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Cooperative, Collaborative, and Related Strategies' Effect on Learning in Children with Autism

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Abstract

When the right circumstances are met, children with autism can engage in settings for general education and have a successful educational career. A truly inclusive learning environment and research-based inclusion techniques must be in place for children with autism to be successfully included. The research studies that concentrate on cooperative and collaborative learning methodologies are reviewed in this article. The article concludes by outlining the need for additional study. This study examined 29 research studies using cooperative, collaborative, and related techniques with children with autism. Each article had to meet these requirements to be included: 1. describe the use of an evidence-based intervention for at least one participant with ASD. 2. Consist of at least one collaborative, cooperative, or related method. 3. Research needed to be conducted in an inclusive setting and finally, 4. The reviewed articles had to have been released in 2010 or later

Index terms— inclusion, cooperative learning, collaborative learning, children with autism

1 Introduction

utism, a neurodevelopmental disorder, significantly influences an individual's daily life, impeding their ability to engage in typical activities, particularly in the realms of social interaction and communication. It manifests in restrictive behaviours, often characterized by repetitive actions, which encompass stereotypy, ritualistic behaviour, perseveration (Ringdahl, 2011), and compulsions. (American Psychatric **??**ssociation, 2013) According to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), autism is a spectrum disorder with varying degrees of severity and presentation. The core symptoms of autism are evident early in childhood and persist throughout the individual's lifespan. One can observe repetitive behaviours and fixation on particular interests and, or specific activities.

The authors of this paper maintain the belief that it is possible for children on the autism spectrum to receive education alongside their same-age peers in mainstream schools. Specific adaptations will be needed. Lindsay (2007) pointsout that inclusion is a crucial education plan designed to increase the educational opportunities of students with particular needs.

Research such as that carried out by Crosland and Dunlap (2012) and Sanahuja and Qinyi (2012) has shown that students with autism spectrum disorders (ASD) benefit from attending mainstream, although additional support is required. This paper reviews individualized and systemic interventions, specifically cooperative learning strategies, used with autistic children. These strategies are believed to help create an inclusive learning environment. Therefore, in this paper, we discuss strategies for the successful inclusion of children with autism, which can be used by educators in mainstream environments.

2 II.

3 Method a) Search Procedures

The studies in this research were obtained by searching research papers in the HyDi database, which discuss cooperative and collaborative strategies. HyDi is an extensive database with access rights to many databases such as Education Database, Web of Science, ProQuest Central, Social Science Database, Springer, and EBSCOhost.

The terms ”cooperative,” ”collaborative,” and ”learning strategies” were employed in conjunction with ”autism,” ”Asperger,” and ”inclusion.”. The returned papers were sorted by relevance, and the abstracts of all articles containing ”autism” or ”Asperger” in the title were manually screened. Publications that did not pertain to the research question of the current study, meaning they contained the search terms in a different context, were excluded. The search also included papers that were cited in the articles which were selected for inclusion. Studies published between 2010 and the spring of 2023 were included in this literature review. The literature searches were conducted in the winter of 2022 and again in the spring of 2023.

The Web of Science allowed us to refine our search results by choosing pertinent research areas. We utilized this function by selecting ”education-educational research.” Within this database, the search yielded 102 papers, of which 8 met the inclusion criteria. EBSCO Host provided the option to search several databases. This search returned 113 papers, with six qualifying for inclusion. ProQuest Central provided the option to narrow down the search result by title; we selected autism or Asperger's. This search returned 82 papers, of which eight qualified for review. Social Science Database produced 22 papers, four qualifying for A inclusion. Springer returned 18 papers, and one qualified for review. Education Database produced 49 papers, two qualifying for inclusion. All abstracts were read, and 29 articles were selected for review.

4 b) Inclusion and Exclusion Criteria

For inclusion in this extensive review, each article underwent evaluation based on several criteria. Initially, the article needed to detail the application of an evidence-based intervention for at least one participant with ASD. Secondly, the articles were required to incorporate a minimum of one cooperative learning strategy. Thirdly, the research was mandated to have been conducted within an inclusive setting. Lastly, the reviewed articles were expected to have been published in the year 2010 or later.

5 III.

6 Results

7 a) Review of Strategy 1: Cooperative group teaching

Cooperative learning is one of the methods that enable students with disabilities to reveal their strengths and weaknesses together with their typically developing peers (Corbett et al., 2013). Studies on cooperative learning have shown that it positively affects the social acceptance of students with disabilities in general education classes **??**Gilles, 2007). Supporters of the cooperative learning model believe that learning consists of various components. Cooperative learning is a very beneficial model for children with autism. Corbett et al., (2013) emphasized that Student Team Learning (STL) has three bases. These are team rewards, individual responsibility, and equal opportunities for success. Using STL techniques, teams earn certificates or other team rewards if they exceed a designated criterion. Personal accountability implies that the team's overall success relies on the individual learning efforts of all team members. This redirects the team members' actions towards elucidating concepts to their peers and ensuring that everyone in the team is adequately prepared for quizzes or assessments, which they must undertake independently, without reliance on their teammates. Equal opportunities for success mean that students contribute to their teams by improving over their past performances. This ensures that high, average, and low achievers are equally challenged to do their best and that the contributions of all team members will be valued.

