# Role of Virtual Reality Technologies in Iraqi Educational Spaces

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Abstract: The world seen rapid developments in the field of information technology within all life fields, particularly the educational field. Usually, we find the traditional educational methods lack a sense of realism and interaction. Solving this problem is by utilizing virtual reality technology to make actual practice present in the classroom. As an interactive technology, it provides students with an accessible, reliable environment that was previously unavailable and offered an opportunity for learning by practicing instead of teacher-centered learning and within a vision that does not look at the past but looks to the future. Virtual reality technology will change the nature of the relationship between the teacher and the student. Thus, the change will reach the nature of the educational spaces that contain this technology, which will significantly impact the design of school buildings and classes of the electronic future.

With this, the research problem identified as an existing weakness in the directed knowledge base at the extent of the impact of virtual reality technology on the architectural design of the Iraqi educational spaces specifically Accordingly, the research sought to achieve its objectives by exploring the importance of virtual reality technology in the educational field and the essential technological components necessary to create virtual data, clarifying the difference between traditional education and modern education (technology-based) and by defining the status of conventional education in Iraq and Problems related to the low quality of the existing school buildings, and designing a classroom model that achieves virtual reality systems and at the same time is used for traditional lessons

Building a theoretical framework to achieve these goals by extracting indicators that apply to the practical side is the plane to accomplish these goals. The framework includes attempts to prove the research hypothesis represented by the positive impact of virtual reality technology on the design of Iraqi educational spaces. Finally, the research results indicated that virtual reality technology has dramatically affected the future design of educational spaces. Adopting this technology in the educational process allowed students to develop their creativity, increase their motivation and gain real experience in a more interactive educational method

**Key words:** virtual reality, modern schools, educational spaces, digital technologies

## Introduction:

In recent years, our real worlds have undergone radical transformations due to the great success of intelligent technologies that have revolutionized all areas of life. As a result, the individual can live, travel, learn and study all through a virtual world. Today's virtual reality is one of the emerging technologies capable of changing every aspect of our life. Virtual reality technology can range from uncomplicated environments presented on a computer to multisensory environments full of experiences through hats, clothing, and particular technological devices.

## 1. Virtual reality

Virtual reality refers to a computer representation creating a perception of the world that appears to our senses in a way similar to the real world. Through virtual reality, information and experiences transfer to the minds more interactively. (Ibrahim, 2015).

It is a computerized simulation environment that allows a person to experience something that does not happen in front of him, but it is actually happening right in front of his eyes, which makes his mind feel and immerse in virtual reality anytime, anywhere. (Sharma, Shete, Dubey, and Shetty). The view might not be from real life, such as a moving scene or an actual location that has been photographed and embedded in a virtual reality application. (Altamimi, 2019)

Arabic and English terms for this concept were varied. For instance, we encounter titles such as "Enhanced Reality" , "High Fidelity Simulation" and "Artificial Reality" or "Virtual Environment" , “Synthetic reality”, And finally it was named “Cyberspace” (is an analogy controlled by more than one computer). (Ali, 2001).

**Consequently, virtual reality is the latest and most crucial computer technology. It is a clever attempt to merge imagination with reality and the convergence of technology with the true-to-life world by creating a three-dimensional environment, It makes the user immersed in interacting and then moving, not just external observation and viewing and all achieved using special electronic equipment**.

### 1-1 Virtual reality work

To make the human brain feel the virtual environment, we must provide some tools to make it look realistic and to feel actual and the sense of reality achieved by using these devices as follows:

First: There must be a source for displaying the virtual reality to the user using a personal computer to help witness an internal purpose and the control unit for the real-life experience, and a smartphone for an outdoor experience which acts as a powerful driver of producing content.

Second: There must be an interface between the human brain and the virtual world, which is realizing it by the head-up display screen. These are the devices that make our brains feel and sense a virtual reality.

