

Educating Students In Remote Areas Using Augmented Reality

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Abstract— Augmented Reality(AR) technology nowadays is widely used in various fields of education. Students have been learning from books and videos but with AR they can see objects right in front of them, which can make learning more interesting. Companies like Microsoft, google, Facebook and apple are making their products more interactive by providing their customers real life look while using their products. In this paper, a new method of education with the help of AR technology has been proposed for the students in remote areas, to whom proper education is not provided. Further in this paper related work which has already been done and what outcomes can be expected if this method would be implemented done has discussed. Students wearing AR glasses would be able to attend lectures recorded from teachers at far distance, with view as if teacher is present at that moment. Students can be grouped together to see same lectures and discuss with each other. Teachers from various places can also give live lectures to different group of students with AR glasses and give them answers to their questions.

Keywords— Hologram, Microsoft HoloLens, AR, Augmented Reality, Education, VR, Virtual Reality.

I. INTRODUCTION:

A. Overview:

Education is the most important thing in this world it not only make people independent but make them understand what is better way to live their lives, whereas technology is helping people to get access to information from all over the world and making people reach new heights and create new to achieve[1]. In this competitive and informational era, it is everyone's right to get education and come forward to work in this astonishing environment. But unfortunately, not everyone has access to these opportunities, many under developed countries fail to provide proper education to their citizens, they are unable to provide such environment where everyone can get education and change their lives and bring change to other's. Not only under developed countries but many developed countries fail to provide proper education to their people in remote areas or villages[2]. They don't provide established environment where

everyone can have access and ability to acquire chances to get effective education to accomplish their goals and contribute to society.

Teaching with playing videos and presenting informative material does not provide real life institutional view. This paper presents a new way where students will be able to get quality education without perceiving technology is being used, and this is possible with Augmented reality (AR).

1) Augmented Reality

Two widely known technologies AR and VR which are similar to each other, whereas Augmented Reality (AR) can be described as adding virtual object with real object in real domain, users sees there 3D images with real environment and get real life view [3] while wearing AR glasses .

2) Virtual Reality

Virtual Reality (VR) in which people are surrounded with virtual or unreal surrounding, it make users see virtual objects around him as if he is in another place. [4] Users need to wear glasses to experience this view.

3) Holograms

Holograms are 3D images formed by recorded light patterns. Which allow users to see images in 3D by emitting light, it was invented in 1947 by Dennis Gabor using holography [4].

This paper discusses AR technology and holograms to provide education in remote areas. AR has changed perspective of seeing things that are faraway. For students using technology and technical devices to study while moving where ever they want instead of sitting on a particular place is motivating for them to do their task [5] where holograms will allow students to learn from single seats using single device. For AR this research is referring tools such as Microsoft HoloLens and Meta 2 for augmented reality environment, and hologram that can be helpful to achieve this objective.

B. Problem Statement:

Many students in remote areas are not provided proper educational environment to complete their basic education. They don't have basic elements which are required in any educational institutes to provide education. Such as enough qualified teachers, building or environment where they can learn etc.

C. Research Questions:

- How AR technology will be used to improve education method?
- What impact this intervention will have on student's learning?
- How much time will be needed to utilize this idea if implemented.
- What motivates people to work with this technology?

D. Research Objective:

The objective of this research is to highlight what role Augmented Reality technology and holograms can play to give access of effective and interactive information and improve quality of education for people in remote areas, who are not being served with opportunities and don't have enough resources to get proper education.

II. Literature Review:

Augmented reality keeps students engaged in their work and make them understand better using 3D visuals. Which helps and motivate them in learning new things, students learning with AR technology gives better result [6]. AR can provide unique experience to students because they can learn by looking at thing as if they are present in that situation. Students will not be in different world as VR technology do while AR brings objects to real world [7].

Method of learning has been changing from fast years from tradition methods of learning such as text books to widely used digital tools present for students in institutes to make information accessible and interactive, now students are not using only brain but whole body to interact with tools to learn, which is increasing their interest of learning. Students use their body to control virtual objects to study [1].

The Redmond, Washington-based company utilized HoloLens in different environments to monitor its effect in learning. Students found it beneficial while learning different challenging materials[8]. NASA is using Microsoft HoloLens in their project Sidekick for training and making them experience thing they can face and how they should deal with different situation before going to space [9].