Cooperative learning is a method that can foster success for future generations. The SENSE Theatre project, a peer-mediated initiative immersed in play and focused on performance, is introduced by Corbett et al. **??**2013). Through the programme, actors of a similar age who are ordinarily developing are paired with individuals who have Autism Spectrum Disorder (ASD) to serve as co-actors and peer models in a play. The severity of each participant's symptom profile and their prior interaction with the ASD community are taken into consideration during the matching process. Ten main goals are the emphasis of the SENSE Theatre approach. These goals are communicated, exemplified, and integrated through direct instruction, bolstered by a variety of case studies and ongoing, supervised experience.

These ten main goals are clearly explained to peers and are intended to improve different facets of autism symptomology. The primary goals and desired behaviours include: (1) giving social support to establish trust and lower stress levels; (2) making an enjoyable environment to promote social play; (3) modeling warm social interaction to encourage reciprocal engagement with peers; (4) increasing motivation to boost social initiation; (5) using directed communication to improve verbal back-and-forth conversation; (6) using nonverbal communication to enhance gestures, eye contact, and facial expressions; (7) playing imaginatively to cultivate creativity; (8) using empathic responding to foster empathy; 9) supporting active learning to promote novelty and participation; and (10) advancing individual learning by combining social learning with behaviour.

Studies on this subject are summarized in Table 1. The results showed that using the CVLE-social interaction system had significant positive effects on participants' performance, both within the CVLE-social interaction system and in terms of reciprocal social interaction learning. All the studies reviewed here were designed with a single-subject experimental model. A total of 15 students, 13 of whom were ASD students (n = 13 ASD), were included in the studies. Participants were between the ages of 4 and 11. These studies were carried out in

inclusive environments, in preschool, primary, and secondary schools. A variety of behaviours were targeted for intervention. In one study (Cheng & Ye, 2010), the focus was on enhancing social competence in a collaborative virtual environment. Another study (Scott, 2019) delved into the hidden aspects of group work's curriculum, while Lee et al. (2021) concentrated on physical activities.

Cheng and Ye (2010) focus on using a virtual learning environment to help the deficiencies of social competence for people with ASDs and to increase their social interaction. In particular, it provides a basic exploration of social competence within collaborative virtual learning environment (CVLE) systems and behavioural performance in social and cognitive interactions. Thus, this CVLE-social interaction system involves a 3D expressive avatar, an animated social situation, with verbal and text communication. The results showed that using the CVLE-social interaction system had significant positive effects on participants' performance, both within the CVLE-social interaction system and in terms of reciprocal social interaction learning.

Lee et al., (2021) evaluated the effects of cooperative physical activities on the social interactions of children with autism spectrum disorder (ASD) in China.

Cooperative physical activities include procedures such as peer selection, peer practice, group task completion, and an interdependent group contingency. The intervention took place during inclusive physical education (PE) classes. The generalization of interactions with peers was evaluated during free play. Although the frequency of inappropriate interactions increased after the intervention in both settings, the proportion of inappropriate interactions relative to appropriate interactions decreased for two children in the PE setting and all three children in the free-play setting.

Scott (2019) used Video-recorded observations. The observations were transcribed and coded according to the nature of each conversational attempt, which included prompted reciprocal communication, unprompted reciprocal communication, self-centric conversations, directives, clarification questions/ statements, and off-topic remarks. Results from this study indicate that when the four participants with ASD used a structured protocol that guided communication attempts (through explicit tasks) during cooperative academic group works, their interaction attempts increased, as did their (prompted and unprompted) reciprocal exchanges.

8 b) Review of Strategy 2: Peer Tutoring and Peer

Influences Peer-mediated instruction is implemented by pairing a child on the spectrum with another child without disabilities (Berman, 2019). Thus, rather than involving just a teacher or therapist through this strategy, one or more peers will take on a role in the teaching/learning process. This intervention can be used in small groups and classroom-wide intervention programs **??**Zhang et Classroom-Wide Tutoring consists of dividing the class into diverse small learning groups. Teams should include at least one high-performing student, an average student, and an underperforming student with a disability (Lundblom & Woods, 2012). Thus, while there is heterogeneity within groups, groups are similar across the class, allowing the educator to capitalize on the groups' complementary knowledge and achieve higherlevel, collaborative objectives. The teacher conveys to students that every team collectively bears the responsibility of aiding all its members in comprehending the material taught earlier. Teammates should have the chance to collaborate in problemsolving or grasping the content, with each potentially taking on the role of the designated "tutor" within the group (Lundblom & Woods, 2012).

