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Increasing skill performances of problem-solving in students with intellectual disabilities

Debra Lynn Cote
University of Nevada, Las Vegas

INCREASING SKILL PERFORMANCES OF PROBLEM-SOLVING IN STUDENTS WITH INTELLECTUAL DISABILITIES

by

Debra Lynn Cote

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[redacted]
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[redacted]
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[redacted]
Examination Committee Member

[redacted]
Examination Committee Member

[redacted]
Graduate College Faculty Representative

ABSTRACT

Increasing Skill Performances of Problem Solving In Students with Intellectual Disabilities

by

Debra L. Cote

Dr. Thomas Pierce, Examination Committee Chair
Professor and Chair
University of Nevada Las Vegas

Research indicates that teachers and parents of children with disabilities rated self-determination, and in particular problem-solving skills, as important for success (Agran & Alper, 2000; Kolb & Hanley-Maxwell, 2003; Wehmeyer, Agran, & Hughes, 2000). Yet students with intellectual disabilities lack specific instruction related to self-determination, and often they have limited opportunities to practice the problem-solving skills that are needed (Agran & Wehmeyer, 2005; Grigal, Neubert, Moon, & Graham, 2003). This results in adolescents with intellectual disabilities exiting the school environment without the problem-solving skills needed to solve real-world problems.

Problem-solving instruction increases the acquisition of self-determination skills of students with intellectual disabilities and teaches these students how to self-regulate their behaviors (Agran, Blanchard, Wehmeyer, & Hughes, 2002; Palmer & Wehmeyer, 2002; Palmer, Wehmeyer, Gipson, & Agran, 2004). These behaviors are important for successful inclusion and access to the general education curriculum (Agran, Cavin,

Wehmeyer, & Palmer, 2006). It is imperative that direct instruction of problem-solving skills begins when students are in the elementary grades so they have increased opportunities to practice the skills over time (Palmer & Wehmeyer, 2003).

Researchers have noted that elementary-age students with intellectual disabilities have demonstrated problem-solving skills during instruction (Palmer & Wehmeyer, 2003), nevertheless, researchers have suggested more study is needed to assess the generalization and maintenance of problem-solving skills (Agran et al., 2001; Palmer et al., 2004). The purpose of this study was to research middle school students' with intellectual disabilities application, maintenance, and generalization of problem-solving skills. This study contributes to the limited research for this population of students, and provides a systematic approach to teach problem-solving skills that lead to self-determination (Agran et al., 2002; Crites & Dunn, 2002; Palmer & Wehmeyer, 2002).

This study was designed to investigate the effects of problem-solving instruction to increase the skill performances of problem solving in middle school students with intellectual disabilities. Since the participants were students with intellectual disabilities who were instructed in a special education classroom, this research can be used to improve student outcomes. In addition, this study provides insight into how this problem-solving strategy can be implemented by teachers.

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CHAPTER 1

INTRODUCTION

The behavioral actions of thinking, problem solving and decision-making are traits only possessed by humans (Gagné, 1959). Problem solving is a progression of teaching phases that facilitates goal attainment that otherwise would be unattainable (Gagné). Gagné defined the five phases in problem solving. First, the individual is presented with a problem and is taught to discern a goal. Second, the individual learns to use and assimilate the concepts in solving problems. Third, the individual identifies the courses of action available to him or her. Fourth, the individual selects the course or courses of action that will result in an appropriate solution. Finally, the individual evaluates the selected course of action and determines its success or failure. For individuals with intellectual disabilities this process can be difficult.

Individuals with intellectual disabilities often have difficulty generating various courses of actions or choosing a course of action when presented with a problem (Agran & Wehmeyer, 2005). Instead, these individuals may choose the easier course of action, or the one they are most familiar with (Agran & Wehmeyer). Also, the development and attainment of new skills is influenced by an individual's past knowledge when presented with an analogous problem (Baumeister, 1967). Baumeister suggested that the ability of individuals with intellectual disabilities to grasp new information is dependent upon: (a) how the information is presented, (b) the significance of the information, and (c) the

framework in which the information is presented. These individuals, nevertheless, can retain what they learn (Baumeister). According to the President's Committee on Mental Retardation (1976), all individuals with intellectual disabilities are presumed capable of learning the skills needed to become autonomous and productive members of society.

Problem solving competencies or higher-order processing skills can and should be developed by both students with and without disabilities (Kolb & Stuart, 2005; Liu, 2004). Yet, many students with disabilities lack the knowledge of what to do when confronted with a problem (Kolb & Stuart, 2005). Students with intellectual disabilities, in particular, need to develop problem-solving competencies in order to deal with the everyday challenges of life (Edeh & Hickson, 2002). The development of these skills helps prepare students with disabilities for inclusionary school settings and inclusionary communities (Agran & Alper, 2000). These students often remain dependent upon others, without the use of structured learning environments to promote student autonomy (Wehmeyer, Hughes, Agran, Garner, & Yeager, 2003). To increase students with intellectual disabilities participation and success in meeting their goals in inclusionary settings, they need training in the acquisition of problem-solving skills (Agran, Cavin, Wehmeyer, & Palmer, 2006).

Problem solving and goal setting are important elements of self-determination (Eisenman, 2007). Research indicates that problem-solving instruction increases students with intellectual disabilities acquisition of self-determination (Agran, Blanchard, Wehmeyer, & Hughes, 2002; Palmer, Wehmeyer, Gipson, & Agran, 2004). Problem-solving instruction involves teaching students with intellectual disabilities how to self-regulate their behaviors and how to autonomously solve problems (Palmer & Wehmeyer,

2002). These behaviors are important for successful inclusion and access to the general education curriculum (Agran et al., 2006). The development of these skills, however, starts when students are in the elementary grades so they have increased opportunities to practice the skills over time (Palmer & Wehmeyer, 2003). Students as young as five-years-old can and do learn how to: (a) set goals, (b) take responsibility for their learning, and (c) make needed changes when exposed to problem-solving instruction (Palmer & Wehmeyer). Studies suggest that young students with intellectual disabilities who receive problem solving training increase appropriate behaviors and reach their IEP goals (Agran et al.; Palmer & Wehmeyer).

Purpose of the Study

Research indicates that teachers and parents of children with disabilities rate self-determination, and in particular problem-solving skills, as important for success (Agran & Alper, 2000; Kolb & Hanley-Maxwell, 2003; Wehmeyer, Agran, & Hughes, 2000). Yet, students with intellectual disabilities lack specific instruction related to self-determination and often have limited opportunities to practice the problem-solving skills that are needed (Agran & Wehmeyer, 2005; Grigal, Neubert, Moon, & Graham, 2003). This results in adolescents with intellectual disabilities exiting the school environment without the problem-solving skills needed to solve real-world problems.

The literature indicates that problem-solving instruction is needed for students with disabilities (Cole & Barrett, 1997; Glago, 2005; Wehmeyer, Palmer, Agran, Mithaug, & Martin, 2000). Researchers have noted that elementary-age students with intellectual disabilities have demonstrated problem-solving skills during instruction (Palmer &

Wehmeyer, 2003), nevertheless, researchers have suggested more study is needed to assess the generalization and maintenance of problem-solving skills (Agran, Blanchard, Wehmeyer, & Hughes, 2001; Agran et al., 2002; Palmer et al., 2004). The purpose of this study is to investigate middle school students with intellectual disabilities application, maintenance, and generalization of problem-solving skills in special education settings. This proposed study will contribute to the limited research, for this population of students, and provide a systematic approach to teach problem-solving skills that lead to self-determination.

Research Questions

Student Outcomes

1. What were the effects of problem-solving instruction on the skill performances of problem solving in students with intellectual disabilities?

2. To what degree were students with intellectual disabilities able to identify the steps of problem solving?

3. To what degree did students with intellectual disabilities generalize their skill performances of problem solving?

4. To what degree did students with intellectual disabilities maintain their skill performances of problem solving?

Student Perception

5. What effect did the problem-solving instruction have on students with intellectual disabilities perceptions of their skill performances of problem solving?

Teacher Perception

6. What were teacher perceptions about implementing the problem-solving strategy to increase skill performances of problem solving in students with intellectual disabilities?

Significance of the Study

Individuals with disabilities need to develop self-determination for autonomy and quality of life (Agran & Hughes, 2005). Few teachers, however, use strategies to facilitate student development of self-determination (Thoma, Nathanson, Baker, & Tamura, 2002; Thoma, Rogan, & Baker, 2001). One component of self-determination is problem solving (Wehmeyer, Gragoudas, & Shogren, 2005). However, students with intellectual disabilities lack explicit instruction in problem solving and when confronted with problems these students turn to others for solutions (Agran & Wehmeyer, 2005). Clearly, these students require explicit research-based problem-solving instruction.

The ability to problem solve can increase the likelihood of post-school success for individuals with intellectual disabilities (Wehman, 2006). Following problem-solving instruction, individuals are better at identifying encountered problems and possible solutions on the job (Hughes & Rusch, 1989). With training, repeated practice, and opportunities to generalize problem-solving skills, individuals with intellectual disabilities can be successful at handling problem situations (Crites & Dunn, 2004).

Problem-solving training, using the *Self-Determined Learning Model of Instruction*, has been significant in increasing students with disabilities abilities to set and attain goals in the general education setting (Palmer et al., 2004). In addition, students improved in socially appropriate behaviors following self-regulating problem-solving instruction

(Agran et al., 2001). Researchers found that teachers ranked self-determination and problem-solving skills important program goals for successful post-school adult outcomes (Wehmeyer et al., 2000).

Due to the lack of research in the area of self-determination for middle school students with intellectual disabilities, (Agran et al., 2001; Agran et al., 2002) in particular problem-solving skills, this study is essential. This study will help determine the effects of problem-solving instruction to increase skill performances of problem solving in middle school students with intellectual disabilities. Because the participants will be students with intellectual disabilities who are instructed in special education classrooms, this research can be used to improve student outcomes. This study will provide insight into how this strategy can be implemented by teachers.

Definition of Terms

A Teacher's Guide to Implementing the Self-Determined Learning Model of Instruction Early Elementary Version (Palmer & Wehmeyer, 2002). The model has been used by both teachers and parents in assisting a child to learn choice-making, decision-making, goal setting, and problem solving. These skills help students' exhibit self-determination, make choices, learn to set goals, and develop problem-solving skills.

A Parent's Guide to the Self-Determined Learning Model for Early Elementary Students (Palmer & Wehmeyer, 2002). Palmer and Wehmeyer emphasize that the model supports teacher and parent problem-solving instruction across settings. Parents can utilize the sequential questions to facilitate their child's problem-solving skills that lead to self-determination.

General Education Setting. Students with disabilities are instructed in the general education classroom with the needed individualized supports, accommodations, or modifications (Wehman, 2006).

Goal Attainment Scale (GAS). The GAS score measures " ... treatment induced change" (Smith & Cardillo, 1994, p. 272). Educational researchers have used the GAS score to assess skill changes, following intervention, in individuals with intellectual disabilities (Agran, et al., 2002; Palmer & Wehmeyer, 2003; Smith, 1994; Wehmeyer, et al., 2000).

Inclusion. Inclusion refers to practices that welcome students who are gifted and those with disabilities into a school environment where teachers, administrators, students, the community, and parents alike are responsible for students achieving and reaching their potentials (Friend, 2008).

Individualized Educational Program (IEP). "IEPs are legally required planning tools for school-age students with disabilities" (Westling & Fox, 2004, p. 102). It is a legal document organized by a team who determines student needs, goals, objectives, related services, supplementary aides and services, initiation date, and duration of services annually (Friend, 2008).

Intellectual Disabilities. Taylor (2007) noted, "In the international professional community, mental retardation has been replaced with terminology such as intellectual disability and learning difficulties. Increasingly, self-advocates and others find the phrase mental retardation to be not only out-dated, but offensive as well" (p. ii). The American Association on Mental Retardation changed its name to the American Association on Intellectual and Developmental Disabilities in January 2007 (Hallahan, Kauffman, &

Pullen, 2009). Schalock et al. noted: "The authoritative definition for intellectual disability/mental retardation is that of the AAIDD (previously the AAMR). The definition in the 2002 AAMR *Manual* (Luckasson et al., 2002, p. 1) remains in effect now and for the foreseeable future" (2007, p. 118). The term intellectual disability is synonymous with mental retardation (Palmer, et al., 2004; Schalock et al.). For the purposes of this study, intellectual disabilities will be used.

Mental Retardation. According to The American Association on Mental Retardation 2002 definition: "Mental retardation is a disability characterized by significant limitations both in intellectual functioning and in adaptive behavior as expressed in conceptual, social, and practical adaptive skills. This disability originates before age 18" (Beirne-Smith, Patton, & Kim, 2006, p. 61; Luckasson et al., 2002, p. 1).

Problem-Based Learning (PBL). "Problem-based learning is a student-centered pedagogical strategy that poses significant contextualized, real-world, ill-structured situations while providing resources, guidance, instruction, and opportunities for reflection to learners as they develop content knowledge and problem-solving skills" (Hoffman & Ritchie, 1997, p. 97).

Problem Solving. Problem solving is "the process of identifying a solution that resolves the initial perplexity or difficulty" (Agran & Wehmeyer, 2005, p. 255). "Problem solving is typically viewed as a systematic process involving three sequential steps: problem identification, problem analysis, and problem resolution" (Agran & Wehmeyer, 2005, p. 256). "Problem solving involves the generation of, not merely the selection of possible solutions" (Palmer & Wehmeyer, 2002, p. 39).

Problem-Solving Instruction. As a learning strategy, problem-solving instruction teaches a learner to independently solve a problem while drawing upon memory. The learner selects from a variety of responses and then follows through with the correct response (Charney, Reder, & Kusbit, 1990).

Resource Room. A student receives educational support on a regular basis by a special education teacher. The support is usually given, outside the general education classroom, in a resource room setting for part or all of the school day (Hallahan et al., 2009).

Self-Determination. Palmer & Wehmeyer (2002, p. 1) definition, "Self-determination provides a framework for a lifelong pursuit of individually determined abilities and outcomes. For young children, self-determination relates to the interests, choices, decisions, and problems that are solved, usually with adult support." Self-determination behaviors enable individuals to: (1) act autonomously, (2) self-regulate, (3) self-initiate, and (4) act in a self-realizing manner (Wehmeyer, Agran, & Hughes, 1998). Self-determination needs to be taught in elementary grades (Hallahan et al., 2009).

Self-Determined Learning Model of Instruction. "The *Self-Determined Learning Model of Instruction* is a model of teaching designed to enable teachers to teach students to become self-regulated problem solvers, to self-direct instruction toward self-selected goals, and to gain enhanced self-determination" (Agran, Blanchard, & Wehmeyer, 2000, p. 353). Using the three phases of the model (Wehmeyer et al., 2000), the teacher presents students with problems to solve. The students are guided in identifying goals, developing action plans, and making needed changes (Wehmeyer et al., 2000).

Self-Regulated Problem Solving. Wehman (2006) stressed that individuals who self-regulate can look at his or her behaviors, make a judgment, and choose whether or not to reinforce the behavior.

Special Education. Special education refers to instruction that is individualized for a student with a disability. Special education categories include the following disabilities: (a) specific learning disabilities, (b) speech or language impairments, (c) mental retardation, (d) emotional disturbance, (e) multiple disabilities, (f) hearing impairments, (g) orthopedic impairments, (h) other health impairments, (i) visual impairments, (j) autism, (k) deaf-blindness, (l) traumatic brain injury, and (m) developmental delay (Friend, 2008).

Limitations

1. The participants in this study attended the same middle school, therefore, the effects of the problem-solving instruction may be problematic when trying to generalize across school settings (Agran et al., 2002).

2. The number of participants included in the sample size was small, therefore, the effects of the problem-solving instruction may be difficult to generalize across large groups of students.

3. The participants included in the sample size were students with mild and moderate intellectual disabilities; therefore, the effects of the problem-solving instruction may be problematic when generalizing to students with more severe disabilities.

4. The participants included in the sample size were selected using purposeful sampling, therefore, because a control group was not included in the design the results may be difficult to generalize to different populations.

5. The data were collected on participants' performances of targeted behaviors in a classroom and school setting, therefore, care should be used when simplifying the effects for generalization across persons and settings.

6. Participant problem-solving results may be influenced by threats to internal validity (e. g., instructor bias, style of presentation, size of classroom) thereby limiting the extent to which the results can be generalized (Liu, 2004).

7. The participants may have acquired problem-solving skills prior to the implementation of the study; therefore, caution will be used with generalizing the effects of this research.

Summary

The current trend for increasing problem-solving research for students with intellectual disabilities is important (Agran et al., 2002). When children with intellectual disabilities are taught problem-solving skills early in life they grow into young adults who are better prepared to meet the challenges of everyday life (Agran et al., 2002). Quality of life for adults with intellectual disabilities necessitates they possess skills to: (a) make decisions, (b) work, (c) be independent, and (d) be included in the community (McCallion & McCarron, 2007).

The research is limited in teaching problem-solving skills to students with intellectual disabilities (Palmer & Wehmeyer, 2003). The purpose of this study was to determine

whether middle school students with intellectual disabilities increased skill performances of problem solving following instruction, using a modification of *A Parent's Guide to the Self-Determined Learning Model of Instruction for Early Elementary Students* (Palmer & Wehmeyer, 2002), and whether students were able to generalize those skills. The information from this study will expand the existing research on teaching students with intellectual disabilities the problem-solving skills that lead to a student's self-determination (Palmer & Wehmeyer, 2003). The results of this study will have direct and practical research-based implications for special education teachers of middle school students with intellectual disabilities.

The details of this study will be discussed in the following chapters. Thorough reviews of self-determination and problem-solving literature will be presented in Chapter Two. The methodology that will be used for this research will be discussed in Chapter Three. The results, interpretation, and limitations of the research, will be provided in Chapters Four and Five.

CHAPTER 2

REVIEW OF RELATED LITERATURE

Special education legislation supports the development of strategies to promote self-determination for students with disabilities, and the development of strategies that are aligned with the general education curriculum (Konrad, Trela, & Test, 2006). Educators need to be aware of the importance of self-determination instruction, and how to guide instruction to meet individual needs of students with disabilities, while relating skills to state standards (Fiedler & Danneker, 2007; Wehmeyer et al., 2006). A component of self-determinantion, problem-solving instruction, teaches a learner to independently solve problems and generate possible solutions (Palmer & Wehmeyer, 2002). A learner thoughtfully evaluates the possible solutions and then chooses the best answer (Charney, et al., 1990). As a result, when learners are presented with novel problems, they are better prepared to identify the problems, generate solutions, and evaluate the results (Glago, 2005).

Schools, teachers, and parents must work together to help students with disabilties learn the skills that lead to self-determinaition and problem-solving skills (Glago, 2005). When students are engaged in learning environments that allow for the practice of problem-solving skills, they are better able to connect the classroom to the real-world (Liu, 2004). Students with disabilities need opportunities to build on problem-solving

skills. They must be shown how to: (a) identify a problem, (b) research possible solutions, (c) evaluate the best choices, (d) make a decision, and (e) re-evaluate the result (Kolb & Stuart, 2005). Real-world problem-solving instruction can help students develop self-determination skills (Palmer & Wehmeyer, 2003).

When children are presented with a challenging situation they are able to define the problem and list possible solutions along with being able to generate better choices (Wood, Karvonen, Test, Browder, & Algozzine, 2004). Problem solving is needed in everyday life. It is associated with creativity and innovation, and is identified as an attribute that is regarded positively in the workplace (Taylor, 2005). Students with disabilities necessitate problem-solving instruction to promote more positive outcomes.

Problem-Based Learning

Problem-based learning (PBL) first surfaced as a method of instruction in the medical field (Bridges & Hallinger, 1997). Over the past 30 years, however, it has come to be recognized in the field of education. Problem-based learning specifically targets the acquisition of problem-solving skills in learners (Barrows, 2002). Problem-based learning has been defined as a student-centered pedagogical strategy that presents real-world situations that encourage the learner to reflect and find the solution (Hoffman & Ritchie, 1997). Problem-based learning has been shown to promote self-directed learning and the acquisition of interpersonal skills (Könings, Wiers, van de Wiel, & Schmidt, 2005). A major component of problem-based learning is that instruction is student-centered (Bridges & Hallinger, 1997). During PBL, students work through problems relating to the

real world (Barrows, 2002). The framework for PBL instruction utilizes metacognitive questions between the teacher and students to encourage student independence.

Benefits of Problem-Based Learning

When teachers provide students with classroom opportunities that include critical thinking and problem solving activities it personally involves the students (Drake, 1993). Teachers, who engage their students, while allowing for different responses, provide meaningful school experiences in today's culturally diverse classrooms (Drake, 1993).

Benefits of Starting Early

Researchers have indicated that children as young as six can learn to actively direct their thinking and reasoning (Doll, Sands, Wehmeyer, & Palmer, 1996). These young children select and generalize solutions across settings when problems are presented (Doll et al., 1996). They experience difficulty, however, in connecting the consequences of their concrete-operational thinking approach to the end result, and thereby require teacher re-direction. Children ages 9 to 11 start setting goals and making corrections when their actions do not lead to the desired outcome (Doll et al., 1996). Additionally, children over 12 can generalize problem-solving skills.

Problem-Solving Instruction

Problem solving has been defined as a task, activity, or situation in which the answer is not easily discernible nor attainable (Wehmeyer & Schwartz, 1998). Students who problem solve can identify a problem and develop possible solutions (Wehmeyer & Schwartz, 1998). When problem-solving skills are taught and practiced throughout the entire school setting, students are encouraged to model and adopt the skills (Dopp &

Block, 2004). Problem-solving skills can be used in helping students with disabilities brainstorm possible solutions to problems.

Research has indicated that individuals who exhibit self-determination behaviors are more effective at solving problems that protect them from negative situations in school and beyond (Wehmeyer, 2005). The goal of teaching problem solving to students with intellectual disabilities is to provide a necessary tool to be used by the student throughout the course of life. Students who are skilled at problem solving achieve better post-school outcomes (Wehmeyer & Palmer, 2003; Wehmeyer & Schwartz, 1998).

Need for Problem-Solving Instruction

Gagne' (1959) referred to problem solving as "productive thinking" (p. 147). Goal oriented individuals problem solve when confronted with a stimulus situation and when unable to draw upon prior experience (Gagne', 1959). Gagne' identified the various phases of problem-solving instruction as: (a) the presentation of a problem situation, (b) carefully distinguishing important elements from less important elements, and (c) the consideration of possible solutions. Problem-solving instruction (Agran & Wehmeyer, 2005) is especially important for individuals with intellectual disabilities because they experience difficulties learning problem-solving skills through typical learning experiences (e.g., watching others). Often, parents, adults, or caregivers resolve problems for these individuals as a substitute for teaching the skills to solve their own problems (Agran & Wehmeyer, 2005).

Baumeister (1967) noted that teachers of children with intellectual disabilities more often held the view that their students were unable to learn and maintain new skills, and therefore set fewer expectations for them. Baumeister stressed that children with

intellectual disabilities could learn new skills, but their acquisition of skills was dependant upon the teacher's manner of presentation and the number of opportunities the child had to apply the skills. These children need to be presented with individualized training that is: (a) sequential, (b) at their level, (c) programmed for review opportunities and (d) embedded with error correction (Malpass, 1967).

Problem-solving skills need to be specifically taught, modeled, and practiced (Agran & Wehmeyer, 2005). Increased self-awareness encourages students with disabilities to identify supports and resources to assist them in reaching their goals (Wehmeyer, 1995). Problem-solving instruction encourages student acquisition of personal efficacy and self-awareness. When students learn to find answers to their own questions they become less dependent, more independent, and self-reliant (Scruggs, & Mastropieri, 1997). Instead of protecting and sheltering students with disabilities from making mistakes, teachers must provide opportunities for students to develop their own thinking (Glago, 2005). Students with intellectual disabilities must develop problem-solving skills in order to be successful in inclusive settings (Agran & Alper, 2000). Parents and teachers of students with intellectual disabilities want these students to learn problem-solving skills (Kolb & Hanley-Maxwell, 2003).

Kolb and Hanley-Maxwell (2003) conducted a study to determine social skills considered by parents as essential for students with cognitive disabilities success. The 11 parent participants were from a small Midwestern city school district of which the total student population was 3,400. Children, of the participants, had disabilities that included intellectual, learning, and emotional. Prior to data collection, in-depth interviews were held with participants, using an interview protocol. First, the protocol was developed,

after researching commercially developed curricula and social skills research. Second, experts in the field of social skills evaluated the protocol for its design. Third, sample interviews were conducted prior to initial interviewing. Using open-ended questions, participants were asked to give the definition of "social skills" and to identify the most essential skills they wanted their child to learn. Conversations were audio taped and later sent out for transcription.

