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Benefits of using Augmented Reality in education

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Abstract

Using augmented reality in education sphere is merely a news. However, specific benefits of use have not been studied thoroughly yet. Thus, implementation of augmented reality is being avoided by majority of institutions, which according to our conclusion, has to be worked on. The article demonstrates how augmented reality is applied in many spheres and is of great perspectives in field of education, specifically language teaching. The present work focuses on particular language skills of students, which might be enhanced using augmented reality in classroom.

Keywords: *augmented reality, virtual reality, tangible interface, education, language teaching.*

I. Introduction

Using high technology in the field of education is not a new trend. However, there have been made a great deal of researches on how particular types of technical appliances serve to the effectiveness of teaching and learning process. Most of the devices that are applied in instructing learners are directed to involving them in the learning process by means of immersive Virtual Reality- seeing and contacting objects in the computer-made environment. However, unlike VR (Virtual Reality), AR (Augmented Reality) serves to its user by completing the real world with the necessary component(s) from VR. The ability to overlay computer graphics onto the real world is commonly called Augmented Reality (Billinghurst 2002). The following work focuses on characteristic features, types and merits of using Augmented Reality in education.

A great example of AR is placed and currently used in The Arts Center of Christchurch in New Zealand. There is an empty dusty basement room where one can enter and see the life-sized virtual image of an old man telling visitors stories from the past. He is Ernest Rutherford, Nobel-prize winning physicist who worked

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in that room over a hundred years ago. Through the use of advanced technology an empty room is turned into a rich educational experience.

II. Methods

As a result of a library research we concluded that there are three main features of any appliance which is presented by AR. They are followings:

- Combination of virtual and real worlds;
- Real time interaction with user;
- Being registered in a 3D space (Azuma 1997).

An appliance possessing the above mentioned features is used for both single user tasks and collaborative tasks. By a single user Augmented Reality was first used to showing a virtual 3D X-Ray image laid over a patient's body being operated (Bajura 1992). Later, it was used to repair a printer (Feiner 1993), in which virtual annotations instructing the users how to fix the machine appeared on it. We consider that, Augmented Reality can also be used to enhance collaborative tasks. A good example of this is the StudierStube project of Schmalsteig, et al (Schmalsteig 1996). They use see-through head mounted displays to allow users to collaboratively view 3D models of scientific data posed on the real world.

From the examples of application in real life one can summarize that several devices are necessary in AR systems: displays, computers, input and tracking devices. There are two main types of displays see-through and monitor-based. For instance, an ordinary smartphone screen is used as a monitor based displaying device in order to show a virtual 3D image of a studied object put into a real world environment. Moreover, See-through devices are divided into two sub-types: video-see-through (in a form of a headmounted display) and optical see-through (in form of one-eye-glasses).

We believe that the advantages of using AR in education are undeniable. They allow seamless interaction between real and virtual worlds. We reckon that in a classroom setting, students work together better if they are focused on a common workspace. Yet this is difficult to achieve in computer-based education. Children working on separate computers, even if they are side by side, do not perform as well as they would if they were huddled around a single machine (Inkpen 1997).

Furthermore, objects are manipulated in a tangible interface. In educational setting physical objects or props are commonly used to convey meaning. As Gav points out, in a collaborative setting speakers use the resources of the physical world to set a socially shared meaning (Gav 1997). It is true that physical objects support collaboration both by their appearance, the physical affordances they have, their use as semantic representations, their spatial relationships, and their ability to help focus attention. We contemplate, in Augmented Reality there is an intimate relationship between virtual and physical objects. AR applications based on a tangible interface metaphor use physical objects to manipulate virtual information in an intuitive manner. Subsequently, in this way

people with no computer background can still have a rich interactive experience. For example, in the Shared Space interface users could manipulate three-dimensional virtual objects simply by moving real cards that the virtual models appeared attached to (Poupyrev 2000). There was no mouse or keyboard in sight. This property enables even very young children to have a rich educational experience (Billinghurst 2002).

III. Results and discussions

We believe, using AR in teaching a language, a foreign language in particular, is highly effective. Due to its image-bearing feature, using AR instead of realia might be attractive to young learners in order to initiate a discussion, debate, description, definition etc. We contemplate that availability is another asset of AR. One primitive example of it is an application presented by 'Devar', which works with the help of alphabet cards and QR code produced by the company. There are images of animals on each card which represent a specific letter, who show up on the display of a smartphone when directed to it, they pronounce the alphabet letter and their names. For instance, 'B is for - Bumblebee'. We assume that this application can be utilized in primary classrooms for presenting and practicing sounds as well as letters of the alphabet.

Besides, transition from real world to the virtual is smooth while AR is applied. Very often young children fantasize about being swallowed up into the pages of a fairy tale or a cartoon and becoming part of the story. The MagicBook makes this fantasy a reality by using a normal book as the main interface object. People can turn the pages of the book, look at the pictures, and read the text without any additional technology. However, if they look at the pages through a handheld Augmented Reality display, they see three dimensional virtual models appearing out of the pages. The models appear attached to the real page, so users can see the AR scene from any perspective simply by moving themselves or the book. The models can be any size and are also animated, so the AR view is an enhanced version of a traditional three-dimensional "pop-up" book. Users can change the virtual models simply by turning the book pages. When they see a scene they particularly like, they can fly into the page and experience the story as an immersive virtual environment. In the VR view, they are free to move about the scene at will and interact with the characters in the story. Thus, users can experience the full Reality-Virtuality continuum.

IV. Conclusion

To conclude, using Augmented Reality in most spheres of education, such as medicine, physics, mechanics, literature and so forth, has shown its positive outcomes. For instance, merger of real and virtual worlds results in better group work, when a workspace is shared by students. Moreover, straightforward instructions to using the applications allow even those with no computer background to have a rich interactive experience in learning. Withal, the objects registered in AR space give the opportunity to interact with user in real time, granting more detailed meaning that is conveyed. Although applying AR in teaching FL is not yet researched, we propose that it has significant perspective in this field as well. The system can be used to enhance speaking, listening replacing simple visual and auditory aids.

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