

The Developing of learning spaces in the faculties of architecture in Syria using smart architecture techniques

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Abstract

The expansion of the Syrian universities and the creation of new branches of several specialties in public and private universities, including the faculties of architecture and the presence of some colleges in temporary buildings in poor condition, all of the above proves the need for an appropriate learning environment in keeping with the techniques of the age.

The objective of the research is to develop learning halls for architectural students to benefit from smart architecture in Syria by studying the most important contemporary techniques used in the development of education and analyzing the educational vacuum of one of the faculties of architecture in Syria By presenting the existing problems and offering alternatives to remedy these problems using modern technology.

Keywords: Learning Spaces - Smart Architecture.

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- 1- **Introduction:** There has been a lot of progress in life in the world because of the scientific and technological progress, including the learning environment. The technology has affected the educational space and the way of furniture distribution in this space, whether in international universities or schools, which requires considering the study of the educational reality in Syria and the need to develop it.
- 2- **The importance of research and its objectives:** Despite the circumstances of the war in Syria, but in recent years has witnessed the creation of new universities, government and private schools included architecture in Tartus and Hama and the University of Hawash which is Private University and Al-Manara .. But did not keep pace with the global changes that affected the needs of students in all stages of life, so It was necessary to study their need for modern educational methods that meet the requirements of the age, hence the importance of research.

The aim of the research is to develop learning halls for architectural students to benefit from smart architecture in Syria by studying the most important contemporary technologies used in the development of education.

- 3- **Research Methods:** The most important techniques of smart architecture that affect the design of learning spaces within the faculties of architecture will be explained and summarized the main techniques used to apply them to a proposed model.

3-1- **The influential Factors on the quality of the learning environment:** with A comparison of the old and modern learning methods it was observed that learning was through lectures and rigid routine exercises. Currently, self-learning through individual exploration and focuses on the use of software. Points affecting the quality of the educational environment:

- 1- furniture can be reconfigurable to support different learning situations and tables, seats and display panels provide the maximum flexibility.
- 2- The spaces should be designed in a flexible manner that allows multiple means of use according to the learning method.
- 3- Focus on daylight in places of learning and adopt energy-saving lighting.
- 4- Provide sound insulation for the classrooms.
- 5- Provide thermal comfort within learning spaces and ensure a healthy environment.
- 6- Provide an integrated network of data, audio, video and wireless communications, as well as Provide interactive whiteboards, Internet access and video conferencing.



Figure (1): Modern Learning Hall Model



An old learning hall model

3-2- **The most important techniques of smart architecture used in the development of the educational space:** There are some techniques affecting on the learning environment, which recently used as an alternative to the traditional means, which need less space,

- 1- **the technology of Holographic Visual Walls:** Achieving complete isolation of the space and providing maximum privacy without the need for a physical separator such as a block or wood that separates the space from the rest of the spaces through the wall of the holographic, which depends on the technology of stereographic and holographic images and has many applications Which ensures complete isolation of the space so as to provide maximum privacy.
- 2- **The technology of walls with LCD windows as an interactive solution:** the entry of the screen within the educational space to affect the formation of architectural spaces in the era of the digital revolution to become a functional component.
- 3- **Smart materials:** Smart materials are allowed to be modified according to the surrounding environment by sensors. The components of smart materials vary from electrically active polymers that contain memory modules or surrounded by a electrical field. The research will focus on the use of smart materials such as transparent concrete(Polymer and optical fibers of 4% are present in concrete and 40 cm in thickness)
- 4- **Virtual reality technology:** A system consists of a room 3 * 3 m, which includes a screen similar to the theater screen and each wall is a three-dimensional wall allows to imagine through a computer is dedicated and there is the technology of PLEX and similar systems in terms of the method of presentation where is It is designed in three or more screens, creating an environment such as curved environment but with more features. Each screen can be displayed separately or extend to a part of the neighboring screen. A large number of displays can be made at the same time through the largest number of screens. With a large number of computers.
- 5- **virtual reality simulation programs:** These programs rely on the analysis of real reality and its integration with virtual reality and blending with it to be difficult to distinguish ,between the most famous of these programs is called DIVE, which uses a large library of images and real video scenes that can be treated as 3D scenes with any default scene The ARTHUR system is used to simplify the architectural design of non-specialists. It transforms the 3D drawing into a virtual block on a real round table. It can be dealt with this block and modified to suit the specialized and non-specialized, as shown in Figure 2:



Figure (2): shows how to use a simulation software program.

3-3- Proposing of educational space model for architectural students with application of smart technologies:

An advanced vacuum design model using intelligent architecture techniques will be suggested. This proposal will be allowed for a variety uses and can be implemented for example at the University of Tartus, Because the Faculty of Architecture is placed within temporary buildings in very poor condition and the following is the explanation:

The proposal is a building suitable for several uses to accommodate 77 students in the case of turning into a runway and accommodate 49 students in the case of the need for drawing tables, the walls and roof can slipped and gathered , seats remain to become places to walk and sit, It is suggested in the design that the furniture be Foldable and The hall can be used as a lecture hall, as a drawing room, or as a triangular learning hall after dividing the spaces into rooms using virtual reality simulation systems or converting the hall into a projects showroom.