This technology does not depend on single field of study, many completely different fields are using this technology to make their trainees or students learn efficiently, first application related to HoloLens was created by EdTech innovation team from Leiden University for medical students, in which holograms in application moves with your body [10].

While using HoloLens students would be able to move body parts and see how they look and perform, major benefit for medical students is working with HoloLens simulation is that there is no harm if something goes wrong [11]. Another completely different field which is using Microsoft HoloLens is developing engines for motor vehicles. In which even nonprogrammer can design and monitor their engine [12]. even though you won't have real product to test but with technology allows you to see your product in 3D and makes you see how it will look when developed.

A. Devices using Augmented Reality

1) Microsoft HoloLens

Microsoft HoloLens not just another VR, its uses Augmented technology to provide their users an environment where they can wear glasses while walking or doing other work[13]. These glasses allow virtual objects to be viewed in real environment, users can interact with virtual objects by moving their hands in required way. These glasses allow users to perform multiple tasks such as playing games, creating 3D objects and viewing already built in applications in 3D.

2) Meta 2

Meta 2 glasses also use augmented technology to allow users to experience virtual objects in real environments. With meta 2 user can view images, videos and play games in 3D. With Meta 2 user can create, see and modify 3D objects through hand gestures.

These AR devices has changed perspective of designing or creating models. User can create and view 3D designs of their products before working with hardware. User gets many benefits such as saving cost of purchasing hardware or it provides ease to change design to experience different looks. Also, this technology is making communication effective by allowing users to experience real time view by showing videos in 3D [1].

B. Holographic Projection

Holograms are images produced by recorded light patterns and presented in three dimensions, this process is known as holography. This technology has changed perspective of seeing things by providing different view of objects. It is

beneficial for many fields such as Education, science, arts etc. Holograms were invented in 1947 but latest advancement in technology have made it more useful in different fields such as flight simulation, robotics, medical, entertainment, designing, education etc. [14].

III. Cost

Whenever modern technology or new concept takes shape of device, is not affordable for everyone to get it. According to fox news when world's first commercial portable cell phone on September 21, 1983, Motorola came its costs \$3,995 at that time[15] and for mobile supporting digital camera, fast internet and accessing things that we are doing now was a dream back then but today is reality with less cost.



Figure 2: Microsoft HoloLens [15]

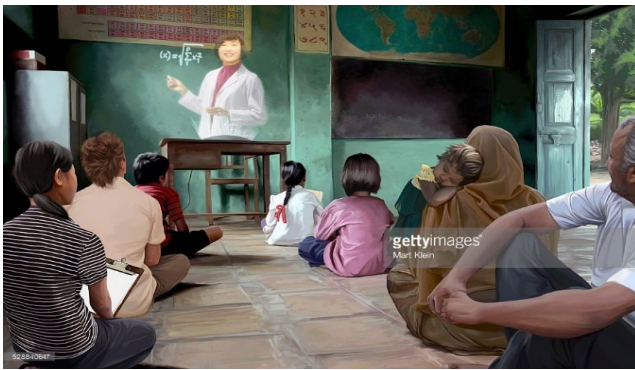


Figure 1: Educating students with Holograms [16]

Cost required for Microsoft HoloLens is \$3000 for development edition which is suitable for individual and \$5000 for organizations with additional features such as added security and device management etc. [13] and for meta 2 is \$1,495[16] these numbers have been taken from their official website in January 2018. But this cost can be minimized if we will provide only features that will be needed by students while learning. Its costly for us students to implement this idea to find what impact it will have that's why we showed these images to students and ask them to solve questionnaire to get feedback about implementation of this technology.

IV. Research Methodology:

This research has been conducted by reviewing existed literature to get idea about work that has already been done related to this paper and reviews were taken from different students about these technologies by asking them to solve questionnaire and teachers were interviewed for their views about this technology and its implementation in the field of education.

V. Results

1) Questionnaire

Questionnaires were solved for evaluation by different people from different fields to get diversity in results. Images Fig 1 and Fig 2 as shown below were shown to them, incase if someone don't know about Microsoft HoloLens and holograms can get idea by looking at images. 200 people answered these questions. There were some people who initially didn't know about these technologies after seeing pictures and by explaining what it is and what is purpose of this idea and answering their questions idea was clearer than before. Results were analyzed by inputting data in Microsoft excel and calculating percentage.

