Improving the Problem-Solving Ability of students with Autism Spectrum Disorder: A Meta-Analysis

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Abstract

This research paper examines practical methods for enhancing students with autism spectrum disorder's (ASD) capacity for problem-solving. By conducting a thorough literature review and meta-analysis, the research pinpoints crucial methods and approaches that notably improve students with ASD's ability to solve problems. The results emphasize the value of multicomponent therapies that include social skills training, visual aids, and direct teaching. These methods work especially well for addressing the social and cognitive aspects of problem-solving. Furthermore, emphasis is placed on the importance of providing teaching that is both individualized and adaptable to meet the unique requirements of each student with ASD. The effectiveness of visual envisioning, self-questioning, and collaborative problem-solving techniques in fostering cognitive flexibility and autonomous problem-solving abilities is also investigated. The study comes to the conclusion that a comprehensive strategy that combines a variety of instructional tactics and supports can significantly enhance children with ASD's problem-solving abilities, improving their social and academic achievements.

Keywords: *Problem solving ability, autism spectrum disorder, students, strategies.*

Introduction:

Problem solving ability is valued in both educational and professional contexts. Everyday problems range from the really basic to the quite complicated, such choosing what to wear to those in workplace (D'Zurilla & Goldfried, 1971). In order to successfully operate in a given situation, a person must solve problems on time. This process involves identifying problems and potential solutions, weighing options, and selecting the optimal course of action (D'Zurilla & Goldfried, 1971).

A number of methods for solving problems were proposed. A cognitively based problem-solving paradigm was employed by D'Zurilla and Goldfried (1971). It consists of the following steps: (a) describing and formulating a problem; (b) identifying possible solutions; (c) assessing each option; (d) reaching a choice; and (e) executing a solution. Three steps were suggested by Shure, Spivack, and Jaeger (1971) for solving problems: coming up with other answers, weighing the pros and cons of those options, and thinking out the cause-and-effect relationships between those solutions. Although a cognitively based approach to problem-solving stresses coming up with multiple solutions and assessing how effective they are, Foxx and Faw (2000) pointed out the variety of problem situations in which someone must act right away and suggested an alternate method to teach students problem-solving (i.e., to ask a series of

questions, such as "Who should I talk to? Where can I find assistance? and How should I respond?").

Autism spectrum disorder (ASD) is a neurodevelopmental disorder which is marked by repetitive behaviours, limited interests, and difficulties in social interactions. The authors list the variables that are correlated with the risk of ASD and discuss the data supporting the theory that ASD is a neurobiological illness impacted by both hereditary and environmental factors impacting the developing brain. The prevalence of ASD is estimated by the World Health Organization (WHO) to be 0.76% worldwide; however, this figure only represents around 16% of all children. A 2021 research that was published in the Indian Journal of Paediatrics estimates that 1 in 68 children in India are thought to be affected by autism. The prevalence of autism in boys is higher than in girls, with a male-to-female ratio of around 3:1.

Students with autism spectrum disorder (ASD) have particular difficulties and opportunities when it comes to problem-solving skills. For children with ASD to succeed academically and grow fully, it is essential to comprehend and improve their problem-solving skills. This calls for specialized teaching strategies and continuous study. Anecdotal evidence indicates that people with ASD are frequently better at solving mathematical puzzles than their neurotypical counterparts, but communication, social interaction, and flexible thinking issues might make it difficult for them to solve problems in the real world. Studies show that children with ASD and typically developing (TD) children differ significantly in their ability to solve mathematical word problems. Students with ASD often struggle more in this area because they have trouble with the language and context of the problems they face (Bae 2017). With an emphasis on their unique learning requirements and talents, a variety of instructional techniques, including the use of worksheets and multiple example training, have been designed to help children with ASD become better problem solvers (Suarez et al., 2021).

Review of Related Literature

- Lora et al. (2019) The study taught adolescents with ASD a problem-solving strategy using textual activity schedules to independently complete vocational tasks, leading to task completion even in the presence of problems and generalization to new tasks This strategy aimed to decrease reliance on others, with results showing successful independent task completion and social validity of the procedures in real-world work environments
- Yakubova and Taber-Doughty (2016) The study used cue sheets, practice sessions, and video modeling as part of a multicomponent intervention to improve students with autism spectrum disorders' (ASD) ability to solve problems when completing occupational activities. During each intervention session, students watched three video clips on their own, practiced problem solving using a model setting, and, if necessary, used a cue sheet. The outcomes demonstrated that every student had performed better, and three of the four students had maintained their newfound abilities at a six-week follow-up.
- Cote et al. (2014) Students with autism were taught problem-solving skills using a specific intervention and instructional mode. The study found that problem-solving intervention

combined with the Self Determined Learning Model of Instruction was effective in teaching problem-solving skills to elementary students with autism.

