This is to certify that the
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A STUDY TO DETRMINE THE INFLUENCE OF TEACHING PROBLEM SOLVING TOOLS TO EDUCATIONALLY AT-RISK HIGH SCHOOL STUDENTS

presented by

JULIE A. MORTON

has been accepted towards fulfillment
of the requirements for the

Doctoral degree in The Department of Communication

Ron Jamborini
Major Professor's Signature

May 28, 2005
Date

A STUDY
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A STUDY TO DETERMINE THE INFLUENCE OF TEACHING PROBLEM SOLVING TOOLS TO EDUCATIONALLY AT-RISK HIGH SCHOOL STUDENTS

By

Julie A. Morton

A Dissertation

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ABSTRACT

A STUDY TO DETERMINE THE INFLUENCE OF TEACHING PROBLEM SOLVING TOOLS TO EDUCATIONALLY AT-RISK HIGH SCHOOL STUDENTS

By

Julie A. Morton

An experiment manipulated problem solving skills training (yes, no) and the educational-risk level of students (at-risk, non-risk) to determine their influence on measures of behavioral-outcome efficacy. Students participated in problem solving classroom training, once a week, for 7 consecutive weeks. Four schools, two at-risk and two non-risk, were used.

A path model was tested based on the belief that both educational-risk level and problem solving skills training would influence behavioral efficacy. This influence was expected to occur directly through their influence on self-efficacy and indirectly through their influence on problem solving cognitive skills and cognitive skill's subsequent influence on locus of control.

Results suggest that problem solving skills training does influence behavioral efficacy. For all students the indirect impact of problem solving skills training on self-efficacy was significant, and the direct impact on problem solving cognitive skills approached significance. Clear inter-group differences are apparent in the variables of locus of control and behavioral outcome efficacy. Specifically, in the at-risk group, the direct impact on locus of control was significant and the indirect influence of behavior outcome efficacy neared significance. The small sample size may explain why the positive path from self-efficacy to behavior outcome efficacy did not reach levels of

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significance. In the non-risk group, no evidence of a positive affect on locus of control was found; nevertheless, the indirect influence of behavior outcome efficacy was significant.

Results indicate that problem solving skills training may reduce some of the risk factors associated with educationally at-risk students. Specifically, increases in locus of control will impact an at-risk student in that s/he will no longer perceive that her/his life is subject to fate, luck or the actions of another individual, but rather that given acts will lead to given outcomes. Increases in self-efficacy will impact an at-risk student in that s/he will now have the perceived ability to carry out the desired act(s). Further, the positive path observed from self-efficacy to behavior outcome efficacy suggests that the at-risk students are more likely to use their problem-solving skills to solve the personnel and/or academic problems that they encounter.

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DEDICATION

In an interview Maria Shriver once said, "You can have everything in life – you just can't have it all at the same time." As a woman who dons the various hats of wife, mother, daughter, friend and professional, I heartily concur with this sentiment. Life is a balancing act, but everything does have its time.

As per the needs dictated by my personal and familial life, this dissertation took much longer to complete than I ever thought it would. Without doubt, my personal life got in the way of my professional one. Yet, when I look at my family, I cannot help but think that I not only made the right decisions for the time, I also made decisions that I would repeat again today.

Jake, Max, Charlie-Bug and Nick – you provide me with an endless source of emotion: awe; joy; love; exasperation; satisfaction; respect; frustration; laughter and fatigue! Interaction with you forces me to grow and stretch in ways I never imagined possible. I dedicate this work to my 4 Boyz. I hope you realize that with tenacity and interest you can make any dream come true.

Ron - you are my partner in every sense of the word. You not only inspire me to be a better person, you still love me as much when I fall short of my goals. I have a better time with you than with anybody else in the world. This is true, even when we are just sitting quietly in the same room doing our own things. I dedicate this work to you for all of your on-going and continual support. Whatever I do – or wherever I go – you are my biggest cheering section. My love truly knows no bounds.

Mommy and Daddy, you always told me to find my dreams and then you helped me to make them come true...Ron...School...Kids...Health...Career. No daughter could

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be luckier...I love you...You're doing the right thing... I'm proud of you too. I dedicate this work to you for teaching me again and again the kind of love which I can only aspire to, both as an individual and, as a parent.

Finally, to those students who are at-risk, I also dedicate this work to you. Maria Shriver is right. You can have everything in life – you just can't have it all at the same time. Everything does have its time. Dreams can, and do, come true.

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- Paul Skalski for his comments on the earlier versions of my paper which were used to improve the clarity and quality of the ideas expressed therein;
- Patrick Ribbons for his on-going help with my computer problems;
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- Belhma Krishna whose wonderful care of both my children and my house let me go to school and/or work with a free mind and a light heart;
- Lauren Backman and Jenn Bullwagner whose involvement with our family delights all of us;
- The extended O'Brien clan for their on-going support and interest;
- Phil Weeks, who has been a real friend both in times of sickness and in health;

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- Elisa and Gil Palter, and Henry and Illana Morton for always being their when I needed them. They not only provided extra hands, meals, and strong shoulders, they also acted as dictionaries, sounding boards, and real friends;
- And last, but certainly not least, Ron Tamborini. Without Ron, I would not have completed the PhD. He let me cry in his office and laugh in his house. The extension of his hand in friendship never lessoned his demands that I think clearer, write cleaner, and broaden my outlook so that I help more than "just one at-risk student." I have tried over the years to tell Ron how appreciative I am of his actions both as a friend and as a professor. He ignored my comments then, as I am sure he will continue to ignore my comments now. However, I want the record to show that he is exceptional both as a teacher and as a man.