And finally, the response needed when doing an action. the process is managed using any input devices such as a joystick, trackballs, data gloves, tracking platforms, and motion platforms. (Laister & Kober, 2002)

### 1 - 2 The virtual reality technology characteristics in the scientific fields:

A virtual world is the content of a specific medium that may exist in the real world or only exist in the imagination of a creator and can be designed to make others participate in it. Virtual reality has certain characteristics that distinguish it from other media and computer educational methods, as in the following table: (Ibrahim, 2015)

<table>
<tr><th>Specification</th><th colspan="2">Possible Values</th></tr>
<tr><td rowspan="5">Immersion</td><td colspan="2">Stereoscopic scenes</td></tr>
<tr><td colspan="2">Sense of space</td></tr>
<tr><td colspan="2">Isolation from the outside world</td></tr>
<tr><td colspan="2">Transformed senses</td></tr>
<tr><td colspan="2">Tele Presence</td></tr>
<tr><td rowspan="7">Simulation</td><td colspan="2">Reality Simulation</td></tr>
<tr><td rowspan="3">Simulating human behavior</td><td>Flight</td></tr>
<tr><td>Walk</td></tr>
<tr><td>Vision</td></tr>
<tr><td rowspan="2">Simulation of normal volumes</td><td>Beings</td></tr>
<tr><td>Things</td></tr>
<tr><td colspan="2">Simulation of direct Act</td></tr>
<tr><td rowspan="4">Interaction</td><td rowspan="4">Imaginary capabilities</td><td>Being in real places</td></tr>
<tr><td>Being in unreal places</td></tr>
<tr><td>Being with people</td></tr>
<tr><td>Being with living creatures</td></tr>
</table>

Table No. (1) shows the possible values of virtual reality properties (Safou, Munawna, and Al-Sheikh, 2014).

**1 - 3 Uses of virtual reality in the educational field**

Using virtual reality technology in the educational sphere has a effective impact. As virtual reality provides advanced technology contained in the means and methods that facilitate the educational process. Provides the learner with virtual learning environments that allow visualization and perception of complex scientific concepts. For example, observing the atom structure field, or the movement of the planets, and interact with environments that are challenging to visit and study in reality due to its danger, high costs, or spatial dimension. Or it does not give the learner the understanding required through studying it in the two-dimensional dimensions, especially the scientific materials making the educational process more enjoyable and enjoyable. Where students and learners can practice new skills in a repetitive environment that allows for non-dangerous correction and repetition. (Mathur & Shrivastava, 2020)

By using techniques such as Virtual Reality (VR), students can be more actively aware of their classmates and can communicate with them in real-time. They can also receive instant feedback from their teachers and gain a sense of being with their peers even though it may be their remote physical locations. These shared virtual environments also facilitate active participation in group discussions. (Montoya, Massey, & Lockwood,2011). Since virtual reality environments require dynamic interaction and participation, learners have shifted from passive recipient to active. (Lee, 2018) The main strength of this method is that it allows users to see this environment in 360 degrees and explore its three-dimensional elements in a way that will enable interaction with the scene, This is different from simply participating in displaying the information on a computer screen. Virtual reality technology is believed to have the potential to develop student-centered self-learning by exploring a world closer to realism and more interactive (Abraham, 2015) .Students of all ages usually retain between 10% and 30% of what they read and watch. This leads the traditional educational materials to fail to inspire and engage more students because it forces them into testing memory rather than retaining knowledge through practice and experience.

The important thing here is that VR and 3D graphics for e-learning have now expanded by providing complete VR environments where learning takes place. This highlights the shift in e-learning from the traditional text-based learning environment to a more comprehensive and intuitive one. Since the default is a computer simulation of a natural environment, interaction with a 3D model is more realistic than browsing two-dimensional web pages searching for information. These virtual reality environments can support multiple users, further reinforcing collaborative learning where students learn together and often from each other. (Monahan, McArdle, & Bertolotto 2008) Using immersive virtual reality environments will change dynamically depending on student input, which will keep the student active and engaged throughout the lesson or activity. Thus, some of the advantages and effects of the virtual reality technique are summarized as follows:

- Make new experiences possible.
- Increasing student motivation
- Inspiring creative learning and boosting students' self-confidence (Fernandez, 2016)
- Promotes motivation and learning (Dede, Jacobson, & Richards, 2017, pp. 1-15)
- Supports decision-making, supports perception (Mellet-d'Huart, 2009, pp. 185--224)
- Individuals with disabilities who do not have the opportunity to participate in experiences and learning environments may have access to learning experiences with virtual reality environments.
- With virtual reality applications, people who are far away and share common interests can join joint projects and gain different experiences. (Lee, 2018)

Figure No. (2) shows Kelsey Yearick Elementary School students during the field trip to a place where a small number of students go (the moon)
https://www.southplattesentinel.com/2017/04/05/virtual-reality-/field-trips-offer-new-way-to-explore

Figure No. (1) shows the students' exploration experience through virtual reality
/https://av-project.net

