

# Exploration of special children education based on AR technology

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**Abstract.** Augmented Reality (AR) is a nascent technical advancement that enables the seamless amalgamation of real-world and virtual-world data. The notion of materializing virtual information to enable its perception by human senses is a subject of significant scholarly interest, resulting in a perceptual experience that transcends the confines of conventional reality. Because of the popularity of augmented reality, artificial intelligence, and Internet support, distance learning systems with contextualized learning, gamified learning, and collaborative learning will empower all traditional classrooms or home education, rapidly adding massive learning resources. This research evaluates the current literatures related to AR as well as the influence and efficacy of AR on the education of special needs children, such as hearing impairment, intellectual disability, autism, emotional-behavioral disorders, etc. The purpose of this research is to uncover the benefits and challenges of AR, as well as recommendations and future directions, by studying pertinent situations.

**Keywords:** Augmented Reality (AR), special children education. learning environment.

## 1. Introduction

Augmented reality (AR) is an innovative technical advancement that overlays digital information onto tangible items or geographic areas, therefore augmenting and enriching the overall user experience. Virtual reality (VR) is an advanced technical innovation that generates a fully immersive and computer-generated environment. Various academic fields, including as medical, marketing, education, and fashion, are now engaged in the exploration and use of augmented reality technology to facilitate the amalgamation of real-world and digital information [1]. Education combines AR technology to create initially specific situations that fully utilize the senses of smell, hearing, sight, and touch to fully immerse the learner in the intended context [2]. The evaluation of exceptional individuals consists of receiving increasing attention and focus from the education community. The assessment of persons with special needs encompasses an important means of determining the starting point of rehabilitation concerning the provision of education for children with special needs is the topic at hand., as well as an essential method of testing the value of rehabilitation education for children with certain criteria. The aim of this research is to illustrate the applications and challenges of AR in special education through case studies, especially the practice in conditions such as Disorder of Attention Deficit Hyperactivity (ADHD), hearing impaired populations, and autism and to look forward to the directions and opportunities within the domain of special education. In this paper, it explored the potential of AR as an educational tool for children with unique needs or impairments, reviewed existing literature on AR in special education, and

discussed the challenges and restrictions on the utilize of AR in particular education. This paper can provide certain reference value for practitioners in the special education industry.

## 2. Literature review

The utility of Augmented Reality (AR) applications has been shown across several fields used in the education and treatment of Individuals with disabilities. Augmented reality portals give the appearance of moving to another area. This is useful for children with ADHD who need to switch activities (for example, in augmented reality mode, these children can engage with multiple 3D models) or settings during breaks in the learning process [3]. A volunteer (male, 21 years old) with Autism Spectrum Disorder (ASD) evaluated the built AR portal, confirming that it may help him alleviate anxiety and experience a state of tranquility and relaxation, and shift attention drawn to troublesome situations.

AR has not been used in different areas of education for many years. AR has developed a gesture for hearing impaired children to see sign language words through the use of a printable template, with the option to perform quizzes to assess what the children have gained from the learning module [4]. Designed and adapted for the hearing impaired (school age children).

AR has shown promising results for adolescents with cognitive impairments. AR intervenes with teenagers with cognitive deficits. The findings revealed that for all three students, there was a functional link between the accurate replies given during the probes and the execution of the AR intervention. There was a subsequent stage also carried out to assess the maintenance the results, which revealed the presence of a good maintenance impact. A novel training approach using augmented reality has been developed by researchers to enhance the acquisition of essential life skills among youngsters diagnosed with autism. A pedagogical approach is suggested whereby youngsters acquire new abilities via the use of pertinent terms or phrases within an interactive setting [5]. The intervention program's social validity was also evaluated, suggesting that it was practical and helpful [6].

Education in the realm of Augmented Reality (AR) technology is fun and educational, and the use of various strategies has the potential to significantly enhance students' motivation and captivate their attention for a long time. There are also some challenges or obstacles that need to be considered. The practical use of AR applications, should always stand in the children's position to consider the problem, using AR technology for children to enhance the presentation of educational material, it is necessary to use effective strategies, AR apps are mostly used by youngsters. Increasing numbers of augmented reality (AR) devices are being introduced gestures, speech. The augmented domain presents several novel characteristics, such as eye tracking, motion tracking, and other mechanisms that enhance information interaction. Augmented reality (AR) devices has the potential to be well-suited for a variety of applications, a wide range of natural circumstances, such as sound as well as brilliant radiance conditions that give high requirements for display resolution. Synthetic haptic input technology for users in real environments still needs to be improved.

## 3. Case studies

### 3.1. Case study: Enhancing daily life skills learning for children with ASD through augmented reality

**Introduction:** In this case study conducted with a novel training method is developed that uses Augmented Reality (AR) to help children with autism acquire daily living skills. The approach suggests an interactive environment in which the children learn new abilities by employing appropriate terms or phrases. Our purpose is to assist autistic children with quick interaction learning and proper behavior repetition.

