Teaching Social Problem Solving to Individuals with Mental Retardation

Steven A. Crites
Indiana-Purdue University Fort Wayne

Caroline Dunn
Auburn University

Abstract: The purpose of this study was to determine effectiveness of a problem-solving curriculum for transition-age students with mental retardation. The interactive training program Solving Your Problems (Browning, n.d.) was used to teach a five-step process for solving problems. Results indicate participants in the training group were able to use the five-step problem solving process to solve problem situations. Additionally, members of the training group scored higher than those in the control group on a problem-solving curriculum measure and were able to generate more alternative solutions to novel problem situations. There was some evidence of generalization of the five-step process to novel problem situations. Participant feedback on training was positive.

Improving social behavior of people with mental retardation has long been a goal of researchers (Wehmeyer & Kelchner, 1994). In a review of intervention strategies to improve social skills in the employment setting, Huang and Guo (1997) found that treatment procedures could be grouped into six categories: (a) modeling, (b) consequence management, (c) peer-mediated strategies, (d) self-management training, (e) social skills training packages, and (f) process training. Each of these treatment procedures employs different strategies to teach skills.

Many have used behavior modification techniques (e.g., Breen, Hating, Pitts-Conway, & Gaylord-Ross, 1985; Karlan & Rusch, 1982; Matson & Sensatore, 1981; Morgan & Salzberg, 1992). These traditional social skill training approaches focus on teaching skills needed to interact, and have been effective in teaching skills in the classroom.

Unfortunately, this skill training has not resulted in increased social competence or employment outcomes. The employment rate for individuals with mental retardation has remained at about 60% for the last four decades (Benz, Yovanoff, & Doren, 1997; Bobroff, 1956; Dinger, 1961; Stanfield, 1973).

Greenspan and Granfield (1992) developed a model of social competence that may explain why traditional social skills training programs have not resulted in increased social competence and employment outcomes for individuals with mental retardation. According to Greenspan and Granfield, there are two intellectual aspects of social competence, practical intelligence and social intelligence. Social intelligence is made up of social skills and social awareness. The training approaches described above (i.e., modeling, consequence management, peer-mediated strategies, self-management training, social skills training packages) increase social skills but do not necessarily increase social awareness. To effectively increase social competence, training procedures must address the social-cognitive abilities of the individual with mental retardation as well (Siperstein, 1992).

Process training addresses cognition. In process training, focus is not on teaching a behavior but on teaching the process of understanding the social situation and using learned skills appropriate to the situation. Training usually involves the following steps: (a) decoding, (b) decision-making, (c) performance, and (d) evaluation. Individuals with mental retardation are taught to understand

Correspondence concerning this article should be addressed to Steven A. Crites, Indiana University-Purdue University Fort Wayne, School of Education, Department of Professional Studies - Neff 250K, 2101 E. Coliseum Blvd., Fort Wayne, IN 46805-1499. E-mail: critess@ipfw.edu
the context of the social situation, determine alternative social behaviors and choose the most desirable, perform the behavior, and evaluate effectiveness of the chosen behavior (Huang & Cuvo, 1997).

The teaching of social problem solving provides a framework for interpreting the social situation and generating appropriate alternative behaviors. This approach teaches cognitive skills which may increase social competence and, in turn, job retention (Wehmeyer & Kelchner, 1994).

The purpose of this study was to determine effectiveness of a problem-solving curriculum for transition-age students with mental retardation. A modified version of the interactive videodisc problem-solving training package, *Solving Your Problems* (Browning, n.d.), was used for training. Individuals with mental retardation were taught a five-step problem solving procedure. The steps included: (a) identify the problem, (b) size up the problem, (c) think up solutions, (d) decide upon a solution, and (e) study what happens. The investigation was designed to answer the following questions:

1. Will there be a difference between treatment and control groups in problem-solving ability after treatment?
2. Will there be a difference between treatment and control groups in problem-solving knowledge after treatment?
3. Will there be a difference between treatment and control groups in ability to use a five-step process to solve problems after treatment?
4. Will there be a difference between treatment and control groups in number of solutions generated to two problem scenarios after treatment?
5. Will students in the treatment group learn to use the 5-step process to solve untrained problem situations?
6. How will participants in the treatment group rate the training curriculum after treatment?

