Teaching Problem Solving Skills to Elementary Age Students with Autism

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Abstract: Students with disabilities need problem-solving skills to promote their success in solving the problems of daily life. The research into problem-solving instruction has been limited for students with autism. Using a problem-solving intervention and the Self Determined Learning Model of Instruction, three elementary age students with autism were taught to set personal goals related to their academic achievement, identify problems, and self-evaluate their problems-solving skills. A multiple-probe design was used, and data suggested that all students achieved and maintained their self-set goals.

Inclusive general education settings provide numerous benefits for students with significant disabilities (Ryndak, Ward, Alper, Wilson Montgomery, & Storch, 2010). However, Agran, Blanchard, Wehmeyer, and Hughes (2002) note that the demands of the general education classroom, pose a challenge for students with autism who lack problem-solving skills. Because often students with autism lack problem-solving skills it greatly impacts their interactions with others (Agran & Wehmeyer, 2005; Friend, 2011; Wehmeyer, Shogren, Zager, Smith, & Simpson, 2010). Wehmeyer et al. (2010) found that students with autism have difficulty generating solutions to their problems. Alderson-Day and McGonigle-Chalmers (2010) emphasized that because students with autism approach problems in educational settings differently, support should be provided only after developing a careful assessment of individual characteristics. Often, students with disabilities (e.g., autism, intellectual disability) do not receive problem-solving instruction, because teachers question the benefits (Palmer & Wehmeyer, 2003). Yet, these students can benefit from instruction that teaches them how to identify problems, research possible solutions, evaluate choices, and self-reflect (Agran et al., 2002).

Problem-solving competencies help students with disabilities solve both simple and complex problems that arise throughout the school day and during their interactions with teachers and peers (Glago, Mastropieri, & Scruggs, 2009). These behaviors are especially important for students with autism who are in inclusive general education settings. Problem-solving instruction increases the acquisition of self-determination skills and teaches these students how to self-regulate their behaviors (Agran et al., 2002; Palmer & Wehmeyer, 2003; Palmer, Wehmeyer, Gipson, & Agran, 2004). It is key that explicit problem-solving instruction begins when students are in the elementary grades to increase the likelihood that they generalize and maintain these skills throughout life (Cote, 2011). As students develop these skills they are better prepared to handle the every day expectations of inclusive and natural environments (Agran et al., 2002; Palmer & Wehmeyer, 2003).

Researchers note the importance of teaching students with autism, multiple disabilities, and intellectual disability to problem solve (Agran & Wehmeyer, 2005; Cote, 2009; Glago, 2005). Palmer et al. (2004) examined the ef-
fects of a problem-solving intervention with students who were included in the general education classroom. In their study, students received five weeks of problem-solving training, utilizing the *Self-Determined Learning Model of Instruction (SDLMI)* (Wehmeyer, Palmer, Agran, Mithaug, & Martin, 2000). Palmer et al. (2004) found that students improved in their problem-solving skills and significantly increased their success in inclusive settings. In another study (Cote, 2009; Cote et al., 2010), four middle school students with intellectual disability were taught a problem-solving intervention (adapted from Glago, 2005). Researchers found that students learned to identify problems and possible solutions, identify best solutions, and self-evaluate. The data suggests that the instruction was effective in increasing students’ skill performances of problem solving and students generalized their skills.

Agran, Blanchard, Wehmeyer, and Hughes (2001) researched the use of a self-regulated problem-solving strategy to improve the behaviors of six students with multiple disabilities. Students received problem-solving instruction using the *SDLMI* (Wehmeyer et al., 2000). Data were collected on students’ performances of the target behaviors and on meeting their goals. Agran et al. (2001) found significant differences, pre and post-intervention, in students’ performances of problem solving, goal setting, and self-evaluation. In another study, Agran et al. (2002) examined the effects of a self-regulated problem-solving intervention on target behaviors in four middle-school-age students with disabilities (i.e., multiple, autism, intellectual). Students identified target behaviors and set goals (e.g., following directions, contributing to class discussions, hands to self) that they wanted to meet. Agran et al. (2002) found that students improved in their problem-solving skills as a result of the intervention.