- Pugliese and White (2013) The study adapted a cognitive-behavioral intervention program, Problem Solving Skills: 101, for college students with ASD, showing high treatment adherence and two participants improved in problem-solving ability and distress post-intervention

Strategies for improving problem solving ability of students with autism spectrum disorder:

Transition-Related Task Performance:

Students with ASD can adjust to new activities and environments more easily if measures designed to improve transition-related task performance are put into practice. Providing clear, visual directions and segmenting activities into smaller, more manageable chunks are examples of these tactics. (Doughty & Yakubova, 2016)

Teaching Problem-Solving with Worksheets:

Worksheets may be a useful organized tool for teaching problem-solving. This involves multiple exemplar training and error correction techniques to help students with ASD systematically work through problems, enhancing their ability to find solutions independently (Suarez et al., 2021)

Professional Development for Teachers:

Providing teachers with solutions unique to autism can greatly improve inclusive education. Understanding autism and modifying instruction to fit the special requirements of students with ASD should be the main goals of professional development as these actions can help students with ASD become more adept at solving problems (Petersson-Bloom & Holmqvist, 2022).

Social Problem-Solving Techniques:

Improving one's capacity for social problem-solving might be very advantageous. This entails instructing pupils on how to detect social signs, comprehend other viewpoints, and formulate suitable reactions in social contexts. These abilities are essential for improved peer engagement and integration (Minot, 2022).

Evidence-Based Practices (EBPs):

By implementing EBPs specifically designed for students with ASD, academic and behavioural problem-solving ability can be improved. To meet the specific requirements of each student, these strategies include creating customized learning plans, employing visual aids, and using organized teaching techniques etc. (IRIS | Page 2: Evidence-Based Practices, n.d.)

Evidence Based Practices as identified by National Professional Development center (NPDC)on autism spectrum disorder are:

Antecedent based intervention:

An arrangement of things that happen before an interfering behaviour occurs and is intended to make it stop is known as an antecedent-based intervention.

Cognitive behaviour intervention:

Instruction on the management or regulation of cognitive processes that result in modifications in overt behavior is known as cognitive behavioral intervention.

Differential reward of conduct that is incompatible, alternative, or otherwise:

Providing favourable/desired outcomes for behaviours or not allowing them to occur lessens the likelihood of an undesired behaviour. The following scenarios result in reinforcement: a) when the learner is exhibiting a desired behaviour other than the inappropriate behaviour or b) when the learner is not exhibiting the inappropriate behaviour.

Discrete trial teaching:

it is a method of instruction intended to impart proper behaviour or abilities. It typically involves one student or client and one teacher or service provider. Typically, instruction entails large-scale trials. Every trial consists of the teacher teaching a presentation, the child response, a planned consequence, a pause before the instructor presents the next lesson.

Work out:

Increasing physical activity can either increase proper conduct or decrease undesirable behaviours.

Extinction:

it is the process of removing or withdrawing rewards for disruptive conduct in an effort to lessen its prevalence. Extinction is frequently employed in conjunction with functional behaviour evaluation, functional communication training, and differential reinforcement, while it is also utilized as a stand-alone intervention strategy.

Functional behaviour assessment (FBA):

it is the methodical gathering of data on a disruptive behaviour with the goal of determining the functional circumstances that allow the behaviour. In functional behaviour analysis (FBA), the interfering or problematic behaviour is described, the antecedent or subsequent events that regulate the behaviour are identified, a hypothesis on the behaviour's function is developed, and/or the hypothesis is tested.

Functional communicationtraining:

it is the process of substituting more suitable communication for disruptive conduct that serves a communication purpose. Extinction, differential reinforcement of alternative behaviour, and/or FBA are frequently used in functional communication training.

Modeling:

it is the process of exhibiting a desired target behaviour so that the learner will copy it and eventually pick up the copied behaviour. This EBP is frequently used in conjunction with other tactics like reinforcement and prompting.

