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<div align="center">Augmented Reality in Medicine and Education</div>

As technology advances many new technologies have emerged and one of the most exciting ones is Augmented Reality (AR). It has many applications in the medical field and in education that can completely change our approach to learning in each respective field. The use of AR has been rapidly increasing as the technology becomes more available due to its multiple cases of evident success in the learning experience. In the online paper 'The development of augmented reality (AR) in anatomy course. International Journal of Education in Mathematics, Science, and Technology', they explain how many students taking anatomy courses struggle to gain a full understanding of the anatomy of the human due to models being 2d where in real-life humans live in a 3d world. AR was able to bridge this gap and helped students visualize anatomical systems in the 3d space, which drastically improved learning and retention of information. In another research article, 'The effects of augmented reality applications on the academic achievement and motivation of secondary school students. Malaysian Online Journal of Educational Technology', they performed an experiment on 7th graders learning cells and cell division where half of the students used the traditional method of learning, and the other half used AR programs to do the learning. In their research they discovered students performed better on the post-test when learning via AR. In another example of AR in education, 'Augmented reality applications in education: Arloopa application example', they provided students with their program Arloopa and discovered that 90 percent of students found the resource helpful and

recommend it for other students. In a different approach than students using AR in the reserach article, 'Predicting quality of English language teaching through augmented reality competencies and TPACK model components among Kuwaiti undergraduates. Contemporary Educational Technology', they devised a study where they tested undergraduate students, planning on teaching English, in AR competency and determined that the more competent they were with AR technologies the higher quality of English teaching they performed. Lastly in two more articles, 'Augmented Reality in Education: Interactive Classrooms' and 'Augmented Reality and Virtual Reality In Medical Devices', they display multiple sources of AR programs that could be used in education and in medicine in each article, respectively, as well as described each of them. These two sources are what I performed textual analysis on due to their structure and content.

For many years people have been successful using more traditional methods of learning for education and medicine, and those methods continue to be used in schools today as they were long before. With recent improvements in technology, education has begun to shift to new methods one of which being the use of Augmented Reality. Many students fail to grasp hard to imagine concepts like math in the 3-d space for example. The benefit of AR is the ability to visualize concepts in the third dimension as well as provide the ability for hands-on-learning in new ways. Another benefit of AR that is extremely evident in the medical field is the use of models in anatomy. Previously anatomy classes have used life size models to show various sytems but these models are limited due to the intertwining of various organ systems. With AR there are programs that can switch back and forth between multiple systems while keeping the same model as well as allowing views from all angles. Another use provide by AR is medical scans which previously were shown on a 2-d screen or print where in AR they allow for a 3-d visualization that doctors can use to spot illnesses easier.

My goal in this research is to gain more confidence in the resource of Augmented Reality to determine if it should really be adopted by more people. I have performed textual analysis on various sources which have given me insight into the realm of possibilities that AR has to offer. Following, I will structure my paper to have my methods of research, the results I have found from these methods and then conclude my findings to add the critical conversation surround AR. By the end of my research, I will answer what the various benefits and successfulness of Augmented Reality in medicine and education?

My methods for collecting primary data included searching the web for information surrounding Augmented Reality with the intention to perform a textual analysis on the sources that would give me insight into the successfulness of AR as well as provide me with various programs developed with AR to grasp the various use cases that AR provides. To perform my literary analysis, I picked two sources, 'Augmented Reality in Education: Interactive Classrooms' and 'Augmented Reality and Virtual Reality In Medical Devices'. I decided on these sources because of the rich information they provide as they give various AR programs which has helped me understand the reach that this technology has to offer. With each of the sources I analyzed how they were structured and what their goals were by creating them. I followed multiple of the various links displayed on the sites and noted the usefulness of sending me here. As for the other sources I used critical analysis to gain a further understanding into what these sources offered in the sense of Augmented Reality. As I analyzed these sources I continually linked it back to my research question to see if it added towards the discussion in a beneficial way. All in all, the process of analyzing these sources have given me insight into what AR's capabilities are and where it can be used.

Through my textual analysis I have determined that AR has various applications in medicine and education. I found that by using the structure of a list they were able to show various examples of

AR sources. Due to the list structure I have determined that the amount of Augmented Reality Programs is a lot which attests to the wide-reaching capabilities that AR offers. Also, through the textual analysis I determined that AR is a useful tool because if it were not useful then the goal that the list creator had would be non-existent. I believe that making a list of resources shows that the tool is helpful, and the goal of the creator was to provide a helpful resource in finding these AR resources to be used by many people. Through critical analysis of my other secondary sources I have determined that AR has legitimate benefits in education and medicine. The experiments all showed applications of AR and gave evidence that they improved upon our understanding of the knowledge at hand. All in all, AR has been proven to be a helpful and wide-reaching tool.

My answer to the so what question is that AR is extremely helpful, and more people should know about it so that it can be used by more people universally. From my research you can use some of the sources which are catalogs to find AR resources that can help you. As for further research suggestions, I believe people should continue to document ways that AR has helped people as well as research new fields that AR could be used for. For example, from my own experience in construction I could see the benefit of using AR to teach electrical apprentices various principles like visualizing a three-way switch which is almost always confusing for newcomers and was much easier to understand visually.

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