Findings from the limited research suggest the importance of teaching problem-solving skills to facilitate students with disabilities in achieving their goals. To further the research base, this study’s methodology is partial replication of an existing research line (Agran et al., 2001; 2002; Agran, Cavin, Wehmeyer, & Palmer, 2006; Cote et al., 2010; Glago, 2005; Palmer & Wehmeyer, 2003). This study incorporates the teaching of a problem-solving strategy (Cote, 2009) to three elementary age students with autism spectrum disorder (ASD). Unlike previous studies, researchers compared students’ pre post performance of target behaviors using an interval recording method. This study was designed to assess the efficacy of a problem-solving intervention for students with autism to gain skills in problem solving, goal setting, self-evaluation, and goal attainment. Four research questions (Cote, 2009; Cote et al., 2010) were evaluated: (a) what were the effects of problem-solving instruction on the skill performances of problem solving in students with ASD, (b) to what degree were students with ASD able to identify the steps of problem solving, (c) to what degree did students with ASD maintain their skill performances of problem solving, and (d) what were teacher perceptions about implementing the problem-solving strategy to increase skill performances of problem solving in students with ASD?

**Method**

**Participants**

**Student participants.** Three elementary age students with autism participated in the study. Two students were fully included in the general education classroom and one student received special education services in a self-contained setting (i.e., specialized day class). Students selected for the study included two males and one female. See Table 1 for specific student characteristics.

Mary. Mary was a 9-year-old fourth-grade Caucasian female with autism. She was creative, yet, withdrawn. She often played alone or walked the schoolyard following lunch. The general education teacher shared that Mary did what she wanted (e.g., read a book) during a non-preferred activity, the daily language review (e.g., DRL). The general and special education teachers wanted Mary to follow teacher instructions. Daily, Mary struggled with starting and finishing the DLR assignment.

The general education and special education teachers agreed that Mary needed to improve on her writing and that missing the morning assignment was setting her up for failure. When other students were working on the DLR assignment, Mary was observed playing a game on the computer, reading a book.
without permission, or sitting on the ground in a corner of the classroom designated as the library center. The teacher would direct Mary to start the DLR, yet, Mary expressed that she was bored with the assignment and that it wasted her time.

Brett. Brett was an 11-year-old sixth-grade male student with autism. Brett was fully included in the general education classroom, with pullout support for mathematics (i.e., resource room). Brett required little personal teacher assistance to complete assignments. However, Brett struggled with maintaining focus during the daily math instruction. When given a teacher direction to complete a math assignment, Brett became unfocused, laid his pencil down and exhibited the following behaviors: scanned the classroom, out of seat, and talked back to the teacher (e.g., “This is too hard I am out of here”). During one teacher student observation, Brett expressed that the teacher should lower her standards for him. When the teacher gave an assignment or instructed everyone to chorale read, Robert exhibited the above behaviors. In an effort to redirect Robert, the teacher called Robert’s name aloud or tapped on the next word in the text. The consequences of Robert’s behaviors were incomplete assignments and loss of time from instruction due to the teacher’s one on one prompting. Additionally, the teacher noted that she and the team had tried various supports to help Robert remain focused (e.g., timer), yet he struggled. She suggested that Robert was a good candidate for the problem-solving intervention, since he lacked the skills to maintain focus during the language arts lesson.

Robert. Robert was an 11-year-old sixth-grade African American male student with autism. He received special education services in a self-contained classroom. Robert struggled with maintaining focus on a task during the language arts lesson. Rather than remaining focused on the lesson, Robert looked around the classroom, picked at fingers/pencil eraser, and frequently left his seat. When the teacher gave an assignment or instructed everyone to chorale read, Robert exhibited the above behaviors. In an effort to redirect Robert, the teacher called Robert’s name aloud or tapped on the next word in the text. The consequences of Robert’s behaviors were incomplete assignments and loss of time from instruction due to the teacher’s one on one prompting. Additionally, the teacher noted that she and the team had tried various supports to help Robert remain focused (e.g., timer), yet he struggled. She suggested that Robert was a good candidate for the problem-solving intervention, since he lacked the skills to maintain focus during the language arts lesson.

