AR and VR in Special Education

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***Abstract*— As we are moving towards a new technology era AR and VR plays a huge role in helping students with special education needs AR and VR are the technology with which we can be completely immersed in a digital world with help of these technologies we can use them and they provide quite a good impact on lives on these students they can learn In a safe and healthy environment regardless of the factors where they lack AR and VR technologies keep on getting cheaper and they are easy to use but there are still some factors where we need to work on so that we can use these technologies in more efficient way.**

***Index Terms*—Augmented reality (AR), Virtual reality (VR), Special Educational Needs (SENs)**

I. INTRODUCTION

Augmented gives an interactive experience through its use of a real-world environment where the objects are added into the real world including visual, Auditory, and Olfactory with the help of the combination of a real, virtual world, and using real-time interaction. AR works when computer search for the markers to interact when a computer comes in contact with the marker it can be (barcode , images , text) computer starts to play digital video audio or text Virtual Reality is a simulation of another world the user can experience a different world from the real world a person can put on his headset and experience the virtual world special education is educating students in a way such that their disabilities don't stop them in this special education the students are provided with their own special needs to make them understand better The user of the VR feels totally driven into the digital world on the other side AR superimpose the digital environment bringing digital elements to our real world the only thing in VR education are Learners meanwhile in some cases the special needy children does not require a whole new environments there are various way we can use AR and VR in special education we can bring books and other study resources by adding 3d images and sound and videos too which will help the teacher and students and well the special education needy children to understand without facing any issue in their visual or hearing impact and our brain find images and videos more interesting than simple text we can also customize our own AR and VR tool for the children with their own needs children can have different-different types of need with the help of this technology we the teacher have the potential to change their ways of teaching and accommodate themselves as the requirement of the children's.

II. LITERATURE SURVEY

As we are moving towards a new era and getting involved in different types of technology we Ar and Vr play a significant role for the children who are needed with some special care and education ways this is a can be very helpful for the students It has been said that the children with special educational needs should get the same opportunities AR and VR have come in handy in this case Students have regularly reported that virtual reality in the classroom is inspiring and fascinating. Immersive VR immerses learners in a virtual world, allowing them to freely walk around and interact. Its ability to bring people together over long distances could assist to overcome the drawbacks of online and distance education. A developmental disability characterized by deficiencies in social and communication skills necessitates the use of special education. By taking into account the student's unique traits, the importance of creating a personalized education program is underlined. Learning outcomes are influenced by interactive technology like 3D virtual technologies. SEN (Special Education Needs) is a term used to refer to children who have learning disabilities and require specialized support. These children are included in the F81 category, which recognizes their unique needs and provides appropriate educational interventions. The three main

types of learning difficulties commonly associated with SEN are dyslexia, dysgraphia, and dyscalculia.

Each child with SEN presents a distinct set of weaknesses and difficulties. The degree and impact of these challenges may vary widely, ranging from mild to severe. It is crucial to recognize that these difficulties are not indicative of a lack of intelligence or potential. Instead, they reflect specific areas in which the child may require additional assistance and alternative teaching methods to reach their full academic potential.

In recent years, virtual reality (VR) technology has emerged as a promising tool in the field of education. Devices like Oculus Rift, HTC Vive, and Samsung Gear VR have gained popularity and have started to find their way into classrooms. VR provides immersive experiences that can significantly enhance engagement and motivation among students, including those with SEN.

One significant advantage of VR is its ability to transport users to inaccessible environments. By replacing the current reality with virtual surroundings, educators can overcome the logistical and cost constraints associated with activities like field trips. Students can virtually visit historical sites, explore distant locations, or even experience simulated scenarios relevant to their learning objectives. This capability opens up new possibilities for hands-on and experiential learning, enabling students to engage with subject matter in a more interactive and memorable way.

Spatial memory is another area where VR can positively impact education. Immersive VR environments allow learners to navigate and interact within virtual spaces, improving their spatial awareness and understanding. This can be particularly beneficial for students with SEN, as it provides them with a tangible and interactive learning experience that supports their cognitive development.

Moreover, virtual reality (VR) has demonstrated potential in training individuals in empathy. Through immersive virtual experiences, VR enables users to virtually inhabit the lives of others, allowing them to gain a more profound comprehension of different perspectives and experiences. This potential has been acknowledged by developers and educators, resulting in the creation of top-notch VR experiences that aim to cultivate empathy and foster understanding. Notable examples include Anne Frank House VR, Driving While Black, Notes on Blindness, and Stanford University's Becoming Homeless: A Human Experience. These experiences hold significant value in promoting inclusivity and empathy among students, including those who do not have special education needs (SEN).

