## AR EDUCATIONAL APP FOR ELEMENTARY EDUCATION

## Literature review

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**IN**

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**1.The History of AR**

The first AR technology was developed in 1968 at Harvard when computer scientist Ivan Sutherland (named the “father of computer graphics”) created an AR head-mounted display system. In the following decades, [lab universities, companies, and national agencies](http://www.augment.com/blog/infographic-lengthy-history-augmented-reality/) further advanced AR for wearables and digital displays. These early systems superimposed virtual information on the physical environment (e.g., overlaying a terrain with geolocal information), and allowed simulations that were used for aviation, military and industrial purposes.

**2. Existing Solution**

Many companies are making AR apps like Byju’s and Akash so that children can learn practically and not by theory but no one has fully made the app yet.

Here are 10 research papers that we have studied and can give you the summary of our project:

**[1] Topic: Augmented Reality and Its Application in Education: A Systematic Survey**

The research paper dives in various types of AR technology, its uses and software/technology used to achieve the AR world. The research paper states that AR is a system in which virtual world is laid over real world and it is interactable in Realtime. There are three types of Augmented Reality - a.) Marker based, b.) Markerless and c.) Geographical. In Marker based augmented reality, the virtual object is placed on a pre-determined marker that is in real world and this gives a very positionally accurate augmented reality. In Marker less augmented reality, the position of the virtual object is determined through sensor inputs like camera, gyro etc, this method is not as positionally accurate as the marker-based method. In Geographical augumented reality, the virtual object is placed using the data from gps, camera and other sensors. The various places where AR can be used in teaching are Electronic Learning, Mobile Learning and Ubiquitious learning. Electronic learning is studying using internet and technology. Mobile learning is studying through smartphones and Ubiuitous learning is studying from anywhere at any time. The various tools that can be used to create AR based application are ARCore, ARkit, Vuforia, Wikitude and Kudanl. Augumented reality can also be used in HMD(Headset mounted Devices), projectors, and iot based devices. The various limitaions of AR based application as listed in the research paper are:

1. AR based gadgets like HMDs, google glasses are very expensice and are not affordable by an average student.

2. Special guidance should be provided to teachers and students who are not in the computer science field to use the AR application

3. The AR based application require a good and stable internet connection to work properly

4. AR based application are expensive to make and hard to maintain

**[2] Topic: Augumented Reality - an Application for Kid's Education**

The research paper gives an example of the use of AR technology to teach kids. It used tools like unity, vuforia and sketchup 3d. Unity is a software used to develop 3d games and other things like AR application. Vuforia is a great AR Sdk that provides with great tracking and realtime 3d object processing. Sketchup 3d is a software used to create and modify 3d objects.The paper divesin creating a app that can be installed on handheld devices like smartphone and tablet. The application is used to teach the 26 alphabets to children using the augumented reality. The application uses marker in real world to track position in real life then place the 3d object in the real world.

Reference – IEEE Xplorer

**[3] Augmented Reality Applications in Education: Teachers Point of View**

As reported in this paper the author describes the view of teacher that what they think of AR as teachers are the common elements in every educational system and plays a key role in integration and acceptance of technology in education in this the author states about that what is AR and how it can be beneficial in many areas like – education, culture field etc. In education it can helps to provide the interface to the student as it connects the real and virtual world and also have special effects like sound etc, and it also decrease the teacher load as the student are learning practically The author also told us about the limitation of AR that children find it difficult to use AR apps and also because of some technical problem, cost, lack of proper tools and many more, it also discuss the issues like: (a) diffusion of AR technology; (b) the need for continuous training; (c) 3D modelling; and (d) teachers’ and students’ involvement in AR applications development. the author has also written about the AR survey conducted with 20 teachers and its outcomes the author concludes that only a small teachers knows about this technology and only few teachers have used the AR apps and without knowing they were AR apps and conclude that the AR apps need to have user friendly interface which teacher of every designation can use whether He/she is using that app first time or not and also it should not bound the students to “pre – packaging” learning experience as knowledge is built through interaction and we should make more advancement in AR technology and it is not feasible to use it in Cultural Heritage