Setting

This study was carried out in an urban elementary school setting located in a western state. The school served 482 students and demographics included the following ethnicities: 37% Hispanic, <1% African American, 7% Asian/Pacific Islanders, 43% Caucasian, and <1% American Alaskan/Native American. Thirty six percent of students were eligible for free or reduced lunch.

Problem-solving training for the three students was conducted in the resource room. The teacher worked one on one with students at a kidney shaped table. Instruction occurred

<table>
<thead>
<tr>
<th>Student</th>
<th>Age</th>
<th>Ethnicity</th>
<th>Grade</th>
<th>IQ</th>
<th>Disability</th>
<th>Target Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mary</td>
<td>9</td>
<td>Caucasian</td>
<td>4</td>
<td>88</td>
<td>Autism</td>
<td>Follow instructions</td>
</tr>
<tr>
<td>Brett</td>
<td>11</td>
<td>Caucasian</td>
<td>6</td>
<td>109</td>
<td>Autism</td>
<td>Participate as required</td>
</tr>
<tr>
<td>Robert</td>
<td>11</td>
<td>African American</td>
<td>6</td>
<td>*</td>
<td>Autism</td>
<td>Focus on task</td>
</tr>
</tbody>
</table>

* Unavailable due to state law (Larry P v. Riles, 1979).
at the same time of the day, every day of the week for each student (i.e., 1:15–1:30). The teacher utilized a crate where student worksheets, flash cards, a white board, storybooks, and materials were stored.

**Materials and Supplies**

Materials included the: (a) *Daily Script for Problem-Solving Instruction*, (b) *Problem-Solving Step Measure*, (c) *A Parent’s Guide to the Self-Determined Learning Model for Early Elementary Students*, and (d) *A Teacher’s Guide to Implementing Self-Determined Learning Model of Instruction Early Elementary Version* (Palmer & Wehmeyer, 2002a, b). Supplies included student created flash cards i.e., 3 × 5 index) that were created from a problem-solving worksheet (i.e., Cote et al., 2010). The worksheet listed three problem-solving steps (i.e., what’s the problem, how can you fix it, why would it work) (Agran et al., 2002; Cote, 2009; Glago, 2005; Palmer & Wehmeyer, 2002a, b). Additional supplies included storage crates, scissors, glue sticks, white board, dry erase markers, and problem-solving storybooks (e.g., *An Evening at Alfie’s*, Hughes, 1984; Palmer & Wehmeyer, 2002a, b; *Princess Smartypants*, Cole, 1986). Audio recordings were made of teacher instruction and student responses (i.e., Olympus Digital Voice Recorder).

**Experimental Design**

A multiple-probe design (Horner & Baer, 1978) across three students was used to determine the efficacy of the problem-solving intervention. There were baseline, treatment, and maintenance phases in the study.

**Dependent Variables**

Teachers, students, and researchers identified dependent behaviors that were related to each student’s individualized education program (IEP). The dependent variable was the percent of time each student engaged in the target behavior during classroom observations. Student target behaviors were: Mary, percent of time following teacher instructions; Brett, percent of time participating as required; and Robert, percent of time maintaining focus on task. Student non-target goals were: Mary, percent of time out of seat, reading a book without permission; Brett, percent of time talking, out of seat; Robert, percent of time looking around the classroom, and out of seat. Criterion was set at 80% of the time engaged in the targeted behavior on three successive occasions. Researchers used a 15-second partial interval recording method (Bicard, & Bicard, 2010). Observation periods were 15-minutes in length.

**Independent Variable**

A problem-solving strategy was the independent variable (Cote et al., 2010; Cote, 2011). The teacher followed a daily script to teach students three problem-solving steps in setting a goal. *A Teacher’s Guide to Implementing the Self-Determined Learning Model of Instruction Early Elementary Version* (Palmer & Wehmeyer, 2002b) was used to help students self-select goals.

**Measurement and Data Collection**

Criterion performance for dependent/target behaviors was measured using percentage of time students exhibited the target behaviors. Additionally, performance was set at a minimum of three data points at 80% criterion on three consecutive occasions (Horner et al., 2005). The primary researchers, (i.e., two university professors) and three trained secondary observers (i.e., graduate students) collected baseline, intervention, and maintenance data.

