



## VIRTUAL REALITY AND AUGMENTED REALITY IN TEACHING OF SOCIAL SCIENCES

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### **Abstract:**

*Augmented Reality is presently used in various arenas ranging from education to enterprise to entertainment. In the learning of Social Sciences, Augmented Reality plays a vital role by helping students perceive abstract information. Visual representation of information in a three dimensional form helps to comprehend information easily, thus helping to build concepts which are the cornerstone for any learning. This paper reviews some Augmented Reality Apps that can be used in teaching Social Sciences. The author has used few of these and also encouraged B.Ed students to use the same in their lessons. The insights garnered from this endeavor are also described in this paper.*

**Keywords:** *Augmented Reality, Virtual Reality, Teaching Learning process, innovations in Social Science pedagogy*

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### **Introduction**

Augmented Reality (AR) refers to an interactive way of presenting digital information in the context of physical environment. It involves an overlay of digital content onto the physical world. AR technology uses cameras/sensors, processing, projection and reflection to superimpose sound, graphics and videos in an existing environment and thus facilitates interactive classrooms that increase student engagement. Virtual Reality (VR) is a computer generated environment that gives the user an immersive experience. This may be done through use of special technology that helps in 360 degree exploration of a place or an object. Thomas B. Sheridan<sup>1</sup> describes this as a “sense of being physically present with visual, auditory, or force displays generated by a computer.” While teaching History, teachers have to transport their students to the realms of the past. Students need to understand the locale of the events. They often need to understand architectural sources that contribute to historical content. VR helps to overcome barriers of time and space and get an experience that is close to a first-hand experience. Learning Geography involves understanding scientific concepts. The learner has to learn phenomena like earthquakes and volcanic eruptions, formation of rocks, planetary movements. All this can be made more realistic through use of AR and VR where the three dimensional environment is simulated.

Before proceeding with actual examples of apps that incorporate AR and VR it is necessary to differentiate between AR and VR. While VR is completely virtual, AR uses a real world setting for data overlay. AR adds virtual elements to the user’s real world experience. AR thus is a blend of real world physical objects with some digital inputs. VR is the creation of simulation of real world where the user is immersed into the immersive environment.



The following paragraphs describe the use of AR and VR in learning Social Sciences. The author of this paper has tried out one of the apps with B.Ed student-teachers who in turn have used it in their internship lessons. Some experiences of use of AR and VR by Social Science teachers in other countries are also included.

**Google Expeditions:** Field trips and excursions have always been recognized as first hand experiences that enhance learning of History. Some challenges faced by teachers in organizing frequent field visits include paucity of funds and finding adequate time in the regular schedule. One cannot possibly visit every place that is covered in the syllabus. Besides, even if one does visit the monument or historical site, one may not be able to explore inaccessible areas like the roof of the monument or one may not be able to closely examine the structure. In such cases Google expeditions offer a very viable option to explore the historical site. A mixture of 360 degree panoramic views and 2D imagery make such virtual excursions very interesting.

The Google Expeditions App is available on iOS and Android platforms. Panoramic scenes, curricular connections and discussion questions are available. There are over 500 VR expeditions. Students need a VR kit, which includes a special headset, to explore different places. The students can observe these places as if they are physically present in the place. The teacher can have break time for thinking by posing questions and fostering discussions. Objects and places can be seen in the form of a close up thus facilitating better observation. Structures like the Pyramids, the Great Wall of China or the Colosseum can be closely explored. Students can take a virtual underwater tour or plunge into outer space or explore a volcano.

Students can create their own VR tours using Thinglink and view them in VR using the headsets. Apps like Cardboard Camera and Google Street View camera are also useful to create 360 degree panorama tours.

An interesting application is the Public Speaking VR where sees an audience in front of him/her and this can be used to practice public speaking. The Apollo 15 Moon Landing App gives the user the experience of landing on the Moon and exploring the surface by walking around or by using the Rover.

### **Google Arts and Culture Tours**

The Google Art and Culture Site (<https://artsandculture.google.com/>) is a treasure trove for teachers and learners. There are many world class museums showcased and one can have a virtual walk through these to observe artifacts. Natural sites like the Great Barrier Reef and architectural wonders like the Taj Mahal can be seen at close quarters. Over 2000 museums, 100000 art works and 10000 places can be explored without leaving the comforts of one's home or classroom. The Art to AR section allows exploration of culture through the lens of art, thus promoting cross disciplinary connections.

