

How can AI Empower the Prosocial Behaviors of Children with Special Needs in Inclusive Education?

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Abstract: Prosocial behavior development is crucial for social integration and mental health of children with special needs. Inclusive education is seen as the ideal placement for these children and can support such development, but in practice it makes it hard to get good results because the support is insufficient and teachers often lack training. AI technology offers a new pathway to develop prosocial behavior in these children and can help overcome barriers in the inclusive education practice. We examine current research on prosocial behavior in this population. Then we focus on AI technology with empowering potential, analyzing how assistive technologies, adaptive learning systems, chatbots, and virtual reality can promote expression and development of the prosocial behavior. These tools provide personalized learning pathways and barrier-free communication methods and they create safe social scenario simulations and give continuous emotional support. However, AI empowerment also brings multiple challenges. It is worth noting that this research can provide reference for promoting inclusive education development and helping develop social skills of children with special needs with AI.

Keywords: Artificial Intelligence (AI); Inclusive Education; Children with Special Needs; Prosocial Behavior.

1. Introduction

In principle, inclusive education is accepted because it can reduce discrimination and build a society that includes everyone, and it should provide fair educational chances for all children [1]. But around the world, inclusive education faces some difficulties. For example, teachers may not be well prepared and there is a lack of resources and support systems [2]. In China, the "learning in regular classes" policy also has serious problems. The quality of education is uneven, and regional development is not balanced. Also, social participation is low [3]. This poorly supported environment can limit the educational benefits for children with special needs and it also makes it hard for their social development in the long term, especially for the formation of prosocial behavior. Prosocial behavior means voluntary actions to benefit the others. It includes altruism, such as sharing and helping [4]. This behavior is crucial for children with special needs. It helps establish positive peer relationships. Also, it can improve academic engagement and social competence [5]. But in fact, the social participation level of children with special needs in the educational settings is low. They tend to have strained peer relationships and face marginalization in social networks [6], which limits the expression and development of their prosocial behavior. In recent years, AIs with human-like features, such as social robots and virtual agents, have shown effectiveness in bringing users' empathic concern and helping observational learning [7, 8]. They can help improve the expression of prosocial behavior. This suggests that if we integrate AI technology into inclusive education, it can be a catalyst to promote prosocial behavior development in children with special needs. It opens up new possibilities to support their social development in inclusive settings. So, it is necessary in theory and practice to examine the role of AI technology in supporting prosocial behavior in children with special needs. We should also discuss its application challenges and prospects and this can help construct the inclusive educational environments.

2. Overview on Prosocial Behavior in Children with Special Needs

At present, children with special needs often show low social participation and prosocial behavior. We note that a large study covering 30 countries found that children with disabilities have less access to education and even when they can attend school their educational participation and social integration is lower than peers and among these children those with learning or communication disorders face the most severe exclusion [9]. Also, through literature review, we find that compared to typically developing children, children with special needs often meet multiple challenges in school setting. These include strained peer relationships, fewer positive evaluations, lower status within social networks, and negative self-perceptions regarding social competence [6]. We observe that this widespread phenomenon of insufficient social participation limits opportunities for children with special needs to practice prosocial behaviors. Cooperation and sharing are common examples. In the long term, this can create obstacles to their mental health, social adaptation, as well as life-course development. Despite these challenges, prosocial behavior development has protective and promotive value. In fact, research indicates prosocial behavior can enhance their popularity in the peer groups. For instance, in special education schools, the prosocial behavior level shown by students with intellectual disabilities is positively correlated with their popularity [10]. Increased popularity can help them gain more friendships. It can also bring more social support. Also, prosocial behavior is associated with higher academic engagement and stronger social competence. It is linked to lower levels of aggressive behavior [5]. This suggests that developing prosocial behavior is not just training in social skills. It is an investment in the overall positive development of children with special needs.

Inclusive education environment is a key external context, and it can influence the expression and development of

prosocial behavior in these children because the environment shapes how they interact with others in daily school life and this is important for their social growth. It is worth noting that research on this topic is still limited in quantity. For example, some studies found that helping behaviors in students with intellectual disabilities are more influenced by individual characteristics like age and gender. The influence from classroom peers is less obvious [11]. Also, we can see that the underlying psychological and social motivations for this are not explained well. In summary, prosocial behavior of children with special needs in inclusive education context can face difficulties because the environment is complex. However, it has important value for their development. This gives a reason for the possible integration of artificial intelligence technologies.

