

Interactive 360-Degree Virtual Reality into e-Learning Content Design



Abuelainin Hussain

Abstract: *The techniques and methods essential in creating 2D and 3D virtual reality images that can be displayed in multimedia devices are the main aims of the study. Tools such as desktops, laptops, tablets, smartphones, and other multimedia devices that display such content are the primary concern in the study. Such devices communicate the content through videos, images, or sound which are realistic and useful to the user. Such contents can be captured from different locations in virtual imaginary sites through the abovenamed electronic devices. These are beneficial e-learning instructional techniques for students, especially for higher learning [1]. Considering architectural learners who rely on such images to develop the expected simple designs useful in real constructions, 360-degree imaging has to be considered in e-learning for their benefits. The primary forms through which the content can be transformed into a virtual reality include YouTube and Facebook websites, all of which can display 360-degree virtual environment content. Through this, the learners will interact with virtual reality in such setups, thus enhancing their studies.*

Keywords: *Virtual Reality; e-Learning; Multimedia design; Graphic design; Digital Media; Higher Education.*

I. INTRODUCTION

The research aims to encourage the faculty members in the higher learning institutions to focus on improving e-learning by converting the traditional content into electronic instructional content. Such content can be used by learners through electronic devices to access instructions better than the typical conventional instructions [5].

II. RESEARCH PROBLEM

It has been evident for the faculty members to design their content into traditional formats, which has been a significant disadvantage to the learners accessing the content through the e-learning methods. Thus, the research on how content delivered can be more useful to the learners has been the primary concern. Through the virtual reality (VR) conversion of the content, the learners will perceive the information better than the average traditional method.

III. RESEARCH APPROACH AND METHODOLOGY

Choosing four assemblies, one in 2D, and displaying them for the students through a computer was carried out. The drawings were then taken to a 3D studio and generated the corresponding 3D models.

The results were viewed in software that allowed real-time manipulation of results, and the students questioned their experience with the benefits of such a technique [3]. The results showed that every learner understood the content ever than before as they were able to interact with it through virtual reality. The learners were able to identify each assembly's specific details than ever before in a traditional method.

IV. SCOPE OF WORK

This study supports the instructional materials of higher education to find the proper technology tools used in multimedia production to encourage the faculty members to create educational virtual reality content and apply virtual reality design techniques to convert the traditional instructional materials to become electronic instructional materials. Also, to develop virtual reality content fast and easy by using free online tools. In addition, support scientific research in the fields of development of interactive multimedia design, e-learning instructional design and virtual reality design.

V. HYPOTHESIS

Embedding and producing interactive 360-degree virtual reality to learning activities has many positive advantages to learners in an e-learning setting.

VI. LITERATURE REVIEW

The instructional methods used for traditional learning have to be improvised due to the increasing need for e-learning, where learners receive instructions without face-to-face interaction. Thus, the need to convert content into more useful education to the learners who are far away from the original class has been sought. The use of interactive 360 degrees VR to e-learning has been a fundamental aspect of success in teaching learners [2]. Such methods are likely to improve user engagement with the content more than he could in the traditional learning method. The learners will be able to view the content in a three-dimensional view, thus will be able to conceptualize more easily. The use of interactive multimedia in the learning is beneficial to the e-learners as compared to other methods. Such media allow the learners to control, manipulate, and combine different contents such as sound, text, animations, and computer graphics. Such media, which engages the user, entirely changes the user's situation being the observer to a participant, thus has to be considered the best electronic information system [3].

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The virtual reality, which is also conveyed by the interactive media, creates a situation whereby the learners can observe the image as it appears in the real natural setup through interactive media.

The e-learning authorizing tools in the market include an articulate storyline, which can create visually exciting information such as storytelling, simulations, and gamification. Articulate rise 360 has two authorizing tools, which include storyline 360 and Rise 360. Adobe captivates 2019 is another tool that is still among the best authoring tools [4]. Others include Lectora Inspire 19, iSpring Suite9.7, and easy generator, which is popular nowadays in the e-learning industry.

Samples of VR 360 degree Include web-based interactive 360-degree, which has capabilities of forming virtual reality studio and used in architectural designs, YouTube 360, which can create virtual reality for videos creating the best experience for the users [5]. Face book 360 degrees has the capability of showing photos in three dimensions and videos as well. 3D VR 360 can produce 360-degree images and videos, thus also used in electronic learning.