As this survey has been conducted in Hyderabad city of Pakistan so people answered by keeping in mind country's situation. While answering about reason of low quality around 50% people think that it because of not enough qualified teachers. We can see how clear it is that qualified teachers are needed in remote areas and how it is main reason of lack of quality in education in remote areas. This technology is solution to this problem because highly qualified teachers would be able to give lectures from distance, and student will get real-life experience as if they are present in class with instructor. While answering about in quality of education in remote areas more than majority thinks quality of education in remote areas is poor. Only education can make people independent enough to change their conditions and create opportunities for themselves, huge amount of efforts are needed to be done in

this area to make quality education common for people. As shown in Fig 3 when people were asked about effectiveness of Microsoft HoloLens or Hologram in comparison to traditional methods 70% preferred and found effective these methods more than traditional ways of educating students by showing them images through slides or playing videos in

classroom or in homes. Further when people were asked to rate these technologies if are used in providing education. 25% finds it excellent whereas 10% selected not good, whereas holograms are concerned 50 % people selected good while 20 % selected excellent.

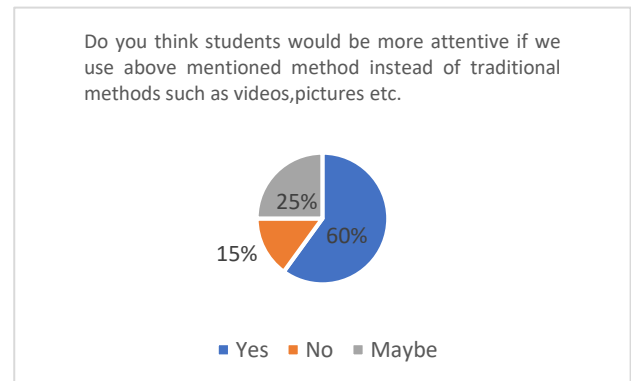
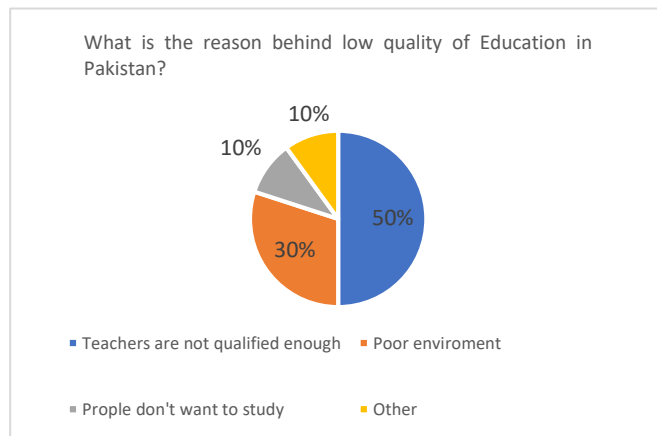
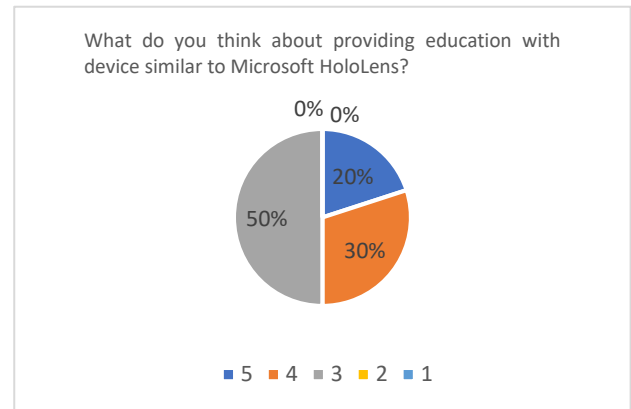
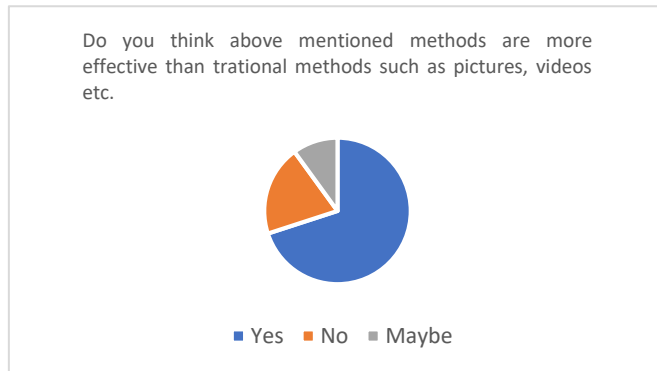
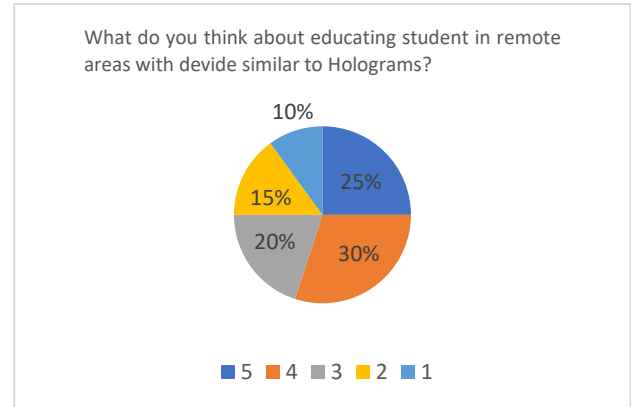
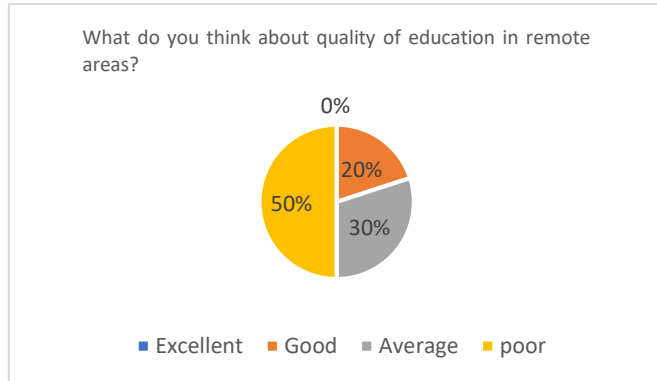