3. Key AI Technologies for Empowering Prosocial Behavior in Children with Special Needs

Children with special needs have insufficient social participation and lack the necessary social skills, and psychological support is also scarce for them, so it makes it hard to develop the prosocial behavior in the practice and we need to find methods to help them. Also, AI technologies can help solve these issues and they are expected to be useful tools in this field. In fact, AI can provide personalized learning pathways and barrier-free communication methods, and at the same time it can give continuous emotional support together with safe social scenario simulations that are controllable, so these functions can support the development of prosocial behavior. These AI pathways offer practical solutions and they can bring new opportunities for its development.

3.1. Assistive Technologies Providing Barrier-Free Communication

In 1988, United States passed Assistive Technology Act. This law gives a definition of assistive technology (AT). It says AT includes any item or device, and product system is also included. These can be used to maintain or improve functional capabilities of individuals with disabilities, and we should note that AT can help them get more independence in education and employment, and also in recreation and daily living activities [12].

Assistive technologies can help the children with special needs. It includes health and quality of life, education with literacy learning, social participation, communication and interaction, and independent living [13]. In fact, barrier-free communication is very important. When we remove the barriers, children with special needs can express themselves and understand others, and this is expected to be a prerequisite for the social interaction and prosocial behavior. Also, Augmentative and Alternative Communication (AAC) can have good potential.

We describe AAC as a set of tools and strategies that can replace spoken language [14] and it can support individuals with intellectual disabilities, learning difficulties, and other conditions like cerebral palsy or vision and hearing problems. We note that AI-powered neural implants can help individuals with visual or hearing impairments [15]. In fact, damaged sensory functions can be repaired by these devices and communication experience can be improved. Also, wearable assistive devices can translate sign language into speech, and this helps communication between hearing individuals

without sign language training and those with the hearing impairments [16]. AAC can improve communication between children with special needs and their peers and teachers. It is worth noting that breaking down communication barriers is the first step towards social integration, and it creates conditions where children with special needs can transition from being "observed subjects" to "active participants" and also "potential helpers" in the social interactions.

3.2. Adaptive Intelligent Tutoring Systems Providing Personalized Learning Pathways

Intelligent Tutoring Systems (ITS) are computer-based instructional systems which combine AI technology with educational theory. In fact, they can give customized content and learning pathways for students, and support should be designed based on individual learner differences such as learning style, cognitive ability, interests, and progress.

For example, these adaptive systems with multidimensional learner model can assess the learner style first. Then they adjust how the learning content is presented [17]. Research on the integration of ITS with Augmented Reality (AR) and Virtual Reality (VR) in education and training shows that the integrated system improves academic outcomes. Also, we can see that it enhances student motivation and engagement, and the self-confidence is improved at the same time. It can help teachers analyze student data and adapt teaching strategies [18]. Adaptive ITS supply personalized learning methods. It is worth noting that these methods can enhance academic ability and the self-efficacy, so the internal motivation for developing prosocial behavior can be provided.

3.3. Chatbots Providing Continuous Emotional Support

Chatbots are AI-based dialogue systems [19] and they can interact with users through text or voice using natural language, and in fact this technology has been used in education to support various teaching activities and learning processes. We can see that they provide the personalized instructional support, answer questions from students, act as the learning companions, and give feedback. This can help improve teaching effectiveness and the learning experience.

Review study found chatbots can work as assistants for students' learning and homework. Students can use these tools to get flexible resources with personalization, and they also help with skill development [19]. Also, chatbots can provide psychological support with personalization and scalability, and the access threshold is low. It can avoid stigma from traditional mental health services [20].

The chatbot is trained with psychological counseling data. Then it can work as a learning partner without getting tired and also give emotional support. It has good accessibility. The service can be provided 24 hours a day and 7 days a week. In fact, this support has low threshold and is easy to access, so it can reduce social anxiety and loneliness in children with special needs, and their emotional stability can be improved. They can show more open and altruistic tendencies. This is expected to be the internal basis for developing prosocial behavior. At the same time, because the chatbot has human-like design, it can bring out empathic concern, and based on social learning principles, we use it to model prosocial behaviors and reinforce these actions. This mechanism is based on human-like imitation and observational learning.

