and animation during distance learning to raise their response to this type of education and eliminate students' feeling of boredom and strengthen the relationship between them, it also enhances the scientific knowledge growth of learners.



- 3- Providing budgets and continuous training programs for educational communities to build effective ecosystems to support and continuously improve educational institutions.
- 4- Guiding learners to keep them on track, engaged and informed, especially in dealing with students who are learning.
- 5- Teachers invest their experiences in meeting the needs of learners with high motivation, because self-orientation plays the most important role in the educational style, where follow-up tools and external guidance are weak. As well as providing learners with rapid and continuous feedback and encouraging discussion among them.

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