VII. HARDWARE AND SOFTWARE

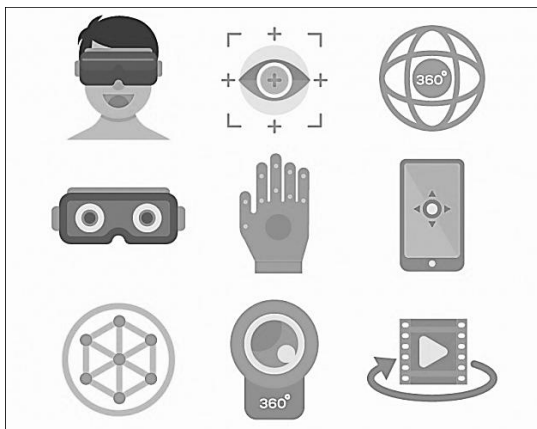


Fig. 1 Figure 8.1 Hardware and software

Hardware and software used in 360 degrees VR project include gear headset with controller, smartphone with VR player app, Gear 360 camera with the controller, Face book surround360.

VIII. FIELD STUDY

A. Web-based interactive 360-degree

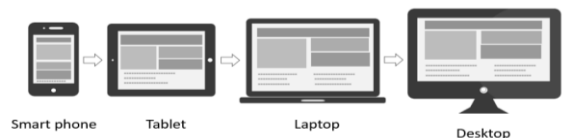


Fig. 2 Web-base 360-degree display devices

Web-based interactive 360-degree was used in the study of construction safety to improve the learning methods used in safety rules, which are traditional and lack to deliver well in most cases. The images and videos taken for learning were interactive, and learners could learn better with such videos and pictures in their phone devices, thus boosting conceptualization. Such a virtual field trip should be considered as it showed better learning experiences.

B. 360-degree for YouTube

360-degree for YouTube is another method that can be applied in e-learning due to virtual reality features that can be streamed through it in the form of graphics and videos. In a study carried on by YouTube, learners were given the assignment to view some pictures and videos [3]. They were to compare the images they viewed with other print formats and to show some differences. Most of the learners proved that the 360 degrees for YouTube were very interactive and appeared more real than those in the print format. It was a realistic representation, and the images could be viewed from all sides, thus making understanding better.

C. 360-degree for Facebook

360-degree for Facebook was used in a study to navigate if it could be used by learners to improve their learning compared to the traditional methods. A group for e-learning was made, and discussions were made online together with the videos and other images streamed through 360 degrees for Facebook learners [2]. The study showed excellent improvement for the learners after assessment. 360-degree for Facebook is essential and can transform learning to be more exciting and improved virtual reality.