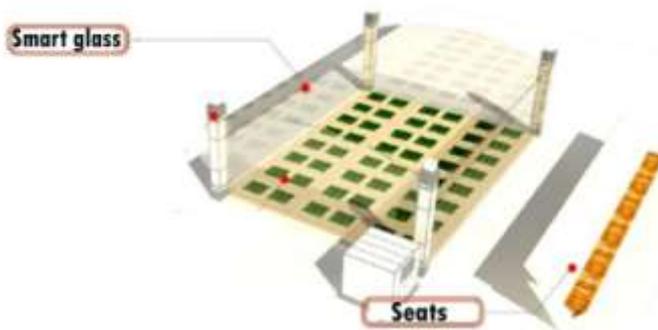


Figure (3) : shows the assembly of the roof behind the seat.

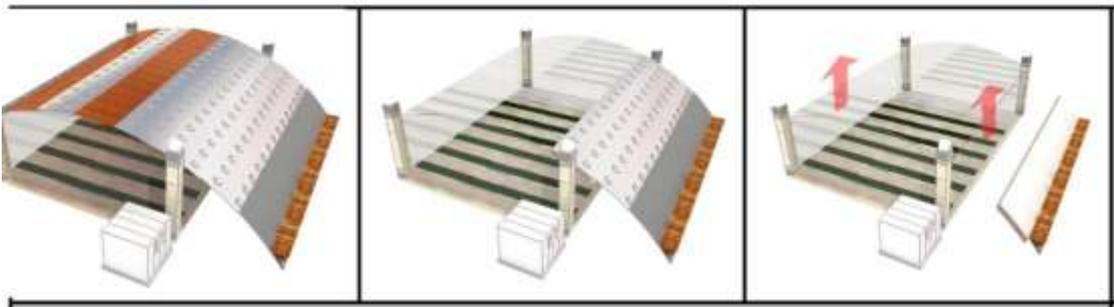


Figure (4): The movement of the glass walls shows up and slides of the roof.



Figure (5): shows the internal folding capacity of the folding furniture and its versatility



Figure (6): Explains the use of the space as a lecture hall



Figure (7) illustrates the use of the space as a drawing hall.

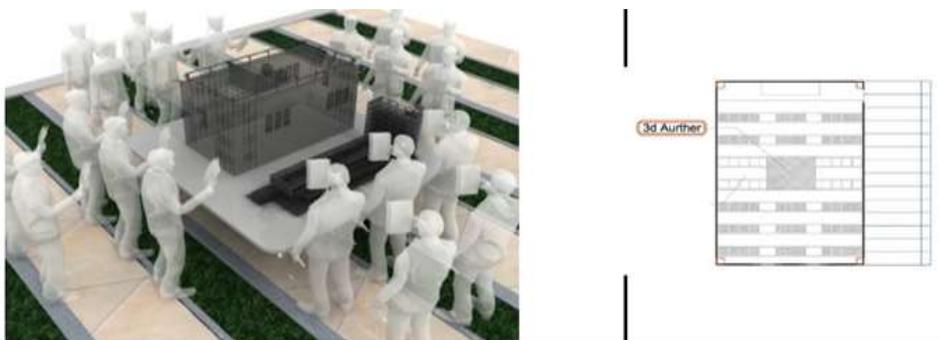


Figure (8): Explains the use of the space for triangular learning.



Figure (9): illustrates the use of simulation technology



Figure (10): The use of the vacuum to display students' projects and the use of interactive glass technology shows that the outer glass wall is dimmed

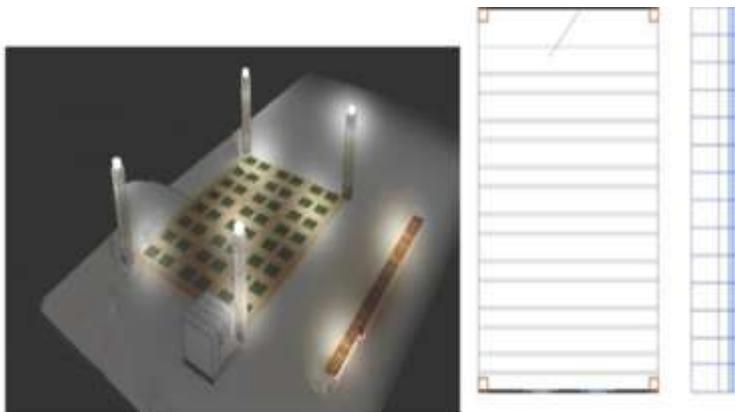


Figure (11): illustrates the use of the space as a picnic area, sitting and watching outdoor movies

4- Conclusions and Recommendations:

It was found that the increasing number of architectural students in Syria can be accommodated by adopting smart and fast solutions and the need to adopt modern teaching methods that keep pace with the times and help to provide students with high skills.

The study recommends educating decision-makers about the importance of taking advantage of the smart architecture technologies and their special potentials in the modern universities which operating temporary places in poor condition. The study also recommends expanding the scope of the internet and spreading it in all areas, especially remote ones.

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