

# Revisión de la realidad aumentada y realidad virtual como impulso a la educación de los estudiantes más jóvenes

Jorge de Jesús Cedillo Gutiérrez

2023-09-28

# Índice

<b>1. Introducción</b>	<b>3</b>
<b>2. Método</b>	<b>3</b>
2.1. Realidad aumentada . . . . .	3
<b>3. Resultados</b>	<b>6</b>
<b>Bibliografía</b>	<b>6</b>

## 1. Introducción

En la era actual, la educación se encuentra en medio de una transformación impulsada por avances tecnológicos que están redefiniendo la forma en que los estudiantes acceden a la información y participan en el proceso de aprendizaje. Entre las tecnologías emergentes que han captado la atención de educadores y expertos se encuentran la Realidad Aumentada (RA) y la Realidad Virtual (RV). Estas tecnologías, inicialmente asociadas con la industria del entretenimiento, están ganando terreno en el ámbito educativo debido a su potencial para ofrecer experiencias inmersivas y enriquecedoras.

La Realidad Aumentada se caracteriza por mejorar el mundo físico con elementos digitales, proporcionando una capa adicional de información y contexto. Por otro lado, la Realidad Virtual sumerge a los usuarios en entornos completamente virtuales, ofreciendo experiencias que pueden simular la realidad o llevar a los estudiantes a lugares y situaciones inaccesibles de otra manera. Ambas tecnologías tienen el potencial de revolucionar la forma en que se imparte y se absorbe el conocimiento, pero su implementación efectiva en entornos educativos requiere una comprensión profunda de sus beneficios, desafíos y mejores prácticas.

En este contexto, esta investigación se propone explorar críticamente el impacto de la Realidad Aumentada y la Realidad Virtual en la educación, examinando estudios relevantes y perspectivas de expertos. Se abordarán temas clave, como el papel de estas tecnologías en la motivación y participación de los estudiantes, sus beneficios en la enseñanza y el aprendizaje, así como los desafíos inherentes a su implementación en entornos educativos. Al comprender mejor cómo la RA y la RV pueden integrarse de manera efectiva en la educación, se buscará proporcionar una base sólida para la toma de decisiones educativas y el diseño de estrategias pedagógicas que aprovechen al máximo el potencial transformador de estas tecnologías en constante evolución.

## 2. Método

Se realizó una búsqueda de artículos con las palabras clave:

- Realidad aumentada en la educación
- Realidad aumentada
- ¿Qué es la realidad aumentada?

Y se clasificaron los resultados de acuerdo a lo siguiente...

### 2.1. Realidad aumentada

1. “Los elementos motivacionales del uso de la tecnología están ya suficientemente probados como para quedar fuera de discusión (Reinoso, 2012) y muchos autores defienden que la tecnología de RA sirve realmente para mejorar la práctica educativa y la comprensión de ciertos aspectos de la realidad por parte de los alumnos. Igualmente se ha utilizado también para proporcionar prácticas a los discentes (aplicaciones médicas) que de otra forma serían imposibles de proporcionar con sujetos reales”. [1]
2. “Otras mejoras vendrán de la mano de aplicaciones que permitan la interacción entre los propios marcadores, esta clase de interacción ya está conseguida y funciona perfectamente (por ejemplo, ARChemistry de Paradox). No se ha encontrado ninguna aplicación gratuita que las implemente, ésta es una de las características que la empresa Aumentaty ha señalado para desarrollar en su próxima versión de su software gratuito Aumentaty Author”. [1]
3. “The incorporation of AR into teaching situations makes it necessary to envisage several principles, such as: designing environments which are flexible enough to ensure that AR

incorporation does not become a technological problem but an educational and didactic issue; assuming the limitations posed by the context; working with curricular contents for the purpose of achieving a penetration level that goes beyond merely marginal aspects, and enabling teachers as well as students to have sufficiently developed digital competences; doing research into the methodologies which can be mobilized within AR; producing multi-platform materials which can be used in various formats; and training the teaching staff in didactic competence so that they can incorporate AR into educational practices and use it to create scenographies that prove enriching in educational terms, and not merely beautiful from an esthetic and technological perspective. These are the aspects around which our research project will revolve. The present paper is going to conclude with the remarks made".[2]

4. "The considerations above allow us to establish a clear difference between AR and VR, since virtual data replace physical ones in the latter, as a result of which a new reality arises. Instead, AR shows two realities overlapping on different information layers in various formats (computer-generated images, video sequences, animations, etc.) in order to shape a new reality which is the one that a person truly interacts with." [2]
5. "Overall, results of the students' surveys and teacher feedback suggest that there are multiple benefits to using this suite of technology for teaching and for learning. For teaching, AR can be harnessed to create a learning experience that is student-centered, and provides opportunities for peer-teaching, collaboration, and one-on-one teacher guidance." [3]
6. "Teachers reported high levels of student engagement with the smartphones, but written survey results from the teachers indicated mixed opinions about the specific impact of the smartphones on student learning. Teachers' surveys indicated a strong feeling about the effectiveness of the probeware for supporting student learning, while the AR was rated more neutrally on this same question. Through analysis of observations, survey responses, and interviews we concluded that, in this use case, AR was most effective as a mode of engagement and as a way of structuring and enhancing the probeware-based activities of the field trip." [3]
7. "Such feedback suggests that AR can provide a powerful pedagogical tool that supports student-centered learning. Given the positive effects of student-centered approaches on higher-order skills such as critical thinking and problem solving (McCombs & Whisler, 1997), these technologies may support the use of sophisticated pedagogical approaches of great benefit to student learning. They can encourage active processing thus helping students to develop deeper understanding, discover gaps in their understanding, and realize the potential for transfer in similar contexts." [3]
8. "Students had no problems at all in learning how to interact with the different masterpieces presented and easily switched among the pictures. They quickly learned how to navigate through the information presented. From the very beginning of the experience, a collaboration nexus among students was established." [4]
9. "The motivation mean scores obtained were  $M = 3.62$  for the augmented reality based learning scenario and  $M = 3.29$  for the course based on slides. A clear improvement on the attention and the satisfaction motivation factors for the learning environment based on augmented reality technology compared with a more traditional learning environment was noticed. These results were supported by a qualitative study where students claimed that an AR learning environment was more appealing and easy to understand than the slidebased course". [4]
10. "We believe that the immersive capabilities of AR helped students maintain higher