IX. 360 DEGREE PANORAMA PRODUCTION

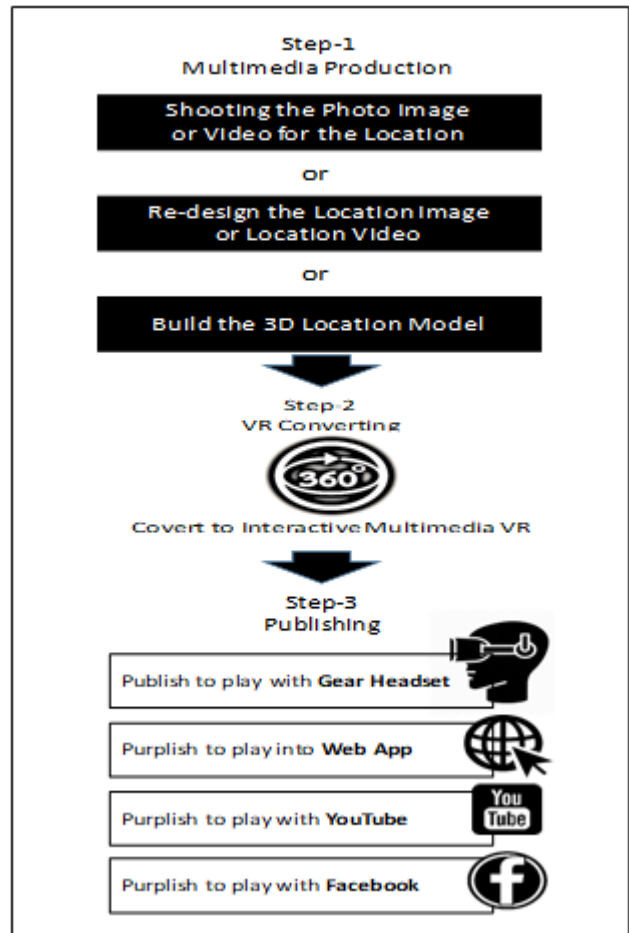


Fig. 3: 360-degree panorama production Framework

The panorama production framework starts with shooting 360-degree videos or images or changing the image/video location or building a location model for the 3D object. The second step is the conversion of the image/video to interactive multimedia VR. The third step entails publishing the image/video to play it in a web app, YouTube, Facebook, or gear headset learners [2]. The last is to embed the content to e-learning or transferring it to a learning management system (LMS).

X. PRACTICE FOR HOW TO EMBED 360 DEGREE IN E-LEARNING CONTENT DESIGN

In this practice, we using the Learning Management System LMS “Moodle” and we applied the following steps to produce and embed the 360-degree into learning course activates by using HTML editor.

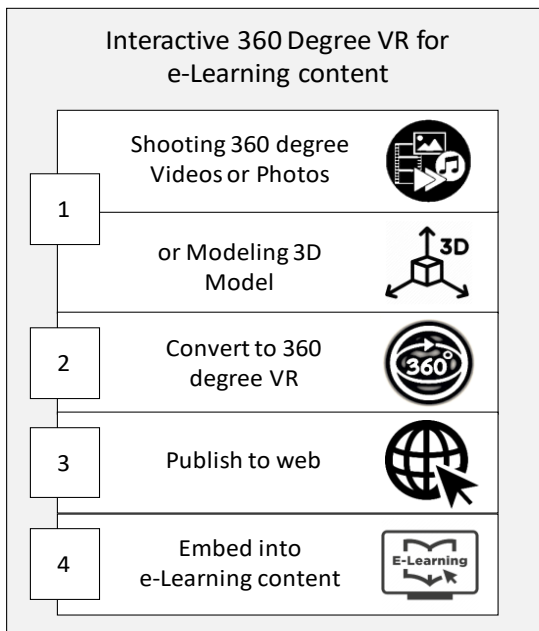


Fig. 6 Interactive 360 Degree VR for e-Learning content

A. Interactive 360-degree Photos

For photos, by using “Momento360” free online software (<https://www.momento360.com>) the easiest way to make the most of all your 360 images and videos through upload, view, and share your 360 photos and videos all in one place, all from your browser. Share 360s easily with who you want, how you want. No app or signup required, so nobody gets left out. You can embed them on your online course content too. Step into your 360 photos and videos with Virtual Reality. Momento360 supports Google Cardboard and Gear VR, with more on the way.

B. Interactive 360-degree Videos

For video we can upload to YouTube and copy share embedding text into LMS by using HTML Editor and you can use Cardboard for paly interactive 360 video. Please visit this sample: <https://youtu.be/r8-6Z1Efgzg> 360-degree videos are videos that allow the viewer to look in all directions. We also speak of immersive videos”, since the user is completely immersed in the virtual world presented to them.

It is deemed an interactive medium since the user can

decide where to look for themselves. But that’s not the only reason: A virtual reality app can also integrate interactive hotspots that the user can select within this application, such as web links, videos or texts. 360-degree videos are most impressive when viewed with VR glasses (Head Mounted Display). However, you can also watch such 360-degree videos in a web browser or on social networks. Watch VR180 and 360-degree videos with Google Cardboard or another for an immersive virtual reality experience with Cardboard and the YouTube mobile app.

C. Interactive 3D Virtual Reality

By using “Sketchfab” free online software (<https://sketchfab.com>) the easiest way to make Interactive 3D VR 360 and based on this research aims, by using the software “Autodesk 3Ds Max” and online VR player “Sketchfab.com”, we created a simple project for public building example “school building” with Interactive Multimedia buttons. In this project we found the following design and implementation process mentioned in Figure 11. Please visit this example:

<https://sketchfab.com/models/42182ef26317483486f1066e99ad6f3b>

XI. HOW TO CREATE 3D VR 360°?

After building 3D modelling in 3Ds MAX(Autodesk), we are only a few steps away to create a 360° panorama by the following steps:

In this tutorial, you learn to render a 360° Panorama of your 3D scene that you can view on your mobile device or with the help of a Google Cardboard.