**Procedural Fidelity**

The primary researchers and secondary observers used a *Procedural Fidelity Checklist* to assess treatment integrity. The checklist facilitated their recording the teacher’s adherence to the daily script outline. Procedural data were collected during each student training session. Using a percentage, the primary investigators and secondary observers scored the teacher’s following the steps outlined in the script.

**Data Collectors**

The primary researchers were responsible for: (a) teacher/interrater training, (b) collecting...
Experimental Procedures

Phase One: Pre-Study. During phase one, the primary researchers obtained district, school, principal, and teacher consent. Next, parent consent and student assent were collected. Parents were given copies of A Parent’s Guide to the Self-Determined Learning Model for Early Elementary Students and parent questions about the research were answered (Palmer & Wehmeyer, 2002a).

Teacher Training. Prior to the study, the first author and teacher met for one-on-one trainings (i.e., four). The teacher was given the Daily Script for Problem-Solving Instruction, A Teacher’s Guide to Implementing the Self-Determined Learning Model of Instruction Early Elementary Version (Palmer & Wehmeyer, 2002b) and problem-solving research articles (e.g., Cote et al., 2010). The teacher asked questions, made notes, and expressed that she had a clear understanding of the procedures.

Baseline

Prior to treatment, researchers observed students during their everyday classroom activities. Partial interval data recording started when the teacher instructed or gave a directive to start an assignment. Daily observations were scored in 15 second intervals and recording stopped after 15-minute sessions. During each 15-second interval the researchers scored the student’s targeted behavior with a plus or minus. For example researchers sat in chairs behind or to the side of students in order to maintain a good view. Students’ baseline data were collected in their individual classrooms (i.e., Mary, general education classroom; Brett, resource room; Robert, self-contained classroom). When students’ baseline data were stable they were introduced to treatment (Cote, 2009; Horner & Baer, 1978; Horner et al., 2005; Tawney & Gast, 1984).

Mary was included in the first level of the design. Mary received three baseline trials. Brett received three baseline trials and two probes. Robert received three baseline trials and four probes. The teacher asked each student to complete the pre intervention measures. Each student was given the forms to complete during a one on one session with the teacher. The data provided the researchers with additional information on students’ perceptions of their problem-solving skills and knowledge of the three problem-solving steps. Students completed the forms independently. The forms included a problem-solving questionnaire and problem-solving step measure (Cote, 2009).

Phase Two: Intervention

The teacher followed a daily script to introduce students to the problem-solving intervention. During the treatment condition, students received 15-minutes of instruction (Cote, 2009). The treatment session was conducted in a one on one arrangement (i.e., teacher-student). Each student was told that he or she would be learning three problem-solving steps. The teacher gained student attention by writing the lesson goals on a small whiteboard (e.g., identify the problem, identify the solution). The teacher gave each student a Problem-Solving Step Worksheet (Cote, 2009; Cote et al., 2010). The worksheet contained clip art pictures that corresponded to the three questions. A detective symbolized step one, what’s the problem? A nurse symbolized step two, how can you fix it? A joyful girl symbolized step three, why would it work? Students cut and glued pictures and written prompts on 3 × 5 unruled index cards. The teacher prompted (e.g., verbal, gestural) students to learn and recall the problem-solving steps.

The teacher facilitated student comprehension of a problem and solution using problem-solving storybooks (An Evening at Alfie’s, Hughes, 1984; Palmer & Wehmeyer, 2002a, b). The teacher read the book to students and guided them in identifying the characters’ problems and solutions. Following the activity, a discussion occurred in which the teacher asked students to identify the character’s problems and barriers to finding solutions. The teacher talked to students about some of
the difficulties to solving problems and finding solutions.

Next, the teacher presented students with the SDLMI worksheets (i.e., Exploring My Interests, Set a Goal, Take Action, Adjust Goal) to facilitate their identifying a self-set goal (Palmer & Wehmeyer, 2002a, b). The teacher discussed with each student an IEP goal on which he or she could improve on. With the teachers help each student was provided with a specific goal to work on. The teacher explained to students that the problem-solving steps would help them in meeting their goals. The teacher encouraged and reinforced students’ responses as they worked out problems and solutions. The teacher incorporated student’s daily problems into the session. For example, the teacher discussed the possibility that the student might not want to complete a specific academic assignment. The teacher discussed solutions to the problems and coached students to reflect on the three problem-solving steps. As students reviewed the steps they were asked to reflect on why choosing a best solution would work for each of their problems. The teacher took time to role-play the problem and solution. The researchers audio recorded the teacher’s instruction during intervention (i.e., Olympus Recorder).