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

Figure 1:

Figure 2:

Figure 3:

Figure 4:

Figure 5:

Figure 6:

Figure 7:

Figure 8:

LIST OF FIGURES

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Introduction

Educationally at-risk students are young people who have a statistically high probability of encountering failure, attrition or inadequacies with regard to their formal academic education. They constitute an ever-growing problem in society. There are a variety of economical and sociological phenomena that increase the risk factors associated with educationally at-risk students.

One phenomenon associated with educationally at-risk students is their ability to negotiate conflict and resolve problems. There is reason to believe that at-risk students have less ability than others to solve acute and/or chronic problems in their life. Many educationally at-risk students may not know how to make good decisions. And if they do, they lack the communication skills to effectively discuss their challenges and or implement their solutions. These students have not developed the skills to analyze, nor to solve, problems effectively. Studies demonstrate that their problem solving attempts lack logical development, thoroughness and sufficient effort (Blum & Spangehl, 1982). Further, "their impulsive, unsystematic [problem solving] styles consistently create more problems than they solve" (McCluskey, Place, McCluskey, & Treffinger, 1998, p 3).

A second phenomenon associated with educationally at-risk students is their inability to implement a proposed solution. When compared to national norms, at-risk students have higher levels of communication apprehension, and lower levels of self-perceived communication competence (Chesebro et al., 1992). Communication apprehension is a learned condition that occurs for a variety of reasons. It is associated with shyness and/or fear of speaking publicly to a group of people, or privately to strangers. Communication competence is the capacity to create messages that are

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understood, and that obtain their objective. Numerous at-risk students have limited English proficiency, reside in environments that limit opportunities fostering the growth of oral communication skills, and have experienced prior education failures affecting their willingness and/or readiness to communicate orally (Delpit, 1990; National Center for Education Statistics, 1990B). Both high communication apprehension and low communication confidence make it more challenging for at-risk students to successfully execute their ideas.

A third phenomenon associated with educationally at-risk kids is their belief that external circumstance controls the success in their lives (Blum & Spangehl, 1982). Locus of control refers to the beliefs that we have about our control over life's events. People vary in these beliefs from an external to an internal locus. Maintaining the belief that we are victims of fate, or that attaining desired goals and rewards depends upon luck, circumstance or powerful others rather than our own efforts is characteristic of an external locus of control. This type of belief is associated both with poor problem-solving skills (Houtz, Ringenback & Feldhousen, 1973), and with academic failure (Findley & Cooper, 1983). People with an internal locus of control believe that they control their own destinies and are responsible for what happens to them. They are better problem solvers (Houtz et. al, 1973), better communicators (Daly, Kreiser & Roghaar, 1992), and have greater academic achievement (Findley & Cooper, 1983) and less communication apprehension (McCrosky, Daily & Sorenson, 1976) than those with an external locus.

Although locus of control is thought to be a relatively stable trait, Nowicki and Barnes (1973) demonstrate that through experience, it is possible to transform an orientation from an external to an internal locus of control. When attempting to change a

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student's locus of control, educators must realize that the attributions the student makes about the cause of her/his outcomes will determine the type of belief (internal/external) the student will have about locus of control. To develop a generalized belief that reinforcement is contingent on effort, individuals must perceive their own successes to result from their own actions (Rotter, 1966). Thus, in order to modify a locus of control orientation, educators must endeavor to teach students specific, comprehensible and utilizable skill sets whose objective level of success is clearly reliant upon the individual applying the skills.

In order to make proper communication decisions, certain problem solving skill sets, such as how to identify a problem, how to generate ideas, how to evaluate ideas and, how to plan for action, constitute the type of objectively measurable, specific, comprehensible and utilizable skill sets necessary to change a control orientation. Since the most commonly stated reason for dropping out of school is poor academic performance (Hahn, 1987; Pallas, 1990), problem-solving skills may not only help to change the control orientation, they may also reduce the overall risk factor associated with some at-risk students by increasing their ability to negotiate and resolve some of the problems they are experiencing in their lives.

The present study attempts to investigate essential processes relating problem-solving skills to the performance of at-risk students. The core feature of the model proposed is a simple direct path from problem solving skills training to the acquisition of problem solving cognitive skills to increased behavioral outcome efficacy. Simply put, it is expected that training will provide skills that will effectively change behaviors. In addition to recognizing this straightforward influence process, however, the model goes

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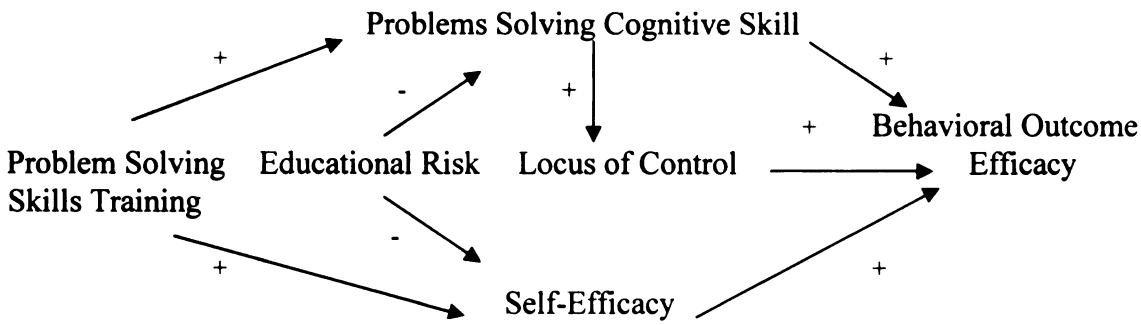
further to explicate the manner in which educational risk, locus of control and self-efficacy also impact behavioral outcome efficacy (See Figure 1).