**Method**

**Participants and Setting**

Four classes of special education students participating in an Occupational Diploma program (a diploma option for special education students with focus on employment skills) at two high schools in rural southeast Alabama participated in the study. Based on quasi-experimental group design, the intact classes were randomly assigned, two as treatment and two as control groups.

Training sessions and assessments were conducted in special education classrooms at the high schools. All members of the classes participated in the study, but only those who met the selection criteria described below were included in the study.

Participants were required to meet the following selection criteria: (a) provide a signed consent form from a parent or guardian, (b) provide student assent, (c) have a reported IQ score equal to or less than 70, and (d) complete both the pre-treatment assessment and the post-treatment assessment. Additionally, data were only used from those in the treatment group who attended 70% of the training sessions.

Thirteen participants were members of the classes assigned to the treatment group. The treatment group was 84% male and 100% non-white, with a mean age of 17 years, and a mean IQ of 51. Five of the participants were members of the classes assigned to the control group. The control group was 80% female, 40% white and 60% non-white, the mean age was 17 years, and the mean IQ was 60.

**Materials**

A modified version of the problem-solving training package, *Solving Your Problems* (Browning, n.d.) was used for training. The training package includes (a) an instructor’s guide, (b) lesson plans, (c) videodisc vignettes of problem situations, (d) a curriculum knowledge test, (e) student curriculum questionnaire, and (f) a problem-solving workbook. A videodisc player, television, and written problem scenarios were additional materials used in the training program.

**Dependent Measures**

Six dependent measures were used to determine effectiveness of the intervention. The first four were given to both treatment and control groups, the last two were completed
by the treatment group only. Descriptions of the dependent measures follow.

**Interpersonal Cognitive Problem-Solving (ICPS).** ICPS, a sub-test of the ARC’s Self Determination Scale (Wehmeyer & Kelchner, 1995), was the first dependent measure. This measure presents beginning and ending for six problem scenarios. Participants were asked to provide the middle for the scenario. Scenarios depict interpersonal problem situations common to students in high school. Each answer is scored on a scale of 0 to 2. There are clear examples to use in scoring and good concurrent validity with Means-End Problem Solving (Platt & Spivack, 1975).

Because the interpersonal cognitive problem solving measure required the evaluator to rate the answer, the investigator and a trained graduate student both rated the answers. In the evaluation of the ICPS, percentage of agreement was calculated using the point by point agreement method (Kazdin, 1982). In cases of disagreement, the lower of the two scores was used in the data analysis. Reported inter-rater reliability was .97.

**Curriculum Knowledge Test (CKT).** The CKT (Browning, n.d.) consisted of fourteen true/false and multiple-choice questions about problem solving. The assessment instrument was based on the model of problem solving used in the curriculum.

**Solve the problem (STP).** In this measure participants were read two problem scenarios and asked to write down the steps they would use to solve each problem (i.e., what do you do first, second, and so on). Based on the five-step problem-solving process, the score for each problem ranged from 1 to 5. Participants received one point for each of the steps correctly used to solve the problem.

The STP assessment required the evaluator to make a judgment about the number of steps used based on the written answer. To avoid bias, both the first author and a trained graduate student judged answers. In evaluation of the STP, percentage of agreement was calculated using the point-by-point agreement method (Kazdin, 1982). In cases of disagreement, the lower of the two scores was used in the data analysis. Inter-rater reliability was calculated at .95.

**Brainstorming (BS).** Because individuals with mental retardation have difficulty generating alternative solutions to problems (Wehmeyer & Kelchner, 1994), an important component was brainstorming solutions (step three of the problem-solving procedure). BS measured the number of solutions generated for two problem scenarios. Participants were read each scenario and asked to list as many solutions as possible. The participant’s score was the number of solutions generated.

During the training phase, those in the treatment group were asked to complete three independent assignments in their workbook. These assignments occurred on Day 6, Day 8, and Day 10 of the training phase. Participants were asked to identify a problem they encountered and provide a solution using the five-step procedure. All written assignments were evaluated by the first author at the end of training to see if participants were able to generalize use of the procedure to untrained problems.