**4 - 1 The fundamental technological components of virtual reality systems in the educational field**

The main advantage of virtual reality systems are in patterns or species that are against the user (which constitute the shared surface between the user and the virtual world) (Rahim, 2015), can use a large variety of devices virtual reality to create a virtual environment with potential and different purposes. Depending on the budget, needs, and complexity required, a wide range of hardware and software is available to create virtual environments with different capabilities and purposes. The main technological components of VR systems are feedback displays and interactors. (Agil, Balbed, IbrahimM., & Yusof, 2008, pp101-106). To aid in the process of visualizing the virtual world, we will clarify the common types of systems that are used with virtual reality programs:

**4-1-1: Window on World Systems (wow):** A system in which a traditional computer screen is used to show the virtual world. This system depends on the personal computer. This idea traces back to the beginning of (computer graphics) emergence in 1965. The person should look at the display screen (as a window) to view the virtual world.

**4-1-2: Video Mapping**: In this system, the user's input image combines with the two-dimensional graphics. The user sees his body interacting with the virtual world on a computer screen or a unique display screen, and this is what we see in video games.

**4-1-3: Immersive Systems**: These systems consider the maximum extent of the complete integration of the user's personality within the hypothetical world. These integration systems often provide the person with a Head Mounted Display (HMD). Because this helmet or head mask contains the display screen and headphones. (Isdale, 1998)


Figure No. (3) shows different shapes for vertical screen systems (Rahim, 2015)

One of the beautiful capabilities in the combination systems is its ability to create an impression inside the person for an environment of colossal size within a small physical space called "Cave Automatic Virtual Environment." By using multiple projection screens located inside the helmet to create any space the user wants .There is a new type of automated virtual cave system, which is more complex as it consists of a small room in which the displays on all walls, floors, and ceilings -They are special electronic screens for display - which secures a complete separation from the surrounding environment (Isdale, 1998).

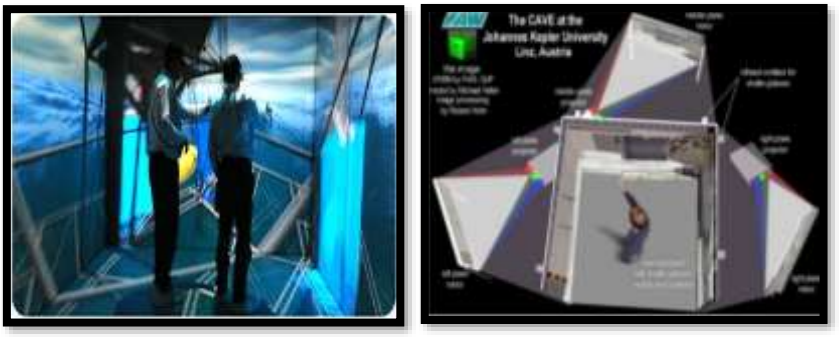


Figure No. (4) shows the combined system to Cave Automatic Virtual Environment
**http://couldthishappen.com/2012/03/forget-the-red-pill/**
**https://sites.google.com/site/vrlearrn/alajhzte-w-aladwat**

**4-1-4: TelePresence**: a type of (VR) system that differs from the fully computer-made imaginary worlds. This technology enables the user (at any location worldwide through any private network of communications) to participate in it. It carries out in another place through (remote control). This process led to expanding the awareness of the human sense, hence become influenced and affected by the environment of nonpresent by the physical concept. This technology uses in conducting surgical operations by remote control (Tele Robotics): it is a Robot being equipped with a system to perform a specific process in the body of any human being in any hospital connected to this network. NASA has also used TeleRobotics to conduct remote searches of space and planets. (Isdale, 1998).

Figure No. (5) shows (Tele Robotics) Used to conduct surgical and remote controlled operations
https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370(19)30137-3/fulltext

Other sceneries may include various tools and devices such as Hand Data Gloves that follow the hand and fingers movement, arms and wand which people used such a tool to manipulate objects in the virtual world. For example, they can count to perceive their illusory environment as an actual environment in which they move, carry and change the position of things..etc. Such gloves are equipped with sensors on the fingertips to distinguish the nature of materials and bodies, enabling the user to identify materials in terms of size, type, temperature ... etc. In addition to a device that tracks the movement and direction of the hand in general (Isdale, 1998). Moreover, a data suit is equipped with sensors on each position and curve in the person's body to transfer all the person's movements within this suit to the virtual reality program on the computer. (Bertol & Daniela, 1997) When this suit uses in conjunction with the rest of the virtual reality tools, the user feels immersed or integrated, and the body becomes capable of feeling, responding to materials, heat, the Environmental systems, movement and sound.(Emmett, 1998).