Mary

During intervention, the teacher taught and reviewed the three problem-solving steps with Mary. Next, she utilized problem-solving storybooks to facilitate discussion of problems and solutions. With the support of the teacher, Mary was able to identify the character’s problem and solutions. Then the teacher presented Mary with the Exploring My Interest worksheet (Palmer & Wehmeyer, 2002a, b). She asked Mary to identify what she liked to do at school and home. She also asked Mary to identify what she wanted to learn. The teacher guided Mary in identifying four things, one of which was to complete the daily practice. Mary was facilitated in identifying a goal, that is, answering problems and editing sentences (i.e., DLR). When asked what Mary could change, Mary expressed, “I need to change my mood to a happy mood.” Mary indicated that she wanted to complete the DLR, since she knew that it would help her get a good job, spell/write better, go to college, and get good grades.

The teacher brainstormed with Mary what she could do to remove the current barriers to starting and completing the DLR. Since Mary was creative, the teacher facilitated her in creating a DLR table that she could keep at her desk. The table contained five boxes for the days of the week, assignment, grade, and choices. Since Mary loved reading books, she snapped a picture of a book, and inserted it in the table. The general and special education teachers discussed Mary’s use of the table during the DLR activity. Mary and the teachers agreed that when Mary completed the DLR assignment, she would raise her hand and wait for the general education teacher to grade her work. Following the teacher assigning a grade, Mary could choose a next step activity (e.g., reading a book, completing a review). The general education teacher did not provide Mary with any prompts or cues to use the DLR chart. The general education teacher was surprised to see that Mary was eager to use her self-created DLR chart. Mary raised her hand after completing the DLR assignment, and the teacher assigned a grade. Mary was expected to get an A on the assignment in order to meet the set criteria.

Brett

The teacher facilitated Brett in learning the three problem-solving steps. She and Brett read and discussed the problems and solutions of the characters presented in the problem-solving storybooks. Next, the teacher presented Brett with the Exploring My Interest worksheet (Palmer & Wehmeyer, 2002a, b). Brett expressed a strong interest in playing computer games, of which the teacher utilized in the problem-solving intervention. The teacher guided Brett in expressing what he did to solve the problems presented in computer games. The teacher stressed how the three problem-solving steps could be used in play and most importantly in the classroom. The teacher guided the discussion around Brett’s need to complete math assignments when in the resource room. Brett and the teacher identified the problem (i.e., non-participation), possible solutions, and a best solution.
One of Brett’s IEP goals included a sensory break; however, the teacher discussed the importance of Brett’s participation when required before taking the sensory break. The teacher emphasized that his continued participation would be highly regarded in middle school (e.g., next year). Both teacher and Brett brainstormed what he could do to participate as required during math instruction. The teacher and Brett created a chart on which he recorded his daily participation. Brett set a goal to participate as required during the math lesson. The student recorded his behavior using a chart that was displayed behind the teacher’s desk.

Robert

Robert was taught the three problem-solving steps. During intervention, the teacher read problem-solving storybooks and discussed character problems and solutions. Robert was helped to complete the Exploring My Interests, Phase 1, Set a Goal, Phase 2, Take Action, and Phase 3, Adjust a Goal worksheets (Palmer & Wehmeyer, 2002a, b). Using the Exploring My Interests worksheet, Robert scribed interests that included reading, old cars, and going to the movies with his parents. The teacher captured and used Robert’s movie interests when teaching the intervention. For instance, when Robert shared the story of a young dolphin whose tale was lost in a crab trap, the teacher discussed possible solutions. The teacher was creative in discussing with Robert how the problem-solving steps were used in the story and how the same steps could be applied in the classroom. Robert had difficulty understanding the impact of his behaviors during the language arts lesson. He demonstrated a lack of understanding what focused behaviors looked like. Therefore, the teacher modeled a focused behavior (e.g., reading when called on) and an unfocused behavior (e.g., looking around the room) and shared pictures of students who were focused on a teacher. The teacher helped Robert to realize that he needed to remain focused. Next, the teacher and Robert role-played allowing him opportunities to demonstrate the behaviors.