Figure 1. Path Model of Hypothesized Relationships



The basic model begins with problem-solving skills training. Training is expected to instigate relevant processes through two paths. First, a path from training to self-efficacy shows enhanced self-efficacy necessary to initiate the desired behavioral outcomes. Second, a path from training to problem solving cognitive skills indicates the expected acquisition of the cognitive skills necessary to initiate the desired behavioral outcomes. At the same time, an indirect path from cognitive skills to behavioral outcome efficacy is proposed through locus of control. Separate from its direct path, cognitive skills are expected to cultivate internal locus of control, which then increases behavioral outcome efficacy.

In addition to the influence of problem solving skills training identified in the basic model, the study takes into consideration the level of educational-risk experienced prior to training. The model represents the influence of risk with negative paths from the level of student educational risk to both self-efficacy and problem solving cognitive skills. The two paths suggest that high risk will be associated with diminished levels of self-efficacy and cognitive skills. As such, when level of educational risk is high, the

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potential need and opportunity for skills training to facilitate the acquisition of cognitive skills and self-efficacy is high. In non-risk students, ceiling effects are expected to attenuate the influence of training.

If the proposed model were supported, interventions based on this model would be more affordable and sustainable than those more complex programs that have been used to date. However, decisions for interventions of this nature call for empirical support, and no prior research has tested this model with adolescent at-risk students.

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Chapter 1

Literature Review

The Risk of Educational Failure

'Risk', as defined in Webster's Dictionary, means the possibility of suffering harm or loss (Webster, 1987). When individuals are 'at-risk', they are in a situation that has the possibility of some sort of negative outcome. At-risk individuals have not necessarily experienced that outcome, and are not guaranteed to experience it in the future. Nevertheless, they have a high probability of doing so. For the purpose of this paper, an academic risk definition will be used. Specifically, at-risk students are young people who are thought to be at-risk of educational failure, educational attrition, or inadequate formal education. Specifically, educationally at-risk students are comprised of individuals who perform below grade level expectation; study at modified or basic levels; earn 50s and low 60s without having mastered the foundation skills, and; are disengaged or have poor attendance.

The precise number of children who drop out of schools is difficult to ascertain. Schools utilize different leave codes, and use different methods of calculating the dropouts from year to year, and from school to school (Hahn, 1987). While exact attrition numbers may be difficult to establish, it is possible to determine with accuracy the national graduation rate. When the Urban Institute calculated national graduation rates for the class of 2001 (the most recent year for which statistics were available), only 68% of all public high school students graduated (Swanson, 2004). This means that nearly one-third of all public high school students who should have graduated failed to do. Further

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analysis indicated that for Black, American Indian, and Hispanic students, the national graduation rate hovers at 50% (50, 51, and 53% respectively) (Swanson, 2004).

Certain objective, stable, facts are obtainable with regard to those who are considered to have increased educational risk factors (Janosz, LeBlanc, Boulerice & Tremblay, 1997). The vast percent of students who drop out do so between the ages of 17 and 18 (National Center for Education Statistics, 2002). Potential dropouts tend to be retained in the same grade, have poor academic grades, and feel disengaged from school. They tend to be part of a large peer group, to be involved in more passive activities, to adhere more frequently to deviant norms, to manifest behavior problems, to be arrested more frequently by the police, and to exhibit psychological vulnerability (Janosz et. al, 1997). At-risk students tend to have higher levels of communication apprehension (Chesebro, McCroskey, Atwater, Bahrenfuss, Cawelti, Guadino & Hodges, 1992) and lower levels of conflict negotiation skills (National Mental Health and Education Center, 2002). Between the ages of 15 and 24 male dropouts out-number female drop-outs; there are higher concentrations of at-risk students in urban centers and rural areas than in suburban areas; drop-out rates are lowest in the Northeast and highest in the South; the most commonly stated reason for dropping out is poor academic performance, and disadvantaged students are at an increased risk of dropping out (Hahn, 1987; Pallas, 1990). Several economical and sociological factors that have been highly correlated with increased educational risk. Children are more likely to perform poorly and drop out of school if they live in poverty (Stedman, Salganik, & Celebuski, 1988), have Black or Hispanic heritage (Bruno, 1988), live with single parents (Stedman et al., 1988), have mothers that have not completed high school (Natriello, McDill, & Pallas, 1990; Barro &

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Kostad, 1987), have limited English proficiency (Natriello et al., 1990; Salganik & Celebuski, 1987), have a sibling who has dropped out of school, or are home alone for more than three hours a day (The National Center for Education Statistics, 1989; Western Interstate Commission for Higher Education, Teachers Insurance and Annuity Association, and The College Board, 1988). Despite the fact that there is no consensus explanation for these phenomena, there does seem to be agreement that these economic and sociological factors are external forces beyond the control of the at-risk student which often interact with one another (Frymier & Robertson, 1990; Jones & Watson, 1990). Unquestionably, these factors act individually and collectively as barriers to the student's ability to perform in school.