Figure No. (6) shows different models for gloves and a data suit (Rahim, 2015)

**Therefore, we conclude that these systems classify into immersion and non-immersion systems according to the degree of user interaction. For example, immersion systems: give the user a state of the briefing and a more realistic view by using devices such as Head Mounted Display (HMD) and Cave Automatic Virtual Environment. While, the non-immersion systems do not give a feeling of immersion but allow the user to overlook a virtual world through a conventional computer screen or Display Screen.**

**2. The difference between traditional education and modern education in Iraq**

| Comparison Topic | Traditional Education | Modern Education |
|---|---|---|
| **Classroom discussions** | Usually, the teacher writes more than talk and discussion | The teacher discusses more than writing. |
| **Subject and curriculum** | • The teacher conducts the lesson according to the current program of study and curriculum.<br>• The process of developing the curriculum is not available, as the book after its publication is difficult to collect and amend again. Also, this increases its cost.<br>• The educational materials are static , unchanged for many years.<br>• The scientific content presents through (the book, like texts, images that lack technical accuracy.)<br>• Technical means and methods are not used only at particular times. | • The student participates in determining the topic. The study relies on various sources of information.<br>• The curriculum can be developed quickly and is inexpensive when publishing on the web, and development can occur after publication.<br>• Ease of developing the educational materials provided electronically with all that is new<br>• It presents scientific content more excited and interactively (texts, fixed and moving images, video clips, graphics, charts, simulations and virtual reality, e-book, etc.)<br>• It is based on multi-media electronic presentations, discussion style, and web pages. |
| **Education process** | • The student learns “what” and not “how”; Student and teachers are busy to complete the required materials ; Students do not engage in inquiry-based learning and problem-solving but rather in the tasks that it sets out by the teacher.<br>• The student is a recipient who does not make an effort in research and investigation but instead relies on the method of presentation and lecture.<br>• The lesson presents for the whole classroom without taking into account the individual differences between the learners. | • The student learns "how" and less "what"; Learning includes a research study that combines the search for information. And collecting it from web data on the telecom network; Learning is better connected to the real world,The subject matter is more prosperous, and it includes the materials in various formats<br>• The activity and effectiveness of the learner in learning the scientific material lead to his dependence on self-learning.<br>• It takes into account the individual differences of the learners according to the needs of the learner |
| **Motivation** | Student motivation is low, and the topic is far away from them. | Student motivation is high due to participating in the things closest to them and using technology. |
| **The role of the teacher** | • The teacher is the controller and the main source of learning, the transmitter and instructor of information | • The teacher's roles are guidance, advice, help, and counseling. |

| | | |
|---|---|---|
| | • The student depends on the teacher, and he is not always available and can only interact within the classroom and break. | • According to student speed, they learn according to their abilities and interests, time, and the place that suits them, with the ability to communicate with the teacher and ask questions via e-mail, chat rooms, etc. |
| **Language** | The language used is the mother tongue language. | The students need to learn foreign languages. |

Table No. (2) shows the difference between traditional education in Iraq and modern education (technology-based education) (Ahmed A. Hashim and Nada K. Kareem, December 2012)

**3 - Problems of traditional education in Iraq**

For many years, the traditional teaching method is to stand and deliver the most prominent educational strategy in classrooms. It aims to provide students with a great deal of information for learners, preserving their attention and maximizing teacher control. Disadvantages of the traditional teaching method include : reduced feedback and engagement from students and lead students to be passive learners. The twenty-first century has brought about a set of learning strategies to improve students 'learning to become fully equipped with new skills that enable them to think for themselves, be self-contained, change and orient themselves.(Al-Juboury, 2012).

The main challenge is highlighted in the infrastructure field for the education sector is clearly in all school stages within public education.Including the lack of school buildings and the high rates of overcrowding in each semester and distribution of teachers inappropriately as well as the low qualitative side in their skills and qualification and school environment unsuitable shortage immense in The equipment and infrastructure for schools. In the primary stage as the diagram below shows there is deficit of (4329) buildings and duplexes in (4482) buildings and triple doubling in (752 buildings) In addition to the presence of (149) clay schools, (1536) unfit schools and (4717) buildings need to be renovated, On the other hand, the secondary education , there is a deficit of (3161) facilities in Iraq and there is a duplex in (1754) buildings and a triple duplex in (195) buildings. In addition, there are (283) unfit buildings and (1518) buildings in need of renovation.(The General Directorate of Educational Planning in the Ministry of Education).