levels of attention and interest on the learning content. The higher concentration and memorization levels that students claimed to achieve with AR technology, seems to cause this positive effect on learning outcomes.” [4]

11. “In relation with the usability study, authors were greatly surprised to observe how students were able to quickly learn and use the augmented reality system and the ease with which students overcame the technical problems that arose. Students manifested their interest in continuing using this technology in other courses and at home. Thus, although AR is not mature enough to be used massively in education, enthusiasm of middle-school students diminished most of the barriers found.” [4]
12. “Teachers appreciated the visualization/ virtualization, augmentation, and interactivity affordances offered by AR for integrating ARinE. Some teachers thought that it is easy to find AR resources, while others thought that it is difficult.” [5]
13. “Teachers believed that AR mainly increases students’ interest and engagement as well as it facilitates students’ interaction, understanding, exploration, explanation and experiences that previously were not possible. In addition, they considered that AR supports and facilitates interactive learning and experiential learning as well as visualization and teaching topics that previously were not possible” [5]
14. “On the other hand, these teachers believed that the cost of buying and maintaining AR equipment and resources as well as the lack of AR educational content and resources prevent the integration of ARinE” [5]
15. “One type of AR technologies includes a head-mounted display and/or an additional backpack with computer equipment. The cumbersome and expensive design could cause problems such as discomfort and poor depth perception (Kerawalla et al., 2006). To avoid these problems, current development of AR systems adopts portable technologies that are less obtrusive and enhance a sense of immersion and presence.” [6]
16. “Our analyses and discussions of empirical studies in AR indicated that while augmented reality can be created by integrating multiple technologies and has a great potential to support learning and teaching, there are various issues to consider when AR is implemented in educational settings.” [6]
17. “The t-test result of their post-test scores indicates that the learners’ knowledge related to elastic collision was significantly improved by using the developed AR Physics system.” [7]
18. “The results indicate that the implementation of new technologies in education of virtual and augmented reality improve interactivity and student interest in mathematics education, contributing to more efficient learning and understanding of mathematical concepts when compared to traditional teaching methods.” [8]
19. “Prior to using the AR technology in the learning environment, researchers are encouraged to plan well-structured teaching and learning components encompassing (1) students’ needs, (2) learning objectives, (3 ) the forms of support such as equipment, and (4) the types of learning strategies that suit students’ needs” [9]
20. “The technologies used in particular Augmented Reality must be integrated with appropriate learning strategies for the purpose of making an impact on improving the quality of the learning process. The selection of appropriate learning strategies can influence the success and effectiveness of the technology support used, such as Augmented Reality in education.” [9]
- 21.

### 3. Resultados

Se encontraron 20 artículos referentes al tema, entre los cuales, destaca la postura o iniciativa de tecnología en la que se describe un método como lo plantean los autores x, y, y z. A partir de lo cual, se reconoce que. . .

### Bibliografía

1. Espinosa, C.P.: REALIDAD aumentada y educación: ANÁLISIS de experiencias prácticas. Pixel-Bit. Revista de Medios y Educación. (2015)
2. Cabero, J., Barroso, J.: The educational possibilities of augmented reality. New Approaches in Educational Research. 5, (2016)
3. Kamarainen, A.M., Metcalf, S., Grotzer, T., Browne, A., Mazzuca, D., Tutwiler, M.S., Dede, C.: EcoMOBILE: Integrating augmented reality and probeware with environmental education field trips. Computers & Education. (2013)
4. Serio, Á.D., Ibáñez, M.B., Kloos, C.D.: Impact of an augmented reality system on students' motivation for a visual art course. Computers & Education. (2013)
5. Perifanou, M., Economides, A.A., Nikou, S.A.: Teachers' views on integrating augmented reality in education: Needs, opportunities, challenges and recommendations. Future Internet. 20, (2023)
6. Wu, H.-K., Lee, S.W.-Y., Chang, H.-Y., Liang, J.-C.: Current status, opportunities and challenges of augmented reality in education. Computers & Education. 62, (2013)
7. Lin, T.-J., Duh, H.B.-L., Li, N., Wang, H.-Y., Tsai, C.-C.: An investigation of learners' collaborative knowledge construction performances and behavior patterns in an augmented reality simulation system. Computers & Education. 68, (2013)
8. Dimitriadou, E., Stavroulia, K.-E., Lanitis, A.: Comparative evaluation of virtual and augmented reality for teaching mathematics in primary education. Education and Information Technologies. 25, (2019)
9. Hanid, M.F.A., Said, M.N.H.M., Yahaya, N.: Learning strategies using augmented reality technology in education: Meta-analysis. Universal Journal of Educational Research. 8, (2020)