Regardless of the impetus for leave-taking, the consequence of a student dropping out of the educational system prior to completing high school can be severe. For instance, high-school dropouts are more likely to be unemployed than high school graduates and to earn less money than high school graduates when they eventually do secure work (US Department of Education [USDE], 1999). High school dropouts are also more likely to receive public assistance than high school graduates who do not go on to college (USDE, 1998). Females who drop out of high school are morel likely to have children at younger ages and are more likely to be single parents than high school graduates (McMillen & Kaufmann, 1996). Finally, at eighty-two percent of the population, dropouts make up a disproportionate percentage of the nation's prison inmates (Harlow, 1996).

Historical Intervention Strategies for At-Risk Students

Intervention programs focusing upon minimizing risk factors associated with at-risk students have existed since the 1930s. The various theoretical and practical

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orientations of these programs can generally be categorized by different time periods. Each epoch strived for improvement through fashionable communication interventions: In the 1930's and 40's, intervention programs focused upon remedial skills by improving the cognitive skills of at-risk students through non-credit reading and learning skills courses (Kulik, Kulik & Schwalb, 1983). From the 50's to the 70's, programs in special education were developed. High school graduation requirements were raised and special materials were provided for students (Frymier & Roberson, 1990). On-going developmental and remedial courses were taught by teams composed of faculty members and counselors. Services, such as directive guidance sessions, counseling, and advisement, were added (Kulik, Kulik & Schwalb, 1983). Schools communicated directly with parents, spent extra time on reading, writing and arithmetic, assigned extra homework, referred students to psychologists or social workers, and emphasized higher order thinking (Frymier & Roberson, 1990), as well as study and listening skills (Thompson, Grandgenett & Grandgenett, 1999). Nevertheless, the focus of all of this attention was largely on factors external to the student.

In the 1980's school systems first accepted the fact that a student's classroom performance was highly correlated with family and other environmental factors (Bruckner, 1995). Students with behavioral problems, such as those associated with communication, conflict resolution, and attention span deficits, were identified as constituting a large contingency of the at-risk students (Thompson, Grandgenett & Grandgenett, 1999).

In response to these admissions, intervention programs began to address and manipulate internal and external factors affecting the at-risk student. At this time

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psychological variables were also added to intervention programs. Research into cognitive variables, task motivation, cultural aspiration, task performance, self-esteem and locus of control was undertaken. Blum and Spangehl (1982), two ardent advocates of this new approach, proposed that psychological and behavioral variables must be assessed and influenced before the at-risk student's academic deficits can be affected. They continued this train of thought with the rational that a focus on internal factors would provide students with self-knowledge, coping skills, and problem-solving skills which would be "applicable and transferable to everyday educational and personal challenges." Intervention programs would thus provide students with the communication and academic skills, as well as the internal resources needed to overcome the challenging external factors with which they have to deal.

Current Intervention Strategies for At-Risk Students

In international comparatives, students in the U.S. begin to falter academically around junior high school (Office of Education & Research Improvements [OERI], 1999). Despite both the changing theoretical orientation of intervention programs, and the best of educator intentions, many academic institutions continue to deal inappropriately with at-risk students, especially those who demonstrate basic academic deficiencies. The educational gaps of such students may manifest inadequacies with regard to basic academic skills such as reading, writing, math, and study skills (Jones & Watson, 1990). They are also more likely to perform poorly on standardized tests of intelligence and achievement that are educational predictors of talent and success (Jones & Watson, 1990).

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One course of action for students who demonstrate a paucity of basic academic skills is to ignore the problem and to simply continue to process the students through the system. Although undesirable, it is estimated that since 1983 over 10 million Americans have reached the 12th grade without learning to read at a basic level (OERI, 1999).

An alternative academic solution is to hold children back and make them repeat a grade in the hope of strengthening their core knowledge base. This approach continues despite the fact that studies have established that when a school holds students back these children have a lower opinions of self, have fewer friends, and are up to four times more likely to drop out than those who have been promoted (Hahn, 1987).

Another academic solution is to place the students in alternative streams with varying academic challenges. In the case when at-risk children are not held back, they are more likely than other students to be placed in academic programs apart from the mainstream. The separate tracking of students can have devastating unintended outcomes for them (Hallinan, 1987; Gamoran & Berends, 1987).

The above information notwithstanding, it is important to note that academic institutions do not always deal inappropriately with at-risk students, nor are all at-risk students educationally challenged, or experiencing academic failure. In fact, Torrance (1969) found that at-risk children perform well on the figural tests of creative thinking ability; exhibit high non-verbal fluency and originality; display high creative productivity in small groups; are adept in visual art activities; are highly creative in movement, dance and other physical activities; are highly motivated by games, music, sports, humor and concrete objects; and have language rich in mental imagery.

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In order to help an at-risk child cope with the internal and external challenges, both in and out of the educational environment, Torrance (1969) suggests that a school-based intervention program must break the cycle of failure experienced by these children. This must be done without holding students back or placing them into academic streams. However, unlike the suggestions put forth by Torrance, all too often scholars and practitioners create a list of edicts, or "thou shall nots," without suggesting a viable "thou shall" alternative.