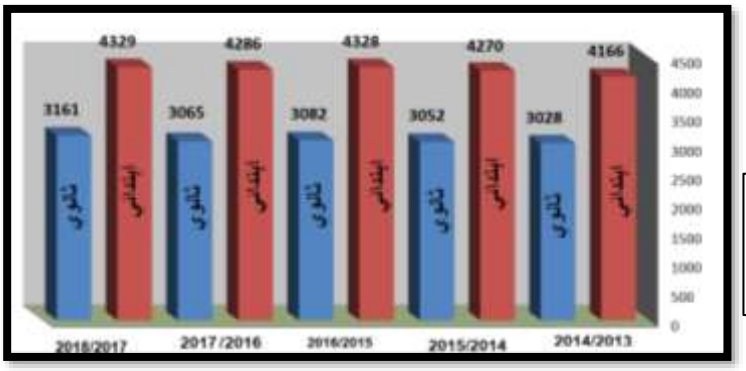



Diagram No. (1) shows the deficit in the number of local school buildings in Iraq (General Directorate of Educational Planning in the Ministry of Education)

The National Strategy for Education and Higher Education in Iraq 2011-2020 indicated that the enrollment rate in Kindergarten was 7%, and in the primary stage 91% , the intermediate stage is 36%. However, we find that these rates drop a lot in the preparatory stage to reach 18%, and the decline continues in higher education to reach 14% . (The National Strategy for Education and Higher Education in Iraq, 2012, Pages 25-26)

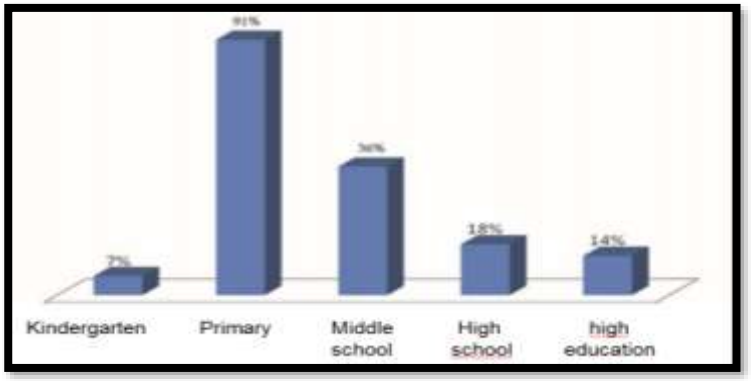
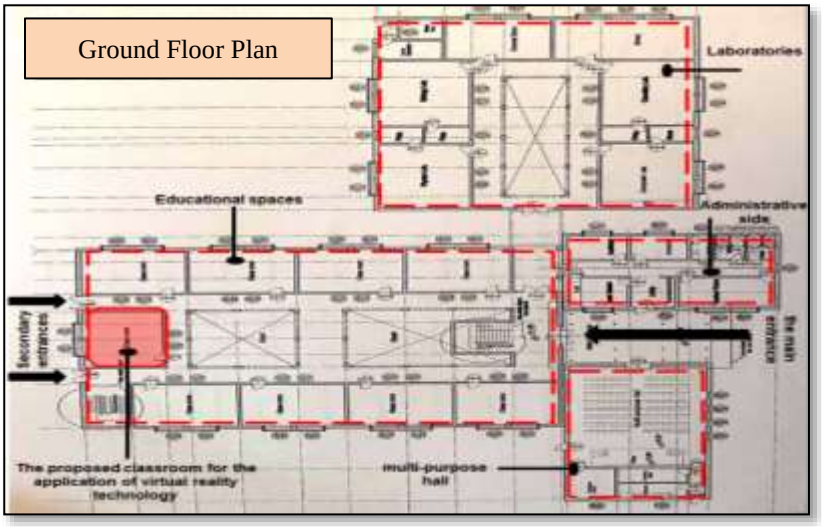



Diagram No. (2) shows Enrollment rate at different levels of education (General Directorate of Educational Planning in the Ministry of Education)