Naturalistic intervention:

it refers to intervention techniques used in the learner's regular environment, activities, and routines. By setting up the environment, activity, or routine, providing the support needed for the learner to engage in the targeted behaviour, explaining the behaviour when it happens, and/or setting up natural consequences for the targeted behaviour or skills, teachers and other service providers can pique a student's interest in a learning event.

Parent-implemented intervention:

In order to help their kid develop a wide range of abilities and/or lessen disruptive behaviours, parents provide them tailored interventions. Parent training programs are constructed so that parents may learn how to provide interventions in their community and/or at home.

Peer-mediated teaching and intervention:

By expanding social and learning possibilities within natural surroundings, typically developing peers often interact with and/or assist children and youth with ASD in acquiring new behaviour, communication, and social skills. Peers are methodically taught by teachers and support providers how to include kids and teenagers with ASD in constructive and prolonged social interactions through teacher-directed and learner-initiated activities.

Picture exchange communication system:

With the image Exchange Communication System (PECS), learners are first instructed to give a picture of a desired object with a communicative partner in exchange of a desired object.PECS is divided into six stages: (1) "how" to communicate; (2) persistence and distance; (3) discrimination between pictures; (4) sentence structure; (5) responding to requests; and (6) commenting.

Pivotal response training:

Intervention methods that are applied in settings that build on learner interests and initiative are guided by pivotal learning characteristics, such as motivation, self-management, reacting to numerous signals, and self-initiations.

Prompting:

it is the act of providing learners with verbal, gestural, or physical support to enable them to acquire or perform a specific behaviour or skill. Typically, a peer or adult will provide a prompt before or while a student tries to utilize a skill.

Reinforcement:

it is an action, situation, or event that follows a learner's desired behaviour and increases the likelihood that the behaviour will occur in the future.

Response interruption/redirection:

When an interfering activity is taking place, introducing a prompt, remark, or other distractions in an attempt to draw the learner's focus away from the behaviour and ultimately reduce it.

Scripting:

A written or spoken explanation of a particular scenario or ability that acts as a role model for the student. Typically, scripts are practiced a lot before the ability is applied in real life.

Self-management:

Teaching that focuses on helping students distinguish between proper and incorrect conduct, keeping a precise record of their own actions, and rewarding themselves when they behave right.

Social narratives:

Stories that provide a detailed description of social settings by emphasizing pertinent cues and providing instances of suitable behaviour. Social narratives are usually quite brief and customized based on the requirements of the learner. They may also include images or other visual aids.

Social skills training:

Instruction in groups or one-on-one settings aimed at teaching students with autism spectrum disorders (ASD), appropriate social interactions with adults, classmates, and other people. In order to support students with ASD in learning and practicing communication, play, or social skills to foster healthy interactions with peers, most social skill sessions involve teaching on fundamental ideas, role-playing or practice, and feedback.

Structured play groups:

These are small group activities that take place in a designated space and have a predetermined activity. They are also distinguished by the adults who lead the group, provide prompts or scaffold as necessary to support the students' performance in relation to the activity's objectives, and specifically choose peers who are typically developing to be in the group.

Task analysis:

it is a method that breaks down a behaviour or action into smaller, more manageable parts so that the ability may be assessed and taught.

Technology aided instruction and intervention (TAII):

Instruction or interventions that employ technology (such as a tablet, computer, computer program, or online activity) to improve or sustain functional abilities and behaviours are referred to as technology-aided instruction and intervention (TAII).

Video modelling:

it is the use of video recording and display technology to create a visual representation of the intended behaviour or skill (usually in the behaviour, communication, play, or social domains) to aid in learning and improve problem solving ability.

Visual support:

Any visual aid that helps a student engage in a desired action or skill without the need for reminders is referred to as visual support. Pictures, written words, items in the surroundings, how the environment is arranged or boundaries are seen, timetables, maps, labels, organizing systems, and timelines are a few examples of visual supports.

Conclusion:

Research on helping children with autism spectrum disorder (ASD) become more adept at solving problems shows how important it is to provide specialized, multi-component methods that target the social and cognitive sides of problem-solving. Effective techniques include visual aids, social skills training, and direct teaching. These methods all help to improve cognitive flexibility and the ability to solve problems on one's own. Furthermore, optimizing the academic and social performance of kids with ASD requires customized approaches that address their unique requirements. Teachers may considerably enhance the problem-solving abilities of kids with ASD by using these various approaches, which will benefit their general development and academic achievement.

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