One method currently used with great success in classrooms is the "five senses" approach. In fact, entire school systems, such as the Heschel and the Waldorf Schools, are based on this method wherein educators identify which sense each child most effectively uses to maximize learning, and teach specifically to that sense. Alternatively, other programs achieve educational success by focusing on various types of success a student might have (e.g., artistic, athletic, interpersonal...). This "whole person" approach is particularly useful for at-risk individuals who are often use to thinking of themselves as failures, when in fact they are only experiencing academic failure.

I believe that the most effective intervention practice may be to teach problem-solving skills to at-risk students in order to modify their belief that they control their own destiny, or what can be called their "locus of control." In this sense, the "problem" in "problem-solving skills," can be viewed as parameters (i.e. conditions, objects, or information) that interfere with the problem solver's wishes to move from a current state to a desired future state. The "problem" is that the at-risk student lacks the correct answer and/or the appropriate chain of action to solve the problem (Mayer, 1983).

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Teaching at-risk students to become better problem solvers should have two net effects: (1) students should become cognizant that they not only have the skills, but also the ability, to control (at least parts of) the world around them; and (2) students should use the knowledge of both their new skill base, and their modified locus of control, to begin to effectively deal with their myriad life problems.

Wege and Moller's (1995) work with at-risk students provides some support for this expectation. In their study of twenty-nine undergraduate students, they hypothesized that "problem solving training would enhance a group of ineffective problem solvers' appraisal of their problem-solving skills, the quality of their solutions to specific problems, and their self-efficacy expectations while contributing towards an internal control orientation (p.508)." The primary difference between the thirteen ineffective problem solvers and the sixteen effective problem solvers was that the ineffective students appraised their problem-solving skills more negatively, had lower self-efficacy levels and an external control orientation. Not only was the hypothesis supported, but the results were maintained also at a two-month follow-up. The present study attempts to identify causal processes associated with these observations that lead to different behavioral outcome efficacy.

Resiliency and At-Risk Students

Although many students may be defined as at-risk, not all become subject to the pitfalls associated with elevated risk levels. Some at-risk students show great resiliency, the process of, capacity for, or outcome of successful adaptation despite challenging or threatening circumstances (Masten, Best & Garmenzy, 1990). Rotter (1987, 1990) identified several types of protective factors which reduced a child's exposure to risk.

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Among those highlighted are beliefs about self-efficacy, agency (locus of control), and mastery of important life skills such as problem solving. The following variables were included in the present study for this reason.

Problem Solving Skills Training

When we have a problem we must orient ourselves towards sensing a problem or a gap in information, forming ideas or hypotheses, testing and modifying the hypotheses, and communicating the results (Torrance, 1988). Thus, problem solving is "the process of closing the gap between what is and what is desired; answering questions, clearing up uncertainties, explaining that which was not understood or known, or removing perplexity; and inclusive of perceiving, thinking (cognition), feeling and behaving (Isaksen, 1994, p. 7). The model offered here begins by positing that problem solving skills training[1] will have direct positive effects on both self-efficacy and the acquisition of problem solving cognitive skills. The simple path then ensues from cognitive skills to behavioral outcome efficacy.

Problem Solving Skills Training and Acquisition of Cognitive Skills

Research shows that training designed to enhance problem-solving techniques can effectively cultivate the cognitive skills necessary to successfully engage in problem solving behavior. Specifically, Guilford (1967) shows that problem solving skills training can increase problem solving cognitive skills associated with idea fluency (the ability to produce large numbers of ideas, options, or possibilities), idea flexibility (the ability to produce a variety of kinds of ideas, options or possibilities, or the ability to use a variety of strategies to produce ideas, options or possibilities), and idea originality (the ability to produce novel, or unique ideas, options or possibilities). Skill training in problem solving

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has had other important influence as well. Training has been shown to increase the tendency to "approach" in terms of one's approach/ avoidance problem solving style (i.e., the style of evaluating problems, either approaching or avoiding them). In addition, training has been shown to increase problem-solving confidence (an individual's confidence in engaging in a wide variety of problem solving activities including problem identification, solution finding and implementation) in the general population (Heppner & Petersen, 1982).

Problem Solving Skills Training and Self-Efficacy

Self-efficacy is a learned behavioral trait associated with the perceived ability to carry out desired action (Bandura, 1977). Self-efficacy has been shown to be an important factor determining whether adaptive behaviors will be initiated, how much effort will be expended, and how long it will be sustained in the face of obstacles and aversive experiences (Bandura, 1982). As such, self-efficacy is an important factor in determining behavioral outcome efficacy in many different circumstances.

Bandura (1982) suggests that both the level and strength of self-efficacy can be modified through modeling, observation, and reinforcement. In particular, Bandura (1977) identified "problem-based learning" as a method for raising the level of self-efficacy. Brown (1999) defined problem-based learning as a form that "engages the student in investigating a problem situation for which there is no right or wrong answer. The situation raises concepts and principles relevant to the subject matter that reflect real-life issues of the students' world. Problem-based learning requires observation, investigation, solution building and resolution by students who "own the problem" and who must formulate their own solutions. The ill-structured problems offer students

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opportunities to test their skills and confront the internal and external barriers[2] they may perceive as limiting their successful achievement of a goal or objective (p.3)." In essence, this form of problem-based learning is precisely what students learn in effective problem solving skills training. As a result, in addition to providing the problem-solving cognitive skills that they need to handle tasks successfully, problem-solving skills training should help students set realistic goals and pursue them with the recognition that they have the ability needed to reach those goals if they apply reasonable effort (Brophy, 1998). In other words, problem-solving skills training should increase self-efficacy.