**Methods:** The study included 21 teachers who working at the Ghada Almedinah Autism Children's Centre. A personalized plan is developed for each youngster is classified according to their individual IQ. The data was collected through the Google Docs online survey tool. Design a simple program architecture where the camera captures images, renders modules combine virtual components and original images, and then render enhanced images on the monitor. Using children's familiar environment as a mobile application, there is also audio interpreting the current interactive card.

**Results:** The initial results of the functional tests and the opinions of psychologists and teachers show that this approach is effective.

**Conclusion:** This case presents an Augmented Reality technology based on marking that uses mobile devices. Its main advantage compared to expensive devices is the use of affordable gadgets. Since this first investigation, our objective is to investigate the use and efficacy of personalized apps specifically developed for individuals diagnosed with autism.

### *3.2. Case study two: Using an augmented reality game to teach three junior high school students with intellectual disabilities to improve ATM use*

**Introduction:** This case conducted individuals with Intellectual Disabilities (ID) may struggle with everyday life chores. Individuals with ID require autonomous automated teller machine (ATM) abilities in addition to other daily living responsibilities.

**Methods:** The experiment was carried out by three middle school pupils in a special education class. We used augmented reality (AR) technology to make ATM training more entertaining. To establish the association between game-based treatments and independent ATM use, a varied baseline layout was utilized.

**Results:** The data showed that the proportion of correct task steps increased for all three subjects. According to the results of the social validity test, teachers believed that the augmented reality (AR) game was extremely useful and helped students acquire ATM skills effectively.

**Conclusion:** The overall performance of the three research participants improved following a post-intervention mandatory performance intervention. While we are utilizing a slot machine simulator rather than an actual slot machine, the simulator's great realism is appreciated. This simulator's extreme realism appears to be beneficial to pupils studying the slot machine skills courses in the course.

### *3.3. Case study three: Exploring the effect of an augmented reality literacy programme for reading and spelling difficulties for children diagnosed with ADHD*

**Introduction:** The case started with children afflicted with Attention Deficiency Hyperactivity Disorder (ADHD) experiencing difficulties associated with three main symptoms: hyperactivity, distraction and impulsiveness. The primary objective of the AHA (ADHD-Augmented) project is to examine the effects of digital therapies on the reading and writing abilities of children who are diagnosed with polymorphism and are enrolled in the pilot trial. The AHA project aims to implement an evidence-based intervention to strengthen existing literacy courses by enhancing AR capabilities, by doing so, it improves the reading and spelling abilities of youngsters with motor impairments.

**Methods:** The study conducted a pilot research was conducted with a cohort of 117 youngsters.. Data were administered to children at every level of both WWL(Wordsworth Learning) and WWL-AR(Augmented Reality Wordsworth Learning) interventions were analyzed. The AHA (ADHD-Augmented) system is designed to implement evidence-based interventions to study the quantitative and qualitative impact of AR on literacy and spelling performance in learning environments and level of participation in assignments in scholars diagnosed with multiple mobilities.

**Results:** Such investigations may yield more trustworthy data on the efficacy of AHA remedies than the standard WWL protocols and control settings. The AHA system was evaluated using a pre/post-test research methodology, with no extra follow-up assessments planned. Given that studies have demonstrated that long-term recall of academic information is an intrinsic benefit of the AR system, upcoming research must explicitly analyze the influence of AR on the mind preservation, particularly within the realm of language education.

**Conclusion:** This research investigates the effectiveness of the AHA system in facilitating the enhancement of reading abilities in a group of youngsters who have been diagnosed with Attention Deficit Hyperactivity Disorder (ADHD). To evaluate the influence of AR solutions, future study in the field of language training should include bigger sample numbers and use more rigorous approaches.

#### 4. AR challenges toward special education

Augmented Reality technologies, which are always growing, are transforming the way we aid learning. Recognizing and learning about such technologies can benefit children with special educational learning and advancement [7]. The combination of AR technology and special education has its inevitability and feasibility, but there are many practical dilemmas in applying the immature and perfect technology to the complicated special education. The main challenges are AR technology is limited by limitations from economic and educational perceptions. Specific variants: AR products are expensive. Currently there are many types of main display devices for AR technology, which can be PCs, iPads, etc. or smart glasses, etc. The more satisfactory delivery methods are basically visual, and devices such as smart glasses are popular in the education of special populations, but they cannot be popularized because of their high price. Another aspect to consider is that there are several categories of special populations, each of which is graded to varying degrees. It is challenging to accomplish fairness and individualization of education through the use of AR technology in the face of a wide range of special groups [8].

#### 5. Conclusion

Overall, AR offers a wide range of applications for assisting therapy, intervention, and education for exceptional children. Research findings indicate that the integration of augmented reality (AR) educational technology has been shown to provide beneficial outcomes for kids who possess specific educational requirements. It is noteworthy that the application of AR technology in the incorporation of specialized educational initiatives has the capacity to augment academic accomplishments and instructional contributions for pupils. It helps students to acquire skills, improve learning achievement and societal interplay, encourage learning zeal and self-assurance, as well as motivation, enhanced memory, individualized instruction, and autonomy. Another potential question is whether there is a child-centered learning environment for children with unique educational challenges.

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