The data were analyzed using open coding in which data were compared to determine categories. Using axial coding, data were sorted into categories and subcategories (e.g., problem solving). Kolb and Hanley-Maxwell (2003) found that participants' answers (e.g., What social skills are important to you?) could be coded under interpersonal and intrapersonal skill areas. Participants identified self-awareness, (b) self-management, (c) empathy, and (d) healthy relationships as key skills for friendships. Problem-solving skills, a subcategory of self-management, were identified as important in the development of a child's emotional ability. In particular, participants wanted their son or daughter to learn problem-solving skills. They identified the need for their child to learn the skills to identify a problem, generate a solution, and evaluate an effect.

Kolb and Hanley-Maxwell (2003) found that participants identified problem-solving instruction as being a necessary component of social skills programs. Participants desired those skills to be taught in lessons and reinforced by the teacher's modeling. Kolb and Hanley-Maxwell concluded that social skills instruction needed to be imbedded in all academic and nonacademic areas and shared with families to generalize the skills in home and community settings. Problem-solving instruction must be incorporated into school curricula.

A national survey of educators (Wehmeyer et al., 2000) examined the effects of self-determination instruction and student-directed strategies on students with disabilities ages 14 and up. Surveys were sent to 9,762 members of professional organizations that included: (a) TASH, (b) the Council for Exceptional Children, and (c) both divisions of Mental Retardation and Developmental Disabilities and Learning Disabilities. Only educators responsible for transition planning were asked to complete and return the survey. Participants teaching in middle, high, postsecondary campuses, or additional environments (i.e., health care) returned 1,219 surveys from all areas of the United States. Most participants were special education teachers of students with mild and moderate intellectual disabilities as well as learning disabilities who taught in hospitals, resource, specialized programs, general education, and special schools.

Wehmeyer et al. (2000) indicated that participants rated seven instructional domains under the construct of self-determination (e.g., problem solving, choice making, self-management). Participants identified the importance of teaching self-determination to students with disabilities to prepare them for adulthood. Teachers were questioned about their use of strategies to teach those skills (e.g., goal setting, self-evaluation). Participants responded using a 1-6 point Likert scale.

Wehmeyer et al. (2000) found that over 90% of participants rated all the domains of self-determination as essential skills for students. The highest scores came in the domains of decision-making, problem solving, and choice making (i.e., 4.93; 4.94; and 5.03). While participants noted the importance of providing self-determination instruction, only 22% indicated that their students had self-determination goals written in their Individualized Educational Program (IEP). Of the 1,219 returned surveys, 501

participants indicated that they did not have the expertise or knowledge to teach the strategies that promote self-determination. Wehmeyer et al. noted that participants who taught students with severe disabilities, more often expressed that their students would receive less benefit from self-determination instruction, as compared to participants who taught students with mild disabilities.

Wehmeyer et al. (2000) indicated that participants who taught students in resource rooms rated self-determination as important. Wehmeyer et al. noted that educators needed training in using research-based strategies that have been proven to facilitate the skills of self-determination. They suggested that instruction be given at the pre-service and in-service level so that teachers become familiar with ways to incorporate student-directed behaviors. The researchers concluded that districts needed to provide educators with the freedom to embed problem-solving instruction in order for these students to exhibit self-determination behaviors.

Components of Self-Regulated Problem-Solving Instruction

Students with disabilities need to develop the skills of self-regulated problem solving (Palmer & Wehmeyer, 2003). Self-regulation problem solving implies that a student learns to regulate his or her problem solving as a result of: (a) identifying a goal, (b) developing a plan, and (c) evaluating and making the needed changes (Palmer & Wehmeyer, 2003). During instruction, the teacher assumes the role of facilitator in guiding the students in the acquisition of effective problem-solving skills. This method results in the students' ability to own problems and find solutions that foster the development of critical thinking skills (Kolb & Stuart, 2005).

In particular, students with intellectual disabilities require sufficient time to reflect upon solutions to problems, and time to evaluate whether or not their solution was effective (Agran et al., 2002). When students with intellectual disabilities are provided with opportunities to re-examine their thinking through effective teacher questioning and prompting, positive results emerge (Scruggs & Mastropieri, 1997). Instead of teachers providing the solutions to problems during problem-solving instruction, the teacher redirects the question back to the student (Scruggs & Mastropieri, 1997). This encourages the student to reflect and find another solution to the problem, while at the same time it increases the student's level of independence (Scruggs & Mastropieri, 1997). Students with disabilities are more independent and self-reliant following problem-solving instruction (Agran et al., 2002).

Agran et al. (2001) researched the use of self-regulation strategies to improve student behaviors and success in the general education setting. Specifically, they studied the difference between teacher and student-delivered reinforcement when evaluating targeted behaviors such as initiating conversations organizational skills that increase students' skills in the classroom. Six male participants, from grades 10 and 11, were included in the study. Two participants were students with intellectual disabilities and all received special education services in Utah.

First, participants, along with both general and special education teachers, identified target behaviors to facilitate students' success in the general education setting. Agran et al. (2001) found that five participants selected a target behavior with little help from teachers, while the sixth participant required support. Second, they were divided into two groups. Agran et al. conducted two training sessions to teach the observers the strategies

and the recording method to be used. Three general education teachers and a peer collected individual data. Third, participants were instructed to set personal goals that included a teacher assessment of present performance and expectancy using the Goal Attainment Scale (GAS) (Kiresuk, Smith, & Cardillo, 1994). Participants and teachers completed the GAS for each goal while identifying five projected outcomes (e.g., least favorable; most favorable).

Next, participants were taught self-regulation strategies that included goal setting, self-monitoring, self-evaluation, problem solving, and self-reinforcement. The two-step process as described by Agran et al. (2001), taught participants discrimination of the targeted behaviors using examples and non-examples. Secondly, they learned to self-evaluate and self-reinforce.

The participants were instructed in problem-solving instruction using the *Self-Determined Learning Model of Instruction* (SDLMI; Wehmeyer et al., 2000). Using the SDLMI, participants were instructed in: (a) setting a goal, (b) developing an action plan, and (c) evaluating their progress. A multiple baseline design across group participants was used in the study. The experimental design included: (a) baseline, (b) training, and (c) a post-training condition. Data were collected on the participants' performances of the targeted behaviors and on the participants' meeting the projected goals.

Agran et al. (2001) found significant differences, pre and post-intervention, in participants' performances of problem solving, goal setting, and self-evaluation. Participants' data, however, were not significant until the researchers changed the reinforcer and schedule of reinforcement. They suggested that problem-solving instruction, along with self-regulation behaviors, gives students a tool in which to be

successful in the general education classroom. The researchers stressed, that while students with disabilities benefited from this valuable instruction, further study was needed to assess the effects across settings and for maintenance and generalization.

In another study, Agran et al. (2002) researched the effects of self-regulated problem-solving instruction on improving targeted behaviors in four middle-school-age students, two seventh and eighth graders, from the state of Utah. The participants included two females with intellectual disabilities, one female with multiple disabilities, and one male with autism receiving special education services. They were chosen based upon their interest and their parents' interest in learning self-regulated problem-solving instruction. The four participants were receiving instruction in general education settings. The self-regulated problem-solving instruction occurred in small-group and one-to-one discussion in the classroom.

Participants were asked to identify target behaviors they wanted to improve based upon their IEP goals. Three of the participants required little assistance in identifying a targeted behavior, however one participant required more assistance. The teacher facilitated the participant's identification of three behaviors, and then facilitated her selection of the one that she wanted to change. Mastery was set at 80% for the participants (Agran et al., 2002). Targeted behaviors included: (a) following directions, (b) contributing to class discussions, and (c) increasing appropriate touching.

Three general education teachers and a paraprofessional collected data on the participants' targeted behaviors. Each participant's behavior was recorded using a specially designed form, unique to that participant. Two training sessions were conducted. Throughout the first session, participants were taught about the SDLMI.

During the next training session, the recorders learned the method of data collection as well as how to record individual behaviors. Nine observations were conducted to establish a 98% interobserver reliability (Agran et al., 2002). During baseline, teachers and participants predicted post-intervention results based upon participants' present levels. Using the Goal Attainment Scale (GAS), they were able to make those predictions (Kiresuk et al., 1994).

During baseline, teachers observed the participants without providing any reinforcement or direction. However, during the self-regulated problem solving intervention teachers provided praise and redirection. Trainers set up three to five scenarios in which the participants were able to practice their use of the steps. Initially, participants were instructed to verbalize the questions (i.e., "What is the problem?") (Agran et al., 2002, p. 283) when learning the problem solving model. After teachers were confident participants were proficient in the steps, they taught participants to use cue cards only when needed. If a participant forgot the sequence, while in the general education classroom, he or she referred to the cue card.

Agran et al. (2002) used a multiple-baseline design across participants that included baseline, training, and maintenance. The researchers established mastery at 80% per session throughout 8 days; however, the mean number of sessions required for mastery was 2.3. Teachers had projected participants' GAS scores below their actual achievement (Kiresuk et al., 1994). Participants exceeded teachers' projected GAS scores by 20%. Three participants' post-intervention probes were 100%. During baseline, participants' performances of targeted behaviors were between 0% and 20%, compared to post-intervention performances of 100%.

The researchers concluded that using the Self-Determined Learning Model of Instruction (SDLMI)) with students with intellectual disabilities gives educators a systematic tool to teach the skills of self-regulated problem solving (Wehmeyer et al., 2000). They suggested additional research was needed, as well as a longer maintenance period, for generalization of the learned self-regulated problem-solving skills.

Palmer et al. (2004) conducted a study to determine the value of problem-solving instruction and study skills instruction on students included in the general education curriculum. The 22 participants ranged in age from 11 to 15. Twenty of the participants were identified with intellectual disabilities and two were identified with learning disabilities. Nineteen received services in general education settings and 3 received services in resource settings. The 10 male and 12 female participants' grade levels included: (a) 4 in sixth, (b) 4 in seventh, (c) 11 in eighth, and (d) 3 in ninth. Participants were drawn from three school districts in the Midwest, and researchers assigned them to either a treatment or control group. Palmer et al. (2004) matched groups based on: (a) IQ, (b) self-determination skills, (c) placement, and (d) class schedule.

Pre-instruction, participants assessed their self-determination using the ARC's Self-Determination Scale (Wehmeyer & Kelchner, 1995). During the initial phase, Group One received problem-solving training while Group Two received no training. During the next phase, Group Two received goal-setting instruction while Group One received no training. A modified interrupted time series with switching replication design (Cook & Campbell, 1979) was used.

During the first phase, Group One attended five weeks of problem-solving training, 35 minutes daily, utilizing the SDLMI (Wehmeyer et al., 2000). Teachers or

paraprofessionals used additional classroom time to review and practice the strategy. Participants were taught to: (a) identify a problem and develop a goal, (b) devise a plan, and (c) evaluate their acquired knowledge, based upon the actions and consequences of their choice. Following instruction, participants completed the second part of The Arc's Self-Determination Scale and the problem-solving measure. The outcome measures for Groups One and Two showed significant differences in mean scores on the problem-solving measures. The GAS was used to rate goal attainment (Kiresuk et al., 1994). Both groups' GAS post-scores were above the mean score of 50.

Palmer et al. (2004) concluded that it is possible for students with intellectual disabilities to significantly improve in their problem-solving skills and to significantly increase their success in inclusive settings. Palmer et al. noted that following training, participants were more successful at meeting district-based standards and exceed their goals. They suggested that additional research should include a generalization component to access the effects of the problem-solving instruction.

Agran, Blanchard, and Wehmeyer (2000) field-tested the SDLMI (Wehmeyer et al., 2000) to teach self-regulating problem-solving skills to students with intellectual disabilities. The researchers hypothesized that the SDLMI would facilitate high school students' with intellectual disabilities abilities to become self-determined young adults.

Nineteen, middle school and high school students participated in the study. Of the participants, twelve were male and seven female. Twelve were identified with intellectual disabilities, five were identified with multiple disabilities, and two were identified with learning disabilities. Teachers were asked to select prospective participants who were involved in post-school transition activities (e.g., on the job training). Participants

received instruction: (a) at their places of employment, (b) in their self-contained classroom setting, (c) in the community, and (d) in the general education classroom setting. Prior to baseline, participants were asked to select a behavior, associated with his or her IEP goals, to improve upon (e.g., follow directions, improve personal and social skills). During baseline, instruction, and post-instruction six educators and eight paraprofessionals collected data on participant targeted behaviors.

Throughout baseline, educators filled out a GAS (Kiresuk et al., 1994) for each participant that predicted post-instruction results. Training incorporated Phases Two and Three of the SDLMI (Wehmeyer et al., 2000), to teach participants problem-solving skills. Training contained the following elements: (a) worksheets, (b) scripts, (c) encouragement, and (d) re-direction. To determine the results of the model, a delayed multiple-baseline-design was performed. Following training, educators chose the score that best described the participants' success in meeting his or her goal.

The results (Agran et al., 2000) indicated that 17 out of the 19 participants made significant improvement in reaching their goals. The measures suggested that 89% of participants' goals exceeded their teacher's predicted GAS score (Kiresuk et al., 1994). Teachers and participants reported positive benefits to using the model to increase: (a) problem solving, (b) independence, (c) self-confidence, and (d) choice-making.

Agran et al. (2000) concluded that students with intellectual disabilities increased in self-determination following instruction that incorporated problem solving. They stressed that empirical research was especially significant for transition-age-students with intellectual disabilities, so that they might be active participants in their learning. Agran

et al. suggested that additional research should incorporate performance data over lengthy intervals of time for students with intellectual disabilities.

Glago (2005) studied the effects of problem-solving instruction on elementary-age students with learning and emotional disabilities. The participants' were in 4th and 5th grade general education classrooms. They included 13 males and 8 females, who received special education services, in resource room settings. Participants were from a public school in a large eastern school district. Six were identified with emotional disabilities and 15 were identified with learning disabilities. Glago dispersed participants using a random control group design. Ten were assigned to the experimental group, and 11 were assigned to the control group.

The study was conducted over a 12-week period that included 9-weeks of instruction and a follow-up maintenance check. Glago (2005) instructed participants in small groups, for 30-40 minutes, once a week. The experimental group received problem-solving instruction utilizing five steps: (a) identify the problem, (b) generate possible solutions, (c) select the best one, (d) implement the solution, and (e) assess whether it worked. Intervention included a review of the problem-solving steps, presentation of problem scenarios or vignettes, role-play, and flashcards. When needed, the experimental participants were facilitated in writing responses and in reading questionnaires. The control group participated in silent sustained reading for the allotted 30-40 minutes.

Five assessments were used as a measure of participants' problem-solving skills. Participants were given a pre and post-test to access knowledge of the problem-solving steps. Palmer, Wehmeyer, Gipson, and Agran's problem-solving questionnaire was used to assess participants' perception of problem-solving abilities (2004). Participants were

presented with scenarios as pre and post-test measures of their skills in identifying problems and solutions. Glago (2005) used a self-generated questionnaire to assess participants' self-efficacy. A final measure, an adapted math worksheet, was used to assess participants' generalization of the instruction.

The results of Glago's study (2005) suggested that participants in the experimental group had significant increases in problem-solving skills when compared to the control group. When looking at pre- and post-test scores, participants in the experimental group had significant improvement in problem-solving skills when presented with problem scenarios. Participants in the experimental group had higher perceptions of their problem-solving abilities post-instruction when compared to the control group. The scores indicated that participants in the experimental group were significantly different from the control group in their abilities to apply the instruction and generate possible solutions to classroom problems.

Glago (2005) found that participants with emotional and learning disabilities improved in their problem-solving skills following instruction, and they were able to maintain those skills over time. The researcher asserted that elementary-age students do benefit from instruction in problem-solving strategies and when these strategies are taught consistently they lead to a child's self-determination. Glago concluded that future research must look at the efficacy of reliable self-determination instruction on student achievements in self-contained, resource, and inclusive settings.

Crites and Dunn (2004) examined the efficacy of problem-solving instruction with high school age students with intellectual disabilities from two schools in rural southeastern Alabama. Eighteen participants, from four special education classrooms,

were randomly chosen for a treatment or control group. Thirteen participants were in the treatment group and five were in the control group. The participants in the treatment group were 84% male with an average age of 17, and the participants in the control group were 80% female with an average age of 17. An unpublished curriculum, *Solving Your Problems*, was used for instruction that included lessons and scenarios.

Four assessments were used to measure participants' problem solving (e.g., generating possible solutions) skills prior to treatment (Crites & Dunn, 2004). Participants were assisted with writing the answers when needed. Next, participants, in the control group, received instruction for one hour per day, for 10 days. Utilizing five lessons, participants were taught to recognize problems, generate solutions, make a choice, and evaluate the results. Instruction included class discussions, viewing videos of real-life situations (e.g., financial difficulties, getting along with others) and role-playing possible solutions. After instruction, both the treatment and the control participants were again tested using the four assessments. An ANCOVA was used to compare pre- to post-test scores. In addition, participants, in the control group, were given two additional assessments.

Data analysis indicated that participants in the treatment group, who were predominantly male, made significant improvements in the skill performances of problem solving, when compared to participants in the control group, who were predominantly female. Participants in the treatment group had a 60% mean increase in their abilities to generate possible solutions as compared to the control group mean of 28%. Crites and Dunn (2004) assessed generalization of the skills following problem-solving instruction. They found that participants had difficulty solving new situations that involved

themselves, but with continued practice, participants increased in their abilities to apply the skills to the new situations.

Crites and Dunn (2004) concluded that more study needed to be conducted on methods to teach problem solving to persons with intellectual disabilities. They suggested that these individuals need additional opportunities to generalize problem-solving skills across all subject areas along with sufficient data that suggests what research-based methods are most successful at teaching, maintaining, and generalizing these skills. Crites and Dunn maintained that researching the problem-solving abilities of transition-age students with intellectual disabilities, who are gainfully employed, can be meaningful information for teachers.

Edeh (2006) researched the efficacy of both an interest-based and traditional method to teach problem-solving skills to students with intellectual disabilities. The evenly distributed gender participants were randomly assigned to three sample groups of 24 that included: (a) African Americans, (b) European Americans, and (c) Nigerians. The chosen samples attended urban public schools and private schools and received special education services under the category of mild mental retardation.

All participants took part in: (a) a pretest, (b) a post-test, and (c) maintenance data collection. A sample problem, from the Edeh Scale of Interpersonal Problem Situations, (Edeh & Hickson, 2002) was discussed with each participant. Each problem situation included: (a) a scenario, (b) an opportunity to solve the problem, (c) four possible solutions, and (d) the opportunity to choose one. The researcher wrote participants' answers. Groups of four to five participants were given 10 training interventions using interest-based and conventional strategies. Edeh (2006) instructed both strategy groups

to: (a) identify a problem, (b) establish an objective, (c) identify barriers, (d) choose from the possible solutions, and (e) judge the end product. Both treatment groups received instruction in problem solving using matching formats (e.g., same order, role-play), however, the interest-based group used their own problems.

Following treatment, Edeh (2006) examined participants' score changes in independent problem solving. An ANCOVA was conducted for comparisons within each treatment group. Participants in both the interest-based and traditional groups showed significant improvement in producing problem-solving answers during post-tests and maintenance when compared to the control group. In particular, participants from the interest-based group performed better than the traditional group, even after three months. They were better able to create solutions to sample problem situations.

Edeh (2006) concluded that problem-solving proficiencies are required for persons with intellectual disabilities. Edeh's results stress the importance of problem-solving instruction that includes: (a) individual interests and contributions, (b) cultural differences, (c) common interests, (d) gender differences, and (e) incorporating successful techniques. Edeh suggested further research to look at both productive and unproductive problem-solving strategies for persons with intellectual disabilities in order to establish the most effective instruction.

Hughes and Rusch (1989) researched the effectiveness of using self-instruction and typical examples to teach problem solving to adults with intellectual disabilities. The participants were a 37-year-old female and a 57-year-old male. Both were identified with severe intellectual disabilities and were employed at a cleaning business. They received on the job support. When confronted with a problem, participants looked to others for

assistance or discontinued their job. Their boss recommended that they learn problem-solving skills.

Participants were evaluated on: (a) remembering the process, (b) replies to learned situations, and (c) replies to new situations. During self-instruction, participants learned to use words that: (a) identified the problem, (b) indicated the best answer, (c) stated result, and (d) were supporting. They received individual instruction for 30 minutes prior to starting work. During training, Hughes and Rusch (1989) randomly presented participants with five problems and three possible choices (e.g., unable to find an item). Training was continued until participants' correct answers were constant. Hughes and Rusch utilized: (a) prompting, (b) corrective feedback, (c) modeling, and (d) practice during problem-solving instruction.

The researchers used a multiple baseline design to evaluate the effects of the training. The frequencies of correct responses during baseline and during trained and untrained situations were compared. Both participants showed significant improvement in performances during trained and untrained situations when compared to baseline performances. The results suggested that participants learned problem-solving skills utilizing the self-instruction strategy. Participants continued to display those skills during monthly maintenance checks for 6 months.

Hughes and Rusch (1989) concluded that problem-solving skills could be taught and learned by individuals with severe intellectual disabilities using sequential methods and problem situations. They pointed out that these individuals responded to: (a) modeling, (b) the use of several examples or problem situations when learning the correct response, (c) repetition, and (d) opportunities for generalizing the steps. The researchers stressed

the importance of problem-solving research for persons with severe intellectual disabilities in order to improve their employment outcomes and autonomy.

Liu (2004) examined the effectiveness a problem-solving intervention utilizing a problem-based learning media. The 155 middle-school participants were sixth-grade students in the southwest. The participant sample included Hispanic, African American, Caucasian, and other ethnicities. Participants from gifted programs, general education classrooms, English as a second language (ESL) and students with learning disabilities participated. They were divided into three groups: (a) gifted and talented, (b) general education, and (c) English as a second language and students with learning disabilities.

A problem-based learning software program, *Alien Rescue* (Liu, 2004), was used to teach science to participants daily for 45 minutes. Participants worked in groups of two to three. The problem-solving instruction included: (a) lesson plans, (b) the use of strategies, (c) independent learning opportunities, (d) class discussions, and (e) teacher facilitation. The dependent variables were pre and post-test scores. A two-factor mixed ANOVA was conducted. Across all groups, test scores showed significant changes in competencies, however, participants with learning disabilities showed twice the improvement. Teachers taught participants to take control of their learning, while providing them the freedom to make choices, and assume responsibility for the answers. Liu noted that teachers facilitated participants through problem solving without using direct instruction. Participants reported that they enjoyed taking responsibility for their learning.

Liu (2004) concluded that problem-based media could be used to teach academics to students. The results suggest that students with disabilities can develop higher-level cognitive skills as they learn to reason and justify possible solutions to problems. Liu,

however, highlighted that students with disabilities may require additional teacher support when learning problem-solving skills. Liu emphasized that additional research needs to be done to assist students in connecting school curriculums to real-life problems.

O'Reilly, Lancioni, Sigafoos, O'Donoghue, Lacey, and Edrisinha (2004) evaluated problem-solving strategies and external control with five adult males who ranged in ages from 30 to 35. All participants were identified with mild intellectual disabilities. They lived in group homes and worked in sheltered settings. Both participants wanted to increase their social interactions with fellow workers.

The researchers and support staff observed participants' social skills (O'Reilly et al., 2004) During baseline, participants were presented with scenarios and asked to show or state what they would do (e.g., asked to clean up after themselves), however, no instruction occurred. Social skills instruction included vignettes, role-plays, and scripts. Participants were randomly assigned to either strategy.

The problem-solving strategy involved scenarios that required handling disagreement. One example given was that of a person who was watching TV and another person entered the room and changed the station without consent. During the problem-solving instruction, justification for the correct behavior along with modeling occurred. Role-plays helped participants to present and verbally give the reason for performing the skill.

The external control strategy involved scenarios where a participant needed to respond appropriately to direction. During the external control instruction participants repeated the steps in the problem-solving instruction, however, verbalizing the steps was not included. Participants were evaluated in the number of steps they were able to

correctly complete in a task analysis. The experimental design was an alternating treatment that included a baseline, treatment, and a maintenance phase.

Both strategies were effective in helping participants perform the appropriate social skills. No significance was noted between the problem solving and external control strategies. Post-intervention data indicated they were able to maintain the skills four weeks later.

O'Reilly et al. (2004) concluded that both problem solving and external control were effective interventions to teach social skills to adults with intellectual disabilities and that they maintained and generalized the skills. They suggested further research be conducted in real-world settings and beyond the constraints of the group home. Lastly, the researches noted that participants needed intensive instruction in order to acquire the needed skills. Their conclusions indicate the relevance of an effective strategy for teaching problem-solving skills to persons with intellectual disabilities.