Problem Solving Cognitive Skills and Behavior Outcome Efficacy

The direct path from problem solving cognitive skills to behavior outcome efficacy is one of the core features of the model. It completes the expected outcome of training, that is, a change in effective behaviors. Simply put, people cannot produce effective behavioral outcomes without the necessary skills, regardless of the level and orientation of locus of control. Thus, students with problem-solving skills are expected to exhibit an increased ability to resolve personal and/or academic problems – what we identify as behavioral outcome efficacy. In this case, behavior outcome efficacy might refer to whether students utilize one or more of the acquired problem solving tools for problem solving.

Several studies demonstrate the expected relationship between problem-solving skills and behavior efficacy outcomes in children, in individuals who have dropped out of the educational forum, and in at-risk university students. Tellado (1984) found that when sixty-six students (grades 7 - 9) participated in a problem solving skills training program the students in the treatment group demonstrated better problem-solving skills than did

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those in the control group. McCluskey, Baker, O'Hagan, and Treffinger (1998) found behavioral effects on several outcome measures at two points in time. In their study, eighty-eight talented, at-risk high-school dropouts participated in Lost Prizes, a study focusing on life-skills training (including problem solving), multiple growth plans, and mentored work studies programs. In the first year, sixty-five percent of the individuals responded by completing high school, entering post-secondary programs, or obtaining full-time employment. At a one year follow-up the researchers found that the influence of the skills training and in many cases the skills themselves were still being benefiting some of the at-risk youth. Avarello (1993) found that when twenty-two at-risk university students (18-25) participated in an introductory fifteen-week creativity course with sections focusing on problem-solving skills, students experienced an increased ability to solve problems. They also experienced improved communication and listening skills, improved self-confidence, enhanced ability to be more open-minded, increased ability to work with others, greater confidence in their ideas, improved 'can-do' attitude, and enhanced outlook on their lives. Students reported that the knowledge and skills gained as a result of this course were transferable and that they employed them in other college courses, their family life, their place of work, and their personal lives.

Locus of Control

Beyond the obvious importance of acquiring problem-solving skills, one of the most critical features of the proposed model is locus of control. Locus of control of reinforcement (referred to henceforth as locus of control) deals with an individual's beliefs about the nature of the world, and specifically with regard to whether or not individuals maintain an expectation that reinforcement is internally or externally

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controlled. This control orientation affects not only the degree to which we believe that we can control our environment in important life situations, but also the notion that we can effect the environment through our own behavior (Rotter, 1966).

As a construct, locus of control is particularly pertinent to at-risk students. Observations on this population regularly include statements indicating beliefs that success experienced in life is a result of external circumstance (Blum & Spangehl, 1982). Rotter (1966) described locus of control as follows: "When a reinforcement is perceived by the subject as following some action of his own but not being entirely contingent upon his action, then, in our culture, it is typically perceived as the result of luck, chance, fate, as under the control of powerful others, or as unpredictable because of the great complexity of the forces surrounding him. When an individual interprets the event in this way, we have labeled this as a belief in external control. If the person perceives that the event is contingent upon his own behavior, or his own relatively permanent characteristics, we have termed this a belief in internal control" (p. 1).

Locus of control has been widely explored as a psychological variable, and scales used in its study have been subject to several criticisms.[3] Despite most of these criticisms however, its extensive use in research has been considered appropriate for many purposes. As discussed below, it can be seen as especially appropriate for investigating the link between problem solving cognitive skills and behavioral outcome efficacy among the type of at-risk students of concern in the present study.

The criticism particularly relevant to the focus of the present study deals with the claim that internal locus of control items assess both the belief about the likelihood of a behavior leading to a specific outcome (locus of control), and the belief about one's

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ability to successfully perform a behavior (self-efficacy). Since the assertion in the present study is that both internal locus of control and self-efficacy work in conjunction to manifest change, both must be included in the study. The fundamental concern is to simply identify and parse out the different effects. Undoubtedly, it is possible for a person to have a high internal locus of control and yet not engage in the practical manifestation of activities which one would naturally assume are related to this locus. Specifically, "people with an internal locus of control are people who see both good and bad outcomes as following from, or contingent on, their own actions. [Nevertheless] they don't necessarily feel that they have the competence to act in effective ways" (Carver & Scheier, 2000, p. 373). When individuals perceive a lack of competence within themselves to act in an effective manner, they are displaying a low self-efficacy.

Problem Solving Cognitive Skills and Locus of Control

Although locus of control is thought to be a relatively enduring dispositional characteristic, studies indicate that it is modifiable through experience. For instance, Nowicki and Barnes (1973) found increased internal locus in male students (grade seven to nine) after they participated in a one week structured camp situation where counselors made clear connections between the camper's behavior and resultant rewards. The path from problem solving cognitive skills to locus of control in the present model suggests one way that locus of control can be modified.

Implicit in this prediction is recognition that in order to acquire cognitive skills through training, we must first receive repeated opportunities to learn, use, and rehearse the skill. Thus, in developing these skills, the problem solver experiences success with them. The path from cognitive skills to locus of control is based on recognition of this

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combined with reasoning implicit in Rotter's work on locus of control. According to Rotter (1966), if individuals perceive that their own skill determines success, not luck or chance, they are more likely to expect future success and to generalize expectancies of success from one task to another similar task. Repeated task success facilitates the expression of internal attitudes, while failure fosters externality. In this case, the repeated experience of successful use promoted during the acquisition of problem solving cognitive skills is expected to produce perceptions that outcomes result from skill, since luck or chance does not happen repeatedly. The repetition of objective task success during training and associated attributions of internal control should facilitate the expression of internal attitudes and the development of internal locus of control.