Another significant advantage of VR is its potential to facilitate distance learning. VR technology has the capacity to overcome the limitations of traditional online learning and distance education practices. By providing immersive environments where students can interact and collaborate, VR can create a sense of presence and connection, bridging the gap between physical distance and facilitating meaningful interactions. Multi-user virtual campuses have been explored as potential platforms for distance education, offering students the opportunity to meet, work together, and engage in collaborative learning experiences.

In addition to VR, augmented reality (AR) environments have also been developed to cater to the needs of individuals with special education needs. AR overlays digital information onto the real world, allowing users to interact with virtual elements in their physical environment. These AR environments are designed to provide tailored support and accommodations to individuals with SEN, assisting them in various educational tasks and promoting their learning and development.

Within the framework of special education, the Special Education Application Center's program covers a wide range of subjects and areas of The program encompasses a wide range of subjects, including mathematics, reading and writing, physical education, visual arts, music, cultural and religious studies, ethics, social studies, language and speech development, nutrition education, social adaptation skills, and traffic and first aid education courses. This holistic approach ensures that children with special education needs (SEN) receive comprehensive support not only in academic areas but also in social,

emotional, and practical skills that are crucial for their overall growth, well-being, and development.

In summary, SEN encompasses children with learning disabilities who require specialized support in their educational journey. VR technology, such as Oculus Rift, HTC Vive, and Samsung Gear VR, has shown promise in enhancing education for students with SEN. It can create immersive and interactive experiences, overcome physical limitations, promote spatial memory, foster empathy, facilitate distance learning, and provide tailored support through AR environments. By leveraging these technological advancements, educators can create inclusive and engaging learning environments that cater to the unique needs of children with SEN, empowering them to thrive academically and personally.
Educators are keeping looking for tools that can be used by them to educate the children with special education needs as we are moving forward in the new technology era educators are finding a good and not too complex and cheap tools that can be used to help children so they don't fall behind other children's

III.GAPS FROM THE LITERATURE SURVEY

1. When it comes to SEN it comes very to a difficult task cause SEN can different there could be different-different disabilities and may vary from person to person
2. AR and VR tools are very expensive
3. AR and VR tools are very complex for normal people to understand
4. There are social environment factors affecting SEN

IV. TOOLS

Educators are constantly looking for an upgrade in technology so that they can be more expressive to their students so that their students can grasp each and every concepts taught by the teachers and AR and VR has given them a ray of hope make their students understand more the students who require special education with the help of technology It came possible for them to understand better and it came very handy when it was performed in real life it passed with flying colors and some of the tools are Merge Cube it is a mobile application with the help of it students can interact with the virtual world providing them an amazing interface and awesome experience students can watch fossils and experiment with simple machines not this students can hold them in their palms proving an Cospace Edu With this mobile application students can learn to code they can add audio video they can access this application with the help of phone tablet it makes it quite handy they can add their own 360 view and access it

Figure 1 Merge cube

Assemlr This tool can be used by the students and they can be a content creators as well they can access the content of the other students and they can deep dive in the ocean, Planets, and how to do exercises in the the correct way Narrator AR with this application students can practice their handwriting virtually with will also help them in finding what is the correct way to write the word and direct them

Figure 2 Assemlr App

Wonderscope With this application Students can interact with the stories Argument Classroom let the students can explore differently activates learn about geometry, and weather visit historical landmarks check on different types of animals and plants this one is the most interactive one yet with lots of diversity and knowledge to explore not only this helps the children to understand better and it's quite easy to work with it also help students to learn more about the wildlife and other activities whole class can take part in these activities and most importantly it will also have a safe environment.

Figure 3 Wonderscope App

Microsoft HoloLens is developed for the medical can understand the human body and can use this to understand different cases and anatomy of human this is very easy to use and with this, we don't need human bodies to learn medical students children with disability can use this app and understand human anatomy without going through so much pain

Figure 4 Microsoft hololens

Learning languages can hard when it comes to theoretically but with the help of Mondely students can learn any languages with this it's easy for them to understand and when comes to it also provide support for communication with the other people virtually and It's quite important feature cause when learning with this app students can interact with the languages they have learnt it will give them a nice support when it comes to practical and they don't have to worry about their skills cause with this it will truly enhance their real life applications and its quite important for anyone to express themselves

Figure 5 Mondely app

Froggipedia is an app with which students can explore the internal organs of the frogs which is very very important for biology students and with the help of this life of frogs can be saved

Skyview app is one of the amazing apps this app helps students to learn about the sky and stars and identify the planet and different types of things present in the space