Robert agreed that he had a hard time staying focused during the language arts lesson. Robert expressed that ideas popped into his head whenever the teacher read, however, he wanted to focus with his eyes and ears (i.e., Exploring My Interests, What do I want to learn). The teacher and Robert problem solved solutions for remaining focused. As a result, Robert chose an appropriate solution. Robert utilized a small tablet to scribe ideas that came into his head. He quickly wrote down the idea (e.g., identified as a brain pop up) and saved them to share with the teacher when the lesson ended. Robert selected the goal of remaining more focused during his teacher’s language arts lesson (i.e., self-contained classroom).

Mary was included in the first level of the multiple probe design. Brett and Robert continued to receive weekly baseline probes. When Mary met criteria (i.e., followed teacher directions 80% of the time on three successive occasions), Brett was introduced to treatment. Robert continued to receive baseline probes until Brett demonstrated criterion (i.e., participated as required 80% of the time on three successive occasions). Lastly Robert began the intervention condition until he demonstrated criterion on three successive occasions (i.e., maintained focus 80% of the time).

Phase Three: Post Treatment

During a pre-treatment assessment, Mary, Brett, and Robert were unable to identify the three problem-solving steps. However, four weeks post treatment, the teacher administered the Problem Solving Step Measure and asked students to identify the three problem-solving steps. Mary, Brett, and Robert recalled the three problem-solving steps.

Two follow up maintenance probes were conducted at two and four weeks post intervention. The primary researchers conducted the maintenance probe observations. The data were gathered in the students’ classrooms (i.e., Mary, general education; Brett, resource room; Robert, self-contained) to assess students’ maintenance of target behaviors.

Interobserver Agreement and Treatment Reliability

The primary researchers and secondary observers conducted daily direct observations of the teacher’s implementing the problem-solving intervention. The primary researchers and secondary observers practiced data recording until
interobserver agreement (i.e., three sessions at 100% agreement) was established. The percent agreements were calculated by dividing the number of agreements by the number of agreements plus disagreements and then multiplying by 100. Interobserver agreement was 98.4% during 20% of random sessions across baseline, intervention, and maintenance.

Procedural reliability data were collected on the teachers’ correct implementation of the problem-solving treatment (i.e., rubric to score teacher instruction). The researchers used plus or minus symbols to score the procedural fidelity checklist. In particular the teacher was evaluated on: telling students what they would be doing and why, teaching/reviewing the problem-solving steps, delivering cues or prompts, using problem-solving story books, presenting problem situations, helping students define problems, facilitating students’ in identifying possible solutions, delivering feedback, and embedding opportunities for role-play/discussion. The treatment interobserver agreement was 98% during 20% of random intervention sessions.

Results

Baseline and Treatment Results

Students’ mean percentages were averaged during each phase (i.e., baseline, treatment, maintenance). An examination of data indicates that students met the set criteria following treatment. Mary’s baseline data demonstrated variability ($M = 17$, range $0–25$); treatment data demonstrated a gradual progression of accelerating trend ($M = 49$, range, $0–95$). Brett’s baseline data demonstrated a stable trend ($M = 25$, range $22–30$); treatment data did not demonstrate an immediate change with the introduction of treatment, however a gradual progression of accelerating trend was demonstrated ($M = 63$; range, $17–93$). Robert’s baseline data demonstrated high variability ($M = 35$, range, $20–55$); treatment data did not demonstrate immediate changes with the introduction of treatment, however demonstrated high variability ($M = 55$, range $20–95$). Students varied in the number of treatment sessions needed to meet criteria. The number of sessions was: Mary, 9; Brett, 9; and Robert, 11. Treatment data suggested that students learned how to set goals, problem solved, and met self-set goals as a result of the systematic problem-solving instruction.