Peer Support Arrangements involve equipping one or more general education students in an inclusive classroom to provide academic and social support to students with disabilities (Corbett et al., 2013). Broad descriptions of individualized educational objectives, participation objectives, and social interaction objectives for the student with a disability are shared with the peers. Educators with expertise in special education or paraprofessionals offer comprehensive support to facilitate the peer counseling process and assist students in achieving their established objectives (Corbett et al., 2013).

Lunch Bunches relates a student with a disability to a group of students without similar disabilities or students without disabilities to join them for lunch, focusing on social interaction during that lunchtime (Fan et al., 2021) A total of 241 autistic persons participated in these investigations, according to an overall analysis of the trials. Examining the participants' gender characteristics reveals that 47 of them are male and 15 are female. Furthermore, the gender of 179 people with autism was not identified. There are 15 boys and 15 girls among children with typical development. The 134 students' genders were not identified. This group, along with their peers, constituted the 375 participants in the study. The age range spans from 4 to 18.

When the methods of the studies are examined, it is noticeable that most of them are carried out with a single-subject design. Seven of them used multiple baselines (Banda., et al., 2010;Ganz., et (Parsons., et al., 2019). The other one study used qualitative methods (Fan et al., 2021), and yet another used clinical trials (Zhang et al., 2022).

When we examine the type of intervention the studies used one would see that most used social skills and social instruction **??**Banda., et

9 c) Review of Strategy 3: Social Skills Training

Individuals with autism spectrum disorders (ASD) have recently received a lot of attention both within and outside the PBS (Positive Behaviour Support) community (Vincent et al., 2022). Because social interaction is a common problem for people on the spectrum, many social skills interventions have been designed to try to improve

the social aspects of their lives (Corbett., et al.,2013). Although there is increasing evidence supporting the use of social skills training to improve social performance, there is little evidence that this enhanced performance improves the quality of social life of people with ASD (McMahon, et al., 2012). This discrepancy is, at least in part, due to how the dependent variable was defined. Researchers commonly evaluate the efficacy of interventions by examining observable changes in behaviour, focusing on the behaviour's outward appearance. Examples of these dependent variables encompass aspects like social initiation, social response, conversational skills, and peer imitation (Sabey et al., 2020). As a majority of studies within this category revolve around peer interactions, they were primarily assessed under the former title. Upon evaluating the studies, it becomes evident that a total of 140 individuals with autism were involved in the research. Regarding the gender composition of the participants, five were male, two were female, and the gender of 133 individuals with autism was not specified. The age range of the participants varied from 6 to 12 years. If the methods of the studies are examined, one can notice that different designs were used. For instance, **??**asari et All the interventions evaluated used social skills intervention, but they used different programs such as peer social connection **??**Kasari, et al., 2012), vocalizations (McMahon, et al., 2012), social behaviour (Sabey, et al., 2020), physical activity **??**Sansi, et al., 2021), and cooperative play (Vincent et al., 2022).

10 Social Skills Intervention

The students on the autism spectrum showed increases in the percentage of time engaged in cooperative play with peers during the intervention.

11 d) Review of Strategy 4: Collaborative Teaching

Schools are communal organizations, and for teachers, collaborative competence is an essential component of their expertise. Similarly, Collaboration is an essential aspect of teacher education, helping students learn how to teach effectively and develop their team teaching (Huskens, et al, 2014

12 Collaborative teaching

Based on these preliminary results, co-teaching appears to be an effective mode of instruction for meeting the needs of pupils with, and without, SEN in mainstream settings.

Upon review of the studies, it is evident that a cumulative total of 496 individuals with autism were participants in these research endeavours. When the gender characteristics of the participants are examined, it is seen that 6 of them are boys, and the gender of 490 individuals with autism was not specified. The age ranges vary between 5 and 13 years old.

Different types of designs were used in these studies. Becevic et al. (2021) employed a crosssectional post-virtual clinic survey design, Huskens, et al. (2014) utilized a multiple baseline design, and Lehane and Senior, (2019) incorporated a mixedmethods approach. Upon evaluation of the interventions, it is apparent that all of them were based on collaborative learning and teaching methods.

All the interventions evaluated used different programs such as virtual collaboration (Becevic, et al., 2021), robot-mediated intervention (Huskens, et al., 2014), and collaborative teaching **??**Lehane & Senior, 2020).

IV.

