

Dylan Katchen

Dr. J.T. Taylor

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Literature Review

I have collected 6 sources which will give insight into the world of Augmented Reality in education and in the healthcare field. Following I will analyze each source and look at the Credibility, Accuracy, Reasonableness, and Support (CARS model) of each one.

In the first source, Predicting quality of English language teaching through augmented reality competencies, I have determined it is a credible source as the source was peer-reviewed and includes various references in the end of the article. I believe the information is accurate because the research experiment was clearly explained and the results were nicely visualized in a chart for easy understanding. Also, their findings match with other sources they found to compare to. The possibility for bias is minimized through the peer review process. The article includes statements from other sources to support their own findings.

The second source Augmented Reality in Education: Interactive Classrooms appears to be credible as it is from an educational institute. The page was created within the past four years so I believe the information provided to be accurate. There appears to be no bias in this article as it is more of a resource to see various types of Augmented Reality use cases. The website consists of various sources of use cases of AR as support.

In the third source, Augmented Reality and Virtual Reality In Medical Devices. The author is from the FDA which is a known and respected administration, so I am confident the information

they provide is credible as well as accurate. Bias has minimal availability in this resource because this is more like a catalog of use cases of AR in the medical field, similar to the previous source. There are plenty of support links in this source that point to the various AR programs used in the medical field.

The fourth source, The development of augmented reality (AR) in anatomy course covers a study where students use AR in their class and they compare the results with a posttest compared to the traditional way of teaching. I found this source to be credible due to the peer reviews as well as the clear and concise display of their own results. The peer review and the clear display of methods and results ensures the accuracy of this article. There appears to be no agenda influencing the article as well as supporting research that proves the reasonableness of the findings. At the end of the article is a list of sources which support the papers general findings as well as contribute to the overall conversation offered by the article.

In the fifth source, The effects of augmented reality applications on the academic achievement and motivation of secondary school students the researcher discusses their findings of 7th graders using AR for their cell and cell division section of class. They compared the students using AR and the ones using traditional methods. I found this article to be credible with the help of peer reviews. I believe this information to be accurate as the information is backed by a simple study with clear results that are easy to digest. There is no bias as the paper has been peer reviewed which nullifies it from all possible bias. The end of the article includes citations which support the researchers findings and add to the discussion in the paper.

In the final source, Augmented reality applications in education: Arloopa application example the author performs an experiment where he asks students their thoughts on the given AR application Arloopa. This source is credible with the help of peer reviews with multiple

references to support their claims. This study was from 3 years ago so I believe the information is up to date and accurate. There isn't much room for bias as the experiment was clearly explained and had results that could be easily digested as well as the use of other references that support the claims. At the end of the article is a list of the citations used in the research paper to support the own researchers findings.

I will further my understanding by researching what are the various ways AR can be used to benefit society and how effective they truly are? I will personally look at some AR applications and determine the effectiveness of them through trial and report my own findings.

Annotated Bibliography

AlSuwaih, O. E. (2024). Predicting quality of English language teaching through augmented reality competencies and TPACK model components among Kuwaiti undergraduates. *Contemporary Educational Technology*, 16(4), ep534. <https://doi.org/10.30935/cedtech/15486>

This article covers a study performed in Kuwait where they tested the correlation between augmented reality competency and the Technological Pedagogical Content Knowledge (TPACK) model and the Quality of English Language Teaching (QELT). They found that the better the teacher performed with AR competency and TPACK the better the quality of teaching. They found that Technological Content Knowledge (TCK) was the strongest factor in determining the Quality of English Language Teaching. The data was collected from 317 Kuwaiti students by having them answer three questionnaires. Also, it is important to note that there was no difference in results amongst different genders so the application of this study can be more widespread.

I found the information from this source to be credible as all of the sources appear to be from different educational institutes and organizations so the chance that they would directly

benefit monetarily from this field of research is minimal leading me to believe the authenticity. Also, all of the claims he makes in the research were supported by one of the sources or their own research with clearly listed results. This information is relevant because it shows how useful Augmented Reality can be when used for educational purposes. This information will help me draw more conclusions on the effectiveness of AR in the education system as well as explain another use of AR.

“Augmented Reality in Education: Interactive Classrooms.” *Maryville University Online*, 6 Dec.2023, online.maryville.edu/blog/augmented-reality-in-education/.

This source explains Augmented Reality and its various applications across multiple fields. There is a section that describes the multiple benefits of AR like engagement, understanding, and cost-effectiveness to name a few. Then it breaks down different examples of how AR can be used in each field of education revealing a link to the exact resource they are referring to. It continues to show the certain use cases of AR in upper education as well as where to find these resources. Finally, it gives a list of multiple AR resources alongside a description of what each resource accomplishes and where to find it.