In another study O'Reilly, Lancioni, Sigafoos, Green, Ma, and O'Donoghue (2004) contrasted the effects of problem solving and an external control strategy to teach social skills to two adult males. Both were identified with mild intellectual disabilities and were 34 and 40 years of age. Participant A was employed as a warehouse assistant, and Participant B was employed as a gardener. Although both men went out into the community for recreation and leisure, both participants had few friends.

The researchers interviewed the participants and staff who worked with them to determine the skills to be taught (O'Reilly et al., 2004). Next, a task analysis of the skills (e.g., dealing with conflict) was created. The researchers created scripts used in training and instructed and evaluated participants individually. The external control intervention

and problem-solving strategy were reversed with social situations and then accessed for generalization of the skills.

During baseline, participants were presented with three scenarios and asked to state what they would do under the situation. When presenting the problem-solving intervention, participants were presented with a situation and asked to participate in the role-play. The trainer praised participants when they correctly verbalized the task analysis steps. The problem-solving questions encouraged the participants to: (a) think, (b) decide, (c) plan, and (d) examine. With the external control intervention, participants were taught in the same manner, however they were not taught to express the social principles. O'Reilly et al. (2004) used an alternating treatment design to evaluate the percentages of steps correct in baseline, treatment, and follow-up.

The participants acquired the social skills in the task analysis steps. Participant A showed significant differences in performance during intervention and maintenance. Participant B's data showed significant differences from baseline and intervention as well as during maintenance follow-ups.

O'Reilly et al. (2004) concluded that generalizations of the participants' problem-solving abilities were found. They stressed that social skills should be taught to individuals with intellectual disabilities and that maintenance data should be researched. They noted that individuals with intellectual disabilities profit from rigorous and extended instruction in order to acquire the problem-solving skills needed in life.

O'Reilly Lancioni, Gardner, Teirnan, and Lacy (2002) conducted a study of a problem-solving strategy that was used to improve the social skills of a student with moderate intellectual disabilities. The participant was a 13 year-old middle school girl

who exhibited behaviors of non-compliance and off-task. She was included in general education classrooms with four hours a week in the resource room.

Two teachers were asked to identify 10 classroom scenarios in which the participant would be required to comply and complete assignments. The scenarios were then used in creating scripts for instruction. In one script, participants learned to raise their hand when asking a question. One of the 20 scripts was randomly used in instruction.

A multiple baseline design across environments was used in determining the effects of the instruction over a 12-week period (O'Reilly et al., 2002). The study included a baseline and intervention phase. During 40 minutes of classroom observation, baseline data were collected twice weekly on the participant's behaviors. Teachers and researchers chose five scenarios that were used for each observation. The baseline phase consisted of no direction or instruction to the participant.

The training sessions involved the presentation of four social or academic scenarios that were randomly chosen. Next, the participant was presented with four scripts and asked to generate the correct behavior for each. She was taught problem-solving skills that included: (a) decoding, (b) deciding, (c) performance, and (d) evaluating. The training consisted of modeling, role-play, praise, and error correction.

The results indicated that the problem-solving intervention was effective in increasing the participant's appropriate behaviors (O'Reilly et al., 2002). The participant went from responding appropriately 40% of the time during the baseline phase, to responding appropriately 80-100% of the time during the intervention phase. With the introduction of the intervention, the participant made significant changes in her targeted appropriate behaviors.

O'Reilly et al. (2002) concluded that students with intellectual disabilities can learn the problem-solving skills needed to decrease inappropriate behaviors and increase appropriate behaviors. O'Reilly et al. noted that these skills are needed for the success of these students in inclusive environments. The researchers emphasized that the problem-solving strategy is an influential tool to be used by students with intellectual disabilities. They added future research should address fading and generalization of instruction in order to check for maintenance.

Self-Determination

Throughout history, the right of individuals with intellectual disabilities to be heard has been unrecognized or overlooked. Instead, others have made decisions about their interests (Nirje, 1972). Nirje identified self-determination as an entitled right for individuals with intellectual disabilities and emphasized that these individuals benefit from decision-making opportunities. In Nirje's writings, support was provided for honoring the worthiness of persons with severe disabilities (Ward, 2005). Fernald (as cited in Sloan & Stevens, 1976) expressed that each individual with intellectual disabilities was unique in his or her ability to learn.

While each individual with intellectual disabilities is unique, often his or her uniqueness may not be valued. Instead, individuals with intellectual disabilities face discrimination (Zetlin & Turner, 1984). In place of developing self-determination, these individuals often face realities of: (a) differential treatment, (b) exclusion, (c) stigmas, (c) name-calling (e.g., slow, retarded), (d) negative attitudes, and (e) over-dependence upon others (Zetlin & Turner, 1984). They often are left with no choice but to hide their

disability (e.g., from prospective employers, or schoolmates) in order to avoid the stigma associated with the label (Zetlin & Turner, 1984).

The development of self-determination is a best practice for children with disabilities, according to the 2003 President's Commission on Excellence in Special Education Report (Wehmeyer et al., 2006). Wehmeyer et al. (2006) pointed out that self-determined individuals display behaviors that are: (a) autonomous, (b) self-regulated, (c) initiated and responsive, and (d) self-realizing. Wehmeyer et al. identified the nine component elements of self-determined behavior as: (a) choice-making, (b) decision-making, (c) problem solving, (d) goal-setting, (e) independence, (f) self-evaluation, (g) self-instruction, (h) self-advocacy, (i) internal locus of control, (j) positive outcomes of efficacy, (k) self-awareness, and (l) self-knowledge.

Need for Self-Determination Instruction

The instructional goals that are included in state and local content standards often contain objectives relative to the promotion of self-determination skills (Wehmeyer et al., 2006). Wehmeyer et al. suggested that teachers determine what content standards are mandated and relate those to the skills of self-determination (e.g., problem solving). Teachers should facilitate students in acquiring supports (e.g., such as guided notes, or reduce the number of problems) to increase the likelihood of their success in meeting those goals and objectives in the general education classroom. For instance, teachers can help students who are learning a new or difficult task to realize the importance of the skill and how learning it can improve their performance and success (Eisenman, 2007). Exposing a young child to self-determination instruction is a necessary intervention to achieving that child's future accomplishments (Eisenman).

Agran and Alper (2000) conducted a study to determine the skills special education teachers most valued in students with severe disabilities and the number of students who needed to develop those skills. Ninety-four percent of 100 participants, who were randomly chosen from Iowa's Intermediate Education Agencies, returned surveys. They were asked to participate via in person and on the phone.

Agran and Alper (2000) used a field-tested survey for data collection. Of the 94 participants, some chose more than one school level: (a) five at preschool, (b) 60 elementary, (c) 24 middle school, and (d) 32 at both middle and high schools. They used a 3-point Likert scale to indicate the importance of skill areas necessary for successful inclusion. The survey divided functional skills into five areas: (a) self-determination, (b) academic skills, (c) social skills, (d) independent living, and (e) vocational skills.

Participants indicated they taught students with mild, moderate, and severe disabilities. Despite the level of disability, the researchers found participants chose self-determination and self-management skills as essential for achieving inclusion. The participants indicated that more than 50% of their students needed to learn self-determination skills. The most frequently chosen self-determination components were problem solving and choice-making (4.6 on a range of 5; 4.5 on a range of 5). Agran and Alper (2000) noted that participants identified these skills as more important than academic or community living skills.

Agran and Alper (2000) suggested educators know and use strategies that facilitate the development of self-determination in students. They pointed out that research needed to be conducted to establish that these skills are being taught and used in the general education classroom. Agran and Alper concluded that students with disabilities needed to

be equipped with many skills for inclusive settings beyond the classroom, and effective-based-strategies facilitate the acquisition of those skills.

Eisenman and Chamberlin (2001) researched how schools taught and evaluated student self-determination. Seventeen teachers and other staff members were included in the study. Seven schools were represented, two vocational, four high, and an alternative program for middle and high. Two hundred students, with disabilities that included intellectual disabilities, learning disabilities, and emotional disabilities as well as students without disabilities participated in the evaluation.

Eisenman and Chamberlin (2001) used a cluster evaluation model (Sanders, 1997) for their study. Information was collected during meetings, interviews, observations, student assessments, and documents over a nine-month period. During class discussions participants asked students who they felt influenced them the most in developing self-determination. Most often, students identified parents as the major influencer. Eisenman and Chamberlin indicated that teachers and staff shared methods (e.g., interest inventories, portfolios) that they used in assessing student self-determination. Participants were questioned about: (a) implementation of self-determination activities, (b) their effectiveness in teaching self-determination, and incorporating lessons that promoted self-determination instruction. During the course of the study, four schools implemented additional instruction such as specific life-centered curriculums that promoted student self-determination.

Eisenman and Chamberlin (2001) pointed out that participants expressed that self-determination instruction should begin in elementary school instead of waiting until high school. Participants emphasized that students need time to develop and generalize skills

such as goal setting and self-monitoring. Eisenman and Chamberlin found that participants wanted schools to develop school-wide environments that promoted acquisition of self-determination skills for all students. The researchers concluded that general and special educators needed to collaborate to promote a school culture of self-determination for all students.

Abery and Rudrud (1995) conducted research to determine the effectiveness of an educational classroom-based model developed to promote self-determination skills in participants with intellectual disabilities. The participants included 10 females and 8 males that ranged in age from 14-years-old to 20-years-old. They attended public schools in three suburban districts in the upper Midwest.

The researchers used a 10-module competency-building curriculum developed by project staff, teachers, and school districts for participants over the course of a 9-month period. Sessions were 90 minutes long over a 7-month period. Using the curriculum, the researchers encouraged participant acquisition of 10 skills that included: (a) self-awareness, (b) self-esteem, (c) personal control, (d) values, (e) goal-setting, (f) assertive communication, (g) choice-making, (h) self-regulation, (i) problem solving, and (j) self-advocacy. Instruction began with a review and included a generalization component and opportunities for reinforcement using simulations and role-play. Over the course of six-weeks, participants learned about choices and the impact their choices have on others. Focus group meetings were conducted with participants, parents, and educators to explore hindrances to participants' self-determination and choice making.

Using a pre- and post-group design, data were colleted using Abery and Eggebeen's (1992a; 1992b) Self-Determination Skills Evaluation Scale and Opportunity and Exercise

of Self-Determination Scale. Parents were sent both scales via mail and were the main resource of data. The design consisted of a pre- and post-test. Abery and Rudrud (1995) were interested in test scores to indicate the extent of personal control that participants with intellectual disabilities demonstrated in their lives. The researchers assessed skills and behaviors related to self-determination after participants had completed the program.

The data were analyzed using a matched-pair *t* test. Significant differences were found in pre- and post-test scores in problem solving, choice making and self-regulation (Abery & Rudrud, 1995). Post-test scores revealed that participants were involved in choice making and decision-making at home.

Abery and Rudrud (1995) concluded that while participants increased in their choice-making at home, curricula needed to be used earlier. They suggested that acquiring self-determination skills should be taught in elementary school so children have time to practice skills and become proficient. Abery and Rudrud emphasized that in particular, students with more severe disabilities can benefit from this instruction with the proper supports.

Agran et al. (2006) examined the effects of the SDLMI (Wehmeyer et al., 2000) on students with moderate to severe intellectual disabilities and students with Autism Spectrum Disorder. The students were being serviced in the general education and resource room. The participants included one female and two male middle school students who ranged in ages from 13 to 14. Participants' behavior included noncompliance, inappropriate touching, inattentiveness, and talk-outs. During the pre-baseline phase, participants were facilitated in choosing a goal from several academic

subjects and that were based upon general education content standards. They were guided in measuring their progress in the class.

The participants' performances in meeting their goals were evaluated during: (a) baseline, (b) training, and (c) maintenance. During the baseline phase, researchers asked participants to identify a plan of action and chose a strategy to help him or her achieve their goal (Agran et al., 2006). Researchers then observed participants in the general education classroom, but provided no training. Next, participants received 15 to 20-minutes of instruction in the general education classroom, resource room, and separate room. The SDLMI (Wehmeyer et al., 2000) was used to teach participants the steps of problem solving in order to reach goals. The training included: (a) modeling (b) manual signing, and (c) cueing. All participants were taught to: (a) set goals, (b) self-evaluate his or her performance, and (c) self-instruct.

Agran et al. (2006) gathered data between two and four times per week during baseline and instruction and weekly during maintenance. All participants showed significant increases in achieving their targeted goal. The data indicated participants maintained their behaviors two to three months post-instruction. Agran et al. used a multiple baseline experimental design across participants (Kazdin, 1982).

Agran et al. (2006) concluded that the SDLMI (Wehmeyer et al., 2000) had positive effects upon the participants' self-regulated problem-solving skills and academic performances. They suggested that the model was integral in facilitating students' success to meet general education standards in inclusive settings. Agran et al. stressed that while little research has been done to show the effects of problem-solving instruction for

students with intellectual disabilities the results of their study indicated that these students can and do benefit from it.

Grote (2003) studied the effects of both problem solving and self-instruction with two young female adults with intellectual disabilities. In particular, Grote evaluated participants' self-talk and whether or not it facilitated the acquisition of problem solving. The researcher also looked at modeling, error correction, and reinforcement and their effects upon the participants' behaviors. Both participants lived in a group home setting and the study was conducted over a five-month time frame.

Participant responses were recorded word for word and also tape-recorded. Answers were scored as correct if the participants' responses were unprompted. Responses were scored as prompted if they elicited the researcher's prompting. Participants were also evaluated on sorting accuracy. They were asked to put pictures in a box based upon commonalities in the pictures. For instance, pictures with birds were to be placed in one box and pictures without birds were to be placed in another.

The experimental design was an ABAB design. During baseline, Grote (2003) presented participants with three problem-solving tasks of sorting pictures. The intervention phase included a problem-solving task with questions as to what the pictures had in common and the reasons why. Participants learned to ask themselves questions as part of the self-instructional component of problem solving.

Both participants had difficultly solving the problems, however, with the addition of self-instruction both were able to give the correct response. The first participant learned to sort the cards independently as well as ask questions. The second participant benefited from the researcher's prompting when the intervention switched from the baseline phase.

Grote (2003) concluded that individuals with intellectual disabilities are more likely to benefit from problem-solving instruction with the added component of self-instruction. The researcher found participants correct responses increased as well as their levels of independence when they used self-instructing techniques. Grote noted when both problem solving and self-instruction methods were learned together, problems were more likely to be solved. She concluded that the skills learned lead to increased competencies in problem solving for individuals with intellectual disabilities.

Cole and Barrett (1997) studied the problem-solving abilities of children with intellectual disabilities and compared those to the problem-solving abilities of two groups of children without disabilities: (a) those that were at the same mental age and (b) those that were at the same chronological age. Cole and Barrett's study was based on the hypothesis that individuals with intellectual disabilities are fully capable of problem-solving skills and equally able as those individuals without disabilities, however, they possess those skills at a lesser intensity.

The participants were three groups of 26 elementary-age children from an urban area in Australia. Both genders were equally represented in the groups and all students were randomly chosen. Of those participants with intellectual disabilities, the researchers identified them with cultural-familial causes and not systemic causes. They were receiving services in special education classrooms. Participants whose mental age fell below 5.3 were excluded from Cole and Barrett's study (1997).

Participants were asked to complete puzzle tasks that required them to solve both easy and hard problems. The problem-solving tasks consisted of different images of houses on game cards. The researcher concealed a targeted house and participants needed

to ask "yes" and "no" questions following a problem-solving sequence. Participants were instructed to discard a card when the answer to their question was "no". Their goal was to keep a card that matched the researcher's targeted house (Cole & Barrett, 1997).

Participants were individually tested three times using the problem-solving task. The trials lasted for 25 minutes. The researchers tape recorded the sessions and later recorded the data. An ANCOVA was used to measure the independent variables of: (a) group, (b) gender, (c) sessions, and the dependent variables of: (d) time and (e) number of questions asked.

Cole and Barrett's (1997) data analysis indicated that the group with intellectual disabilities and equivalent mental age were not significantly different in problem-solving abilities. The researchers also found that both groups were equally motivated to learn the problem-solving tasks. Lastly, there were no significant differences in gender between groups.

Cole and Barrett (1997) suggested that further research be conducted to assess problem-solving skills and motivation to learn in children with and without intellectual disabilities. They found that older children without disabilities were more motivated to learn the skills. They concluded that children with mild intellectual disabilities demonstrate the skills equal to that as children without disabilities when exposed to problem-solving instruction that is motivating and inviting.

Components of the Self-Determined Learning Model of Instruction

The SDLMI (Wehmeyer et al., 2000) gives teachers a roadmap to teach students problem-solving skills that are essential for the development of self-determination. Utilizing three phases of the model, the teacher acts as a coach in presenting questions to

students that require self-directed instruction. During Phase One (Wehmeyer et al., 2000, p. 442) students are guided to request: (a) "What do I want to learn?"; (b) "What do I know about it now?"; (c) "What must change for me to learn what I do not know?"; and (d) "What can I do to make this happen?". The teacher facilitates movement from the student's present performance to where the student aspires to be.

Phase Two (Wehmeyer et al., 2000, p. 443) of the SDLMI (Wehmeyer et al., 2000) trains students to ask: (a) "What can I do to learn what I do not know?"; (b) "What could keep me from taking action?"; (c) "What can I do to remove these barriers?"; and (d) "When will I take action?". The last Phase (Wehmeyer et al., 2000, p. 444) instructs students to reflect on: (a) "What actions have I taken?"; (b) "What barriers have been removed?"; (c) "What has changed about what I do not know?"; and (d) "Do I know what I want to know?". When students learn to use the questions taught in the SDLMI (Wehmeyer et al., 2000) they become the "causal" person who sets and achieves goals.

Wehmeyer et al. (2000) field-tested the usefulness of the SDLMI to promote students' goal attainment and self-determination. The sample included 40 participants, from Texas and Wisconsin, ages 14 to 17. Their disabilities were: (a) 13 intellectual, (b) 17 learning, and (c) 10 behavioral. Teachers and project staff identified participants and provided the details of the study. Instruction began following the signing of consent forms.

Post-Phase 1 instruction, participants selected one goal they wanted to achieve, however, three participants selected more than one. The goals consisted of: (a) 10 social skill, (b) 13 behavioral (e.g., following school policies), and (c) 20 academic requirements. The researchers measured goal achievement using: (a) the GAS (Kiresuk et

al., 1994), (b) The Arc's Self-Determination Scale (Wehmeyer & Kelchner, 1995), and (c) the Nowicki-Strickland Internal-External Scale (ANS-IE; Nowicki & Duke, 1974). First, teachers predicted participant post-outcomes using the GAS. Second, participants' autonomy, problem solving, and psychological empowerment were evaluated using The Arc's Self-Determination Scale. The ANS-IE measured participants' locus of control.

Post-instruction, teachers assessed participants' self-determination using The Arc's Self-determination Scale and Nowicki-Strickland Scale. Pre- and post-intervention scores were compared using *t*-tests. The results indicated that 80% of participants had made progress towards their goals. Post-instruction GAS mean scores indicated participants made progress in meeting the level projected by the teacher. More than half, or 55%, of participants were found as having met or surpassed teachers' expectations.

Wehmeyer et al. (2000) concluded that participants with intellectual disabilities benefited from the self-determination instruction. They found that scores were lower for this group in comparison to participants with learning and behavioral disorders. Regardless, 60% of participants with intellectual disabilities met and surpassed their goals. Wehmeyer et al. noted that these students require sufficient opportunities to practice problem solving while learning the phases of the model.

Palmer and Wehmeyer (2003) completed a study on the implementation of the elementary version of the SDLMI (Palmer & Wehmeyer, 2002) with participants who were in kindergarten through third grade. The participants were 50 children with five disabilities. The ethnicities included Caucasian, African American, Hispanic, and Asian American participants. For two months participants received instruction using the SDLMI (Palmer & Wehmeyer).

Initially, a pre-test was conducted that asked participants to define the word *interest* and express an interest. Secondly, participants were asked to define the word *goal* and give an example. Responses of *yes* or *no* were recorded when participants gave an example of a goal or expressed an interest. While many of the participants named an interest prior to instruction, results indicated that there were significant differences in pre- and post-scores for knowledge of the meaning of *goal*. Participants gave significantly more examples of the word *goal* in post-tests. Teachers worked individually and in small-groups with participants to identify: (a) interests, (b) goals, and (c) problems. Participants were helped with completing an interest form that included the participants' drawings, written words, or expressions that were written by staff.

Palmer and Wehmeyer (2003) used the GAS (Kiresuk et al., 1994) to rate goal attainment. Following goal identification, the teachers and participants completed the GAS scale. In developing a range for the goal, teachers and participants used a 5-point scale, with the middle point being the anticipated outcome. Following instruction, teachers evaluated the participants on their actual achievement of completing the goal. Participants were assisted by the researchers in self-evaluation of the outcome of their goal completion. The researchers indicated that participant goal attainment was greater than expected by teachers. Participant grade level did not influence their abilities to attain goals. They set both behavioral and academic goals that included subject areas. The diverse sample used in the study was a strength. The age-appropriate materials assisted the participants in answering the questions of the teachers. Additionally, the participants received extensive one-on-one instruction using the model.

The field-tested SDLMI (Wehmeyer et al., 2000) supported its additional use with the participants in this study. The results indicated that the SDLMI was an effective tool. A limitation in the study was that students with intellectual disabilities had differences in their perceptions of goal achievement when compared to teacher perceptions. Although Palmer and Wehmeyer (2003) indicated that additional supports might be needed for these students, perhaps the teaching style of the teacher, length of instruction time, classroom environment, and age of the student affected the outcomes.

McGlashing-Johnson, Agran, Sitlington, Cavin, and Wehmeyer, (2003) evaluated students with moderate to severe intellectual disabilities job performances using the SDLMI (Wehmeyer et al., 2000). Four high school age participants were included in the study. Both genders were equally represented and ages ranged from 16 to 20. All participants were receiving extensive to pervasive supports in their work experience placements. Participants were elicited as to what job skills he or she wanted to improve.

Over a 30-minute time period and in a home setting, participants were taught the first phase in the SDLMI (Wehmeyer et al., 2000). They were facilitated in coming up with possible goals (e.g., following directions or asking for assistance) and supported in identifying just one. Participants were then observed on the job and task analyses were developed by both the researchers and participants (McGlashing-Johnson et al., 2003). Following three days of stable data, instruction started.

Participants received training in the school setting. They were instructed using: (a) scripts, (b) modeling, (c) guided practice, (d) antecedent cue regulation, and (e) independent practice time. The participants were shown how to monitor their behaviors after completing a step in a task analysis by putting an *X* next to a pictorial cue on a card.

The participants' teachers chose the most likely GAS scores (Kiresuk et al., 1994) for participants, that is, on a range of five what would be the expected or most desirable result. McGlashing-Johnson et al. (2003) used a multiple baseline across participant experimental condition. The percent of correct replies in the task analysis (e.g., riding the bus) was the dependent variable.

The results suggested that three participants made significant gains in meeting their goals and learned problem-solving skills. The data indicated participants' percentages of correct responses not only increased during the intervention, but also continued throughout maintenance checks.

McGlashing-Johnson et al. (2003) concluded that students with moderate and severe intellectual disabilities benefit from the SDLMI (Wehmeyer et al., 2000) in learning a problem-solving strategy. The researchers stressed that the model facilitates the students in: (a) comparing what they know, (b) what they want to know, and (c) setting a goal to acquire the knowledge. They noted students with intellectual disabilities have the aptitudes to learn problem-solving skills that ultimately lead to self-determination and successful life outcomes.

Summary

Students with intellectual disabilities are more independent and self-reliant following problem-solving instruction. The literature indicates that the use of self-regulated problem-solving instruction increased self-determination skills in students with intellectual disabilities (Palmer & Wehmeyer, 2003; Wehmeyer et al., 2000). Without a systematic approach, these students often lack the necessary skills to identify problems,

devise a plan, and self-evaluate. This instruction enables students with intellectual disabilities to access and participate in the general education classroom while relating the skills to the state standards (Wehmeyer et al., 2006).

Researchers suggest that self-regulated problem-solving instruction should utilize strategies that allow for practice of problem-solving skills and involve the use of real-world problems (Palmer & Wehmeyer, 2003). Practice allows students to identify the supports necessary to reach their goals (Wehmeyer, 1995). The literature indicated that parents of children with intellectual disabilities wanted their son or daughter to develop the ability to identify problems, seek a solution, and reflect on the results (Kolb & Hanley-Maxwell, 2003). Educators noted the importance of teaching the skills of problem solving and choice making (Wehmeyer et al., 2000).