Additionally, those in the treatment group were asked to complete a Student Curriculum Questionnaire (SCQ) (Browning, n.d.). After completing the training and assessments, each of the participants were read the five questions about the training program and asked to select one of three provided responses.

**Procedure**

Classes were randomly assigned to one of two groups, treatment or control. Only the treatment group received training. The first author, a graduate teaching assistant, conducted all assessments and classroom training. A graduate student assisted the first author by monitoring participants, redirecting them when needed, and giving assistance with workbook assignments. Before the intervention, the first author and graduate student, both reviewed the training manual, learned the training protocol, and met for two 1-hour sessions and practiced working with the interactive videodisc program.

**Pre-treatment phase.** During the pre-treatment phase, all participants were asked to complete four assessments. The first was a measure of interpersonal cognitive problem-solving (students must provide the middle of a story when given the beginning and end), the second was a curriculum knowledge test, the third measured participant’s ability to solve
two problem scenarios using a five-step process, and the fourth was a measure of the number of solutions generated for two problem scenarios. The first author and the graduate assistant read the directions and scenarios contained in all of the pre-treatment measures to participants. Both the first author and graduate student provided assistance with spelling and, in some cases, wrote the answer dictated by the participant.

Treatment phase. Only those in the treatment group received training. This phase began immediately following the pre-treatment phase. Training sessions lasted approximately 60 minutes per day for 10 days.

Curriculum. Those in the treatment group were taught to solve problems by using the following steps: (1) identify the problem, (2) size up the problem, (3) think up solutions, (4) decide on one solution, and (5) study what happens. Lessons were delivered primarily via an interactive videodisc program. Each training session included a review of the problem-solving procedure, opportunities for verbal rehearsal of learning points and behavioral rehearsal of the procedure as well as role-plays of solutions.

The program is divided into five lessons. Two training sessions were spent on each lesson. The focus of Lesson 1 was on why we should solve problems. Lessons 2 and 3 covered how to solve a work problem. The focus of Lesson 4 was on solving a people problem. Lesson 5 focused on solving a money problem.

The curriculum presented three people with three different problems: a work problem, a money problem, and a people problem. The first person had a problem getting to work on time, another had a problem paying back a loan, and the third had a problem dividing household chores with his roommate.

The first author led subjects through the problem-solving procedure, paying careful attention to encourage the participants to brainstorm solutions to the problem. Due to the interactive nature of the videodisc-training program, participants were able to choose a solution to the problem from the menu and see results played out before them. Built-in pauses allowed for discussion of the problem. This interaction taught participants that there are many solutions to problems and that different solutions for the problem may produce different results.

Each participant had the opportunity to lead fellow classmates through solving a problem situation. Additionally, participants tested alternate solutions in role-play situations. This behavior rehearsal and role-play allowed participants to practice the problem-solving steps as well as appropriate interaction skills (e.g., tone of voice, body language). Students were asked to solve their own problems on three occasions.

Post-treatment phase. The day following the end of treatment, both treatment and control groups were asked to take the four assessment measures again. Scores on the post-treatment measures were compared to pre-treatment levels.

Fidelity of Treatment

To insure the investigator was following the training protocol, fidelity of treatment was measured across 20% of all training sessions. Two trained observers (i.e., a graduate research assistant and a certified special education teacher) simultaneously viewed the lesson to assure that all training procedures were followed. Percentage of agreement was calculated using the point-by-point agreement method (Kazdin, 1982). In cases of disagreement, the lower of the two scores was used in the data analysis. Based on combined scores of two observers, observed fidelity of treatment was .95.

Results

A 2 X 4 mixed between/within analysis of covariance (ANCOVA) was conducted using SPSS 10.0 for Windows. The between factor was group (experimental vs. control), the within factor was problem solving ability measured by four instruments (ICPS, CKT, STP, and BS), and the covariate was IQ.

Data for 18 participants (13 experimental, 5 control) was used in the analysis. Due to small sample size alpha was set at .15 (Stevens, 1996). There were no univariate or multivariate within-cell outliers at alpha = .05. A significant between factor effect of group was reported, $F = 5.80, p = .029$ (see Table 1).
Based on a significant between factor effect, post-hoc ANCOVAs were conducted on each of the four outcome measures. Results are reported below and presented in Tables 2 and 3.