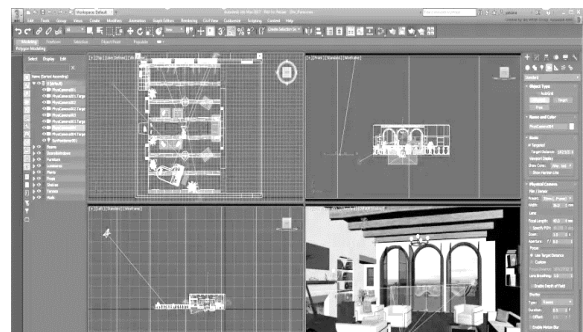


Fig. 7 3Ds Max - CREATE 3D VR 360°

Step One: set the virtual camera at a desired (central) position, the camera height is advised to be at eye level for viewer’s comfort, point the camera to the most interesting view and set up camera position.

Step Two: configure your render setup 2: 1 (width 6000 px: Height 3000 px) Ratio for a reasonable quality, make sure it’s at least 6000:3000 resolution and configure render set up.

Step Three: render (higher the resolution, longer the rendering time) render you can upload your work to (<https://veer.tv>) to view on web, Mobile App, or with a VR goggle setup.

Please watch this tutorials: <https://youtu.be/ztyEX64fzzE>

XII. THE IMPACT OF USING INTERACTIVE 360-DEGREE VIRTUAL REALITY IN HIGHER EDUCATION



Fig. 8 using interactive 360-degree VR in Education

The use of 360 panoramas has excellent potential for understanding complex subjects such as architectural designs and engineering.

This is due to the virtual reality's in-depth knowledge and the object's interaction with the learner through up, down, right, and left dragging of the item. It also facilitates virtual trips through watching 360 videos taken for the aim of learning some complex units. In higher education, it recruits the learners to the real world's expectations on their career paths, thus achieving some virtual experience through video streaming such videos [4]. Learning through experience is very important and is provided by virtual reality. It is also used in the learners' training to gain soft skills, which are essential in learning and improving communication skills for the learners.

A key benefits of using VR in education is that you learn through experience. VR allows us to bring 2D/3D objects to life and makes visualisation a reality, enabling us to experience more than ever, and learn in an immersive way. The practical implications of this are huge, as VR opens up new ways to learn skills that were otherwise difficult to teach. For distance/online learning, as college campuses become global, the location independence of VR becomes more prominent, and a big factor in helping to promote distance learning. To bring learning to life, one of the most obvious benefits of VR is transforming lectures into immersive learning experiences, enabling lecturers to truly bring their subject to life.

XIII. CONCLUSION

In the current days, traditional learning methods have been approved to be disadvantageous in many ways for the e-learning students due to the unavailability of trips, which can make them interact with reality. However, the greatest hope has been brought by the VR panorama, which can produce images and videos in a 360 degree, thus improving the content's interaction with the learners [2]. There is the ability to view images and videos in different views by dragging them in different directions. Learning becomes more comfortable than ever before as learners interact with virtual reality and gain recruitment to the fieldwork in his or her career.

RECOMMENDATIONS

The use of the VR panorama needs to be emphasized by educators to improve learning, especially those doing complex courses due to its benefits. It is recommendable to change the traditional methods which have been in use in the teaching of E-learning since the learners are far away from the real class.

REFERENCES

1. Bharathi, A. K. B. G., & Tucker, C. S. (2015, August). Investigating the impact of interactive, immersive virtual reality environments in enhancing task performance in online engineering design activities. In International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (Vol. 57106, p. V003T04A004). American Society of Mechanical Engineers.
2. Bonner, E., & Reinders, H. (2018). Augmented and virtual reality in the language classroom: Practical ideas. *Teaching English with Technology*, 18(3), 33-53.
3. Cochrane, T. (2016). Mobile VR in education: From the fringe to the mainstream. *International Journal of Mobile and Blended Learning (IJMBL)*, 8(4), 44-60.
4. Pham, H. C., Dao, N., Pedro, A., Le, Q. T., Hussain, R., Cho, S., & Park, C. S. I. K. (2018). Virtual field trip for mobile construction safety education using 360-degree panoramic virtual reality. *Int. J. Eng. Educ*, 34(4), 1174-1191.
5. Sinfield, D., & Cochrane, T. (2020). Augmenting visual design: Designing the changing classroom. *E-Learning and Digital Media*, 17(5), 365-387.

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