Studies show that problem-solving instruction provides students with intellectual disabilites the skills necessary to self-regulate behaviors (Agran et al., 2001). Problem-solving instruction can be useful in helping students with intelectual disabilites achieve their IEP goals while accessing the general education curriculum (Wehman, 2006). Students with severe disabilities have been successful in choosing goals and changing behavior following instruction (Agran et al., 2001).

Researchers found that students with intellectual disbilites learned how to solve problems, following instruction, using the SDLMI (Palmer & Wehmeyer, 2003; Wehmeyer et al., 2000). The practice of problem-solving steps, and the use of scenarios and role-play, were effective methods to help students learn (Glago, 2005). Using cue cards and reinforcement helped students become proficient in problem-solving skills (Agran et al., 2002; Palmer et al., 2002).

Elementary, middle, and high-school students with intellectual disabilities improve in their skills of problem solving, choice making, and self-reguating behaviors following instruction in self-determination (Abery & Rudrud, 1995; Agran et al., 2001; Agran et al., 2002). Problem-solving instruction is an efficient strategy that needs to be implemented early (Abery & Rudrud, 1995; Glago, 2005; Palmer & Wehmeyer, 2002).

Based on the review of literature, there appears to be a need for additional research into the problem-solving behaviors in children with intellectual disabilities, and research into how problem-solving skills contribute to the development of self-determination (Glago, 2005; Palmer & Wehmeyer, 2003). Researchers (Agran et al., 2001) found that problem-solving instruction helped children develop skills needed for successful inclusion, nevertheless, they suggested further study into the maintenance and generalization of these skills (Crites & Dunn, 2002; Glago, 2005; Palmer et al., 2004; Wehmeyer et al., 2000).

Researchers recommend incorporating research-based strategies for individuals with intellectual disabilities that teach problem solving, application, maintenance, and the generalization of skills (Crites & Dunn, 2004). Yet, researchers note that a longer generalization condition is needed across settings to demonstrate the efficacy of instruction (Crites & Dunn, 2004; Palmer et al., 2004).

This review suggests that research-based problem-solving instruction is essential for students with intellectual disabilities (Cole & Barrett, 1997). Researchers have found that students with intellectual disabilities do benefit from self-determination instruction that incorporates the component of self-regulated problem solving (Palmer & Wehmeyer,

2003). This study will investigate the efficacy, of teaching a problem-solving strategy to middle school students with intellectual disabilities, as well as the maintenance and generalization of skills.

CHAPTER 3

METHOD

Overview

As teachers effectively integrate problem-solving instruction into learning activities, students with disabilities develop the problem-solving competencies that contribute to self-determination (Glago, 2005). Problem-solving instruction has facilitated students with disabilities by teaching them how to problem solve and take ownership of learning (Agran et al., 2002; Liu, 2004; Palmer & Wehmeyer, 2003; Wehmeyer et al., 2000).

The problem-solving strategy entailed teaching middle school students with intellectual disabilities how to: (a) identify problems, (b) develop potential solutions, and (c) self-reflect. The study also examined how students benefited from problem-solving instruction, and how students acquired problem-solving skills that led to self-determination.

The methodology was a partial replication of Glago's research (2005). This chapter presents the methods and procedures used in the study. Included are descriptions of the students, setting, instrumentation, design, procedures, and fidelity of treatment. The study was implemented in three phases: (a) pre-study, (b) treatment, and (c) maintenance.

Phase One included: (a) identifying participants, (b) teacher training, (c) collecting baseline data, and (d) conducting pre-test measures. Phase Two was used for

implementing treatment. Phase Three included: (a) participant self-evaluation, (b) maintenance data collection and analysis, (c) post-test measures, and (d) social validity measures.

Research Questions

The following research questions were investigated:

1. What were the effects of problem-solving instruction on the skill performances of problem solving in students with intellectual disabilities?

2. To what degree were students with intellectual disabilities able to identify the steps of problem solving?

3. To what degree did students with intellectual disabilities generalize their skill performances of problem solving?

4. To what degree did students with intellectual disabilities maintain their skill performances of problem solving?

Student Perception

5. What effect did the problem-solving instruction have on students with intellectual disabilities perceptions of their skill performances of problem solving?

Teacher Perception

6. What were teacher perceptions about implementing the problem-solving strategy to increase skill performances of problem solving in students with intellectual disabilities?

Participants

The participants were selected using purposeful or convenience sampling. Horsburgh (2003) noted that purposeful sample selection served a useful function, since participants supplied pertinent information on the topic of study. Participants or students were chosen based on the assumption they would provide the *best* meaning into the problem-solving research, contingent upon the efficiency of the problem-solving intervention. School administrators and teachers identified students receiving special education services under the primary category of mental retardation.

Student participation was contingent on his or her assent, as well as parents' voluntary consent. The students included one male and three females, ages 11 to 12. The mean age of the students was 11.7. Students were in grades six and seven. Parental approval was given for students' inclusion in the study. Parents signed informed consent forms (see Appendix A), and students signed student assent forms (see Appendix B).

Students

The students were four middle school students with intellectual disabilities. Selection of students met state criteria in the following areas: (a) an eligibility label of mental retardation under Nevada Administrative Code (2007), (b) qualification for special education or related services, (c) an Individualized Education Program (IEP), and (d) attendance at a public school. According to the Nevada Administrative Code, "Mental retardation means a condition that is characterized by intellectual functioning at a level that is significantly below average, and which exists concurrently with related limitations in two or more of the following adaptive skill areas: (a) communication skills; (b) self-care; (c) home living; (d) social skills; (e) use of the community; (f) self-direction;

(g) health and safety; (h) functional academics; (i) leisure; and (j) work; manifests before the age of 18 years; and adversely affects the educational performance of a pupil" (NAC 388.055, 2008).

Student Skills

In order to participate in the study, students had the following skills: (a) developed language (i.e., three to four-word utterances), (b) responded to questions, and (c) formulated questions. This was determined by screening each student's Individualized Education Program (IEP) for a standardized language score (e.g., 55-69). According to the IEP, students' language assessments indicated that they qualified for special education services under the eligibility label of mental retardation. Only one student had speech and language goals in her IEP. Student demographic information was gathered from the teacher in a questionnaire and was used as a screening prerequisite tool (see Appendix C). See Table 1 for specific characteristics of students.

Student Measures

Students completed the: (a) *Problem-Solving Questionnaire* pre- and post-tests (see Appendixes D and E), (b) *Problem-Solving Step Measure* pre- and post-test (see Appendix F, (c) *Problem Situation Baseline Measure* (see Appendix G), (d) *Problem Situation Measure* (see Appendix H), (e) *Generalization Measure* (see Appendix I) and (f) *Problem Situation Maintenance Measure* and *Problem Situation Retention Measure* (see Appendixes J and K). The teacher assisted students with reading the questionnaires and measures.

Table 1

Demographic Information of Students

Characteristics	Number
Gender	
Male	1
Female	3
Total	4
Age	
Mean	11.7
Range	11-12
Grade	
Sixth	3
Seventh	1
Overall IQ Score	
55-69	1
40-54	3
Mean	54.8

Table Continues

Table 1 continued

Demographic Information of Students

Characteristics	Number
Language Score	
55-69	4
40-54	0
Mean	61.8
Ethnicity	
Hispanic	1
African American	1
Asian	1
Caucasian	1
Total	4

Teacher

One special education teacher participated in the study. The teacher was the primary service provider of the students' special education services. The teacher signed the consent form indicating her willingness to participate in the study (see Appendix L).

Training was conducted, during the pre-study condition, to introduce the teacher to the Self-Determined Learning Model of Instruction (SDLMI) and the problem-solving

intervention. The teacher completed the *Student Demographics Questionnaire* (see Appendix C), as well as the *Teacher Demographic Questionnaire* (see Appendix M). See Table 2 for specific characteristics of the teacher.

Table 2

Demographic Information of the Special Education Teacher

Characteristics	Teacher
Gender	Female
Age	49
Ethnicity	Caucasian
Years Teaching	23
Highest Degree	Master of Education
Current Assignment	Self-contained Mentally Challenged Classroom
Areas Taught	All
Grade Levels	1-8
License	Generalist K-12
Endorsements	Mental Retardation

Data Collectors

The investigator was the primary person responsible for: (a) teacher/interrater training, (b) implementation of the intervention, and (c) collecting pre- and post-data. One doctoral student (i.e., fifth-year doctoral student) assisted the investigator with data collection, as well as interobserver reliability and procedural fidelity checks. The doctoral student was recruited from the University of Nevada Las Vegas Special Education Department.

The doctoral student collected data until she showed agreement with the investigator's data responses and until interobserver agreement and reliability of observations was established at 100%. Agreement data were calculated by [agreements/(agreements + disagreements)] x 100 = percentage of agreement]. Interobserver reliability data were calculated during 20% of random sessions across treatment. At the beginning of each week, data collectors set an agreed upon time and date to review the data.

Parents

Students' parents completed a *Parent Demographic Information Questionnaire* (see Appendix N). The *Parent Demographic Information Questionnaires* were sent home, in a manila envelope, via the students. Parents were given a 2-week return date. One student returned the envelope in a timely manner. Second questionnaires were sent home with students; yet, three families failed to return questionnaires. Phone calls were made, and the teacher scribed parents' demographic information utilizing the questionnaire. See Table 3 for parents' demographics.

Table 3

Demographic Information of Parents

Characteristics	Number
Gender	
Male	3
Female	4
Total	7
Age	
Mean	33.4
Range	28-43
Ethnicity	
Hispanic	3
African American	1
Asian	1
Caucasian	2
Total	7

Setting

This study was conducted in an urban middle school setting located in a southwestern state. The school was a designated professional development model, and part of a district that served approximately 310,000 students. The school served 929 students, who are 47.1% female and 42.9% male. The schools' student demographics included 130 special

education students and 328 English Language Learners. Students who received special education services were divided into the following categories: 88 learning disabilities, 4 severe emotional disabilities, 28 related services, and 10 mental retardation. The schools' student demographics included the following ethnicities: 73.6% Hispanic, 9.5% African American, 1.2% Asian/Pacific Islanders, 8.7% Caucasian, and 1.2% American Alaskan/Native American. Principal and district consent was gained prior to initiating the study (see Appendix O).

Classroom

The setting was a self-contained classroom used for instructing students with intellectual disabilities. The classroom had a white board, two rectangular shaped tables, one kidney shaped table, one round table, two computers, two filing cabinets, 13 chairs, one adaptive student desk, reading center, two teacher desks and two chairs, refrigerator, and classroom supplies (i.e., manipulatives, games, pencils, paper).

Learning Centers

The special education teacher utilized a small learning center (i.e., small round table with three chairs) for instruction. Instruction occurred: (a) at the same time of the day (i.e., 11:10 a.m.), (b) every day of the week (i.e., Monday-Friday), and (c) during the same period (i.e., fourth). The teacher directed students to the small round table in the back of the classroom. The designated area promoted teacher-student direct-instruction, individualized instruction, and discussion. One white dry erase board was used during problem-solving instruction.

Instrumentation

Five instruments were used to evaluate students' skill performances of problem solving. Students completed the following: (a) *Problem-Solving Questionnaires* pre- and post-tests (see Appendixes D and E), (b) *Problem-Solving Step Measure* pre- and post-test (see Appendix F), (c) *Problem Situation Baseline Measure* (see Appendix G), (d) *Problem Situation Measure* (see Appendix H), (e) *Generalization Measure* (see Appendix I) and (e) *Problem Situation Maintenance* and *Problem Situation Retention Measure* (see Appendixes J and K).

Problem-Solving Questionnaire

Students completed the *Problem-Solving Questionnaire* pre- and post-tests (see Appendixes D and E). The questionnaires were used as pre- and post-treatment measures of student skill performance of problem solving. The teacher assisted students with completing the questionnaires (i.e., read the question and circle the number that best answers the question).

Problem-Solving Questionnaires contained eight questions that included: (a) "What is a problem?"; (b) "Can you name a problem you have had?"; (c) "How did you fix your problem?"; (d) "Did it work?"; (e) "When was the last time you had a problem?"; (f) "Did you ask for help?"; (g) "Who do you go to when you have a problem?"; and (e) "How can someone help you with a problem?" Possible student responses included: (a) positively not sure, (b) maybe not sure, (c) not sure, (d) maybe, and (e) very sure. Responses were scored using a 5-point Likert-type scale.

Problem-Solving Step Measure

Students completed the *Problem-Solving Step Measure* pre- and post-treatment (see Appendix F). The *Problem-Solving Step Measure* evaluated students' knowledge of the problem-solving steps used in the strategy. The steps included: (a) "What's the problem?"; (b) "How can you fix it?"; and (c) "Why would it work?"

The teacher assisted students with completing the measure (i.e., read the question and recorded student responses). The measure was scored using a rubric for the three problem-solving steps (see Appendix P).

Problem Situation Measure

The *Problem Situation Measure* was used during treatment (see Appendix H). This measure assessed students' skill performances of problem solving when presented with a problem situation. The teacher read problem situations to students. Students were asked to give two possible solutions to the problem situation. Next, students were asked to choose the *best* solution to the problem. Last, students expressed why they picked that solution, and expressed why they felt it was the *best* solution.

Students were assisted with completing the measure (i.e., teacher recorded student responses). The *Problem Situation Measure* was scored using a rubric for the five problem-solving answers (see Appendix Q).

Generalization Measure

Students were assessed during role-plays of problem situations using the *Generalization Measure* (see Appendix I). The *Generalization Measure* probes were conducted over a two-week period, three weeks post-treatment. For example, the teacher presented a problem situation to a student. (e.g., the student was directed to a table and

given a book to read. The teacher asked the student to leave the area. Upon the student's return, the book was missing. Another student was reading the book). The student was evaluated using the following criteria: (a) if he or she identified a problem, (b) if he or she identified two possible solutions, (c) if he or she identified a best possible solution, and (d) if he or she identified why the best possible solution would work. A criterion level of 80%, or four out of five answers was used. The *Generalization Measure* was scored using a rubric for the possible five answers during role-play (see Appendix R).

Problem Situation Maintenance and Problem Situation Retention Measures

Seven and nine weeks post-treatment, students were given a *Problem Situation Maintenance Measure*, and a *Problem Situation Retention Measure* (see Appendixes J and K). The measures were used to assess maintenance and retention of students' skill performances of problem solving. Additionally, the *Problem Situation Maintenance Measure* and *Problem Situation Retention Measures* were used to assess functional relationships between the independent and dependent variables over time.

The teachers assisted students with completing the *Problem Situation Maintenance Measure* and *Problem Situation Retention Measure* (i.e., teacher read the problem situation and scribed student responses). The *Problem Situation Maintenance* and Problem *Situation Retention Measures* were scored using a rubric (see Appendix Q).

Materials

The instructional materials were modified from *A Parent's Guide to the Self-Determined Learning Model for Early Students* and Glago's study (Palmer & Wehmeyer, 2002; Glago, 2005). The Self-Determined Learning Model of Instruction questions (i. e.,

"What is my goal?"; "What is my plan?"; "What have I learned?") were modified to support students' comprehension of the problem-solving instruction. The questions used in the study were: "What's the problem?"; (b) "How can you fix it?"; and (c) "Why would it work?" While Palmer and Wehmeyer's model is used to teach students several components of self-determination (e. g., goal setting, choice-making), the skill of problem solving was the main component taught in this study.

Glago's measures and questionnaires have been modified to support student understanding and ability levels (i.e., *Problem-Solving Step Measure*, *Scenario Worksheet Measure*, *Problem-Solving Questionnaire*, *Generalization Measure*). For example, students in Glago's study learned five problem-solving steps that included: (a) identify the problem, (b) think of solutions, (c) pick the best one, (d) try it out, and (e) decide if it worked. The three modified questions used in this study included: (a) "What's the problem?"; (b) "How can you fix it?"; and (c) "Why would it work?" Palmer and Wehmeyer, along with Glago, granted permission to modify materials used in this research (see Appendixes S and T).

Problem-Solving Steps

During intervention, students were taught three problem-solving steps: (a) "What's the problem?"; (b) "How can you fix it?"; and (c) "Why would it work?" (Agran et al., 2002; Glago, 2005; Palmer & Wehmeyer, 2002). The *Problem-Solving Step Worksheet* was created to assist students with remembering the steps (see Appendix U). The worksheet was used to create student-made 3 x 5 flash cards.

Problem Situation Measure

Problem Situation Measures presented 10 problem situations (see Appendix H). The problem situations were similar to those that might be encountered in the student's school or student's home environment. The measures gave students an opportunity to brainstorm possible solutions. The teacher facilitated students in choosing the best possible solution.

A Parent's Guide to the Self-Determined Learning Model for Early Students

A Parent's Guide to the Self-Determined Learning Model for Early Students (Palmer & Wehmeyer, 2002) provided the teacher and parents with a strategy for teaching students problem-solving skills. The model was modified for students with intellectual disabilities (Palmer & Wehmeyer, 2003).

Problem-Solving Books

Palmer and Wehmeyer (2002) identified problem-solving books to be shared with students. The storybook characters, which solved problems, helped students grasp the meaning of *problem* or *solution*. Students' problem-solving book titles included: (a) *An Evening at Alfie's* (Hughes, 1984), (b) *Princess Smartypants* (Cole, 1986), (c) *No Peas for Nellie* (Demarest, 1991) and (d) *Sweet Clara and the Freedom Quilt* (Hopkinson, 1993). During problem-solving instruction, the teacher read and discussed the books with the students.

Digital Voice Recorder

The teacher used one Olympus Digital Voice Recorder to record students' responses. Recordings were made throughout the problem-solving instruction and served as documentation. The investigator and doctoral student collected practice data and reviewed recordings to establish interobserver agreement on the number of recorded

correct and incorrect student responses. After interobserver agreement was established (i.e., 100% agreement on three successive occasions), data collectors reviewed recordings and records weekly. The interobserver agreement was 98.7% during 20% of random sessions.

Crate

The table held four small individual crates. The crates contained the following: (a) 3 x 5 unruled white index cards, (b) markers, (c) glue sticks, (d) scissors, (e) pencils, (f) pens, and (g) a small white dry erase board.

Definition and Measurement of Dependent Variable

Two dependent variables were measured in this study: identifying the problem and generating a possible solution. The investigator and doctoral student collected dependent variable data during pre-study, treatment, generalization, maintenance, and retention. The teacher facilitated students in identifying problems and solutions as well as assessing whether or not the solution worked.

Teacher modeling and prompting aided students in learning the three selected steps in the problem-solving strategy. After students acquired the necessary skills to identify problems, generate possible solutions, and choose the best solution, the teacher facilitated students in asking for assistance when presented with problem situations.

Definition of Dependent Variable

Identifying the Problem. Identifying the problem was defined as possessing the skill to express what was the problem (e.g., There is no more chocolate milk to go with Billy's pizza).

Generating a Possible Solution. Generating a possible solution was defined as possessing the skills to consider optional answers to the problem (e.g., Billy could drink strawberry milk with his pizza).

Definition of Independent Variable

The independent variable used during this study was defined as a problem-solving strategy. Students were taught three problem-solving steps: (a) "What's the problem?"; (b) "How can you fix it?"; and (c) "Why would it work?" The teacher utilized the problem-solving strategy, to facilitate students' skills of problem solving. This problem-solving strategy was modified from: *A Parent's Guide to the Self-Determined Learning Model for Early Students* (Palmer & Wehmeyer, 2002), and Glago's study (2005).

The teacher was instructed to follow the sequential steps outlined in the *Daily Script for Problem-Solving Instruction* (see Appendix V). The script described the order to be followed when introducing students to the problem-solving instruction. The script defined the following: (a) goals, (b) materials, (c) advance organizer, (d) describe and model, and (d) guided practice, (e) role-play practice, (f) problem-solving practice, and (g) feedback.

A *Procedural Fidelity Checklist* (see Appendix W) was used to ensure the teacher's adherence to the steps outlined in the *Daily Script for Problem-Solving Instruction* (see Appendix V). The investigator and doctoral student collected procedural fidelity data during the treatment phase. The following data were assessed during teacher instruction: (a) pushed record button on Digital Voice Reorder, (b) told the student what he or she would be doing and why, (c) taught or reviewed three problem-solving steps, (d) utilized

cues, (e) utilized problem-solving story books, (f) introduced problem situations, (g) facilitated student in defining the problem, (h) facilitated student in identifying possible solutions, (i) provided feedback, and (j) utilized role-play or discussion.

Experimental Design

Multiple-Probe Design

This study used a multiple-probe design (Horner & Baer, 1978) with pre-study (i.e., baseline), treatment, and maintenance phases. The design was used to evaluate the effects of the problem-solving instruction on students' skill performances of problem solving. Students were introduced to the three steps of the problem-solving intervention.

During Phase One, the investigator and doctoral student collected baseline data on students' problem-solving skills, when presented with a *Problem Situation Baseline Measure* (see Appendix G). Data were gathered for at least three consecutive days or until there were signs of stability (Agran et al., 2006). During Phase Two, students received comprehensive problem-solving training (e.g., direct instruction, modeling, role-play). During Phase Three, students' self-evaluated problem-solving skills, post-test measures were conducted, and generalization, maintenance, and retention data were gathered. During both baseline and the treatment condition, visual examinations of the data were used to determine whether a functional association occurred between the independent and dependent variables (Horner et al., 2005).

Procedures

This study was conducted over a 16-week period that incorporated both maintenance and retention measures of students' skill performances of problem solving. The following were included: (a) teacher training, (b) pre-study assessments, (c) treatment, (d) interobserver agreement, (e) procedural fidelity, and (f) social validity measures.

Phase One: Pre-Study

The purpose of Phase One: (Pre-study) was to gather: (a) teacher, (b) student, and (c) parent consent. In addition, during this phase, the investigator conducted teacher training. Next, students were given pre-treatment assessments using the following: (a) *Problem-Solving Questionnaire* (see Appendix D), (b) *Problem-Solving Step Measure* (see Appendix F), and (c) *Problem Situation Baseline Measure* (see Appendix G).

Consent. Parents were informed that the problem-solving instruction may increase their child's self-determination skills and may improve educational strategies for other children with intellectual disabilities. Parents were shown *A Parent's Guide to the Self-Determined Learning Model for Early Elementary Students* (Palmer & Wehmeyer, 2002), and informed that modifications would be made to the model.

Parents were encouraged to ask questions (e.g., *What questions do you have about the problem-solving instruction*). Parents were assured that their child's participation was voluntary and identities were kept strictly confidential.

Parents signed an informed consent as outlined by the Institutional Review Board of the University of Nevada Las Vegas (see Appendix A) in order for their child to participate in the study. A professional translator translated the informed consent and demographic survey (i.e., English to Spanish) to facilitate understanding for Spanish

speaking parents. Two parents, along with the teacher, completed parent demographic surveys at the beginning of the study. The teacher called parents who did not return the surveys, and the teacher scribed parent responses. (see Appendix N). Students were asked to sign a *Student Assent Form* (see Appendix B) to participate in the study.

Teacher Training. The teacher received one-on-one training, conducted by the investigator. Training consisted of 30-minute sessions over a 5-day time period. The teacher was given copies of *A Teacher's Guide to Implementing the Self-Determined Learning Model of Instruction Early Elementary Version* and *A Parent's Guide to the Self-Determined Learning Model for Early Elementary Students* (Palmer & Wehmeyer, 2002). The teacher was asked to read the guides over the weekend.

Training consisted of introducing the teacher to the three phases of the Self-Determined Learning Model of Instruction (Wehmeyer et al., 2000): (a) setting a goal, (b) developing an action plan, and (c) evaluating progress. The teacher was informed that the problem-solving intervention incorporated a modified version of Palmer and Wehmeyer's model (Palmer & Wehmeyer, 2002).

The teacher was introduced to the problem-solving storybooks used during treatment (i.e., intervention). The titles included: (a) *An Evening at Alfie's* (Hughes, 1984), (b) *Princess Smartypants* (Cole, 1986), (c) *No Peas for Nellie* (Demarest, 1991) and (d) *Sweet Clara and the Freedom Quilt* (Hopkinson, 1993). These books were read and discussed with students to facilitate comprehension of the *essence* of a *problem* or *solution*. The teacher was encouraged to use questions in prompting students, to re-read problem situations, or to re-word instruction depending upon students' ability levels.

Finally, the teacher was given the *Daily Script for Problem-Solving Instruction* (see Appendix V). The script described the order used by the teacher when introducing students to the problem-solving instruction. The script outlined: (a) goals, (b) materials, (c) advance organizer, (d) describe and model, and (d) guided practice, (e) role-play practice, (f) problem-solving practice, and (g) feedback to be used during treatment.

The teacher requested that the problem-solving intervention be modeled. With the assistance of a student aide (i.e., after parental consent was given), the investigator modeled problem-solving instruction for the teacher. At least one hour was used for investigator to student aide modeling. Teacher concerns and questions were addressed, during and after modeling.