13 Conclusion

This review has shown that cooperative learning strategies enable students with disabilities to share their skills and weaknesses with their peers who are typically developing (Corbett et al., 2013). According to studies on cooperative learning, it helps general education students with impairments feel more accepted by their peers. **??**Gilles, 2007). Cooperative and collaborative learning proponents, as shown in the reviewed studies, hold that cooperative learning is a particularly useful strategy for children with autism.

Collaborative work among students, aimed at achieving a common goal, often leads to increased success and productivity compared to individual efforts. Creating learning environments that foster positive interdependence is generally more favorable than those emphasizing independence. It's widely recognized that student cooperation within groups can be challenging, and it's important to establish groups in a way that makes the five essential elements of successful collaboration clear. These elements include promoting productive interactions among group members, ensuring individual accountability, explicitly teaching necessary social skills, and encouraging groups to reflect on both task management and interpersonal interactions.

When these key components are integrated into group work, students are more likely to feel motivated to work together to attain both their individual and the group's objectives. They become more inclined to take personal responsibility for their contributions to the group and their interactions with fellow group members. They also tend to show greater respect for the contributions of others and are committed to resolving disagreements democratically. Moreover, they actively contribute to effective task management and the maintenance of positive working relationships. [1]

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Year 2023
46

Figure 1: Table 1 :

				to appropriate
				decreased for two children in the PE setting and for all three children in the free-play setting
Scott, 2019	3 boy, 1 girl with 5 fifth-grade peers	10-11 y	ABA	Hidden Curriculum of group work
				Results from this study indicate that when the four participants with ASD used a structured protocol communication attempts (through explicit tasks) during cooperative academic group work their overall interaction attempts increased, as did their (prom

47 Volume XXIII Issue III Version I D D D D) A (Medical Research

al.2022). Research has indicated that peer-mediated instruction and interventions are effective

Stichter, 2012). If properly designed and implemented, peer support strategies can be a valuable method for providing academic and social support to students with disabilities (Bell & Carter, 2013). Peer support strategies refer to a wide variety of intervention approaches. The main three approaches are (a) classroom-wide peer tutoring, (b) peer support arrangements, and (c) lunch bunches.

Figure 2:

2

Author(s), year	Sample	Age	Design	Intervention	Findings
Banda., and Hart., 2010	2 girls with ASD	8 y	Multiple base-line designs across participants	Peer-to-peer social skills through direct instruction	Results increased initiations participants and sharing behaviours in one of the participants, increases in responses in both participants.
Berman.,2019	2 boys with ASD and 5 peers of the same ages	4 y	ABAB model	Group Affection Activities (GAA) on social interaction	The findings agree with those previously studies, however, the maintenance generalization improved skills remain to be of great concern. It is suggested that in order to address this important issue, an intervention program Group Affection Activities with peer training should be integrated into the early childhood curriculum and implemented for all to benefit.
Collet-Klingenberg., and Neitzel., and LaBerge., 2012	3 boys, 1 girl with ASD, and 18 peers	12-13 y	Pre-test Post-test	Power-PALS (Peer Assisting,Leading Supporting) Implementing a peer-mediated intervention	Power Pals had a significant impact on school experiences and social interactions for both learners with and without ASD.

Figure 3: Table 2 :

Figure 4:

Figure 5:

3

Author(s), year	Sample	Age	Design	Intervention		Find
Kasari., Rotheram-Fuller., Locke and Gulsurd., 2012	60 students with ASD	8 y	2 x 2 factorial design	Social Skills	Significant improvements can be made in peer social connections for children with autism spectrum disorders in general education classrooms with intervention, and these gains persist over time.	with
McMahon., Vismara., and Solomon, 2012	28 students with ASD	12 y	Clinic-based intervention	Social Skills Training	Over the course of intervention, participants made fewer initiating vocalizations, more responding vocalizations, spent more time interacting with a group of peers and spent marginally less time interacting with a leader.	
Sabey., Ross., and Goodman, 2020	2 boys, and 1 girl with ASD	7-11 y	Observational and interventional design	Social skill training	The participants' social behaviour. However, its mixed results in the quality of peer responses may be a more meaningful indicator of its effect on the quality of social lives of the participants.	interven
Sansi., Nalbant., and Ozer, 2021	45 students with ASD	6-11 y	Mixed-method sequential exoplanetary design	Physical Activity Program on the motor skills, social skills	The IPA program increased the motor and social skills of ASD students.	
Vincent et al., 2022	3 boys, 1 girl with ASD	6-8 y	Single-case experimental design			

Figure 6: Table 3 :

4

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Collaborative learning focuses on five key characteristics (DatTran, 2013). The five pillars of collaborative learning theory are consistent with the

Figure 7: Table 4 :

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