Evidence for this expected relationship can be found in work by Omizo, Cubberly and Omizo (1985), where a significant shift in locus of control was observed in sixty learning disabled children (ages 8-11) who were taught rational-emotive therapy (problem solving skills training and development of rational coping strategies session) during a twelve week program. In a similar study, Wege and Moeller (1985) observed heightened internal orientation by previously identified poor problem solvers. The results were maintained at a two-month follow-up.

Locus of Control and Behavioral Outcome Efficacy

As the model suggests, a result of problem solving cognitive skills' influence on control orientation is an expected increase in at-risk students' ability to resolve personal and/or academic problems. In other words, elevated internal locus of control will enhance behavioral outcome efficacy.

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A study by Schur (1999) demonstrated that the likelihood for people to start engaging in behavioral patterns that help in problem solving is significantly related to their attitude (i.e., control orientation). The relevance of attitude with regard to a student's ability to solve personal and/or academic problems is underscored by a study of almost five hundred thousand (non-risk) youth across the United States (Colemen, Campbell, Hobson, McPartland, Mood, Weinfeld, & York, 1966). These researchers found that attitudinal factors had a stronger relationship to achievement than the additive value of all other school factors observed. The Colemen et al. (1966) study provided early cogency for the clear relationship between internal locus of control and educational achievement later found by Nowicki and Strickland (1973). Support for this relationship was more recently demonstrated by DeMello and Imms (1999). In their study of one hundred and forty-six students ages 14 to18 years, significant correlations were found between internal locus of control and productive problem solving coping styles vis-à-vis academic situations. Locus of control has also been found to have a significant affect on persistence in a problem solving behavior, with those high on internal locus of control maintaining a longer persistence rate than those high on external locus of control (Haines, McGrath, & Pirot, 1980).

The expectation that those high on internal locus of control will initiate, and maintain, problem solving behavior is based more often on their inherent belief that they can control their own destiny. Believing they have this control, they should see their own efforts to govern outcomes as functional, and thus are expected to make more attempts to control their environments and/or their behaviors in important life situations (Seeman, 1963; Gore & Rotter, 1963; Strickland, 1965; Phares, 1965). As such, according to Rotter

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(1966) they are more likely to be alert to those aspects of the environment that provide useful information for their future behavior. The deployment of problem solving tools is one example of this. In general, internals take more steps to improve their environmental condition, place greater value on skill or achievement reinforcements and are more concerned with their ability, and particularly with their failures (Rotter, 1966). On the other hand, while internals are usually open to useful information that can positively effect their environment, externals hold the belief that nothing they do will really affect them anyway, and therefore they will likely see no need to change. All this works toward the expectation that internal locus of control will increase behavioral outcome efficacy relevant to problem solving.

Self-Efficacy and Behavioral Outcome Efficacy

As the model indicates, an outcome of problem solving skills training on self-efficacy is an expected increase in at-risk students' ability to resolve personal and/or academic problems. In other words, positive increases in self-efficacy will enhance behavioral outcome efficacy.

Self-efficacy represents the perceived ability to carry out desired actions. Pajares (2005) tells us that the manner in which students evaluate both the effect and their understanding of their actions strongly influences their efficacy beliefs: Successful interpreted outcomes raise self-efficacy and failed interpreted outcomes lower it. Investigators have established that self-efficacy beliefs influence performance achievement by influencing effort, persistence, and perseverance (Bandura & Schunk, 1981; Bouffard-Bouchard, 1990). Thus, students with high self-efficacy may set higher goals than people with low self-efficacy. They may be more likely to persevere when

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confronted with early failure and less likely to submit to paralyzing thoughts of inability and self-doubt. For instance, in a study of students with low, middle, and high math skills, who had within each ability level, either high or low math self-efficacy, Collins (1982) found that students with high self-efficacy completed more problems and reworked more of the ones they missed than did students with low self-efficacy.

We should expect that as levels of self-efficacy increase behavior outcome efficacy should become stronger. If student have low self-efficacy, they should display little or no behavioral outcome efficacy because people tend to engage in tasks in which they feel competent and confident, and avoid those tasks in which they do not. If students have no belief in their skills, they will be unlikely to use them.

Education Risk Level

Educational risk factors are important considerations in any attempt to identify processes that affect behavioral outcome efficacy. In the present model, its influence is identified through paths leading to self-efficacy and the acquisition of cognitive skills.

Educational Risk Factors and Problem Solving Cognitive Skills

The model shows a negative path from educational risk level to problem solving cognitive skills, indicating that increased risk will inhibit the acquisition of skills. While non-risk children may both learn problem-solving skills in the general course of their lives and consciously or unconsciously apply these skills, many at-risk children must overcome the barrier of never having acquired these cognitive skills. In fact, a significant body of research supports the claim that the problem solving attempts of at-risk students lack logical development, thoroughness and sufficient effort (Blum & Spangehl, 1982). Their problem solving may also be impulsive, unsystematic and may create more

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problems than they solve (McCluskey, Place, McCluskey & Treffinger, 1998). These students are inadequately prepared to function in a society that demands skills in problem solving and critical thinking.