Baseline. A multiple-probe design was applied to four students (i.e., Student A, Student B, Student C, Student D). During baseline, students' skill performances of problem solving were determined using *Problem Situation Baseline Measures* (see Appendix G). Baseline criterion performance was set at a minimum of three data points with more than 20% variability, with stability in trends and levels prior to treatment (Horner, Carr, Halle, McGee, Odom, & Wolery, 2005; Tawney & Gast, 1984). All students received a minimum of four baseline measures. Baseline data were scored using a rubric (see Appendix Q).

Treatment Condition

The purpose of treatment was to establish whether students' skill performances of problem solving improved as a result of the problem-solving instruction. The problem-solving instruction was a modification of instruction used in Glago's study (2005), and a

modification of *A Parent's Guide to the Self-Determined Learning Model of Instruction for Early Elementary Students* (Palmer & Wehmeyer, 2002).

Problem-Solving Instruction. During treatment, the teacher instructed students in problem solving, following the *Daily Script for Problem-Solving Instruction* (see Appendix V). Training consisted of one 15-minute session per day, five days a week. Since Student A and Student B showed similar stability in baseline performances (i.e., four days with more than 20% variability) a determination was made to simultaneously introduce treatment. Student C and Student D continued in the baseline phase until Student A and Student B demonstrated 80% criterion (i.e., answered at least four out of five questions correctly) on three consecutive attempts using the *Problem Situation Measure* (Horner et al., 2005). Student C and Student D continued to receive weekly *Problem Situation Baseline Measure* probes. Next, Student C began treatment. Student D continued receiving weekly baseline probes until Student C demonstrated 80% criterion (i.e., answered at least four out of five questions correctly) on three consecutive attempts using the *Problem Situation Measure* (see Appendix H). Lastly, Student D began the treatment condition. Treatment continued until Student D demonstrated 80% criterion (i.e., answered at least four out of five questions correctly) on three consecutive attempts using the *Problem Situation Measure* (Tawney & Gast, 1984). After students met criterion, the teacher conducted three sessions of role-play, using scenarios from the *Problem Situation Measure*.

The teacher supported students in learning the following three problem-solving steps: (a) "What's the problem?"; (b) "How can you fix it?"; and (c) "Why would it work?" (Agran et al., 2002; Glago, 2005; Palmer & Wehmeyer, 2002). The teacher assisted

students in developing 3 x 5 flash cards. The cards were created using the *Problem-Solving Step Worksheet* that lists three questions and three clip art symbols (see Appendix U). To the right of each clip art picture was the question from the problem-solving strategy.

The worksheet (see Appendix U) contained clip art pictures that corresponded to the three questions. A detective, holding up a magnifying glass, symbolized *What's the problem*? A nurse, holding a medical chart, symbolized *How can you fix it*? A cheerful jumping girl symbolized, *Why would it work*? The flash cards were used to prompt students' recall of the problem-solving questions. The flash cards had a picture on one side and a question on the opposite side. The teacher provided positive reinforcement (e.g., smiles, high fives) to encourage students' becoming skilled in memorizing the three problem-solving steps.

During instruction, the teacher reviewed the three problem-solving steps with students. Utilizing the student created 3 x 5 index cards, as prompts, students practiced learning the steps. For example, the teacher showed the clip art pictures attached to the student created cards and asked: (a) *The detective's picture reminds you of what problem-solving step*?; (b) *The nurse's picture reminds you of what problem-solving step*?; and (c) *The cheerful girl reminds you of what problem-solving step*? Students were encouraged to access the printed prompt and visual representation prompt.

Problem Situation Sessions. The teacher modeled role-play of problem situations in order to assist students with the significance of the concepts *problem* and *solution*. The teacher made use of the problem-solving storybooks titled: (a) *An Evening at Alfie's* (Hughes, 1984), (b) *Princess Smartypants* (Cole, 1986), (c) *No Peas for Nellie*

(Demarest, 1991), and (d) *Sweet Clara and the Freedom Quilt* (Hopkinson, 1993), to facilitate students grasp of what a *problem* or *solution* was. For example, after reading the storybook *An Evening at Alfie's* (Hughes, 1984), a discussion was started using the questions: (a) *What problem did Maureen have*?; (b) *How could Maureen fix it*?; (c) *What else could Maureen do*?; and (d) *Was Maureen able to fix the problem*?

The 10 *Problem Situation Measures* (see Appendix H) provided students with opportunities to identify at least two possible solutions per situation. Students were then asked to choose the best possible solution. For example, the teacher encouraged student reflection by asking: *Which solution do you think would work best*? The teacher discussed both solutions to assist students in selecting the one that they felt would work best. The teacher provided students with sufficient practice in selecting a solution to facilitate confidence in their choices. A *Problem Situation Rubric* was used for data collection (see Appendix Q).

Students were afforded opportunities to learn the problem-solving steps during the *Problem Situation Measure* sessions (see Appendix H). Positive reinforcement and role-play were utilized as students attained problem-solving skills. The problem situations contained real-world problems that required the student to: (a) identify the problem, (b) imagine two possible solutions, (c) choose one solution, and (d) give a reason for the choice.

The teacher read the problem situation to the students. For example, one problem situation contained the following scenario: "Ann is having trouble remembering her math facts. Ann's teacher is giving a math test on Friday. Ann wants to get an A on the test." The teacher facilitated the students in defining the problem (e.g., *What does Ann have*

trouble remembering? *What will happen Friday*)? The teacher asked questions such as *How can she fix her problem*?, and *What could she do to solve her problem*?

The teacher made the most of school related problem situations during treatment (e.g., *You need a permission form to go bowling. What happens if mom does not sign it? You cannot go bowling. If you go home without your permission slip what could you do? What else could you do*)? Additionally, the teacher provided students with feedback on their responses. For example, the teacher verbally reinforced students for sharing solutions to the problems such as: *You are right. Why would you feel happy*? *Why would you feel better*? *What would that make the problem go away?* The teacher reinforced the student as to why the solution would fix the problem, thereby, helping the student feel confident with his or her choice (e.g., *You solved the problem, found a solution, and it worked*).

Next, the teacher discussed two possible solutions to the problem situation. The students were encouraged to think of ways that they could fix the problem. For example, the teacher cued students using questions such as: (a) *What could you do*?; (b) *How could you fix it*?; and (c) *Can you think of another thing you could do*?

The teacher asked students to justify or defend why they thought their solution would work. The teacher asked questions such as: (a) *Why would it work*?; (b) *Why is that a good idea*?; and (c) *Why is that solution the best solution*? The teacher encouraged students to share their reasons.

The teacher role-played how to approach a teacher or an adult when presented with a problem. The teacher described and modeled how to ask a question to facilitate students' skills of asking for assistance (e.g., *I do not know what to do. Can you help me*? *What do*

I do now)? Students were given sufficient practice of asking for assistance when presented with a problem. Practice was given during the problem situation sessions.

Phase Three: Maintenance

Self-Evaluation: During Phase Three, students' progress was evaluated on skill performances of problem solving. Post-treatment, students completed the *Problem-Solving Questionnaire* and *Problem-Solving Step Measure* (see Appendixes E and F). The teacher assisted students with evaluations of their existing skills. The teacher read the questions (i.e., "What is a problem?"; "Can you name a problem you have had?"; "How did you fix your problem?"), and participants answered orally. The teacher facilitated students in writing their answers to the questions or circling the corresponding number (e.g., "What is the problem?"; "What could you do to fix it?"; "What else could you do to fix it?").

Generalization Measure: Three weeks post-treatment, three *Generalization Measure* probes were conducted over a two-week period. Students were assessed during a role-play of a problem situation (see Appendix I). For example, the teacher presented the following problem situation, to a student, during role-play: *Your teacher tells you to take out a pencil for the next assignment. You look and cannot find your pencil. You remember leaving a pencil in your desk.* During the actual role-play, the student was presented with an assignment. The student was asked to leave his or her desk. The teacher then removed the student's pencil. The student was directed to return to his or her desk and to complete the assignment. When the student noted the absence of the pencil, the teacher asked the student to: (a) identify the problem, (b) identify two possible solutions, (c) identify a best possible solution, and (d) identify why the best solution would work. The student was

assessed on the following: (a) if he or she identified the problem, (b) if he or she identified two possible solutions, (c) if he or she identified a best possible solution, and (d) if he or she identified why the best possible solution would work. A *Generalization Measure Scoring Rubric* listed the criteria (see Appendix R).

Problem Situation Maintenance Measure and Problem Situation Retention Measure: Seven and nine weeks post-treatment, students were given a *Problem Situation Maintenance Measure* and *Problem Situation Retention Measure* (see Appendixes J and K). Students were re-assessed on their skill performances of problem solving when presented with problem situations. The measures assessed if students maintained and retained their problem-solving skills post-treatment.

The teacher assisted students with reading the problem situation and writing responses to questions (i.e., "What is the problem?"; What could you do to fix it?"; What else could you do to fix it?"; Which solution would work best?"; and "Why will it work?"). The *Problem Situation Maintenance Measure* and the *Problem Situation Retention Measure* were scored using a rubric (see Appendix Q).

Interobserver Reliability

The investigator was the primary person in charge of data collection; however, a doctoral student served as a secondary observer. One digital voice recorder was used to record student responses throughout treatment. The recordings were used to facilitate investigator and doctoral student interobserver agreement. During direct observations of student responses, the doctoral student collected data until she showed agreement with the investigator's data collection of student responses (e. g., problem situation measure),

and until interobserver agreement and reliability of observations had been established. Interobserver reliability data were computed during 20% of random sessions across treatment. The investigator and doctoral student reviewed recordings weekly. Both observers set an agreed upon review time and date, at the beginning of each week.

A percent agreement of at least 80% was identified as acceptable (Kazdin, 1977). The point-by-point method was used to score the data (Kazdin, 1982). Agreement data were calculated by [agreements/(agreements + disagreements)] x 100 = percent of agreement]. The interobserver agreement was 98.7% during 20% of random sessions.

Treatment of the Data

The research questions were analyzed using the following instruments:

1. What were the effects of problem-solving instruction on the skill performances of problem solving in students with intellectual disabilities?

Analysis: The effects were measured using the *Problem Situation Measure* (see Appendix H).

2. To what degree were students with intellectual disabilities able to identify the steps of problem solving?

Analysis: Problem-solving step identification was measured using the *Problem-Solving Step Measure* pre- and post-test (see Appendix F).

3. To what degree did students with intellectual disabilities generalize their skill performances of problem solving?

Analysis: Generalization was assessed using the *Generalization Measure* (see Appendix I).

4. To what degree did students with intellectual disabilities maintain their skill performances of problem solving?

Analysis: Maintenance and retention were assessed using the *Problem Situation Maintenance Measure* and *Problem Situation Retention Measure* (see Appendixes J and K).

Student Perception

5. What effect did problem-solving instruction have on students' with intellectual disabilities perceptions of their skill performances of problem solving?

Analysis: Students' perceptions were assessed using the *Problem-Solving Questionnaires* pre- and post-tests (see Appendixes D and E).

Teacher Perception

6. What were teacher perceptions about implementing the problem-solving strategy to increase skill performances of problem solving in students with intellectual disabilities?

Analysis: Teacher perceptions of students' skill performances of problem solving were assessed using the *Social Validity Measure* (see Appendix X).

Procedural Reliability of Treatment

Procedural integrity or treatment fidelity describes the degree that the condition is executed as intended and not altered (Gresham, MacMillan, Bee-Frankenberger, & Bocian, 2000). Experimenters use procedural integrity checklists to evaluate compliance in following the experimental procedures (Tincani, 2004).

Both the investigator and doctoral student observed the teacher's methods during instruction. A "+" or "-" was recorded if the teacher complied with the methods. The

procedural fidelity or interobserver agreement data were calculated by dividing the number of steps implemented correctly by the number of correct plus incorrect number of steps multiplied by 100. An agreement level of at least 80% across two observers was the standard. See the *Procedural Fidelity Checklist* (see Appendix W).

Social Validity Measures

Social validity measures, obtained from teachers, provide researchers with valuable information on the practicality of the instruction. Teacher, student, and parent feedback were gathered from anecdotal records, interviews, and measures (Agran et al., 2002; Tincani, 2004; Witt & Martens, 1983). This information is useful to future experimenters who wish to replicate or validate the research.

Teachers of students with autism spectrum disorder (ASD) have used the *Intervention Rating Profile* to measure the social validity of a social stories intervention (Scattone, Tingstrom, & Wilczynski, 2006). The scores indicated the teachers' acceptability of the intervention (Scattone et al., 2006).

During week 16, the teacher completed the *Social Validity Measure* (Appendix X). An adaptation of the *Intervention Rating Profile* (IRP-15; Witt & Martens, 1983) was used to assess usability of the problem-solving strategy using a Likert-type scale. Teacher data indicated problem-solving instruction: (a) was fairly easy to implement, (b) facilitated students in seeking assistance, (c) was effective in teaching problem solving, (d) was feasible in the amount of time to teach it, (e) was appropriate for students' ability levels, (f) facilitated students in identifying solutions, (g) was useful in teaching self-determination, and (h) would be continued post-study.

CHAPTER 4

RESULTS

Problem-solving instruction facilitates the development of self-determination in students with intellectual disabilities, and better prepares students for life's challenges (Agran et al., 2002; Palmer & Wehmeyer, 2002). Students who are self-determined engage in behaviors that include identification of problems and possible solutions (Hughes, Wood, Konrad, & Test, 2006). Problem-solving skills need to be developed at a young age in order to prepare a student with a disability for society (Hughes et al., 2006). When students with disabilities are presented with systematic problem-solving instruction, they learn the problem-solving skills that facilitate identification of problems and possible solutions. As a result of instruction, students can generalize and maintain skill performances of problem solving (Glago, 2005).

The purpose of this study was to examine the effects of problem-solving instruction to increase skill performances of problem solving in middle school students with intellectual disabilities. When presented with problem situations, students were facilitated in identifying: (a) problems, (b) two possible solutions, (c) best solutions, and (d) why the solution would work. One baseline and one intervention condition was implemented using a multiple-probe design. The setting was a self-contained classroom, in a professional development middle school, in a southwestern state. Four students were included in the study.

Demographic Data

Students

Three females and one male participated in the study, who ranged in age from 11 to 12 years old. Student A was a seventh grade male, age 12. Student B was a sixth grade female, age 12. Student C was a sixth grade female, age 11. Student D was a sixth grade female, age 12. All students qualified for special education services, as students with mental retardation, under Nevada Administrative Code (NAC 388.055, 2008). Under NAC: (a) Student A was identified as a student with moderate mental retardation and multiple impairments, (b) Student B was identified as a student with mild mental retardation, (c) Student C was identified as a student with moderate mental retardation and orthopedic impairments, and (d) Student D was identified as a student with mild mental retardation.

This population of students was selected, for the study, because researchers have identified the importance of problem-solving training for students with intellectual disabilities (Agran et al., 2002; Palmer & Wehmeyer, 2003). There has been limited research that incorporates a systematic problem-solving intervention for students with both mild and moderate intellectual disabilities (Liu, 2004; Glago, 2005).

Interobserver Reliability

The investigator and a doctoral student practiced interobserver reliability checks until there was at least 100% agreement on three successive occasions. Thereafter,

interobserver reliability data were computed during 20% of random sessions across phases. Interobserver agreement reliability checks were conducted for the *Problem-Solving Step Measure*, *Problem Situation Baseline Measure*, *Problem Situation Measure*, *Problem Situation Maintenance Measure*, *Problem Situation Retention Measure*, *Generalization Measure*, and *Procedural Fidelity Checklist* (see Table 4).

The investigator explained to the doctoral student how to score student skill performances of problem solving using the rubrics (i.e., see Appendixes P, Q, R, and W). Interobserver agreement data were calculated using Kazdin's (1982) point-by-point method (i.e., [agreements/(agreements + disagreements)] x 100 = percentage of agreement). See Table 4 for interobserver agreement data for the *Problem-Solving Step Measure*, *Problem Situation Baseline Measure*, *Problem Situation Measure*, *Problem Situation Maintenance Measure*, *Problem Situation Retention Measure*, *Generalization Measure*, and *Procedural Fidelity Checklist*.

Table 4

Interobserver Agreement Measure Data

Measure	Data Collectors	Percentage of Agreement
Problem-Solving Step Pre-test	48/48	100%
Problem-Solving Step Post-test	48/48	100%
Problem Situation Baseline	208/210	99%
Problem Situation	227/230	98.7%
Generalization	60/60	100%
Problem Situation Maintenance	20/20	100%
Problem Situation Retention	20/20	100%
Procedural Fidelity Checklist	280/286	97.9%

Problem-Solving Step Measure

A *Problem-Solving Step Measure* (see Appendix F) was used pre- and post-treatment to measure students' knowledge of the problem-solving steps used in this study. All students were assisted in completing the pre- and post-test measures (i.e., teacher scribed student responses). Students were asked to name the three steps of problem solving (e.g., (a) "What's the problem?"; (b) "How can you fix it?"; and (c) "Why would it work?". Pre-treatment, all students were unable to identify any steps.

Post-treatment, Student A, did not identify any problem-solving steps. Post-treatment (i.e., 9 weeks), Student B, Student C, and Student D were unable to repeat the problem-solving steps verbatim, but, interestingly, responses indicated that students remembered the steps and their order. For example, Student B identified the first two steps (i.e., *eye glass looking for a problem.*; *feeling better; finding a solution*), however, she did not identify the final step (i.e., *feeling better*). Student C identified the first two steps (i.e., *a problem*; *a solution*), on the other hand, did not identify the last step (i.e., *be happy, he found his backpack*). Student D identified the first two steps (i.e., *the problem, what's the problem*; *the nurse, the solution*), yet, she did not identify the last step (i.e., *happy, we found a solution*).

The investigator and doctoral student scored 100% of all *Problem-Solving Step Measures.* To determine overall interobserver agreement, scores were compared using the point-by-point method (i.e., [agreements/(agreements + disagreements)] x 100 = percentage of agreement). *Problem-Solving Step Measure* pre- and post-test interobserver agreement was 100%.

Problem Situation Baseline Measure

At least three baseline measurements were administered to each student according to a multiple-probe design (Horner & Baer, 1978). The *Problem Situation Baseline Measure* was used for baseline assessment (see Appendix G). Student A and Student B were included in the first level of the design. Student A and Student B received four baseline measurements. Student C received four baseline measurements and three probes. Student D received four baseline measurements and five probes. A minimum of three baseline measurements, with more than 20% variability, was the criterion for introducing treatment.

After interobserver agreement was established for the *Problem Situation Baseline Measure*, between the investigator and the doctoral student, interobserver agreement data were collected during 20% of all baseline measures. Interscorer agreement data were computed using Kazdin's point-by-point method (1982). *Problem Situation Baseline Measure* agreement data were 99%.

Problem Situation Measure

The *Problem Situation Measures* were similar to the *Problem Situation Baseline Measures* in that they assessed students' skill performances of problem solving. Problem situation scenarios were comparable in setting and character (i.e., school; peers). During treatment, students were facilitated in identifying a problem and two possible solutions to a problem situation (see Appendix H). Next, students chose one solution and explained why it was the best solution.

The investigator scored 100% of all *Problem Situation Measures*. After interobserver agreement data were established between the investigator and doctoral student,

interobserver agreement data were collected during 20% of all random measures. Kazdin's point-by-point method was used to determine interobserver percent of agreement (1982). *Problem Situation Measure* agreement was 98.7%.

Generalization Measure

Three weeks post-treatment, generalization data were collected. Students were assessed on their skills performances of problem solving during a role-play of a problem situation (see Appendix I). Over the course of two weeks, three generalization measures were administered to students. Students identified problems, possible solutions, best solutions, and self-evaluated, during role-play sessions.

Both data collectors scored 100% of all *Generalization Measures* during role-plays. Scores were compared to obtain interobserver agreement scores (i.e., [agreements/(agreements + disagreements)] x 100 = percentage of agreement). Generalization Measure interobserver agreement was 100%.

Problem Situation Maintenance and Problem Situation Retention Measures

Seven and nine week's post-treatment, students were given *Problem Situation Maintenance* and *Problem Situation Retention Measures* (see Appendixes J and K). Maintenance and retention data scores were compared to treatment data scores. The investigator and doctoral student scored 100% of all *Problem Situation Maintenance* and *Problem Situation Retention Measures*.

To determine overall interobserver agreement, scores were compared using Kazdin's point-by-point method. *Problem Situation Maintenance Measure* interobserver agreement was 100%. *Problem Situation Retention Measure* interobserver agreement was 100%.

Procedural Reliability of Treatment

A *Procedural Fidelity Checklist* was used to measure teacher fidelity during the treatment phase (see Appendix W). The teacher's adherence to the *Daily Script for Problem-Solving Instruction* was measured using the checklist (see Appendix V). Both the investigator and doctoral student independently practiced procedural fidelity checks until there was at least 100% agreement on three successive occasions. Procedural fidelity data were computed during 20% of random sessions.

The interobserver agreement data were calculated using the point-by-point method, that is, dividing the number of steps correctly implemented, by the number of correct plus incorrect steps, multiplied by 100 (Kazdin, 1982). The Procedural Fidelity interobserver agreement data were 97%.

Problem-Solving Questionnaire

A *Problem-Solving Questionnaire* was used pre- and post-treatment to measure students' knowledge of problem solving. Students were assisted in completing the questionnaires (i.e., teacher read the question; teacher circled the answer). The questionnaire asked eight problem solving related questions: (a) "What is a problem?"; (b) "Can you name a problem you have had?"; (c) "How did you fix your problem?"; (d) "Did it work?"; (e) "When was the last time you had a problem?"; (f) "Did you ask for help?"; (g) "Who do you go to when you have a problem?"; and (e) "How can someone help you with a problem?" Responses included: (a) positively not sure, (b) maybe not sure, (c) not sure, (d) maybe, and (e) very sure. A 5-point Likert-type scale was used to score student responses.

There was a continuum of student responses comparing pre- and post-questionnaires. Post-treatment, Student A indicated that he was very sure he could remember the last time he had a problem, compared to his pre-treatment response that he was not very sure he could remember the last time he had a problem. Post-treatment, Student B indicated that she was somewhat sure about whom to go to with a problem compared to her pre-treatment response of definitely not sure.

Post-treatment, Student C was very sure she could identify a problem, find a solution, and ask for help. Pre-treatment, Student C indicated she was definitely not sure about identifying a problem, finding a solution, and asking for help. The responses of Student D varied the most between pre- and post-treatment. Post-treatment, Student D indicated that she was very sure that she could name and fix a problem, find a solution, and ask for help. Pre-treatment, Student D indicated that she was definitely not sure when it came to naming a problem, fixing a problem, finding a solution, and asking for help. Pre-treatment, students responded quickly when the teacher presented them with the *Problem-Solving Questionnaire*. Post-treatment, students appeared more thoughtful, hesitating before responding.

Social Validity Measure

One week into treatment, the teacher expressed that the problem-solving instruction was too difficult for student ability levels, and perhaps by the end of the study, maybe one student would progress in skill performances of problem solving. She suggested questions be modified to facilitate students grasp of the concept (e.g., "What's the

Problem?", "Which solution would work best?"). In spite of her concerns, the teacher diligently followed procedures utilizing the *Daily Script for Problem-Solving Instruction* (see Appendix V). Social validity information is presented in Table 5.

Table 5

Social Validity Questionnaire of the Special Education Teacher

Problem-Solving Instruction	Response
Was fairly easy to implement	Strongly Agree
Facilitated students in seeking needed assistance	Strongly Agree
Was effective in teaching students to problem solve	Strongly Agree
Was feasible in the amount of time required to teach it	Strongly Agree
Was appropriate for the students' ability levels	Agree
Facilitated students in identifying solutions to problem situations	Strongly Agree
Was useful in teaching self-determination	Strongly Agree
Would be continued post-study	Strongly Agree

Additionally, the teacher encouraged, prompted, and assisted students in identifying problems and possible solutions to problem situations. The teacher worked through the script in providing students with systematic problem-solving instruction that utilized review, flash cards, problem-solving storybooks, problem situation scenarios, modeling, and role-play. Post-treatment, the teacher both expressed and indicated in writing (i.e., *Social Validity Measure*) that students benefited from the intervention, and that the problem-solving instruction would be continued post-study.

Summary of Findings

Pre-Study and Treatment Summary

Baseline (i.e., Pre-Study) and treatment mean percentages were examined for efficacy of problem-solving instruction. Specifically, means measured students' problem-solving skill attainment. During treatment, Student A, Student B, Student C, and Student D met the established criterion for the study (i.e., 80% on three successive occasions). Baseline mean percentages and overall treatment mean percentages were compared. Baseline and treatment mean percentages represented the total number of baseline and treatment sessions, for Student A, Student B, Student C, and Student D, divided by the averaged baseline and treatment session score.