For children with special needs who have limited social skills, it can provide safe learning target. Also, this target is very patient.

3.4. VR Providing Safe and Controllable Social Scenario Simulation

Virtual Reality (VR) is used to realize immersive technologies [21]. We can use it to create three-dimensional environments which simulate real or fictional worlds, and users can enter environments and interact with objects inside using devices like headsets, which can provide immersive experience.

We examine a study from five countries and it shows the technology can adjust teaching content according to the student cognitive abilities and sensory conditions, also motor skills, which means the system can support different types of students with various backgrounds and learning speeds. Also, children can do social training in safe virtual environment and it can increase learning fun and enhance motivation at the same time [22]. VR technology can be important for children

with special needs and in fact it should provide alternative ways for these students because traditional methods often fail to address their specific requirements in education and we should consider this technology as a supplementary tool in classroom. Students with visual impairments, auditory problems, motor difficulties or cognitive limitations can use it to find new learning pathways and this can help break down barriers in the traditional learning. Next, VR technology itself has therapeutic applications. In one study, it is shown that VR can provide safe and controllable virtual environment for children with Autism Spectrum Disorder (ASD). It can enhance their social interaction skills, gestural communication abilities, and also the interest in task engagement [23].

In special education field, virtual reality receives much attention. It can work as useful tool for developing motor and social skills in children with special educational needs. In fact, VR can help these children develop social skills. It can build positive social relationships and it can support prosocial behavior.

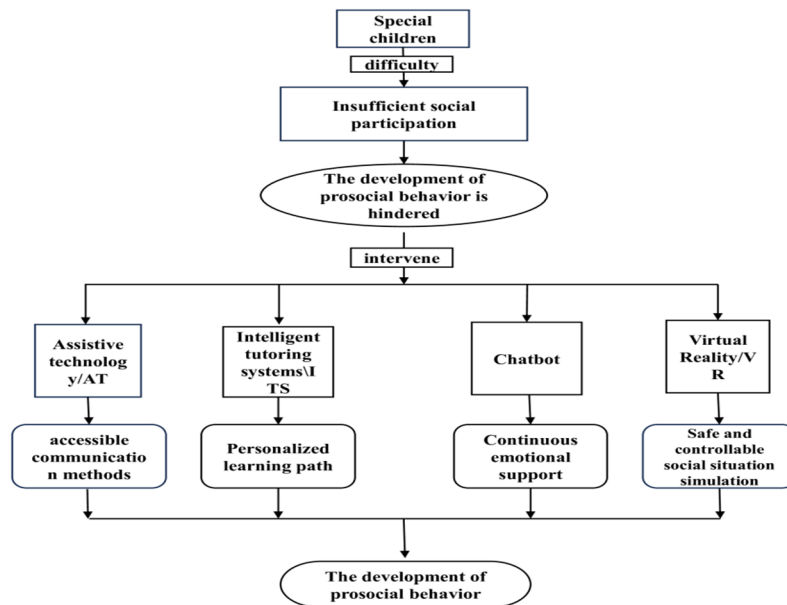


Fig 1. Flowchart of the process by which AI empower prosocial behaviors in children with Special Needs

4. Challenges and Reflections on AI Applications

AI has many benefits in modern society. However, its practical use in real applications also carries potential risks that we should consider. One study shows that in education field, AI may bring several risks [24]. These include threats to academic integrity and plagiarism, over-reliance that can lead to skill degradation, the spread of wrong information, and issues of fairness and accessibility. Also, there are homogenization of content and declining creativity, pressure on teacher training and adaptation, and ethical concerns including privacy issues. For instance, if we use AI too much in higher education, it can raise academic integrity issues [25]. First, we look at the development of prosocial behavior. The issue of fairness is very important here. It is worth noting that assistive technology has benefits that are recognized by special needs populations and professionals. However, economic constraints are their primary concern [26]. Various assistive devices and platforms have high cost and limited availability, so they may be unaffordable for low-income