**From the aforementioned many problems, the most prominent of which are related to the low-level qualitative of school buildings and the infrastructure of the education sector, especially the large deficit in the number of buildings school, overcrowding in the classroom, and the lack of equipment compatible with modern educational methods. Moreover, the above leads to ( use the school building for a two-shift time). This reduces the effectiveness of the educational process. Thus, we can confirm the importance of this research by choosing virtual reality technology as one of the technologies and skills of the twenty-first century that stimulates the educational process. It is also considered as a solution to raise the quality of school buildings to become an educational environment that helps to prepare future generations in line with the requirements of the future.**

**4 - A model of a traditional educational building in Iraq**

In this pivot, a school building model (typical middle school of 18 grades) was designed by the General Directorate for School Buildings in the Engineering Designs Department , which is one of the design authorities approved for the design of local school buildings, will be illustrated, as shown in the following:

| **Reality case for the school building model** | |
|---|---|
| Ground Floor Plan<br>  <br><br>  <br>  | The school consists of Traditional classrooms and its other main components (administrative spaces, a multipurpose hall, laboratories, movement spaces, and service spaces) with two floors. This type of school is called a collective type.<br>The learning orientation adopted in this school is traditional learning (The teacher is instructor, and the student is the passive receiver. the style of throwing lesson by the teacher in a lecture or write on the board, while the school lacks educational spaces that keep pace with modern digital learning and contemporary educational methods.<br>layout and distribution furniture: in the form of rows and the central location of the table makes it the place of authority. |



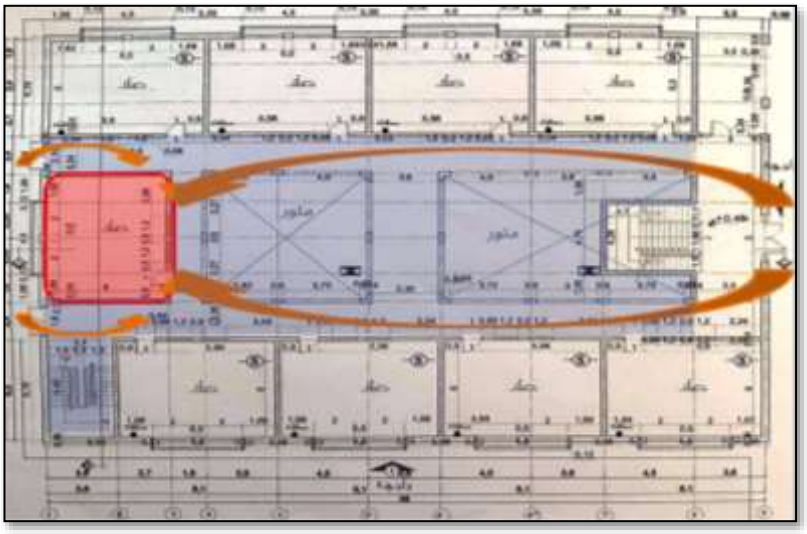
Reality case for educational spaces

**The core of the shift towards modern learning in a part of this school (the classrooms)**

The proposed classroom model to be prepared with virtual reality technology

Central open courtyards and public spaces (corridors and stairs)

Movement axes from the major and minor entrances



**Technological components of the virtual reality technology that used in the proposed classroom model**

proposed Classroom Model plan Supported with Virtual Reality Technology

According to the analysis of the above study, the research concluded that a set of functional requirements defines a good design of the semester model to accommodate the virtual reality technique:

- **Choose classroom's location**: so that it is centrally located within the school area of public spaces with a view on such as corridors and stairs (which converted in the modern schools to be used for meetings areas and socialization), also the classroom sight of the virtual reality technology class to the other classrooms, so that creates a true heart of the school and easy access.
- **Diversity of spaces within the classroom**: In response to the concepts of new learning and away from the design semester one model fits all, the trend to design features a model multi-zones purposes and different size while giving the freedom of students' choices, and could meet traditional learning requirements besides learning with virtual reality technology. The importance of this diversity is evident in the division of educational spaces to developing the student's skills and giving the student the freedom to cooperate and participate in activities.

A dedicated space approved to apply the Cave Automatic Virtual Environment technology at a certain angle. At the same time, it was viewed by the rest of the students in the second space that arranged as a perimeter form and group organization, which allows to (group work with the possibility to reach the blackboard or the teacher, and finally, watch their peers and their reactions as they use the automated virtual cave technology. It is also possible to use the mobile devices while they are wearing a helmet while sitting in their seat. In the middle of the classroom is a large space to move around, safely rotate, and experiment with virtual reality technology tools.