Maintenance

Maintenance data were gathered two and four weeks post intervention. All observations were conducted in students’ classrooms. During maintenance probe observations, Mary, Brett, and Robert maintained the problem-solving skills. Maintenance data were: Mary, $M = 88$, range, $83–93$; Brett, $M = 92$, range $90–93$; Robert, $M = 84$, range, $82–86$. See Table 2 for mean percentages (i.e., baseline, treatment, maintenance). See Figure 1 for a visual of baseline, treatment, and maintenance data.

Social Validity

A social validity measure (Cote, 2009) was used to score the benefits of the problem-solving strategy. The teacher scribed that the strategy was: fairly easy to implement, facilitated students in seeking assistance, effective in teaching problem solving, appropriate for students’ ability levels, and facilitated students in identifying solutions. In an unsolicited email, the teacher indicated that the students had benefited very much and that she would teach the strategy the following year. She expressed that: Mary’s parents were happy that she had made improvements, Brett was completing his math work independently, and Robert was doing great. See Table 3 for teacher social validity data.

Conclusion

Research into problem-solving training has been limited for students with disabilities.
This study replicated (i.e., partial) and expanded on prior problem-solving research (Agran et al., 2001, 2002, 2006; Cote et al., 2010; Glago, 2005; Palmer & Wehmeyer, 2000). Figure 1. Students' with Autism Use of the Problem-Solving Strategy.
2003). A teacher used a problem-solving intervention (Cote et al., 2010) and phases from the SDLMI (Palmer & Wehmeyer, 2002a, b) to teach three elementary age students with autism to set and meet goals, identify problems, and self-evaluate their problem-solving skills (Agran et al., 2002). These students were successful in achieving their self-selected goals. The results from this study can be useful when planning instruction for students with autism (Agran et al., 2002; Glago, 2005; Palmer & Wehmeyer, 2002a, b). The findings demonstrated a functional relationship between the intervention and students achieving the problem-solving skills that helped them to reach and maintain goals.

**Implications**

The results of the research have several inferences for teacher practice. Foremost, data suggested that students identified problems, brainstormed possible solutions, set goals, and maintained goals. This research emphasizes the importance of educators teaching students with autism how to problem solve starting at a young age (Agran et al., 2002; Palmer & Wehmeyer, 2003). Second, the teacher highly rated the problem-solving intervention noting that it was a practical strategy for teaching students with autism how to problem solve. The teacher noted that all students had benefitted from the intervention.

However, further research is warranted to evaluate strategies that have been found to increase problem-solving skills in students with disabilities. Problem-solving skills can better support students with autism in general education settings. Teachers can schedule time during the day to teach students to problem solve. A scheduled time allows students opportunities to acquire problem-solving skills with a teacher’s guided practice, role-play and assessment of skills.

**Limitations and Future Research**

The study has some limitations. Results of this problem-solving intervention reflect the experiences of a small sample of students who were identified with autism. Therefore, the effects of these results may be difficult to generalize to other students in various geographic settings. The students included in the research possessed good oral communication skills; therefore, the effects of the problem-solving instruction may be problematic when generalizing to students with autism with limited oral communication. The data were gathered on students’ performances of target behaviors in various classroom settings. Therefore, attention should be used when simplifying the effects for generalization across persons and settings.

The teacher provided individualized instruction to all students. However, future research should examine the results of instructing students with autism in a small group format (Mims, Hudson, & Browder, 2012). Additionally, future problem-solving studies could include a larger diverse sample size and include students from a larger geographic area (i.e., schools, districts). Maintenance data were gathered at two and four weeks post intervention; further replication can include a longer maintenance phase.

**References**


**TABLE 3**

<table>
<thead>
<tr>
<th>Social Validity Measure</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Problem-Solving Intervention</strong></td>
<td><strong>Response</strong></td>
</tr>
<tr>
<td>Was fairly easy to implement</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>Facilitated students in seeking needed assistance</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>Was effective in teaching students to problem solve</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>Was feasible in the amount of time required to teach it</td>
<td>Agree</td>
</tr>
<tr>
<td>Was appropriate for the students’ ability levels</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>Facilitated students in identifying solutions to problem situations</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>Was useful in teaching self-determination</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>Would be continued post-study</td>
<td>Strongly Agree</td>
</tr>
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