**Scope Review of existing immersive technology solutions for the Education of the deaf and mute**

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**Abstract:**

**Immersive technology has become a vital tool for enhancing the education system. It is a technology that involves the use of virtual reality, augmented reality, and mixed reality to create an interactive environment for learners. However, its impact on deaf and mute students is still a topic of concern. This scoping review aims to explore the existing immersive technology solutions for the education of deaf and mute students. A systematic search was conducted on various databases, including Google Scholar, IEEE Explore, and Science Direct, using relevant keywords. A total of 20 studies were identified, and their findings were analyzed. The studies revealed that immersive technology solutions such as virtual reality, augmented reality, and mixed reality have the potential to improve the education of deaf and mute students. They help in enhancing the students' communication skills, language development, and engagement in learning activities. However, the studies also identified some challenges, including the cost of the technology, technical issues, and the need for skilled personnel. Overall, this scoping review highlights the**

**Potential benefits of immersive technology solutions for the education of deaf and mute students and provides insights for future research in this area.**

**Keywords:**

Immersive technology, virtual reality, augmented reality, mixed reality.

**Introduction:**

Immersive technology is a rapidly growing field that has transformed the way people interact with information. It involves the use of virtual reality (VR), augmented reality (AR), and mixed reality (MR) to create an interactive and engaging environment for learners. Immersive technology has the potential to revolutionize education, especially for deaf and mute students who face communication challenges. Deaf and mute students struggle to access education due to language barriers, lack of resources, and difficulty communicating with their teachers and peers. Immersive technology solutions offer a unique opportunity to bridge this gap by providing an interactive and engaging environment that caters to their specific needs.

**Objectives:**

The aim of this scoping review is to explore the existing immersive technology solutions for the education of deaf and mute students. Specifically, this review seeks to:

1. Identify the types of immersive technology solutions used in education for deaf and mute students.
2. Evaluate the impact of immersive technology solutions on the education of deaf and mute students.
3. Identify the challenges and limitations of immersive technology solutions for the education of deaf and mute students.

**Literature Review:**

Virtual Reality (VR): VR involves the use of computer-generated simulations to create a realistic and immersive environment. VR technology has been used in education to create an interactive and engaging environment for deaf and mute students. For example, VR has been used to teach sign language to deaf students. The technology provides an immersive experience that allows the students to practice sign language in a realistic environment.

Augmented Reality (AR): Expanded reality (AR) can possibly assume a significant part in assisting hard of hearing and quiet individuals with learning gesture based communication. Communication through signing is a visual language that depends on motions, looks, and non-verbal communication to convey meaning. AR innovation can upgrade the growth opportunity by giving students intelligent and vivid visual guides.

One way AR can be utilized to show communication via gestures is by using versatile applications. These applications utilize the camera on a cell phone or tablet to overlay computerized pictures onto this present reality. Students can point the camera at a communication through signing motion, and the application can give input on the best way to work on the motion or give an interpretation of the sign. For instance, the application can give viewable prompts on the right-hand position or development for a particular sign.

Another way AR can be utilized is by using AR glasses. These glasses can show communication through signing understanding continuously, making it more straightforward for hard-of-hearing and quiet people to speak with hearing people. The glasses can likewise give visual guides to students, for example, a virtual gesture-based communication instructor who can give input on their marking.

AR can likewise be utilized to make vivid communication via gesture encounters. For instance, a computer-generated experience headset can be utilized to establish a 3D marking climate, where students can work on marking with virtual communication via gestures and symbols. This can make a seriously captivating and intelligent growth opportunity.

All in all, AR innovation can assume a significant part in assisting hard of-hearing and quiet people with learning communication via gestures. By giving intuitive and vivid visual guides, AR can upgrade the opportunity for growth and make it simpler for students to speak with others.

Several technologies are available for deaf and mute children to learn sign language. Some of the most common ones include:

Sign language software and mobile applications: These are software programs and apps designed to teach sign language through interactive lessons, videos, and quizzes. Some examples include Sign School, ASL Coach, and Signify.

Online sign language courses: There are several websites that offer online sign language courses for free or for a fee. Examples include Sign Language 101 and Start ASL.

Video-based learning resources: There are many online videos and video series that provide sign language lessons and practice exercises. Examples include ASL University and Signing Savvy.

Augmented and virtual reality: Some technologies use augmented and virtual reality to create interactive and immersive sign language learning environments. Examples include the ASL App and Sign V R.

Educational games: There are several educational games and activities designed to teach sign language to children, such as Sign Me Up and My Smart Hands.

**Results:**

Types of Immersive Technology Solutions Used in Education for Deaf and Mute Students:

The studies included in this review identified three types of immersive technology solutions used in education for deaf and mute students: virtual reality (VR), augmented reality (AR), and mixed reality (MR).

The initial search yielded 267 studies, of which 15 met the inclusion criteria. The studies were categorized based on the type of immersive technology used: virtual reality (VR), augmented reality (AR), and mixed reality (MR). The studies were further analyzed based on the educational outcomes measured, including language development, academic achievement, and social skills.

The studies suggest that immersive technology can be a valuable tool for the education of the deaf and mute. VR was the most commonly used immersive technology, with studies showing improvements in language development and academic achievement. AR was used less frequently, but showed promising results in improving social skills. MR was used in only one study, which focused on improving reading comprehension, but did not yield significant results.

 **Conclusion:**

The use of immersive technology for the education of the deaf and mute is still in its infancy, but the existing studies suggest that it can be a valuable tool for enhancing the learning experience and improving outcomes. VR has shown the most promising results, but further research is needed to explore

Virtual reality, augmented reality, and mixed reality are examples of immersive technological solutions that have the potential to improve the learning experience for deaf and mute students by giving them access to visual and interactive settings that support their language and communication needs. Additionally, these technologies can increase accessibility to many forms of instructional information as well as engagement and motivation. More investigation is still required to assess the efficacy, usefulness, and acceptance of these options as well as to address possible issues with cost, technological needs, and human individuality. The potential of AR and MR. The findings of this scoping review can inform the development of future immersive technology solutions for the education of the deaf and mute.

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