**[4] The application of augmented reality in elementary school education**

In this paper the author reported that how Augmented reality is important in the educational centre and has become the attraction of stake holders to improve the quality of education and tells its advantage that how it improves student confidence and enhance their abilities and how can help certain objects and natural phenomena that are difficult to obtain in real world and will provide a valuable learning experience and also its limitations, affordability, features, uses and challenges it face, some challenges are like these apps mostly operate on mobile and we need to make the app more attractive so that children do not get distracted while learning as using mobile can also harm children and they can become lazy also so it need to be attractive and educative that children love to learn from that app the author concluded this paper by saying that the Augmented reality apps can both have a positive and negative impact and the use of AR apps still has to consider the needs and readiness of students as well as existing readiness such as facilities and teachers ability .

**[5] Implementation of Augmented Reality (AR) as A Teaching Media in English Language Learning in Elementary School**

In this research paper the author tells us about AR as a learning medium in English subject in elementary schools, and how there is a increase in the learning outcome before and after use and teacher and student feel more fun in leaning the author tells us about Medan and how English it teached there from grade 1 to grade 6 and not everyone can grasp the significance of learning and dominating English it tells us about marker base and non-marker basedAR and how AR media stand out for understudies and make learning exercise more viable this paper tells us about the technological developed in making AR and information related to implementation of AR the author also shows the result of pretest and post-test and shows a positive result in increase in student vocabulary he took a total of 22 students and see that 19 student got their vocabulary improved drastically with the help of AR app and it also receive a positive response from the parents because of AR app the children increasing like to learn English and the author end it by concluding that there is an increase in learning outcome by the use of AR app and the use of AR app for learning English is appropriate and according to teachers and student, it is very useful if applied in elementary schools.

**[6] Learning the chemical elements through an augmented reality application for elementary school children**

In this the author tells us that how AR technology will provide multiple advantages in learning chemistryas its often seen as boring course amongstudents due to use of static non-dynamic material and how AR will help as it will allow students to interact with virtual element in real world author also tells us that how Covid-19 has made significance change in our learning as it makes most of our study online and making opportunities for companies to come online and also a step close to AR education, also AR has the potential to improve the quality and fluency of teaching learning, Learning chemistry with this technology allows students to complement the study of various topics, favouring the understanding of chemical elements and the formation of chemical compounds. Here the author tells us about the “Atomik-3D” app which can be used in mobile also and helps to study elements and how this app was developed and all those processes required to make that app and also shows its test result that how it performs the concludes it by sayingthat how successful the app was and how it can become more useful in near future.

**[7] An Educational Augmented Reality App To Facilitate Learning Experience**

In This research paper talked about an AR app to enhance our learning experience and students experience the magical transformation of 2D pictures to 3D perspective with the help of an AR app. Augmented Reality (AR) is making big waves in education, especially among young tech-savvy learners. It's like a magic tool that brings learning to life, sparking curiosity, creativity, and a love for learning. By layering digital elements onto the real world, AR adds a whole new dimension to teaching and learning. Researchers have been exploring AR's potential in education, and the results are promising. Students are grasping complex concepts better, whether it's understanding Geography or diving into Engineering topics. AR is flexible too, fitting seamlessly into different subjects and teaching styles. Teachers are embracing AR as a way to engage students of all ages and abilities. Studies show that AR apps, featuring games and simulations, have improved understanding, motivation, and classroom participation. From elementary to university levels, AR is making learning more enjoyable and effective and Interactive AR systems are also enhancing collaboration in learning environments, offering multimedia resources like videos, audio, and 3D models. Reviews of AR in education highlight its many benefits and foresee a bright future for its integration into classrooms. Recent developments, like Microsoft's AR viewer built into Windows 10, and partnerships with educational publishers like Pearson Education, are pushing AR even further. These innovations promise immersive 3D experiences that will revolutionize learning at all levels. So AR is not just a fad; it's transforming education as we know it. With its ability to make the impossible possible, AR is paving the way for the next evolution of learning.