Figure 3 Survey Results

2) Interviews

To get idea about what teachers would think about this technology 10 teachers were interviewed n asked about what they think about this technology and what impact it can made on current quality of education in remote areas they said education is very important for every country. Quality of education is very poor in villages of many countries, if we talk about Pakistan there is a lot of work needed to be done to improve quality of education in those areas. Many teachers in remote areas don't teach students properly, student's concepts are not cleared which make them loose their interest education or becomes barrier from them to compete with other students. If any of these technologies (Microsoft HoloLens, meta2, Holograms) will be implemented in villages it will not only help students to learn new things and get quality of education from highly qualified teacher but teachers from villages will also be able to improve their level of education and way of teaching.

VI. Limitations

Limitation of this idea, delivering education through devices that are using AR technology, such as Microsoft HoloLens, Meta 2 and Hologram, in the field of education. is cost that would be required to bring this technology in villages.

VII. Expected Outcomes:

Outcomes we are expecting if this technology would be implemented are, people from villages would be able to acquire education with the help of devices using AR technology or Holograms. With the help of devices such as Microsoft HoloLens and meta 2 technology people will get feel of educational environment. While attending classes in their village, they can learn different skills and techniques from people all over the world. This technology will give them real time learning experience and will help them learn effectively. Holograms will allow users see teacher in 3D while being in real environment. Students will get chance to learn latest technologies and advancements in field from highly

VIII. Scope:

At this level this research has proposed idea of implementing this technology in field of education and has discussed views of different people about this research. Also, previous literature has been discussed related to this technology. Its implementation would need technical people to create those glasses and fair amount of money would be required to pay them, which at this level is not possible as it would be very costly to implement.

IX. Conclusion:

In this paper a unique way of providing education in remote areas has been proposed with the help of Augmented Reality technology and Holograms. Augmented Reality is used in meta 2 and Microsoft's HoloLens. Areas in which children are unable to get proper education, these devices will be provided to them, AR technology will give them real-time experience of studying in educational institutes by making them see virtual teacher in front of them. Student will not only learn through lectures of teachers, but they would also be able to learn different skills and techniques without going to other places to learn. Holograms will allow them to see without wearing any glasses. All students will see same image which will be shown to them from devices. Whereas Microsoft HoloLens and meta 2 requires wearing glasses to experience this technology.

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