The author used the Virtual Tours with prospective History teachers. These eight student-teachers undergoing their B.Ed Programme used Virtual Tours to teach topics in History. They led their students to virtually explore monuments and caves like the Taj Mahal, Qutub Minar and the Ajanta Caves. The students were encouraged to note down their observations regarding the site. Students noted down the material used for construction, the architectural features and important facts displayed at these sites. All these sites were explored virtually without any special headsets or viewing glass. However the sites could be maneuvered and views from different angles were got. Close examination was possible by zooming in. The 360 degree panorama feature gave the feeling of actually being present. After students observed the places, they were encouraged to share their observations.



Discrepancies were sorted by discussion. It was seen that students took keen interest in observing the minute details and the intricate art. As the site has factual information included, the students could read and connect with what they were observing. The students could spend as much time as they wanted to explore the site. When one actually visits such a site, one is often rushed for time and may fail to observe minute details. Secondly in an actual visit, some parts of monuments like the tall ceilings or the upper part of the roof or dome may be inaccessible. A VR tour overcomes this limitation as one can easily access any part of the monument by a simple mouse click. Close views which may not be possible in an onsite visit are possible in virtual visits. The high resolution images were useful to concentrate on intricacies that one might miss out in an actual field visit.

The Google Arts and Culture site has added features like a quiz that asks visitors to match a painting to a particular style or to find a symbol within a specified painting that represents a provided story. This adds the element of critical thinking and thus enhances the effectiveness of the virtual tour.

#### **Using VR apps for Research in Social Science**

Research in physical sciences usually involves laboratory work. Since inanimate objects are generally used, such experiments can be repeated many times. Research in Social Science involves human beings and data is usually gathered by observing real life situations. Virtual Reality is being used to add a new dimension to research in Social Science. Nicholas Lanzieri<sup>2</sup> and others developed a 30 degree VR simulation where using a mobile device and a daydream handset, students were guided through a panoramic urban environment by a pre-recorded voiceover that promotes reflective and analytical thinking as they observe the community through the lens of a social worker. There were 17 navigable interactive panoramic scenes where the students had to observe the scene in VR and were then presented a question. For example the students watched in VR a subway station of New York City. The voice over first guided the students and then they were asked to think about the transportation resources available in the observed neighbourhood. In another scene the narrator posed the question “A socio-petal space encourages social interactions. Identify and name two such spaces on Grand Street. How might these be used for young and older clients?” There were interactive hotspots that on clicking gave information regarding the demographics, mental health and housing of the people. Participants could review statistical data and use it to draw conclusions. The researchers conclude that as novice students gain more experience with the VR environment, they will develop their schematic knowledge and confidence, allowing them to simulate more complex and realistic environments.

#### **Use of AR and VR for studying historical events**

Social Science teacher Heidi Martasian used VR to give students an idea of transition from agriculture to industrialization. Students used VR to see how mining was done, something that may not be an easy task considering the safety precautions that need to be taken while entering a mine. While exploring World War One, students used VR to get a first-hand experience of how soldiers fought the war from trenches. Thus with the right equipment one can travel through time and space and get a deeper understanding of historical perspectives.

#### **Benefits of use of AR and VR in learning Social Sciences**

The immersive nature of AR and VR helps to share information in engaging ways and it also has the potential to overcome barriers of space and time. Interaction is the key word of AR and VR enhanced learning



environments. Learning can be customized and each learner can choose an individual path to learning. Seeing and experiencing historical events will help to empathise with people of varied cultural backgrounds. Virtual settings are risk free settings to observe and study situations like war or explore natural phenomena like volcanic eruptions which in reality are risky situations to actually be part of.

National Education Policy 2020<sup>3</sup> recommends content creation and dissemination stating ‘A digital repository of content including creation of coursework, Learning Games & Simulations, Augmented Reality and Virtual Reality will be developed, with a clear public system for ratings by users on effectiveness and quality. For fun based learning student-appropriate tools like apps, gamification of Indian art and culture, in multiple languages, with clear operating instructions, will also be created.’ Such content creation needs a blend of expertise in content, pedagogy and technology. Presently, platforms like Immersive VR Education and Nearpod allow teachers to develop lesson plans with VR and AR technology. Teachers need to explore software to create AR and VR based content.

AR and VR once seemed to be a science fiction dream. However today AR and VR in education has opened new avenues and in the days to come will be as ubiquitous as mobiles. Gearing ourselves to use it effectively therefore is the need of the hour.

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