**[8] An augmented reality app for therapeutic education and suitable for mobile devices with different features**

This research paper talks about using Augmented Reality (AR) to help kids with diabetes learn about how much carbohydrates are in different foods. They made an AR app for this purpose. In the app, virtual food appears on a real plate, so kids can see it like it's actually there. They tested the app on 66 kids with diabetes. These kids were split into three groups, each using a different mobile device. The only differences between the devices were the quality of the camera and the size of the screen. They used two tablets with different camera qualities (one had a 2-megapixel camera and the other had an 8-megapixel camera), and a Smartphone with a smaller screen size compared to the tablets but also with an 8-megapixel Camera. The results showed that the kids learned about estimating carbohydrates using the app. Interestingly, there weren't any big differences in how much the kids learned or how much they liked using the app, no matter which device they used. This means that the AR app worked well for teaching, regardless of the device's features.

**[9] Meta-Review of Augmented Reality in Education**

This paper looks at previous research on AR in education to see what's been found so far. It examines both the good and bad sides of using AR in learning. One key focus is on how AR apps are designed and how users interact with them, especially in terms of teaching methods and user engagement .The paper suggests that there's a lot of potential in AR for education, but there's still more research needed. It highlights the importance of considering how AR can make learning more comfortable for students and easier for teachers to manage content .In the future, the paper suggests exploring other factors that might affect learning with AR, like how it can help teachers deliver lessons and how it affects students' cognitive and spatial skills. It also suggests looking into what kinds of content work best with AR and using personalization or recommendation systems to tailor the learning experience to each user's needs. Overall, the paper shows that while AR holds promise for education, there's still work to be done to fully realize its benefits. Augmented reality (AR) has been around for a long time, but it's only recently become widely available to people, thanks to affordable Smartphones. While studies have shown that AR can help students learn better, we're still not sure exactly how it compares to other ways of teaching.

**[10] The Feasibility Study of Augmented Reality Technology in Early Childhood Education**

This paper talks about using a cool technology called augmented reality (AR) in early childhood education. AR can make learning more fun for kids by creating virtual stuff in real life. By analyzing AR in early childhood education, the paper suggests that AR can recreate learning scenes and materials, making learning more engaging and effective for young children. It highlights that AR has solid theoretical backing and technical support for use in early childhood education, and predicts that it will be widely used in kindergarten classrooms. The paper finds that using AR in teaching young children can boost their excitement for learning and help them learn faster and better. Overall, it suggests that AR has great potential to improve early childhood education and make learning more enjoyable for kids.

**3. Review Summary**

These research papers collectively explore the diverse applications of augmented reality (AR) in education, revealing its potential to enhance learning experiences across various subjects and age groups. They address the benefits of AR, such as improved engagement and understanding, while also acknowledging challenges like cost, technical requirements, and the need for teacher training. Despite these obstacles, the papers suggest that AR holds promise for transforming traditional educational methods and creating more interactive and effective learning environments. Overall, they provide valuable insights into the current state and future potential of AR in education, encouraging further exploration and development in this rapidly evolving field.

**4. Problem Definition**

Our main highlight is to make children’s study with a practical approach rather than a theoretical approach and to make up with that AR app are best as we can see a problem that while studying Organic chemistry there are 3D bonds of carbon and children find it difficult to understand and with the help of AR, they can understand it in 3D and which helps them to understand the concept easily.

**5. Goals**

Our goal is to provide the children of elementary classes a new vision of learning as it the building stage of every concept and most children find it boring to learn so with the help of interactive designs and models in AR app the children will be able to concentrate more on studies and can understand everything easily.

**References:**

[1] https://ieeexplore.ieee.org/Xplore/home.jsp

[2] https://www.ijert.org/

[3]https://www.mdpi.com/2227-7102/9/2/99

[4]https://rsdjournal.org/index.php/rsd/article/view/12823

[5]https://obsesi.or.id/index.php/obsesi/article/view/3398

[6]https://www.syncsci.com/journal/AMLER/article/view/AMLER.2022.02.018

[7]<http://ieeexplore.ieee.org/document/8079771/>

[8]<https://ieeexplore.ieee.org/document/8820825>

[9] <https://ieeexplore.ieee.org/document/8534888>

[10] <https://ieeexplore.ieee.org/document/8845339>