families, and this situation can exacerbate existing inequities and create disparities in the distribution of AI educational resources among different social groups. Such inequality may trigger feelings of relative deprivation among children with special needs from disadvantaged backgrounds. In this case, the occurrence of prosocial behavior can be reduced. Second, AI has inherent ethical issues and this can lead to a crisis of trust. AI systems are trained on datasets that may contain wrong, biased, or unethical information, and this leads to problems of misinformation and ethical breaches. Public opinion on this is divided, and there are widespread calls to address ethical issues such as racial bias and inequality [27]. These inherent technical flaws may lead children with special needs to question AI itself and its effectiveness. Prosocial behavior developed on a foundation of distrust is fragile and can be undermined. Finally, the effectiveness of AI in providing psychological counseling is difficult to guarantee, and long-term use may lead to problems of dependency. In fact, AI is not a real person, and it lacks flesh and blood and cannot express facial expressions or body language. Its potential efficacy in psychological counseling remains

questionable. Also, due to their own functional impairments, children with special needs might develop dependency on AI, becoming unwilling to interact with real people and withdrawing from the real world. This can be counterproductive and may hinder rather than help the expression of their prosocial behavior.

We examined AI technologies that can help children with special needs develop prosocial behavior. Also, we looked at why these technologies are necessary. But we did not analyze the specific application pathways in depth. The practical implementation methods are not fully studied. We have not considered if they can work in real world special education settings. Future research can expand in several directions. First, by integrating perspectives from families, schools, and society we can explore models for integrating AI into inclusive education. At the same time, we need to look at implementation challenges, such as economic affordability, public acceptance, teacher training, and resource equity. Second, we can investigate how to guide technology for good from a macro-policy level and it is expected to promote educational equity. Third, we should keep refining the AI technology itself. It should adhere to ethical standards. Also it should have practical utility for broader dissemination. It is worth noting that only through multi-dimensional and cross-level exploration can we promote the application of AI in supporting the social development of children with special needs. In fact, this can help us achieve good results.

5. Summary

For a long time, the inclusive education has faced a difficulty. When we try to support prosocial behavior in children with special needs, standardized teaching environment cannot fit their individual needs and circumstances in most cases, and this results in low levels of social participation and prosocial behavior. It is worth noting that AI can help solve this problem, and we will discuss the roles it can play:

(1) Barrier-Free Communication: Using assistive technology, we can meet different needs of children with special needs in areas such as health and quality of life, education and literacy, social participation, and communication and independent living [13]. With this technology, more chances to socialize with peers and teachers can be provided to children with special needs. It is worth noting that this can help build basis for developing prosocial behavior.

(2) Adaptive tutoring systems can give personalized learning paths for children with special needs. We use technology integration to build such systems that can work in real classrooms. For example, one system uses a multidimensional learner model and it first checks the learner's style and then adjusts the content presentation based on assessment results we obtained from the model [17]. It is worth noting that by offering suitable learning methods these systems can help improve academic performance and they can support development of self-esteem in children and this psychological improvement is expected to have positive influence on their daily life. Then the children can get endogenous motivation and this can help growth of prosocial behavior.

(3) Chatbots can serve as learning partners and emotional supporters. They can provide psychological support that is personalized and scalable, and has low threshold for children with special needs, and this can avoid stigma from traditional

mental health services [20]. Also, chatbots never get tired and are easy to use and can offer 24-hour psychological support. It is worth noting that this can help the development of prosocial behavior in the children with special needs.

(4) Safe Social Scenario Simulations: VR system can adjust teaching content based on cognitive ability and motor skills. Children can enter a safe virtual environment for social training and at the same time they can have more fun in learning because motivation is expected to improve after using this technology [22]. It is worth noting that the social training opportunities provided by VR can help children with special needs improve their social skills. Also, their interest in interacting with peers and teachers can be stimulated. In this way, prosocial behavior should develop.

In conclusion, with AI help, children with special needs can develop higher levels of prosocial behavior, which can bring long-term benefits for their mental health, social adaptation, and their development in whole life course. At the same time, in inclusive environment, when these children develop such behavior, they are not the only group that can benefit. Typically developing children and teachers also gain advantages. The prosocial behavior in inclusive context can have positive impact on everyone within that environment. This is similar to building ramp for people with disabilities. The intended users can benefit, and parents pushing strollers and visitors carrying heavy items can also use it easily. AI role in this field is still in early stage and faces some challenges, including equity and trust problems, also ethical concerns. Effectiveness and dependency are also issues we should consider. Its demonstrated potential has positive significance. It can help build fairer education systems. Also, we can fulfill our commitment to vulnerable groups, and equity and justice in human society can be promoted.

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