The first outcome measure examined was ICPS. The test of between-subjects effects (treatment vs. control) was not significant ($p = .54$).

The second outcome measure examined was CKT. In this case, the test of between-subjects effects (treatment vs. control) was not significant ($p = .165, \alpha = .15$). The observed power was .277, indicating only a 27.7% chance of detecting a difference if one actually existed.

STP was the third measure examined. The results of the test of between-subjects effects indicated a significant difference ($p = .013$), with the treatment group scoring higher. The effect size was large (.343).

BS was the last measure examined. Results of the test of between-subjects effects indicated no significant differences between groups ($p = .225$).

Participants in the treatment group were asked to complete two additional assessments. One was a series of three workbook assignments, the other a student curriculum questionnaire. During the training phase, students in the treatment group completed three workbook assignments in which they were asked to identify and solve their own problem using the five-step process. These assignments occurred on Day 6, Day 8, and Day 10 of the training phase. Workbook answers were examined by the investigator for evidence of application of the trained problem-solving process to novel problem situations.

On the first attempt (Day 6), none of the participants was able to identify a problem. Because no one was able to identify their own problem, the investigator read a prepared novel problem situation and the participants responded in their workbook. Even though they were not able to identify their own problem, the participants were able to use the five-step process to solve the given problem.

An examination of the second assignment (Day 8) yielded results. On the second assignment, three students (25% of sample) identified and solved novel problem situations in their workbooks using the five-step process. Untrained problem situations included: (a) bus driver yells at him because he doesn’t sit down on the bus, (b) his sister always wants him to go to the store and buy her gum, and (c) working with the bricks (masonry class) at trade school is too hard.

Five participants (38% of sample) solved novel problem situations in their workbooks on the third assignment (Day 10). A review of workbooks yielded the following novel problem situations: (a) an argument with a friend at lunch, (b) teacher won’t let him work on his project at trade school, (c) needed money for cigarettes, (d) had a fist fight with a friend, and (e) having a problem with parents because they don’t do things with him anymore like they used to.

After completing training and assessments, participants were asked to complete the SCQ. Students were read the questions and asked to choose one of three responses to indicate their opinion of the training curriculum. Participants generally responded positively to the training program. The questions and responses are presented in Table 4.

**Discussion**

The purpose of this study was to determine effectiveness of a problem-solving curriculum

<p>| TABLE 1 |
| Test of Between Subjects Effects |</p>
<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>F</th>
<th>Sig.</th>
<th>Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUP</td>
<td>1</td>
<td>5.808</td>
<td>.029</td>
<td>.279</td>
</tr>
</tbody>
</table>

<p>| TABLE 2 |
| ANCOVA Summary Table |</p>
<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>F</th>
<th>Sig.</th>
<th>Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICPS</td>
<td>1</td>
<td>0.379</td>
<td>.547</td>
<td>.025</td>
</tr>
<tr>
<td>CKT</td>
<td>1</td>
<td>2.129</td>
<td>.165</td>
<td>.124</td>
</tr>
<tr>
<td>STP</td>
<td>1</td>
<td>7.846</td>
<td>.013*</td>
<td>.343</td>
</tr>
<tr>
<td>BS</td>
<td>1</td>
<td>1.602</td>
<td>.225</td>
<td>.220</td>
</tr>
</tbody>
</table>

* denotes significance ($\alpha = .15$)
for transition-age students with mental retardation. The study was designed to answer the research questions listed earlier. Each of the findings is discussed below.

Though results for the ICPS indicated no significant differences between groups after treatment, an examination of the actual mean differences indicated the treatment group did have a small gain (.51), while the control group had a small loss (–.52) after treatment.

These results do not show as strong an increase in ability to solve problems as Castles and Glass (1996) reported when they compared a problem-solving procedure, a role-play procedure and a combination role-play and a problem-solving procedure. Results of their study indicated that both the problem-solving procedure and combination procedure produced statistically significant higher scores on an investigator developed problem-solving measure than role-play alone. Castles and Glass may have found such strong results because the trained procedure was very highly correlated with the outcome measure.