Baseline data for, Student A, showed no variability ($M = 0$; range, 0). A visual inspection of baseline data, for Student B, showed a stable trend ($M = 20$; range, 0 – 40). The visual inspection, of baseline data for Student C, showed much variability with a stable accelerating trend during the last three probes ($M = 29$; 0 – 60). A visual

inspection of baseline data, for Student D, showed more variability in trend (M = 45; range, 20 – 60). See Table 6 for students' baseline mean and range percentages.

Table 6

Baseline Mean and Range Percentages

Student	Mean	Range
Student A	0%	0%
Student B	20%	0-40%
Student C	29%	0-60%
Student D	45%	20-60%

Student A's treatment data showed a gradual progression of accelerating trend (M = 43.6; range, 0 – 100). Student B's treatment data, showed a gradual progression of accelerating trend (M = 65.7; range, 40 – 100). Student C's treatment data, did not show immediate changes with the introduction of instruction, however, showed variability. Continued visual inspection of data revealed a steep change in slope between sessions three and four (M = 63.3; range, 40 – 80). Student D's treatment data, showed immediate changes with the introduction of problem-solving instruction, thereby preventing a visual inspection of trend (M = 100; range, 100). See Table 7 for students' treatment mean and range percentages.

Table 7

Treatment Mean and Range Percentages

Students	Mean	Range
Student A	43.6%	0-100%
Student B	65.7%	40-100%
Student C	63.3%	40-80%
Student D	100%	100%

The number of problem-solving treatment sessions required for each student to reach criterion differed (i.e., three days at 80% criterion). The numbers of sessions were: (a) Student A, 11; (b) Student B, 7; (c) C, 6; and (d) Student D, 3. Pre- and post-treatment data suggested the effectiveness of the problem-solving instruction to increase students' skill performances of problem solving. Data suggested that participants identified problems and possible solutions as a result of the systematic problem-solving instruction. See Table 8 for baseline and treatment mean percentages.

Table 8

Baseline and Treatment Mean Percentages

Student	Baseline	Treatment
Student A	0%	43.6%
Student B	20%	65.7%
Student C	29%	63.3%
Student D	45%	100%

Generalization Summary

Generalization and treatment (i.e., overall) mean percentages were compared to assess mastery and generalization of skill performances of problem solving. All students maintained and demonstrated skill performances of problem solving at the mastery level during the generalization phase (i.e., Student A, $M = 80$; range, 80; Student B, $M = 93$; range, 80-100; Student C, $M = 93$; range, 80-100; Student D, $M = 93$; range, 80-100). See Table 9 for generalization mean and range percentages.

Table 9

Generalization Mean and Range Percentages

Student	Mean	Range
Student A	80%	80%
Student B	93%	80-100%
Student C	93%	80-100%
Student D	93%	80-100%

Generalization Measure data suggested that students with intellectual disabilities applied skill performances of problem solving to classroom problem situations. Student A, Student B, Student C, and Student D utilized their problem-solving skills during role-play of classroom problem situations. The results suggested that the problem-solving instruction assisted students in identifying problems, possible solutions, and evaluating the effectiveness of their choices. See Table 10 for treatment and generalization mean percentages.

Table 10

Treatment and Generalization Mean Percentages

Student	Treatment	Generalization
Student A	43.6%	80%
Student B	65.7%	93%
Student C	63.3%	93%
Student D	100%	93%

Problem Situation Maintenance and Problem Situation Retention Summary

A *Problem Situation Maintenance Measure* and a *Problem Situation Retention Measure* was administered seven and nine weeks post-treatment to assess students' maintenance and retention of problem-solving skills. Due to the teacher's absence (i.e., surgery) and the winter school break, both the *Problem Situation Maintenance Measure* and *Problem Situation Retention Measure* were administered during the same week to Student A and Student B. Student A, did not reach criterion level on the *Problem Situation Maintenance Measure*, however, did reach criterion level on the *Problem Situation Retention Measure* (i.e., 40%; 100%). Student B maintained criterion level on both the *Problem Situation Maintenance Measure* and the *Problem Situation Retention Measure* (i.e., 80%; 100%). Student C maintained criterion level on the *Problem Situation Maintenance Measure*, however, did not reach criterion level on the *Problem Situation Retention Measure* (i.e., 80%; 60%). Student D maintained criterion level on

both the *Problem Situation Maintenance Measure* and the *Problem Situation Retention Measure* (i.e., 100%; 100%). See Table 11 for treatment, generalization, maintenance, and retention mean percentages.

Table 11

Treatment, Generalization, Maintenance, and Retention Mean Percentages

Student	Treatment	Generalization	Maintenance	Retention
Student A	43.6%	80%	40%	100%
Student B	65.7%	93%	80%	100%
Student C	63.3%	93%	80%	60%
Student D	100%	93%	100%	100%

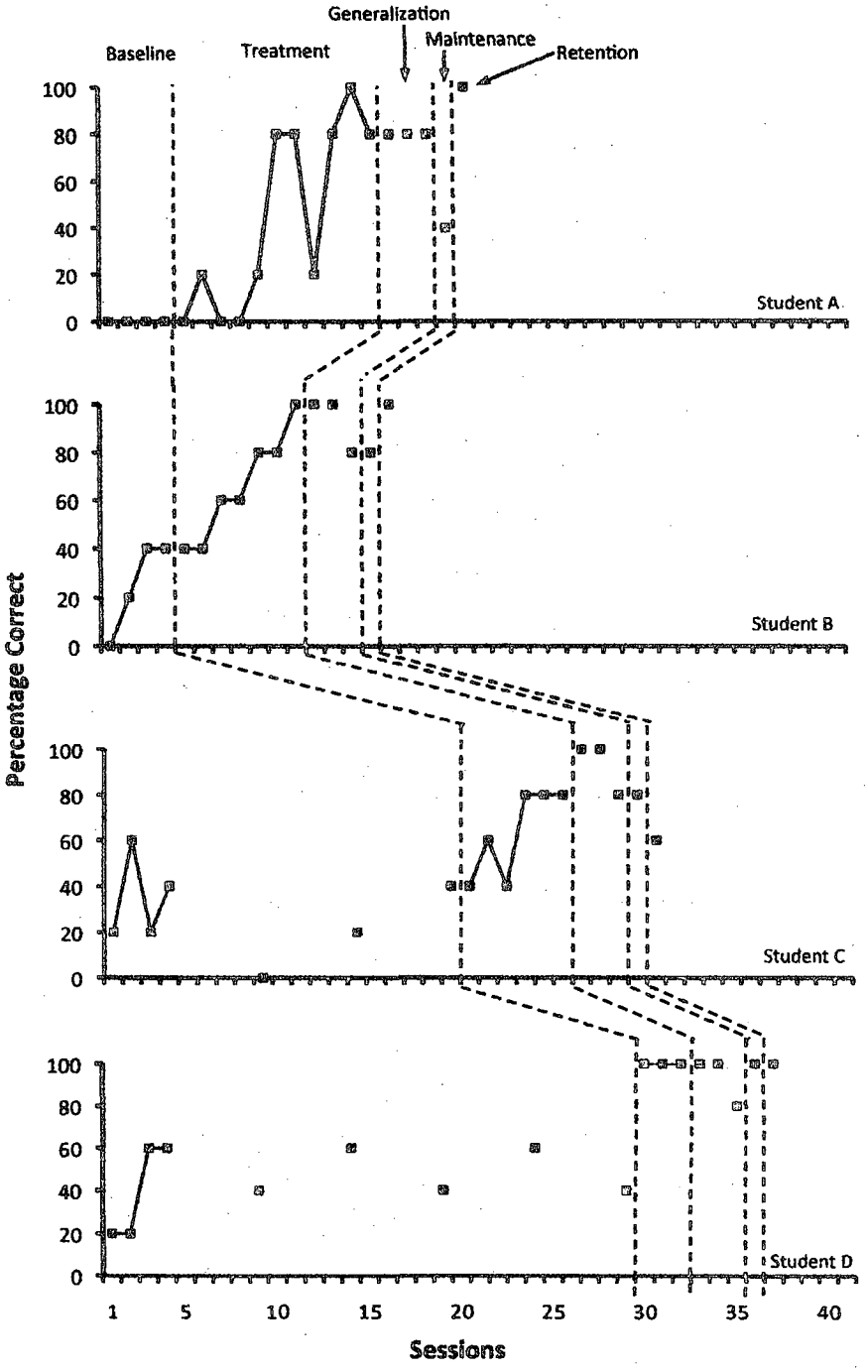
Summary

Baseline, treatment, generalization, maintenance, and retention mean percentages were analyzed to suggest the efficacy of the problem-solving intervention. Data suggested that Student A, Student B, Student C, and Student D, increased in skill performances of problem solving as a result of the problem-solving instruction. Student A, Student B, Student C, and Student D met criterion during the last three days of treatment (i.e., 80% on three successive occasions).

Generalization data points indicated that students applied their problem-solving skills to problem situations during role-play (i.e., Student A, 80%; Student B, 93%; Student C,

treatment, 93%; Student D, generalization 93%). However, the data did not suggest that students were equal in their maintenance and retention of problem-solving skills. Maintenance and retention data points suggested that Student B and Student D maintained and retained their skill performances of problem solving (i.e., Student B, treatment, 65.7%, maintenance, 80%, retention, 100%; Student D, treatment, 100%, maintenance, 100%, retention, 100%). Student A, did not evidence maintenance of problem-solving skills, at the criterion level, on the first measure, but, did evidence maintenance at the criterion level on the second measure (i.e., treatment 43.6%, maintenance, 40%, retention, 100%). Student C, did evidence maintenance of problem-solving skills at the criterion level, on the first measure, but did not evidence maintenance of problem-solving skills at the criterion level on the second measure (i.e., treatment 63.3%, maintenance, 80%, retention, 60%). Although Student A and Student C did not maintain mastery level on both measures (i.e., maintenance, retention), neither Student A nor Student C, returned to their baseline mean percentages (i.e., Student A, baseline, 0%, maintenance, 40%, retention, 100%; Student C, baseline, 29%, maintenance, 80%, retention, 60%). See Figure 1 for a visual of baseline, treatment, generalization, maintenance, and retention problem-solving data.

Figure 1. Student Accuracy Using the Problem-Solving Strategy



CHAPTER 5

DISCUSSION

Students with intellectual disabilities lack needed problem-solving competencies that often result in their dependence on others and increased inabilities to solve everyday problems (Kolb & Stuart, 2005; Wehmeyer, Hughes, Agran, Garner, & Yeager, 2003). There is an even greater need for students with intellectual disabilities to possess the problem-solving skills that prepare them for life outside the school environment and prepare them for inclusive communities (Agran & Alper, 2000; Edeh & Hickson, 2002). The development of problem-solving competency requires implementing systematic problem-solving instruction to increase problem-solving skills in students with intellectual disabilities (Agran, Cavin, Wehmeyer, & Palmer, 2006).

The existing research suggests that students with intellectual disabilities benefit from problem-solving instruction that is systematic and from instruction that provides sufficient support (i.e., review, role-play) as students learn, generalize, and maintain their problem-solving skills (Agran, Blanchard, Wehmeyer, & Hughes, 2001; Agran, et al., 2002; Palmer et al., 2004). Students with intellectual disabilities, however, are underexposed to problem-solving instruction, as indicated by special education teachers (Agran & Alper, 2000). Students who are left without sufficient opportunities to practice problem solving are often limited in other behaviors (i.e., goal setting, decision making)

that contribute to increased self-determination for individuals with intellectual disabilities.

The purpose of this study was to develop a systematic problem-solving intervention designed to teach middle school age students with intellectual disabilities, to identify problems and possible solutions, identify best solutions, and self-evaluate. It was hypothesized that students would increase in their skill performances of problem solving as a result of the problem-solving intervention. Additionally, it was hypothesized that students would generalize their skill performances of problem solving and maintain/retain the newly learned skills. Lastly, it was hypothesized that this study would add to the field of special education by providing a systematic method of teaching a skill component of self-determination, problem solving.

The study included four middle school age students with intellectual disabilities, from one self-contained special education classroom, who attended a public professional development school. All students qualified for special education services under the primary eligibility label of mental retardation under Nevada Administrative Code (2007). Diversity was evident in student ethnicities (e.g., Asian, Hispanic, African American, Caucasian).

The problem-solving study was conducted for 16 weeks. The study included pre-study, training, generalization, and maintenance/retention phases. The study incorporated a multiple-probe design. All students were given at least four baseline measures. Two students were included in the first level of the design. During daily treatment, students received problem-solving instruction. The *Daily Script for Problem-Solving Instruction* guided teacher instruction. Following Student A and Student B reaching criterion,

treatment was introduced to the next student in the level of the design (i.e., Student C Level Two, Student D Level Three). Three weeks post-treatment, students were given three generalization measures over a two-week period that required students to apply their problem-solving skills during role-play problem situations.

The study's methodology partially replicated research conducted by Glago (2005). Glago's study incorporated the teaching of problem-solving skills to students with learning and emotional disabilities, whereas, this study incorporated the teaching of problem-solving skills to students with intellectual disabilities. Additionally, the study added to the existing problem-solving research by incorporating a longer generalization and maintenance phase (Agran, et al., 2000; Agran et al., 2001; Glago, 2005; Liu, 2004).

As a result of the teacher's absence (i.e., surgery) and the winter school break, maintenance and retention measures were given during the same week to Student A, a student with moderate intellectual disabilities. Student A, did not evidence maintenance of skill performances of problem solving at the criterion level, nevertheless, evidenced retention of skill performances of problem solving at the criterion level. When the teacher presented the maintenance measure (see Appendix J), the student focused on the word *backpack* (e.g., incorporated the word *backpack* in all responses). Consequently, the student was unable to identify a second solution, best solution, or to express why the solution would work. Nonetheless, Student A met and exceeded criterion on the retention measure. Whereas Student A failed to meet criterion level on the maintenance, it is plausible that the *Problem Situation Maintenance Measure* was not an appropriate appraisal of the student's problem-solving skills.

Maintenance and retention measures were administered to Student B, during the same week, due to the teacher's absence and winter break. Student B, a student with mild intellectual disabilities, evidenced maintenance and retention of skill performances of problem solving at the criterion level. Additionally, Student B exceeded criterion level on the retention measure. It is of interest to note that the length of time between treatment and maintenance did not negatively impact Student B's maintenance or retention of skill performances of problem solving.

Student C, a student with moderate intellectual disabilities, evidenced maintenance of skill performances of problem solving at the criterion level, but did not evidence retention of skill performances of problem solving at the criterion level. When presented with the *Problem Situation Retention Measure*, Student C did not identify a second solution and did not convey why a best solution would work. It is likely that the length of time between the treatment condition and the administration of the retention measure affected the student's ability to reach the established criterion. While the data results, on the retention measure, were not at the established criterion level, the student never returned to her baseline mean.

Student D, a student with mild intellectual disabilities, evidenced both maintenance and retention of skill performances of problem solving, exceeding the set criterion level. One could believe that Student D benefited from the problem-solving instruction thereby increasing her self-determination.

Students

Question one addressed the effects of problem-solving instruction on the skill performances of problem solving in students with intellectual disabilities. It was hypothesized that students would increase in their skill performances of problem solving as a result of the intervention. The data suggested that all students learned to identify problems and possible solutions using the *Problem Situation Measure*. Further, they learned to identify best possible solutions and to self-evaluate.

Question addressed the degree to which students were able to identify the steps of problem solving. It was hypothesized that students would identify the three steps utilized in the problem-solving instruction: (a) "What's the problem?"; (b) "How can you fix it?"; and (c) "Why would it work?" Pre-treatment, all students were unable to identify any of the problem-solving steps.

Data indicated that three students (i.e., Student B, Student C, Student D) were able to identify the first two problem-solving steps, however, they were unable to recall the final step. Student A was unable to identify any of the problem-solving steps. This could be due in part to the time period between treatment and the administration of the Problem-Solving Step Measure (i.e., nine weeks post-treatment). Perhaps, Student A, Student B, Student C, and Student D may have recalled the problem-solving steps if the measures were administered shortly after treatment (i.e., two weeks), as indicated in Glago's research (2005).

Question three addressed the degree to which students with intellectual disabilities generalized their skill performances of problem solving. Data results suggested that

students generalized their problem-solving skills, and that they applied problem-solving skills during role-play sessions. It is likely, that these problem-solving skills can support students across settings (e.g., home, community), when novel problem situations arise.

The ability to generalize problem-solving skills provides a tool in which students with intellectual disabilities can meet the needs of the classroom and school environment. The generalization of problem-solving skills helps students reduce their dependence upon teacher and staff, thereby increasing levels of self-determination (Palmer & Wehmeyer, 2003).

Question four addressed the degree to which students with intellectual disabilities maintained and retained their skill performances of problem solving. An analysis of the data suggested that three students' maintained their skill performances of problem solving (i.e., Student B, Student C, Student D), and three students retained their skill performances of problem solving (i.e., Student A, Student B, Student D) using the *Problem Situation Maintenance Measure* and *Problem Situation Retention Measure*.

Question five addressed students' with intellectual disabilities perceptions of their skill performances of problem solving. An analysis of student responses suggested that students were more assured of their abilities to: (a) identify problems and possible solutions, (b) fix problems, and (c) seek needed help.

Teacher

Question six addressed the teacher's perceptions about implementing the problem-solving strategy to increase skill performances of problem solving in students with intellectual disabilities. These questions were measured post-treatment, using the *Social Validity Measure*. It was hypothesized that the teacher would find the problem-solving

intervention: (a) easy to implement, (b) helpful for students seeking assistance, (c) effective, (d) feasible for the amount of time required to teach it, (e) appropriate for students' ability levels, (f) helpful for solution identification, (g) useful in teaching self-determination, and (h) would be continued post-study.

Teacher responses indicated the problem-solving intervention was easy, effective, feasible, useful, and would be implemented post-study. When asked if the problem-solving intervention was appropriate for students' ability levels, the teacher indicated agreement. During casual conversations, the teacher indicated that she was surprised that students were able to identify problems, possible solutions, best possible solutions, and self-evaluate.

General Conclusions

The following conclusions were developed from an analysis of the data collected during the problem-solving instruction.

1. The problem-solving instruction was effective in increasing skill performances of problem solving as suggested by the *Problem Situation Baseline Measures* and the *Problem Situation Measure* data.
2. Students were able to identify the three steps of problem solving with limited success as measured by the *Problem-Solving Step Measure*.
3. Students were able to generalize their skill performances of problem solving during role-play problem situations three weeks post-treatment as suggested by data gathered using the *Generalization Measure*.

4. Students' data suggested they maintained/retained skill performances of problem solving over time as measured by the *Problem Situation Maintenance Measure* and the *Problem Situation Retention Measure*.
5. Student perceptions suggested they could identify problems post-treatment as measured by the *Problem-Solving Questionnaire*.
6. Teacher perceptions suggested students increased in skill performances of problem solving as measured by the *Social Validity Questionnaire*.

Summary

Researchers acknowledge the significance of problem-solving instruction for students with intellectual disabilities (Agran et al., 2001; Agran et al., 2006; Cole & Barrett, 1997; Grote, 2003; McGlashing-Johnson et al., 2003). Students with intellectual disabilities have increased their appropriate behaviors as a result of problem-solving instruction designed to facilitate them in setting and meeting goals (Agran et al., 2002). Yet, limited explicit problem-solving research has been conducted with students with mild and moderate intellectual disabilities.

A systematic problem-solving intervention was conducted with students with learning disabilities and students with emotional disabilities (Glago, 2005). Using a modification of Glago's methodology, this study extended the problem-solving research to include students with intellectual disabilities. This study was conducted to examine the efficacy of teaching a systematic problem-solving strategy to students with intellectual disabilities. Specifically, the study was designed to investigate whether students increased in their skill performances of problem solving as a result of instruction. Additionally, the

researcher assessed students' generalization, maintenance, and retention of skill performances post-treatment.

The data suggested that Student A, Student B, Student C, and Student D benefited from the problem-solving intervention, and that they generalized skill performances of problem solving. Additionally, Student B and Student D, students with mild intellectual disabilities, evidenced maintenance and retention of skill performances of problem solving at the criterion level seven and nine week post-treatment. It was not highly plausible that ethnicity affected students' abilities to maintain or retain skill performances of problem solving, since all students were fluent in English. On the other hand, it was conceivable that students with more moderate intellectual disabilities (i.e., Student A and Student C) needed increased opportunities to practice problem-solving skills (i.e., longer session) for maintenance.

Students with intellectual disabilities, who are exposed to a systematic problem-solving instruction, can learn to identify problems and possible solutions, generalize, and maintain problem-solving skills. These skills need to be taught early on, as educators prepare students with intellectual disabilities for post-school life. Problem-solving instruction can facilitate students with intellectual disabilities in meeting the demands of inclusive environments (e.g., inclusive classrooms, community).

The data suggested that students with intellectual disabilities have not been exposed to problem-solving instruction, however, as a result of this study students learned the skills of problem solving. While the students were in a self-contained classroom, more study into the long-range effects (i.e., outcomes) of the problem-solving instruction needs to be researched. Potential outcomes were that these students benefited from a systematic

problem-solving instruction, and that students were better prepared for inclusion in less restrictive environments (e.g., resource room, general education classroom). It is suggested that students generalized those skills, and those skills facilitated their inclusion. It is vital that teachers of students with intellectual disabilities incorporate systematic problem-solving instruction into the curriculum and provide students with opportunities to practice, generalize, and maintain problem-solving skills. Then again, all students (i.e., nondisabled, students with disabilities) need be given opportunities to learn and practice problem solving in a variety of settings (e.g., school, home) in order to meet the demands of adulthood.

Suggestions for Future Directions

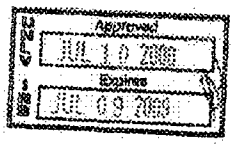
Researchers found that educators noted the importance of teaching problem solving to students with intellectual disabilities (Cole & Barrett, 1997; McGlashing-Johnson et al., 2003). This study suggests that teachers of students with intellectual disabilities will find that students increase in skill performances of problem solving as a result of a systematic problem-solving intervention. It is vital to note that the veteran teacher (i.e., 23 years) indicated that the intervention was easy to implement with students with intellectual disabilities, and that she would continue with the problem-solving instruction. Due to the importance of teaching problem-solving skills to students with both mild and moderate intellectual disabilities future research is warranted to expand upon the limited research for this population of students. Future research is needed to:

1. Investigate both an experimental and control group to determine treatment effects across groups.

2. Investigate problem-solving instruction with students with intellectual disabilities in inclusive settings.
3. Assess the generalization of students' problem-solving instruction with general education teachers.
4. Include problem-solving instruction with elementary-age students with intellectual disabilities.
5. Include two or more public school settings to demonstrate generality of results.
6. Include parent perceptions to determine treatment effects across settings.

APPENDIX A

PARENT CONSENT FOR CHILD FORM



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INFORMED CONSENT

Parent Permission Form

Department of Special Education

TITLE OF STUDY: Increasing Skill Performances of Problem Solving in Students with Intellectual Disabilities

INVESTIGATOR(S): Dr. Tom Pierce and Debra Cote

CONTACT PHONE NUMBER: 895-3205

Purpose of the Study

Your child is invited to participate in a research study. The purpose of this study is to investigate the benefits of teaching problem-solving skills to students with intellectual disabilities, using a modification of A Parent's Guide to the Self-Determined Learning Model for Early Elementary Students (Palmer & Wehmeyer, 2002). It is hoped that as a result of participation and instruction, your child will increase in problem solving and self-determination, skills that lead to an increased quality of life. Additionally, your child may find the problem-solving instruction useful in reaching his or her goals.

Participants

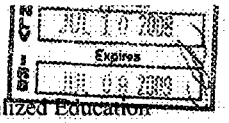
Your child is being asked to participate in the study because he or she is currently enrolled in a special education classroom for students with intellectual disabilities.

Procedures

If you agree to allow your child to participate in this study, he or she will be asked to do the following: be involved with problem-solving instruction for 12 weeks. Instruction will occur daily for 15 minutes. During instruction, your child will learn three problem solving steps: (a) "What's the problem?"; (b) "How can you fix it?"; and (c) "Why would it work?" Using real-world problems, the teacher will help your child to identify problems, solutions, and best possible solutions. Your child will be given opportunities to learn and practice problem solving. Additionally, your child will complete pre- and post-test measures of his or her problem-solving skills, with the help of the teacher.