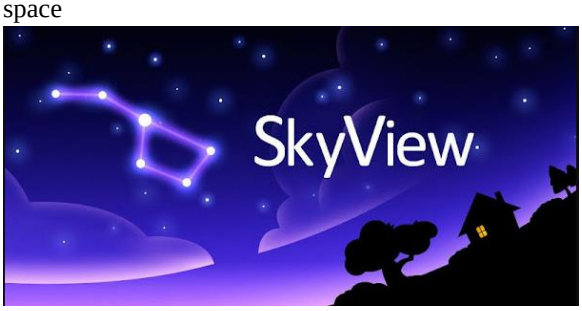

Figure 6 SkyView App

According to Lin & chang, AR is a technique that can be used to link digital info into real-world by previewing its computer-based objects
according to Grubert et al. with the help of AR, we can change the size of the image dimensions and will help in different prospective Browder et al proposed that for effective methods in the field of special education

we can use AR for better learning according to Organ these methods can be used for learning environments cause due to lack of resources it also enhances the teaching method AR has provided ultimate support

In the realm of special education needs, Choi and Baek employed 3D virtual reality (VR) technologies with a particular focus on interactive features. Their research highlighted the significance of utilizing interactive technologies in this context. Similarly, Cihak et al. conducted studies involving the use of iPod video to enhance transition skills in students with Autism Spectrum Disorder (ASD). The results indicated that the students demonstrated increased independence during transitions. Another application explored in special education is the utilization of web-based iPod applications to present pictures to students with ASD in a specific order. Additionally, augmented reality (AR) technology has the capability to create educational content that integrates virtual objects into the real world, offering real-life or near-real-time learning experiences. This enables virtual objects to be seamlessly incorporated into the same space as the physical world, enhancing educational opportunities.
Veronica Lewis uses Chromecast to teach physically disabled learners sue Parton showed how can deafened children can be helped with the help of google glass molly porter uses AI-based training with which she helps her student to interact with the interviews so they don't lack behind cause of their disability In late 2020 the new category was made with the mobile are cheaper to afford and are easy to carry not only this mobile drags the user completely into the virtual world the pc though require more price to pay and require more amount of efforts and they are not easy to carry around and when it comes to mobile the hardware keeps on changing months to months providing an ultimate change in the hardware and keeps getting upgrading to meet the requirement of the technology on the other hand pc upgrade in hardware cost more than a mobile phone upgrade and sometimes it takes a month for an upgrade to come up and with this new category the virtual classroom gets another positive impact on the classroom cause everyone can afford a mid-ranged priced device.


Figure 7 google expeditions

Google Expeditions is a VR-based application that can be used and can take the whole classroom on a virtual trip it takes the user into a fully immersed virtual world with 360 videos and different angles and location-based shots and Vent (Virtual Environment Interactions) is a visual programming tool designed specifically for high school girls to foster their interest and participation in STEM fields. It combines elements of dance, computational thinking, and embodied interaction. The main objective of this system is to empower girls in exploring STEM disciplines. During a summer camp held at the high school, participants were tasked with creating a dance program using programming techniques. They utilized the Oculus Rift HMD to control their avatars within a virtual environment, enhancing their understanding of programming concepts and promoting engagement in STEM-related activities.


Figure 8 htc oculus

Figure 9 Google expeditions

V.CONCLUSION/FUTURE WORK

Working with special education is not an easy task but with the help of technology we got just enough resources to get started and it but there are some parts where AR and VR lack most common part is these technologies are not cheap for everyone to buy and get started with now when it comes to this there are a lot of people who are not aware of the fact that these technologies do exist and it would be not a lie if I say even in 2022 there are people who can't afford a smartphone so how they going to use these technologies to children who are not in a good financially family can't afford these technologies the best they can do is rent on the duration of time school should have a special area for AR and VR, especially for the kids who face difficulties and now it has come to this.

These technologies require a lot of resources like Good internet speed and some high-hardware requirements a lot of services and properly take care of these.

At some part, we are using these technologies but they are not specifically designed for disabled students this factor requires work on

The hardest part of this is that this technology changes from student to student cause, not every student faces the same disability this is the key point we need to work on a part where each student can use some sort of same types of equipment and thus we can also reduce the amount as well we can save resources too and there are some disabilities where we need to focus on other disabilities too And some students don't find themselves comfortable when they have to use technology Best example is A VR headset some people find it quite difficult to keep them on for hours and it's true being in a virtual environment for many hours can do some negative impact on our mind and body too some research found being in contact with a computer causes our brain focusing power as well it also changes the person behavior sleep and many more negative impact can be seen and students could harm their eyes too and sometimes the damage could be cause permanent damage.

VI REFERENCE

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