This source is credible because it was produced by a university which is denoted by the .edu at the end of the URL. I believe it is credible because the resource makes all of its claims alongside a resource which the claim is derived from. Also, the point of this source is less to make a point of Augmented Reality but more to be a resource to see all of the various applications of AR across multiple sectors of education and work. This will be beneficial as I dive into the applications of AR as this will help me find the many examples to further my research and understanding of the applications available currently with AR and could even point in the direction of new uses that could be available in years to come.

Center for Devices and Radiological Health. “Augmented Reality and Virtual Reality In Medical Devices.” *U.S. Food and Drug Administration*, FDA, 9 June 2024, www.fda.gov/medical-devices/digital-health-center-excellence/augmented-reality-and-virtual-reality-medical-devices.

In this article, the Food and Drug Administration exemplifies the use of Augmented Reality in the healthcare industry. It explains the various use cases of AR in the medical field including mental health treatment, neurological disorder treatment, and surgery planning to name a few. Importantly, they also explain some of the risks that AR brings upon its patients' such as neck pain and eye soreness. Then they list many of the FDA approves Augmented Reality uses found in the healthcare industry. They also speculate about the possible effects of AR on populations which it is important to note as the technology becomes more readily available and is forecasted to increase in uses.

I found this source to be credible because the FDA (Food and Drug Administration) is a generally accepted and credible source. As well as a list of sources on which they determine the basis for their points at the bottom of the article. This source will be extremely relevant to my research because it provides many examples of uses of AR in the medical field. This source is very similar to the second source I cover but instead of giving many example of Augmented Reality in the classroom, this one gives many examples of AR in the medical field.

Hasibuan, S. & Chairad, M. (2023). The development of augmented reality (AR) in anatomy course. *International Journal of Education in Mathematics, Science, and Technology (IJEMST)*, 11(3), 744-754. <https://doi.org/10.46328/ijemst.3282>

In this article the author devises a plan to determine the effectiveness of using Augmented Reality in the classroom to learn anatomy. The article explains how the use of 2d

materials like posters and pages struggle at effectively showcasing the size and structure of different parts of human anatomy. The previous fix for this issue was the use of mannequins however this has limitations as to what they can show as it's hard to show different systems like muscular and vascular in one single mannequin. This is where AR excels as it allows students to quickly visualize different systems on the same 'mannequin'. The researcher found that the use of AR in anatomy was highly regarded across many students and two classes.

I believe this source to be credible because all the claims that they make are directly from their own primary research by having students fill out a questionnaire. All of the claims made can be made simply by looking at the questionnaire results leading me to support the credibility of the research. This adds to the conversation of the effectiveness of Augmented Reality by getting direct feedback from the users. Also, this pertains to both education and healthcare as this research includes teaching students' healthcare principles, anatomy. This is different from the first source because in the first one they use AR to determine the effectiveness of teachers where this source measures the effectiveness of teaching from the use of an AR program.

Özeren, S & Top, E. (2023). The effects of augmented reality applications on the academic achievement and motivation of secondary school students. *Malaysian Online Journal of Educational Technology*, 11(1), 25-40. <http://dx.doi.org/10.52380/mojet.2023.11.1.425>

In this research article they explain and show the results of an experiment on 7th grade students who are studying cells and cell division. One group uses the standard method of teaching with a textbook then the experimental group used an augmented reality resource called CellAR to teach the same subject. In the pre-test they found no statistical difference between the two groups but when they performed the posttest they found that the group that used the Augmented Reality program scored much higher in the posttest compared to the control group.

The experimental group also did a survey stating how they approved of this method of learning and the general consensus was that it was well liked and easy to do amongst students.

I found this research to be credible because all of the points made by the researchers were derived directly from the experiment they ran. The experiment was clearly explained, and the results were organized well for easy understanding which shows they are credible. This research will be extremely beneficial to my own research because it provides a direct case of using AR in education and has results which prove the effectiveness of the method. This source is similar to the previous source but focuses on different subjects which attest to the notion that AR has many uses across the education sector.

Yildiz, Ezgi Pelin. “Augmented reality applications in education: Arloopa application example.” *Higher Education Studies*, vol. 12, no. 2, 18 Mar. 2022, p. 47, <https://doi.org/10.5539/hes.v12n2p47>.

This article is about the research study where they try to find what students think about using Augmented Reality for their education. The study found many positive benefits of using the Augmented Reality and over 90% of students said they would like to use it again. This study referred to the use of the AR program Arloopa .The researchers collected this info about the students thoughts on AR in the classroom. The main point made by this research is that using Augmented Reality in the classroom has many benefits and should be used more frequently.

This research is credible because the experiment was explained effectively and clearly stated all the points and the reasoning for them. Also, this research adds to the current discussion made by other researchers by talking about other findings and comparing it to their own adding to the credibility. This research is similar to the past 2 sources because it investigates the effectiveness

of a certain AR program used by students. The findings are all very similar as well stating that AR programs are more effective in education than traditional methods.