Benefits of Participation

There may be direct benefits to your child, such as an improvement in problem-solving skills and self-determination, as a participant in this study. We hope to establish the practice of using A Parent's Guide to the Self-Determined Learning Model for Early Elementary Students (Palmer & Wehmeyer, 2002), to increase students' problem-solving skills. The direct benefits to your child's participation outweigh the small risk to your child. Your child may find the instruction directly benefits him or her in: (a) identifying a problem, (b) identifying a solution, (c)



identifying a best solution, (d) seeking needed help, and (e) reaching Individualized Education Program (IEP) goals.

Risks of Participation
There are risks involved in all research studies. This study may include very small risks. The expected gains by this study far outweigh the small risk of your child losing classroom instruction. This study involves natural observation of your child during problem solving instruction.

Cost /Compensation
There *will not* be financial cost to you or your child to participate in this study. All observations and instruction will take place during your child's normal school day. This study will last 12 weeks. *You will not be compensated for your child's time.*

Contact Information
If you have any questions or concerns about the study, you may contact Dr. Tom Pierce or Debra Cote at **895-3205.** For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted you may contact **the UNLV Office for the Protection of Research Subjects at 702-895-2794.**

Voluntary Participation
The participation of your child in this study is voluntary. You may refuse to allow your child to participate in this study or in any part of this study. You may withdraw your child at any time without unfairness to his/her relations with the university. You are urged to ask questions about this study at the beginning or any time during the study.

Confidentiality
All information gathered in this study will be kept completely private. No reference will be made in written or oral materials that could link you or your child to this study. All records will be stored in a locked facility at UNLV for at least 3 years after completion of the study. After the storage time the information gathered will be destroyed.

Participant Parental Consent:
I have read the above information and agree to allow my child to participate in this study. I am at least 18 years of age. A copy of this form has been given to me.

_____ _____
Signature of Participant Date

_____
Participant Name (Please Print)

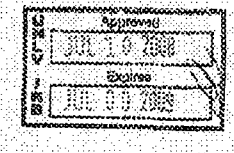
_____
Child's Name (Please Print)

By signing below, I agree to allow my child to be audio taped during the course of this study.

_____

Signature of Participant

Participant Note: Please do not sign this document if the Approval Stamp is missing or is expired.



APPENDIX B

STUDENT ASSENT TO RESEARCH

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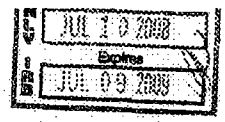


STUDENT ASSENT TO PARTICIPATE IN RESEARCH

Increasing Skill Performances of Problem Solving in Students with Intellectual Disabilities

1. My name is Ms. Cote.

2. We are asking you to take part in a study because I am trying to learn more about teaching students to identify problems and solutions.

3. If you want to be in this study, you will learn three problem-solving steps, from your teacher. You will practice these steps and learn how to solve problems. If you don't know what the word problem means, that's okay. Your teacher will help you.

4. During this study I will watch as your teacher reads stories and asks you questions. Your teacher will write your answers and use a tape recorder to record your answers. There is very little risk to you from being in this study.

5. You may find that you can solve problems on your own and reach your goals after learning the steps your teacher teaches you.

6. Please talk this over with your parents. We will also ask your parents to give their permission for you to take part in this study. But even if your parents say "yes" you can still say "no."

7. If you don't want to be in this study, you don't have to. Remember, being in this study is up to you and no one will be upset if you don't want to be in this study or even if you say "no" later.

8. You can ask any questions that you think of about the study. If you can't think of one now, you can call me at 895-3205, or ask me when I see you.

9. If you sign your name on the line it means you want to be in this study. You and your parents will get a copy after you have signed it.

_____ _____

Print your name Date

_____

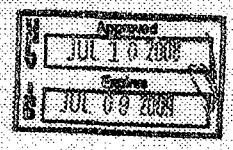
Sign your name

By signing below, I agree to be audio taped during the course of this study.

_____

Signature of Student

Participant Note: Please do not sign this document if the Approval Stamp is missing or is expired.



APPENDIX C

STUDENT DEMOGRAPHICS QUESTIONNAIRE

Dear Teacher,

This student demographics questionnaire is confidential and will be used by the investigator for statistical information only. Participation in this study is entirely voluntary. Please complete the following demographics information for students:

Students' Demographics

Gender:

Male _____

Female _____

Age: _____

Grade: _____

Ethnicity:

European-American	_____	African-American	_____	Asian-American	_____
Hispanic	_____	Native-American	_____	Pacific Islander	_____

Other _____

Grade:

Sixth _____

Seventh _____

IQ:		Language Score:	
55-69	_____	55-69	_____
40-54	_____	40-54	_____

APPENDIX D

PROBLEM-SOLVING PRE-TEST QUESTIONNAIRE

Problem-Solving Questionnaire Pre- _____

Student_____ Date_____

Directions: Please circle the number that indicates how well you (or the student) can answer these questions.

1 (positively not sure), 2 (maybe not sure), 3 (not sure), 4 (maybe), or 5 (very sure)

	Positively not sure	Maybe not sure	Not sure	Maybe	Very sure
(1) What is a problem?	1	2	3	4	5
(2) Can you name a problem you have had?	1	2	3	4	5
(3) How did you fix your problem?	1	2	3	4	5
(4) Did it work?	1	2	3	4	5
(5) When was the last time you had a problem?	1	2	3	4	5
(6) Did you ask for help?	1	2	3	4	5
(7) Who do you go to when you have a problem?	1	2	3	4	5
(8) How can someone help you with your problem?	1	2	3	4	5

APPENDIX E

PROBLEM-SOLVING POST-TEST QUESTIONNAIRE

Problem-Solving Questionnaire Post- _____

Student_____ Date_____

Directions: Please circle the number that indicates how well you (or the student) can answer these questions.

1 (positively not sure), 2 (maybe not sure), 3 (not sure), 4 (maybe), or 5 (very sure)

	Positively not sure	Maybe not sure	Not sure	Maybe	Very sure
(1) What is a problem?	1	2	3	4	5
(2) Can you name a problem you have had?	1	2	3	4	5
(3) How did you fix your problem?	1	2	3	4	5
(4) Did it work?	1	2	3	4	5
(5) When was the last time you had a problem?	1	2	3	4	5
(6) Did you ask for help?	1	2	3	4	5
(7) Who do you go to when you have a problem?	1	2	3	4	5
(8) How can someone help you with your problem?	1	2	3	4	5

APPENDIX F

PROBLEM-SOLVING STEP MEASURE

Problem-Solving Step Measure

Student:_____

Pre-_____ Post- _____

Observer: _____ Date: _____

Name the three steps of problem solving:

1. _____
2. _____
3. _____

APPENDIX G

PROBLEM SITUATION BASELINE MEASURE

Billy puts a magazine in his desk and leaves for lunch. When Billy comes back from lunch, he wants to look at the magazine. He looks in his desk, but he does not find the magazine.

What is the problem? _____

What could you do to fix it? _____

What else could you do to fix it? _____

Which solution would work best? _____

Why would it work? _____

When Brianna gets up from her desk she trips and falls over her untied shoelace. Her friend, Ann, starts laughing. Brianna looks around and sees other children laughing.

What is the problem? _____

What could you do to fix it? _____

What else could you do to fix it? _____

Which solution would work best? _____

Why would it work? _____

Billy has finished his homework and wants to watch a favorite program on TV. His brother wants to watch a different program on TV.

What is the problem? _____

What could you do to fix it? _____

What else could you do to fix it? _____

Which solution would work best? _____

Why would work? _____

Billy's mom wants Billy to finish all homework before riding his bike. Billy has five more sentences to write. Billy wants to ride his bike.

What is the problem? _____

What could you do to fix it? _____

What else could you do to fix it? _____

Which solution would work best? _____

Why would it work? _____

Ann's teacher wants Ann to practice reading sight words everyday. After school, Ann goes to her grandma's house. When Ann's mother picks her up, Ann is too tired to practice, and goes to bed.

What is the problem? _____

What could you do to fix it? _____

What else could you do to fix it? _____

Which solution would work best? _____

Why would it work? _____

Ann knows how to count to 15. Ann's friend, Brianna, can count to 25. Ann wants to count to 25, like her friend, Brianna.

What is the problem? _____

What could you do to fix it? _____

What else could you do to fix it? _____

Which solution would work best? _____

Why would it work? _____

Billy is playing a game on the computer. Billy is winning the game. Ms. Green tells Billy to go back to his desk before the bell rings. Billy wants to finish the game.

What is the problem? _____

What could you do to fix it? _____

What else could you do to fix it? _____

Which solution would work best? _____

Why would it work? _____

Ms. Green asks for volunteers, who have finished their work, to help erase the board. Ms. Green picks Ann and Billy, who have finished their work. Brianna is still working. Brianna likes to erase the board.

What is the problem? _____

What could you do to fix it? _____

What else could you do to fix it? _____

Which solution would work best? _____

Why would it work? _____

Ms. Green instructs the class to stop working and put everything up before the lunch bell rings. Brianna and Ann keep working. The lunch bell rings.

What is the problem? _____

What could you do to fix it? _____

What else could you do to fix it? _____

Which solution would work best? _____

Why would it work? _____

Brianna's teacher tells Brianna to stop talking in class. It is not the first time Brianna's teacher has told Brianna to stop talking. Brianna's teacher gives Brianna an unsatisfactory mark on her paper. Brianna wants a satisfactory mark on her paper.

What is the problem? _____

What could you do to fix it? _____

What else could you do to fix it? _____

Which solution would work best? _____

Why would it work? _____

APPENDIX H

PROBLEM SITUATION MEASURE

When Brianna comes back from specials she cannot find her pencil. She left it on the top of her desk. She looks in her desk and looks on the ground. Brianna sees Ann using a pencil. It looks like her pencil.

What is the problem? _____

What could you do to fix it? _____

What else could you do to fix it? _____

Which solution would work best? _____

Why would it work? _____

Billy likes pizza day at school. He likes to drink chocolate milk with his pizza. When he gets to the end of the lunch line he does not see any in the milk cooler. Billy wants chocolate milk with his pizza.

What is the problem? _____

What could you do to fix it? _____

What else could you do to fix it? _____

Which solution would work best? _____

Why would it work? _____

Ann and Brianna are friends. They sit next to each other in class. Brianna leans over and says something to Ann. The teacher tells Ann to "Keep quiet." Ann was not talking. Brianna laughs.

What is the problem? _____

What could you do to fix it? _____

What else could you do to fix it? _____

Which solution would work best? _____

Why would it work? _____

The teacher asks Ann and Billy to take the lunches to the lunchroom. Ann and Billy walk to the lunchroom. Billy sees Ann take a juice box from Brianna's lunch.

What is the problem? _____

What could you do to fix it? _____

What else could you do to fix it? _____

Which solution would work best? _____

Why would it work? _____

Ann knows how to write her first name. Ann does not know how to write her last name.

Ann wants to write her first and last name. Ann's teacher wants her to practice.

What is the problem? _____

What could you do to fix it? _____

What else could you do to fix it? _____

Which solution would work best? _____

Why would it work? _____

Brianna's teacher gives Brianna a chapter book. Brianna wants to read the book. She does not know the words.

What is the problem? _____

What could you do to fix it? _____

What else could you do to fix it? _____

Which solution would work best? _____

Why would it work? _____

Ms. Todd gave Billy homework to do when he gets home. Billy wants to watch the Power Rangers on TV. Billy's mother wants Billy to do his homework first.

What is the problem? _____

What could you do to fix it? _____

What else could you do to fix it? _____

Which solution would work best? _____

Why would it work? _____

When Ann is at recess Brianna called Ann names. The names make Ann cry. Brianna laughs at Ann and calls her a "Big Baby".

What is the problem? _____

What could you do to fix it? _____

What else could you do to fix it? _____

Which solution would work best? _____

Why would it work? _____

Mrs. Green gave Brianna an envelope to give to her mother. When Brianna gets home she looks in her backpack. The envelope is not in her backpack.

What is the problem? _____

What could you do to fix it? _____

What else could you do to fix it? _____

Which solution would work best? _____

Why would it work? _____

Ann is having trouble remembering her math facts. Ann's teacher is giving a math test on Friday. Ann wants to get an A on the test.

What is the problem? _____

What could you do to fix it? _____

What else could you do to fix it? _____

Which solution would work best? _____

Why would it work? _____

APPENDIX I

GENERALIZATION MEASURE

Your teacher tells you to take out a pencil for the next assignment. You look and cannot find your pencil. You remember leaving a pencil in your desk.

What is the problem? _____

What could you do to fix it? _____

What else could you do to fix it? _____

Which solution would work best? _____

Why would it work? _____

You place a book on your desk and leave. When you come back, the book is not there.

You see your friend reading a book. It looks like your book.

What is the problem? _____

What could you do to fix it? _____

What else could you do to fix it? _____

Which solution would work best? _____

Why would it work? _____

You ask your teacher if you can get on the computer *or* have free time. Your teacher tells you to finish your work. You want to get on the computer *or* have free time.

What is the problem? _____

What could you do to fix it? _____

What else could you do to fix it? _____

Which solution would work best? _____

Why would it work? _____

APPENDIX J

PROBLEM SITUATION MAINTENACE MEASURE

Billy looks for his backpack to go home. Billy checks the wall and the floor of the classroom. He does not find his backpack. Billy's house key is in the backpack.

What is the problem? _____

What could you do to fix it? _____

What else could you do to fix it? _____

Which solution would work best? _____

Why would it work? _____

APPENDIX K

PROBLEM SITUATION RETENTION MEASURE

Billy's teacher tells everyone to put his or her name and the date at the top of the paper. Billy writes his name at the top of the paper. His pencil breaks.

What is the problem? _____

What could you do to fix it? _____

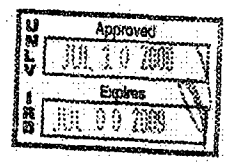
What else could you do to fix it? _____

Which solution would work best? _____

Why would work? _____

APPENDIX L

TEACHER CONSENT FORM



UNLV
UNIVERSITY OF NEVADA LAS VEGAS

INFORMED CONSENT

Department of Special Education

TITLE OF STUDY: Increasing Skill Performances of Problem Solving in Students with Intellectual Disabilities

INVESTIGATOR(S): Dr. Tom Pierce and Debra Cote

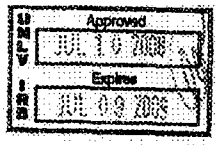
CONTACT PHONE NUMBER: 895-3205

Purpose of the Study
You are invited to participate in an investigation of the efficacy of using a modification of *A Parent's Guide to the Self-Determined Learning Model for Early Elementary Students* (Palmer & Wehmeyer, 2002) to increase skill performances of problem solving in students with intellectual disabilities.

Participants
You are being asked to participate in the study because you are currently teaching students with intellectual disabilities in a special education classroom.

Procedures
If you agree to volunteer to participate in this study, you will be asked to do the following: (a) attend training sessions using a self-determination problem solving strategy, (b) implement problem solving instruction for students with intellectual disabilities, (c) facilitate students in memorizing and verbalizing three sequential problem solving steps, (d) complete pre- and post-intervention assessments, (e) and audio record instruction. You will be asked to use a modification of *A Parent's Guide to the Self-Determined Learning Model for Early Elementary Students* (Palmer & Wehmeyer, 2002). You will teach students three sequential problem solving steps: (a) "What's the problem?"; (b) "How can you fix it?"; and (c) "Why would it work?" The assessments include: (a) problem solving pre- and post-test questionnaires, (b) problem solving step pre- and post-measure, (c) problem situation pre- and post-test measure, (d) generalization measure, and (e) problem situation maintenance measure. This study will be conducted over a 12-week time period.

Benefits of Participation
There *may not* be direct benefits to you as a participant in this study. However, we hope to validate the practice of using a modification of *A Parent's Guide to the Self-Determined Learning Model for Early Elementary Students* (Palmer & Wehmeyer, 2002) to increase skill performances of problem solving in students with intellectual disabilities.



Risks of Participation
There are risks involved in all research studies. This study involves natural observation of you and the students in the classroom setting and questionnaires to track student progress. Because of this, there is minimal risk to you or the students from participation (physical, psychological, social, or legal).

Cost /Compensation
The study will last for 12 weeks. There will not be financial cost to you to participate in this study, because most activities and observations will take place during the normal course of your day in your classroom. It is estimated that the amount of student participation time is 12.5 hours, and it is estimated that the amount of teacher training time is 3 hours. The amount of teacher training time is in addition to regular teaching hours. You will not be compensated for your time.

Contact Information
If you have any questions or concerns about the study, you may contact Dr. Tom Pierce or Debra Cote at 895-3205. For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted you may contact **the UNLV Office for the Protection of Research Subjects at 702-895-2794.**

Voluntary Participation
Your participation in this study is voluntary. You may refuse to participate in this study or in any part of this study. You may withdraw at any time without prejudice to your relations with the university. You are encouraged to ask questions about this study at the beginning or any time during the research study.

Confidentiality
All information gathered in this study will be kept completely confidential. No reference will be made in written or oral materials that could link you to this study. All records will be stored in a locked facility at UNLV for at least 3 years after completion of the study.
After the storage time the information gathered will be destroyed and audio recordings will be destroyed.

_____ _____
Signature of Participant Date

_____
Participant Name (Please Print)

By signing below, I agree to audio record during the course of this study.

_____
Signature of Participant

Participant Note: Please do not sign this document if the Approval Stamp is missing or is expired.

APPENDIX M

TEACHER DEMOGRAPHIC QUESTIONNAIRE

Dear Teacher,

This teacher demographic questionnaire is confidential and will be used by the investigator for statistical information only. Participation in this study is entirely voluntary. Please complete the following demographic information:

Demographic Information for Special Education Teacher

Gender:

Male _____

Female _____

Age: _____

Ethnicity _____

Years Teaching _____

Highest degree earned _____

Current Assignment _____

Areas taught _____

Grade level(s) taught _____

License _____

Endorsements _____

APPENDIX N

PARENT DEMOGRAPHIC QUESTIONNAIRE

Dear Parent,

This parent demographic questionnaire is confidential and will be used by the experimenter for statistical information only. Participation in this study is entirely voluntary. Please complete the following demographic information:

Demographic Information for Parents

Gender:

Male _____

Female _____

Age: _____

Ethnicity:

European-American _____ African-American _____ Asian-American _____

Hispanic _____ Native-American _____ Pacific Islander _____

Other _____

APPENDIX O

PERMISSION LETTER FOR SCHOOL PARTICIPATION

FREMONT

JOHN C. FREMONT MIDDLE SCHOOL

"Unity In Education Builds Strength"

ANTONIO RAEL
Principal
KALANDRA SHEPPARD
Assistant Principal

June 30, 2008

Brenda Durosinmi, MPA, CIP, CIM -Director
Office for the Protection of Research Subjects
University of Nevada Las Vegas
4505 Maryland Parkway Box 451047
Las Vegas, NV 89154-1047

Subject: Letter of Acknowledgement of a Research Project at a CCSD Facility

Dear Ms. Durosinmi:

This letter will acknowledge that I have reviewed a request by Dr. Tom Pierce and Debra Cote to conduct a research project entitled, ***Increasing Problem Solving Skills in Students with Intellectual Disabilities*** at Fremont Professional Development (Middle) School, 1100 E. St. Louis Ave., Las Vegas, NV, 89104.

When the research project has received approval from the UNLV Institutional Review Board and the Department of Research and Accountability of the Clark County School District, and upon presentation of the approval letter to me by the approved researcher, as site administrator for **Fremont Professional Development (Middle) School** I agree to allow access for the approved research project.

If we have any concerns or need additional information, the project researcher will be contacted or we will contact the UNLV Office for the Protection of Research Subjects at 895-2794.

Sincerely,

Authorized Facility Representative Signature — June 30, 2008 (Date)

Antonio Rael, Principal
Print Representative Name and Title

1100 E. St. Louis Ave – Las Vegas, Nevada 89104
Phone 799-5558 ~ FAX 799-5566

APPENDIX P

PROBLEM-SOLVING STEP MEASURE SCORING RUBRIC

Problem-Solving Step Measure Scoring Rubric

Student_____ Date_____

Pre-test _____ Post-test _____

	Correct response 1 point +	Incorrect response 0 points -	Correct order 1 point +	Incorrect order 0 points -
(1) What's the problem?				
(2) How can you fix it?				
(3) Why would it work?				

APPENDIX Q

PROBLEM SITUATION MEASURE SCORING RUBRIC

Problem Situation Measure Scoring Rubric

Student_____ Date_____

Baseline_____Treatment _____ Maintenance _____Retention_____

	1 point +	0 points -
(1) Student states the problem.		
(2) Student identifies a solution.		
(3) Student identifies a second solution.		
(4) Student identifies the best solution.		
(5) Student identifies why it would work.		

APPENDIX R

GENERALIZATION MEASURE SCORING RUBRIC

Generalization Measure Scoring Rubric

Student _____ Date_____

During Role-play:	1 point +	0 points -
(1) Student states the problem.		
(2) Student identifies a solution.		
(3) Student identifies a second solution.		
(4) Student identifies the best solution.		
(5) Student identifies why it would work.		

APPENDIX S

PERMISSION TO USE COPYRIGHTED MATERIAL

UNLV
CELEBRATING FIFTY YEARS

Permission to Use Copyrighted Material

University of Nevada Las Vegas

I, Susan B. Palmer

holder of copyrighted material by The Beach Center on Disability entitled A Parent's Guide to the Self-Determined Learning Model for Early Elementary Students, 2002, authored by Susan B. Palmer, Ph.D. and Michael L. Wehmeyer, Ph.D. hereby give permission for Debra L. Cote to use the above described material in total or in part for inclusion in a doctoral dissertation at the University of Nevada Las Vegas. I also agree that Debra L. Cote may execute the standard contract with University Microfilms, Inc. for microfilm reproduction of the completed dissertation including the materials to which I hold copyright.

Susan B. Palmer, Ph.D. July 22, 2008

Signature Date

Susan B. Palmer Research Associate Professor

Name (typed) Title

Michael Wehmeyer and the Beach Center, University of Kansas, Lawrence Kansas

Representing

College of Education
Department of Special Education
Box 453014 • 4505 S. Maryland Parkway
Las Vegas, NV 89154-3014
(702) 895-3205 • Fax (702) 895-0984

APPENDIX T

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Permission to Use Copyrighted Material

University of Nevada Las Vegas

I, Karen D. Glago

holder of copyrighted material The Effect of Problem Solving Self-Determination Instruction on Elementary Students with Learning Disabilities and Emotional Disabilities, 2005, authored by Karen D. Glago, Ph.D. hereby give permission for Debra L. Cote to use the above described material in total or in part for inclusion in a doctoral dissertation at the University of Nevada Las Vegas. I also agree that Debra L. Cote may execute the standard contract with University Microfilms, Inc. for microfilm reproduction of the completed dissertation including the materials to which I hold copyright.

Karen D. Glago 8/24/08

Signature Date

Karen D. Glago

Name (typed) Title

Fairfax County Public Schools

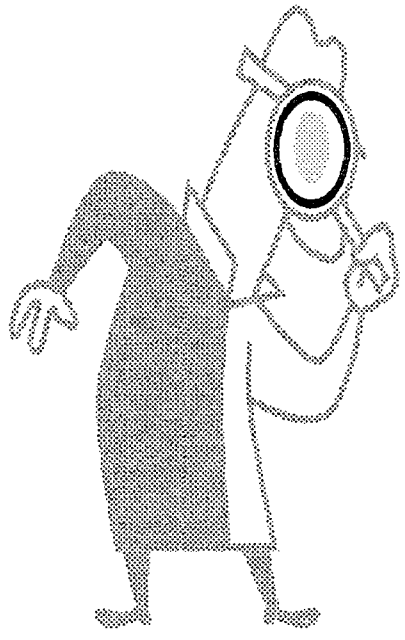
Representing

College of Education
Department of Special Education
4505 Maryland Parkway • Box 453014 • Las Vegas, Nevada 89154-3014
(702) 895-3205 • FAX (702) 895-0984

APPENDIX U

PROBLEM-SOLVING STEP WORKSHEET

Step 1

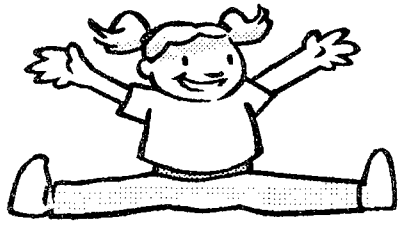


What's the Problem?

Step 2

How can you fix it?

Step 3



Why would it work?

APPENDIX V

DAILY SCRIPT FOR PROBLEM-SOLVING INSTRUCTION

Daily Script for Problem-Solving Instruction

GOALS

1. To increase skill performances of problem solving in students with intellectual disabilities.
2. To introduce students to the concept of problem solving using three problem-solving steps.
3. To promote students' abilities to solve problems using three problem-solving steps: (a) What's the problem, (b) How can you fix it, and (c) Why would it work.