Finally, a third area includes the rest of the virtual reality systems, such as computers that students use to communicate with other students through the virtual reality, interact with them, and exchange experiences with them.

- **Flexibility in the design and the adaption's ability**: from the perspective of adaption of the student's requirements' changes, the rapid curricula development and the educational requirements, the adoption of the flexibility in the classroom model design that can rearrange the furniture, Technological equipment used, and to suit them with the future's classroom requirement with least time and cost.
- **Classroom planning**: provides a variety of spaces for multiple purposes, as well as provides a large intermediate space for each student to have a good view of activity, movement and rotation freely when the student wears the Head Mounted Display (HMD) or any from the virtual reality techniques tools.
- **Furniture arrangement and organization:** It on a perimeter shape as working groups' form that facilitates the students' group activity, the sharing of ideas, interactive discussion, and practical presentations.
- **Transparency and openness**: through open spaces' centralization that mediates classrooms focus on dedicating the main spaces for socialization and practicing of multi-activities that help achieve visual communication with virtual reality classroom model which will create more sense of stirring attention and stimulate what happens in the new classroom. This step is to encourage students to join through a high level of transparency's walls of the semester (extending from the ground to the ceiling) to configure an environment transparent open enhances visual coherence between the classrooms, open spaces, and public spaces (corridors and stairs) intending to make learning with virtual reality technology visual, valuable, and shared.
- Adoption of an appropriate regulation architectural for the proposed classroom location so that the merge of the community's services, and open the school for external users to benefit from this class out of classroom regular hours. As a step to increase the community awareness about such technologies and to increase the efficiency of financial investment, it is necessary to to think early before starting the design process with add-ons, hence the presence of secondary entrances to the school close to the proposed classroom facilitate the entry of the external users without passing through all schools' spaces.

**5 - SWOT analysis of the virtual reality technique in the Iraqi educational spaces:**

Following the theoretical part of the research and demonstration of the virtual reality role in the educational field, SWOT analysis used to determine the strengths and weaknesses of internal technical aspects of virtual reality in the educational field, and identify threats and opportunities in the external environment. SWOT helps to measure the education efficiency and institutional capacity that contribute to implementing the required strategy, developing strengths and available opportunities, and overcoming weaknesses and threats, as indicated in the following table:

| **SWOT Analysis** | **Positive** | **Negative** |
|---|---|---|
| **Internal Factor** | **Strengths** | **Weaknesses** |
| | • Virtual reality is of great interest and popularity, especially among children, because it has similarities with video games in terms of colour, designs, speed and realism, and this stimulates the learning nature and curiosity for the student for question, analysis and criticism<br>• Teachers are always looking for new ways to excite students and attract them to interact fully with school activities, and this is what virtual reality technology provides, so students will surely remember what they learn.<br>• The importance of virtual reality is highlighted in maintaining cognitive | • The cost of the virtual reality equipment and the design of virtual environments, for example, the HMD helmet uses for one user only, compared to its high cost, while the virtual Cave Automatic Virtual Environment system is practical but it requires a big space of the semester in addition to difficulties to move it from place to another one.<br>• In some schools, when interactive whiteboards and computers have not used in education yet, the application of virtual reality will be costly and time-consuming as well as the costly equipment and tools.<br>• Virtual reality is likely to reduce the personal contact and social interaction that |