The reported mean difference on the CKT was not significant \( p = .165, \alpha = .15 \) although the treatment group increased nearly two points, while the control group gained only .2. An examination of the raw scores indicated 11 of the 13 (84.6%) participants in the treatment group scored higher after treatment, one stayed the same, and one scored lower. Not finding a significant difference between groups may be a function of low esti-

<table>
<thead>
<tr>
<th>TABLE 3</th>
<th>Adjusted and Unadjusted Group Mean Differences for Problem-Solving Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure</td>
<td>Treatment Group</td>
</tr>
<tr>
<td>ICPS</td>
<td>Adjusted Mean Difference</td>
</tr>
<tr>
<td></td>
<td>0.507</td>
</tr>
<tr>
<td>CKT</td>
<td>1.952</td>
</tr>
<tr>
<td>STP</td>
<td>4.921</td>
</tr>
<tr>
<td>BS</td>
<td>1.351</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 4</th>
<th>Results of the Student Curriculum Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question</td>
<td>Answer</td>
</tr>
<tr>
<td>1. How much did you learn from the lessons?</td>
<td>nothing</td>
</tr>
<tr>
<td></td>
<td>a few things</td>
</tr>
<tr>
<td></td>
<td>a lot</td>
</tr>
<tr>
<td>2. Were the lessons easy or hard?</td>
<td>easy</td>
</tr>
<tr>
<td></td>
<td>just right</td>
</tr>
<tr>
<td></td>
<td>hard</td>
</tr>
<tr>
<td>3. How much did enjoy the lessons?</td>
<td>not at all</td>
</tr>
<tr>
<td></td>
<td>some</td>
</tr>
<tr>
<td></td>
<td>a lot</td>
</tr>
<tr>
<td>4. How much information was new to you?</td>
<td>nothing new</td>
</tr>
<tr>
<td></td>
<td>some was new</td>
</tr>
<tr>
<td></td>
<td>all new</td>
</tr>
<tr>
<td>5. Would you like some other lessons like these?</td>
<td>no</td>
</tr>
<tr>
<td></td>
<td>maybe</td>
</tr>
<tr>
<td></td>
<td>yes</td>
</tr>
</tbody>
</table>
mated power. However, the effect size was large (.12) suggesting the treatment had an effect even though no significant results were present.

These findings are consistent with findings of Browning and Nave (1993). In their study, Browning and Nave investigated effectiveness of the same problem-solving curriculum. These investigators found that participants with moderate mental retardation in the treatment group did score better on the post treatment curriculum measure than the control group, but did not show enough improvement to make a significant difference between groups (\( p = .208, \alpha = .05 \)).

In each study, the current research and Browning and Nave (1993), the intervention was short (10 days, 5 days). Extending the training program over several weeks may allow participants to not only better acquire curriculum knowledge, but also become fluent in the curriculum, possibly making even more post-treatment gains.

Results found by Foss, Autry, and Irvin (1989) were also similar to the present study. These researchers found that participants who were trained using a combined problem-solving/video-tape modeling procedure, similar to the one used in the current study, did better on the curriculum measure than those trained using a behavior rehearsal/teacher modeling procedure.

Was there a difference in the ability to use a five-step process to solve problems between treatment and control groups after treatment? Results indicate a significant difference between groups. The treatment group performed better than the control group, clearly demonstrating that the participants learned to use the problem-solving procedure.

Hughes and Rusch (1989) found similar results as they taught two individuals with severe mental retardation a self-instruction process to solve problems on the job. In their study, process training was an effective way to increase problem solving in both trained and novel situations.

The findings of Park and Gaylord-Ross (1989) were also consistent with the present study. These investigators also taught individuals with disabilities to successfully use a problem-solving procedure to improve interactions with non-disabled co-workers.

Because individuals with mental retardation do not generate as many alternative solutions to a problem situation as their non-disabled peers (Wehmeyer & Kelchner, 1994), generation of alternative solutions was the subject of the Brainstorming measure. No significant difference was reported between groups on generation of alternative solutions, but a computation of the mean increase after training indicated the treatment group-mean increased 60%, while the control group mean decreased 28%. This indicated the training was effective in increasing the number of solutions generated.