MATERIALS

1. *Problem-Solving Step Worksheet* (see Appendix U)
2. Flash cards (created using the *Problem-Solving Step Worksheet*)
3. *Problem Situation Measure* (see Appendix H)
4. Problem-solving books (e.g., *An Evening At Alfie's* (Hughes, 1984), *Princess Smartypants* (Cole, 1986), *Sweet Clara And The Freedom Quilt* (Keats, 1993)
5. Olympus Digital Voice Recorder

GIVE AN ADVANCE ORGANIZER

1. Tell the student what he or she will be doing and why. Be sure to push record button on Digital Voice Recorder.

   Sample dialogue:

   Today you are going to learn how to name a *problem* and find a *solution* (Write these words on the board as you say them). You will learn three problem-solving steps: (a) "What's the problem?"; (b) "How can you fix it?"; and (c) "Why would it work?"

DESCRIBE AND MODEL

1. Give one blank copy of the *Problem-Solving Step* Worksheet to the student.
2. Demonstrate how to use the worksheet in developing 3 x 5 flash cards.

   Sample dialogue:

   The worksheet has pictures to help you remember three questions. A detective, holding up a magnifying glass, symbolizes "*What's the problem*?" A nurse, holding a medical chart, symbolizes "*How can you fix it*?" A cheerful girl symbolizes, "*Why would it work*?" The flash cards will help you remember the problem-solving questions. The flash cards will have a picture on one side and a question on the opposite side.
3. Review the three problem-solving steps with the student. Be sure to show the pictures attached to the flash cards. Encourage the student to access the printed prompt and visual representation prompt.

   Sample dialogue:

   The flash cards help you remember the problem solving steps. Look at the cards and ask: (a) *The detective's picture reminds you of what problem-solving step*?; (b) *The nurse's picture reminds you of what problem-solving step*?; and (c) *The cheerful girl reminds you of what problem-solving step*?
4. Utilize problem-solving storybooks. Make use of the problem-solving storybooks titled: (a) *An Evening at Alfie's* (Hughes, 1984), (b) *Princess Smartypants* (Cole, 1986), (c) *No Peas for Nellie* (Demarest, 1991) and (d) *Sweet Clara and the Freedom Quilt* (Hopkinson, 1993), to facilitate the student's grasp of what a *problem* or *solution* is.

5. For example, after reading the storybook *An Evening At Alfie's* (Hughes, 1984), a discussion could be started.

   Sample dialogue:

   You just listened as I read the story. I would like you to tell me: (a) "What problem did Maureen have?"; (b) "How could Maureen fix it?"; (c) "What else could Maureen do?"; and (d) "Was Maureen able to fix the problem?"

CONDUCT GUIDED PRACTICE AND PROVIDE FEEDBACK

1. Instruct the student to solve a *Problem Situation Measure* with you. Facilitate the student in defining the *problem* and generating possible *solutions* (e.g., "What does Ann have trouble remembering?" or "What will happen Friday?").

   1. Give instructions for the *Problem Situation.*

   Sample dialogue:

   Listen as I read you a problem. For example, "Ann is having trouble remembering her math facts. Ann's teacher is giving a math test on Friday. Ann wants to get an A on the test."

   2. Provide the student with feedback on his or her responses (e.g., high fives, smiles). Be sure not to tell the student the answer.

   3. Next, discuss two possible solutions to the problem situation. Cue the student using questions such as: (a) "What could you do?"; (b) "How could you fix it?"; and (c) "Can you think of another thing you could do?" Be sure to write student responses using the *Problem Situation Measure* (see Appendix H).

2. Utilize role-play during problem-solving instruction. Role-play how to approach a teacher or an adult when presented with a problem. Describe and model how to

ask a question (e.g., "I do not know what to do, can you help me? What do I do now?"). Be sure to allow the student sufficient time to practice asking for assistance during the problem situation sessions.

APPENDIX W

PROCEDURAL FIDELITY CHECKLIST FORM

Procedural Fidelity Checklist

Teacher:_____ Session #_____

Observer: _____ Date: _____

Condition: Treatment

Observer signature: _____

	+	-
Pushes record button on Digital Voice Recorder		
Tells the student what he or she will be doing and why		
Teaches or reviews three problem-solving steps		
Utilizes cues (e.g., 3 x 5 cards, worksheet)		
Utilizes problem-solving books when appropriate		
Introduces problem situations		
Facilitates student in defining the problem		
Facilitates student in identifying possible solution(s)		
Provides feedback (e.g., high fives, smiles)		
Utilizes role-play or discussion during problem-solving instruction		
Models how to ask a question		

APPENDIX X

SOCIAL VALIDITY FORM

Social Validity Questionnaire

Teacher_____ Date_____

Directions: Please circle the number that best completes the following statement.

1 (strongly disagree), 2 (disagree), 3 (undecided), 4 (agree), or 5 (strongly agree)

The Problem-Solving Strategy:

	strongly disagree	disagree	undecided	agree	strongly agree
(1) was fairly easy to implement.	1	2	3	4	5
(2) facilitated students in seeking needed assistance	1	2	3	4	5
(3) was effective in teaching students to problem solve.	1	2	3	4	5
(4) was feasible in the amount of time required to teach it.	1	2	3	4	5
(5) was appropriate for the students' ability levels.	1	2	3	4	5
(6) facilitated students in identifying solutions to problem situations.	1	2	3	4	5
(7) was useful in teaching self-determination.	1	2	3	4	5
(8) would be continued post-study	1	2	3	4	5

REFERENCES

Agran, M., & Alper, S. (2000). Curriculum and instruction in general education: Implications for service delivery and teacher preparation. *The Association for Persons with Severe Handicaps, 25*, 167-174.

Abery, B., & Eggebeen, A. (1992a). *The self-determination skills evaluation scale*. Minneapolis: University of Minnesota, Institute on Community Integration.

Abery, B., & Eggebeen, A. (1992b). *Opportunity and Exercise of Self-Determination Scale*. Minneapolis: University of Minnesota, Institute on Community Integration.

Abery, B., & Rudrud, L. (1995). Evaluating a multicomponent program for enhancing the self-determination of youth with disabilities. *Intervention in School & Clinic, 30*, 170-180.

Agran, M., Blanchard, C., & Wehmeyer, M. L. (2000). Promoting transition goals and self-determination through student self-directed learning: The self-determined learning model of instruction. *Education and Training in Mental Retardation and Developmental Disabilities, 35,* 351-364.

Agran, M., Blanchard, C., Wehmeyer, M. L., & Hughes, C. (2001). Teaching students to self-regulate their behavior: The differential effects of student-vs. teacher-directed reinforcement. *Research in Developmental Disabilities, 22*, 319-332.

Agran, M., Blanchard, C., Wehmeyer, M. L., & Hughes, C. (2002). Increasing the problem-solving skills of students with developmental disabilities participating in general education. *Remedial and Special Education, 23,* 279-285.

Agran, M., Cavin, M., Wehmeyer, M. L., & Palmer, S. (2006). Participation of students with moderate to severe disabilities in the general curriculum: The effects of the self-determined learning model of instruction. *Research & Practice for Persons with Severe Disabilities, 31,* 230-241.

Agran, M. & Hughes, C. (2005). Introduction to special issue: self-determination reexamined are people with severe disabilities any more self-determined? R*esearch & Practice for Persons with Severe Disabilities, 30,* 105-107.

Agran, M., & Wehmeyer, M. (2005). Teaching problem solving to students with mental retardation. In M. L. Wehmeyer & M. Agran (Eds.), *Mental retardation and intellectual disabilities teaching students using innovative and research-based strategies* (pp. 255-271). Upper Saddle River, New Jersey: Pearson Merrill Prentice Hall.

Barlow, D. H., & Hersen, M. (1984). *Single case experimental designs: Strategies for studying behavior change* (2nd ed.). Boston: Allyn and Bacon.

Barrows, H. (2002). Is it truly possible to have such a thing as dPBL? *Distance Education, 23,* 119-122.

Baumeister, A. A. (1967). *Mental retardation appraisal, education, and rehabilitation.* Chicago, Illinois: Aldine Publishing Company.

Beirne-Smith, M., Patton, J. R., & Kim, S. H. (2006). *Mental retardation, an introduction to intellectual disabilities.* Upper Saddle, New Jersey: Pearson Prentice Hall.

Bridges, E. M., & Hallinger, P. (1997). Using problem-based learning to prepare educational leaders. *Peabody Journal of Education, 72*, 131-146.

Charney, D., Reder, L, & Kusbit, G. W. (1990). Goal setting and procedure selection in acquiring computer skills: A comparison of tutorials, problem solving, and learner exploration. *Cognition & Instruction, 7*, 323-343.

Cole, B. (1986). *Princess Smartypants.* New York: G. P. Putnam's Sons.

Cole, P. G., & Barrett, S. (1997). Figural problem-solving processes of children with intellectual disabilities: Interrogative stategies and solution time rates. *Journal of Intellectual & Developmental Disability, 22*(1), 49-61.

Cook, T. D., & Campbell, D. T. (1979). *Quasi-experimentantion: Design and analysis for field settings.* Boston: Houghton Mifflin.

Crites, S. A., & Dunn, C. (2004) Teaching social problem solving to individuals with mental retardation. *Education and Training in Developmental Disabibilities, 39*, 301-309.

Demarest, C. L. (1991). *No Peas for Nellie.* New York: Aladdin Books.

Doll, B., Sands, D., Wehmeyer, M., & Palmer, S. (1996). Promoting the development and acquisition of self-determined behavior. In D. J. Sands & M. L. Wehmeyer (Eds.), *Self-determination across the life span: Independence and choice for people with disabilities* (pp. 65-88). Baltimore: Paul H. Brookes.

Dopp, J., & Block, T. (2004). High school peer mentoring that works! *Teaching Exceptional Children, 37*(1), 56-62.

Drake, D. (1993). Student diversity: Implications for classroom teachers. *The Clearing House, 66*, 264-267.

Edeh, O. M. (2006) Cross-cultural investigation of interest-based training and social interpersonal problem solving in students with mental retardation. *Education and Training in Developmental Disabilities, 41*, 163-176.

Edeh, O. M., & Hickson, L. (2002). Cross-cultural comparison of interpersonal problem solving in students with mental retardation. *American Journal on Mental Retardation, 107*(1), 6-15.

Eisenman, L. T. (2007). Self-determination interventions building a foundation for school completion. *Remedial and Special Education, 28*(1), 2-8.

Eisenman, L. T., & Chamberlin, M. (2001). Implementing self-determination activities. *Remedial and Special Education, 22*, 138-148.

Fiedler, C. R. & Danneker, J. E. (2007). Self-advocacy instruction: Bridging the research-to-practice gap. *Focus on Exceptional Children, 39*(8), 1-20.

Friend, M. (2008). *Special education contemporary perspectives for school professionals* (2nd ed.). Boston: Allyn and Bacon.

Gagne', R. M. (1959). Problem solving and thinking. *Annual Review of Psychology, 10*, 147-172.

Glago, K. D. (2005). The effect of problem solving self-determination instruction on elementary students with learning disabilities and emotional disabilities (Doctoral dissertation, George Mason University, 2005). *Dissertation Abstracts International, 66*(02), 549.

Gresham, F. M., MacMillan, D. L., Beebe-Frankenberger, M. E., & Bocian, K. M. (2000). Treatment integrity in learning disabilities intervention research: Do we really know how treatments are implemented? *Learning Disabilities Research & Practice, 15,* 198-205.

Grigal, M., Neubert, D. A., Moon, M. S., & Graham, S. (2003). Self-determination for students with disabilities: Views of parents and teachers. *Exceptional Children, 70,* 97-112.

Grote, I. (2003). Individualizing self-instruction for adults with developmental disabilities: Intensifying the occurrence produces generalized compliance with SI. *Journal of Developmental and Physical Disabilities, 15,* 281-298.

Hallahan, D. P., Kauffman, J. M., & Pullen, P. C. (2009). *Exceptional learners an introduction to special education.* Boston: Allyn and Bacon.

Hoffman, B., & Ritchie, D. (1997). Using multimedia to overcome the problems with problem based leaning. *Instructional Science, 25,* 97-115.

Hopkinson, D. (1993). *Sweet Clara and the Freedom Quilt.* New York: Alfred A. Knopf.

Horner, R. D., & Baer, D. M. (1978). Multiple-probe technique: A variation of the multiple baseline. *Journal of Applied Behavior Analysis, 11,* 189-196.

Horner, R. H., Carr, E. G., Halle, J., McGee, G., Odom, S., & Wolery, M. (2005). The use of single-subject research to identify evidence-based practice in special education. *Exceptional Children, 71,* 165-179.

Horsburgh, D. (2003). Evaluation of qualitative research. *Journal of Clinical Nursing, 12,* 307-312.

Hughes, C., & Rusch, F. R. (1989). Teaching supported employees with severe mental retardation to solve problems. *Journal of Applied Behavior Analysis, 22,* 365-372.

Hughes, S. (1984). *An Evening at Alfie's.* New York: Random House Children's Books.

Hughes, W., Wood, W. M., Konrad, M., & Test, D. W. (2006). Get a life: Students practice being self-determined. *Teaching Exceptional Children, 38*(5), 57-63.

Kazdin, A. E. (1977). Artifact, bias, and complexity of assessment: The ABCs of reliability. *Journal of Applied Behavior Analysis, 10,* 141-150.

Kazdin, A. E. (1982). *Single-case research designs: Methods for clinical and applied settings.* New York, NY: Oxford University Press.

Kiresuk, T. J., Smith, A., & Cardillo, J. R. (1994). *Goal attainment scaling: Applications, theory, and measurement.* Hillsdale: NJ: Erlbaum.

Kolb, S. M., & Hanley-Maxwell, C. (2003). Critical social skills for adolescents with high incidence disabilities: Parental perspectives. *Exceptional Children, 69,* 163-179.

Kolb, S. M., & Stuart, S. (2005). Active problem solving: A model for empowerment. *Teaching Exceptional Children, 38*(2), 14-20.

Könings, K. D., Wiers, R. W., van de Wiel, M. W. J., & Schmidt, H. G. (2005). Problem-based learning as a valuable educational method for physically disabled teenagers? The discrepancy between theory and practice. *Journal of Developmental and Physical Disabilities, 17,* 107-117.

Konrad, M., Trela, K., & Test, D. W. (2006). Using IEP goals and objectives to teach paragraph writing to high school studnets with physical and cognitive disabilities. *Education and Training in Developmental Disabilities, 41,* 111-124.

Liu, M. (2004) Examining the performance and attitudes of sixth graders during their use of a problem-based hypermedia learning environment. *Computers in Human Behavior, 20*, 357-379.

Luckasson, R. A., Borthwick-Duffy, S., Buntinx, W. H. E., Coulter, D. L., Craig, E. M., & Reeve, A. et al. (2002). *Mental retardation: Definition, classification, and systems of supports* (10th ed.). Washington, DC: American Association on Mental Retardation.

Malpass, L. F. (1967). Programmed instruction for retarded children. In A. A. Baumeister (Ed.). *Mental retardation appriasal, education, rehabilitation* (pp. 212-231). Chicago, Illinois: Aldine Publishing Company.

McCallion, P., & McCarron, M. (2007). Perspectives on quality of life in dementia care. *Intellectual and Developmental Disabilities, 45*(1), 56-59.

McGlashing-Johnson, J., Agran, M., Sitlington, P., Cavin, M. & Wehmeyer, M. L. (2003). Enhancing the job performance of youth with moderate to severe disabilities using the self-determined learning model of instruction. *Research & Practice for Persons with Severe Disabilities, 28*, 194-204.

Nevada Administrative Code. (2008). *Nevada Administrative Code, 388.055 Mental Retardation Defined.*

Nirje, B. (1972). The right to self-determination. In W. Wolfensberger (Ed.), *Normalization: The Principle of Normalization in Human Services*, (pp. 176-200). National Institute on Mental Retardation, Toronto: Canada.

Nowicki, S., & Duke, M. P. (1974). A locus of control scale for non-college as well as college adults. *Journal of Personality Assessments, 38*, 136-137.

O'Reilly, M. F., Lancioni, G. E., Sigafoos, J., Green, V. A., Ma, C., & O'Donoghue, D. (2004). A further comparison of external control and problem-solving interventions to teach social skills to adults with intellectual disabilities. *Behavioral Interventions, 19,* 173-186.

O'Reilly, M. F., Lancioni, G. E., Sigafoos, J., O'Donoghue, D., Lacey, C., & Edrisinha, C. (2004). Teaching social skills to adults with intellectual disabilities: A comparison of external control and problem solving interventions. *Research in Developmental Disabilities, 25,* 399-412.

O'Reilly, M. F., Lancioni, G. E., Tiernan, R., & Lacy, C. (2002). Using a problem-solving approach to teach classroom skills to a student with moderate intellectual disabilities within regular classroom settings. *International Journal of Disability, 49,* 95-104.

Palmer, S. B., & Wehmeyer, M, L. (2002). *A parent's guide to the self-determined learning model for early elementary students.* Lawrence, KS: The Beach Center on Disability.

Palmer, S. B., & Wehmeyer, M, L. (2002). *A teacher's guide to implementing self-determined learning model of instruction early elementary version.* Lawrence, KS: The Beach Center on Disability.

Palmer, S. B., & Wehmeyer, M. L. (2003). Promoting self-determination in early elementary school. *Remedial and Special Education, 24,* 115-126.

Palmer, S. B., & Wehmeyer, M. L., Gipson, K., & Agran, M. (2004). Promoting access to the general curriculum by teaching self-determination skills. *Exceptional Children, 70,* 427-439.

President's Committee on Mental Retardation. (1976). *The century of decision program: Costs and results.* Washington, DC: Author.

Sanders, J. (1997). Cluster evaluation. In E. Chelimsky & W. W. Shadish (Eds.), *Evaluation for the 21st century* (pp. 396-405). Thousand Oaks, CA: Sage. http://crlt.indiana.edu/publications/journals/TR16-01.pdf.

Scattone, D., Tingstrom, D. H., & Wilczynski, S. M. (2006). Increasing appropriate social interactions of children with autism spectrum disorders using social stories. *Focus on Autism and Other Developmental Disabilities, 21,* 223-229.

Schalock, R. L., Luckasson, R. A., Shogren, K. A., Borthwick-Duffy, S., Bradley, V. & Buntinx, W. H. E. et al. (2007). The renaming of mental retardation: Understanding the change to the term intellectual disability. *Intellectual and Developmental Disabilities, 45,* 116-124.

Scruggs, T., & Mastropieri, M. (1997). Can computers teach problem-solving strategies to students with mild mental retardation? *Remedial and Special Education, 18,* 157-166.

Sloan, W., & Stevens, H. A. (1976). The pendulum swings. *A century of concern a history of the American association on mental deficiency 1876-1976* (pp. 91-120). Washington, DC: The American Association on Mental Deficiency, Inc.

Smith, A. (1994). Introduction and overview. In T. J. Kiresuk, A. Smith, & J. E. Cardillo (Eds.), *Goal attainment scaling: Applications, theory and measurement* (pp. 1-14). Hillsdale, NJ: Lawrence Erlbaum Associates.

Smith, A., & Cardillo, J. E. (1994). Perspectives on validity. In T. J. Kiresuk, A. Smith, & J. E. Cardillo (Eds.), *Goal attainment scaling: Applications, theory and measurement* (pp. 243-272). Hillsdale, NJ: Lawrence Erlbaum Associates.

Tawney, J. W., & Gast, D. L. (1984). *Single subject research in special education.* Columbus, Ohio: Charles E. Merrill Publishing Company.

Taylor, A. (2005). What employers look for: The skills debate and the fit with youth perceptions. *Journal of Education and Work, 18,* 201-218.

Taylor, S. J. (2007). Editor's Note. *Intellectual and Developmental Disabilities, 45*(1), ii.

Thoma, C. A., Nathanson, R., Baker, S. R., & Tamura, R. (2002). Self-determination. *Remedial and Special Education, 23,* 242-248.

Thoma, C. A., Rogan, P., & Baker, S. R. (2001). Student involvement in transition planning: Unheard voices. *Education and Training in Mental Retardation and Developmental Disabilities, 36*(1), 16-29.

Tincani, M. (2004). Comparing the picture exchange communication system and sign language training for children with autism. *Focus on Autism and Other Developmental Disabilities, 19,* 162-173.

Ward, M. J. (2005). An historical perspective of self-determination in special education: Acccomplishments and challenges. *Research & Practice for Persons with Severe Disabilities, 30,* 108-112.

Wehman, P. (2006). *Life beyond the classroom.* Baltimore: MD: Paul H. Brookes Publishing Co.

Wehmeyer, M. L. (1995). A career education approach: Self-determination for youth with mild cognitive disabilities. *Intervention in School & Clinic, 30,* 157-164.

Wehmeyer, M. L. (2004). Beyond self-determination: Causal agency theory. *Journal of Developmental and Physical Disabilities, 16,* 337-359.

Wehmeyer, M. L. (2005). Self-determination and individuals with severe disabilities: Re-examining meanings and misinterpretations. *Research and Practice for Persons with Severe Disabilities, 30,* 113-120.

Wehmeyer, M. L., Agran, M., & Hughes, C. (1998). *Teaching self-determination to students with disabilities.* Baltimore: MD: Paul H. Brookes Publishing Co.

Wehmeyer, M. L., Agran, M., & Hughes, C. (2000). A national survey of teachers' promotion of self-determination and student-directed learning. *The Journal of Special Education, 34*(2), 58-69.

Wehmeyer, M. L., Gragoudas, S., & Shogren, K. (2006). Self-determination, student involvement, and leadership development. In P. Wehman, *Life beyond the classroom transition strategies for young people with disabilities* (pp. 41-69). Baltimore, MD: Paul H. Brookes Publishing Co.

Wehmeyer, M. L., Hughes, C., Agran, M., Garner, N., & Yeager, D. (2003). Student-directed learning strategies to promote the progress of students with intellectual disability in inclusive classrooms. *International Journal of Inclusive Education, 7,* 415-428.

Wehmeyer, M. L., & Kelchner, K. (1995). *The Arc's self-determination scale.* Silver Spring, MD: The Arc of the United States.

Wehmeyer, M. L., & Palmer, S. B. (2003). Adult outcomes for students with cognitive disabilities three years after high school: The impact of self-determination. *Education and Training in Developmental Disabilities, 38,* 138-144.

Wehmeyer, M. L., Palmer, S. B., Agran, M., Mithaug, D. E., & Martin, J. E. (2000). Promoting causal agency: The self-determined learning model of instruction. *Exceptional Children, 66,* 439-453.

Wehmeyer, M. L., & Schwartz, M. (1998). The self-determination focus of transition goals for students with mental retardation. *Career Development for Exceptional Individuals, 21,* 75-86.

Westling, D. L., & Fox, L. (2004). *Teaching students with severe disabilities.* Upper Saddle River, New Jersey: Pearson Merrill Prentice Hall.

Witt, J. C., & Martens, B. K. (1983). Assessing the acceptability of behavioral interventions used in classrooms. *Psychology in the Schools, 20,* 510-517.

Wood, W., Karvonen, M., Test, D., Browder, D., & Algozzine, B. (2004). Promoting student self-determination skills in IEP planning. *Teaching Exceptional Children, 36*(3), 8-16.

Zetlin, A. G., & Turner, J. L. (1984). Self-perspectives on being handicapped: Stigma and adjustment. In C. E. Meyers (Ed.). *Lives in process: Mildly retarded adults in a large city* (pp. 93-120). Washington, DC: American Association on Mental Deficiency.

VITA

Graduate College
University of Nevada, Las Vegas

Debra Lynn Cote

Home Address:
6130 West Tropicana Avenue Box 186
Las Vegas, Nevada, 89103

Degrees:
Bachelor of Science, Special Education, 2002
University of Nevada Las Vegas

Master of Education, Special Education, 2003
University of Nevada Las Vegas

Special Honors and Awards:
Council for Exceptional Children (CEC) Division for Research Doctoral Student Scholar, 2008-2009

Doctoral Comprehensive Examination, Certificate of Distinction, 2007

The National Scholars Honor Society

Golden Key International Honor Society

Phi Kappa Phi Honor Society

Deans List, University of Nevada Las Vegas, 2004

Publications:
Cote, D. (2007). Problem-based learning software for students with disabilities. *Intervention in School and Clinic, 43*(1), 29-37.

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Dissertation Examination Committee:
Chairperson, Dr. Thomas Pierce, Ph. D.
Committee Member, Dr. Kyle Higgins, Ph. D.
Committee Member, Dr. Susan Miller, Ph. D.
Graduate Faculty Representative, Dr. Richard Tandy, Ph. D.