| | | |
|---|---|---|
| | capabilities so that they do not grow in a traditional and separate way from the outside world that relies heavily on artificial intelligence and virtual reality technologies.<br>• The advanced virtual reality technology provides means that facilitate the educational process and allow the learner to perceive complex scientific concepts, as well as interact with informative and hard-to-visit environments that make the educational process more entertaining and welfare | face-to-face education can provide in the classroom.<br>• Despite the advantages of virtual reality, it is impossible to implement a virtual environment that is completely vibrant and similar to the real world in which we live.<br>• The influence of the five senses is limited, as the senses used in it are sight, touch and hearing.<br>• Virtual reality technologies are slowly developing in the Arab world.<br>• The limited knowledge base of the scientific community and students, and the lack of awareness of virtual reality technology. |
| **External Factor** | **Opportunities** | **Threats** |
| | • Teaching with virtual reality technology enables students at early age to simulate scientific experiences and gain actual experiences, and in this way they are gradually prepared for the best future functions.<br>• Introverted students and those with special needs are drawn into the more active discussion and participation in learning which makes learning more collaborative.<br>• It makes the teaching away from the traditional model (the teacher is the control) and moves it to the model (the teacher is the guidance and mentor only).<br>• Virtual reality produces a new educational spaces design, which has the effect of bringing about future changes at the level of Architectural formation of architectural spaces, as well as the appearance and disappearance of functional elements at the architectural level due to the difference in the new teaching method and functions. Traditional classrooms and their wooden desks and blackboards are transformed into interactive spaces that enable the student to see the past, imagine the future and interact with it attractively and enjoyably.<br>• It identifies the strengths and weaknesses of each student and clarifies the personal interests, which helps the student to determine the career paths that are compatible with the student's inclinations and choices. This is the opposite of the Traditional | • The educational curricula must be developed to make virtual reality technology more effective in teaching than the traditional two-dimensional educational content.<br>• It leads to physiological problems in the event of long-term use, especially when it concerns children during the stage of mental and health development, and these problems include headache, eye fatigue, movement performance changes, optical disorders, Autism, and stress.<br>• Teachers need appropriate training courses to use virtual reality devices and systems and fix any technical errors, in addition to their need for awareness of this technology and its importance in the educational field. Some teachers and educators are not convinced of its full effectiveness.<br>• Such a technique needs a large open space for students, so that each of them has a space to rotate and move freely when using the virtual reality technique.<br>• The right implementation of the VR technique within the classroom, so that semester planning takes new angles and considerations. |

| | | |
|---|---|---|
| | classrooms which doesn't support the individuals' differences as well as the difficulties to create an individual's experience for each student. | |

Table No. (3) shows the axes of the SWOT analysis of aspects of applying virtual reality technology in Iraqi educational spaces

**6- Research conclusions:**

1. Virtual reality technology is not new techniques but an old one that appeared in the eighties of the last century. Its appearance in the educational fields was in the nineties of the last century when its actual use began on the educational application in various academic institutions for both learners and teachers, starting from the elementary stages and ending by the university stages, and for the various academic subjects.
2. About 75% of the applications in the educational field focused on the immersion side, whether the presentation was by using an HMD helmet or by using the Cave Automatic Virtual Environment system in which the learner immersed visually with the virtual world.
3. Virtual reality depends on rapidly renewing technology, which creates an atmosphere of suspense and excitement, and this is an attractive element for future's schools.
4. The research found that activating the virtual reality technology in the educational process allowed students to gain experience closer to real life and more interactively and educationally which leads to an increase in creativity
5. The results highlighted that technology virtual reality made it possible for the students to experience the scientific experiments based on the mobile observations and interaction and immersion in it. As well as students were encouraged to make the decision immediately and allow repeating and learning from try and error, which accelerates acquire experiences that are difficult to acquire only through many years of professional and practical practices..

**7- Research recommendations**

1. The necessity to encourage teachers and learners to become familiar with the latest technologies and to exploit them in the field of education, especially the technology of virtual reality, and to develop their skills through training courses prepared by the Ministry of Communications and the Ministry of Education
2. The necessity of shifting in the classroom (part of it or some of the semesters in the school building) to accommodate the virtual reality technology applications.
3. The necessity of taking into account the existence of a large open space for students when designing the classes for the virtual reality technology. Even if you only use Google Cardboard, children will want to rotate so that everyone has more than one arm space in each place.
4. It is possible to add an external space attached to the classroom and equipped with means of comfort that used together students and reduce the tension that may occur to them through exposure to the virtual reality technique repeatedly and reduce the negative part of it. It can also use for group teaching and presentations from the perspective that learning in the open air facilitates the learning process and makes students more involved in the educational process.
5. The necessity of taking into account the time factor (duration of exposure) and the frequency factor of exposure for the virtual reality technique to reduce the negative symptoms resulting from the use of the technology by using it in the fair and safe use and limiting it to short experiments and making it part of a longer lesson plan.
6. The necessity to develop the information network and strengthen its performance in school buildings to accommodate the capabilities of modern technologies.

7. Cooperation with institutions and stakeholders To start laying the foundamentals To enter virtual reality technology to the core of the educational process through devices and necessary programs' preparation. Despite the technology is advanced enough to be a powerful educational tool, but Educational Curriculum Development is the key To make virtual reality technology the most effective tool in the educational process.

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