Castles and Glass (1986) found stronger effects of treatment when they compared a social skills training approach, an interpersonal problem solving approach, a combined social skill training and problem solving approach, and no treatment, to increase the generation of alternative solutions to problem situations.

In their study, individuals with mental retardation trained with the interpersonal problem-solving approach and the combination approach generated significantly more alternative solutions than peers in the control group. Stronger results may have been due to a longer training period (seven weeks) and older participants.

Another area of interest was whether or not participants in the treatment group learned to solve novel problems as a result of training. Generalization of trained skills to novel situations has long been a concern of researchers working with individuals with mental retardation (Gumpel, 1994).

Participants of this study were given three opportunities to identify and solve their own problem. These workbook assignments were designed to promote generalization of the trained five-step problem solving process to novel real-life problems. An examination of assignments revealed that no participant was able to identify and solve a novel problem on the first assignment, 23% of the participants solved novel problems by the second attempt, and 38% of participants solved novel problems by the third attempt. This finding suggests that participants were beginning to generalize the procedure to novel situations. If training were extended, the investigator would expect this trend to continue.

O’Reilly and Chadsey-Rusch (1992) found
similar results. In their study, a problem-solving training approach to increase interaction skills led to generalization of trained skills to novel situations for all three participants with moderate mental retardation. Investigators trained for generalization by using multiple exemplars and providing opportunities for interactions in the natural environment (lunchroom) with a variety of co-workers. Conversely, Castles and Glass (1986) found no generalization of the trained procedure to novel situations. These authors suggested incorporating generalization strategies into the training program.

In the current study, researchers planned for generalization by stressing application of the problem-solving procedure to any problem one might encounter. Participants worked through several novel problems as a group before attempting to generate and solve their own problem. This emphasis may have contributed to the generalization of trained skills.

An often overlooked aspect of a training program for students with mental retardation is an affective evaluation of the training (Soto, Toro-Zambrana, & Belfiore, 1994). Participant reaction to training was the subject of the sixth research question. Participants were asked to complete a five-item questionnaire, expressing their opinion of the training. Results of the survey were positive as 92% reported learning “a lot” from the lessons.

Additionally, 62% of the participants rated the lessons as “just right,” while 38% rated them as easy. Eighty-five percent said that “some of the content was new” or “all of the content was new,” and 62% would like more lessons like these.

These findings were not surprising to the investigator as most participants actively participated in the training, many volunteering to role-play or lead the group through the problem-solving process. It is this investigator’s experience that when students are motivated and excited by the training program they tend to pay closer attention, exhibit fewer inappropriate behaviors, and learn more. Therefore, student input about the training program can be very important in the development and implementation of training programs (Beirne-Smith, Patton, & Ittenbach, 1994).

Limitations. Results of this study are subject to a number of possible limitations including small number of participants in a limited geographic area and a relatively short training period. The assessments and workbook assignments were all paper and pencil tasks and many of the participants in the study had limited writing skills. Even though assistance was offered to all of the participants on written tasks, individuals with mental retardation do not always self-monitor performance and know when to ask for help (Beirne-Smith et al., 1994). The training occurred at the very end of the school year and some of the participants may have been less focused on schoolwork. For example, during one training session, many students were absent getting ready for the prom. On another occasion, training was delayed for graduation awards. Finally, training was delayed again for graduation pictures.

Recommendations for Future Research

Continued research on teaching social problem solving to individuals with mental retardation is needed. Both training programs and research studies should be more longitudinal in nature. Short-term problem-solving interventions do show promise, however, longer periods of training with application activities interwoven into the overall curriculum would allow data collection at several points in the study. Such data may better demonstrate acquisition, fluency, maintenance, and generalization of problem-solving skills and could be valuable in development of better curricula.

Additionally, more studies measuring social problem-solving ability of successfully employed individuals with mental retardation (e.g., Wehmeyer & Kelchner, 1994) need to be conducted. Such data may lend more empirical evidence for the inclusion of social problem-solving training into the curriculum for individuals with mental retardation.

References

Benz, M., Yovanoff, P., & Doren, B. (1997). School to work components that predict postschool suc-


Received: 15 May 2003
Initial Acceptance: 17 June 2003
Final Acceptance: 20 November 2003