In addition to the potential barrier of never having acquired problem-solving cognitive skills, the at-risk child also faces other deeply entrenched personal or societal barriers that prevent their development and use. According to Davis (1992) at-risk children are inhibited from using their problem-solving skills by perceptual barriers that impede our seeing new possibilities, cultural barriers leading to outcome conformity, emotional barriers preventing us from using all our skills, and resource barriers limiting time, money, supplies, people and information. Moreover, one can posit that combinations of economic, sociological and educational system failures make at-risk kids more likely to suffer from ingrained barriers that work against an individual's ability to effectively solve problems. For instance, we know that children who live in single parent households are much more likely to live below the poverty line and to experience resource barriers, and that children whose primary household language is non-English often come from more traditional families and are more likely to experience cultural barriers.

Educational Risk and Self-Efficacy

In addition to its path from educational risk to skills, the model's negative path from risk level to self-efficacy signifies that increased risk is associated with a reduction in one's perceived ability to carry out actions. Cubeta, Travers and Sheckley (1999) demonstrate empirically that at-risk students often experience low levels of self-efficacy, something that may be intensified by the history of failure they often experience.

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Consequently, even when at-risk students acquire problem-solving skills, they feel unable to competently employ them. Bandura (1982) suggests that high self-efficacy is a factor determining whether coping behaviors will be initiated, how much effort will be expended, and how long effort will be sustained in the face of obstacles and aversive experiences. Deeply entrenched barriers to problem solving, such as those mentioned above, appear even more daunting for those with a low sense of self-efficacy. In such cases, individuals are more likely to give up quicker, expend less energy, or fail to initiate problem-solving activities.

Premise

The relationship between problem solving cognitive skills and the deployment of problem solving behavior is indicated in several studies (e.g., Tellado, 1984; McCluskey, Baker, O'Hagan, & Treffinger; 1998, Avarello, 1993). However, these investigations do not consider factors affecting this relationship. This is not uncommon when dealing with at-risk kids, where not only do most educational and institutional systems interacting with them operate largely on assumption and tradition, but much of the existing research has been conducted on an ad hoc basis. Nevertheless, given their unique association with educationally at-risk students, self-efficacy and locus of control seem to be particularly important factors in explicating the relationship between acquiring problem solving cognitive skills and resulting behavior-outcome efficacy. This study provides a first attempt to identify this process. It suggests that the relationship between problem solving cognitive skills and behavior outcome efficacy is mediated both by the perceived ability to carry out a desired action (self-efficacy), and the belief that we control the events in our lives (locus of control).

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The study tests a model in which both problem solving skills training and educational-risk level act as antecedents to psychological processes that influence behavioral outcome efficacy. The model begins by indicating that problem solving skills training will increase both self-efficacy and problem solving cognitive skills. By contrast, educational-risk level is expected to have a negative influence on each of these variables. The model continues from this point along the two separate paths leading to behavioral outcome efficacy. The single path from self-efficacy shows that heightened self-efficacy should directly increase behavioral outcome efficacy. Two paths continuing from problem solving cognitive skills show both direct and indirect influences on behavioral outcomes. The first path indicates that heightened problem solving cognitive skills should directly increase behavioral outcome efficacy. The second path indicates that problem solving cognitive skills should heighten locus of control, and this heightened locus of control should increase behavioral outcome efficacy. (See Figure 1 for the full model of the hypothesized relationships).

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Chapter 2

Methods

Overview

An experiment manipulated problem solving skills training (yes, no) and the educational-risk level of students (at-risk, non-risk) to determine their influence on measures of behavioral-outcome efficacy. Students participated in problem solving classroom training, once a week, for 7 consecutive weeks, exclusive of testing. Four schools, two composed of at-risk and the others composed of non-risk students, were used.

All participants were pre-tested on three scales prior to the commencement of the problem solving skills training, and post-tested on the same three scales one week after the training ceased. The scales measured locus of control, self-efficacy, and problem solving cognitive skills. Problem solving cognitive skills was composed of: problem solving fluency (the ability to produce large numbers of ideas); problem solving flexibility (the ability to produce and/or use, a variety of kinds of ideas); problem solving originality (the ability to produce novel or unique ideas); approach-avoidance (one's style of evaluating problems, either approaching or avoiding them), and; problem solving confidence (an individual's confidence in engaging in a wide variety of problem solving activities including problem identification, solution finding and implementation).

One week after the problem solving skills training was concluded all the participants were post-tested on survey evaluating the course and the instructor. Two weeks after the problem solving skills training was concluded all the participants were post-tested on a survey examining the behavioral outcome efficacy (a student's ability to

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Problem solving skills training and educational-risk level acted as endogenous variables in the hypothesized model. For purposes of analysis, problem solving skills training was scored as either "0," indicating no skills training, or "1," indicating that subjects received training. Thus, positive relationships with endogenous variables indicated that the training had a positive effect. Educational-risk level was dichotomized and scored as "0" (indicating non-risk level) or "1" (indicating at-risk level).
For some comparisons, separate path models were run for each level of educational risk.

Research Participants

One hundred and five students, from four different schools, initially participated in the study. Sixty-nine students participated in the treatment and thirty-five acted as a control group. Of the treatment group, 30 (later reduced to 24) were at-risk and 39 (later reduced to 28) were non-risk. Of the control group, 22 were at-risk and 14 were non-risk. The participants were classified by their educational institutions as having either a statistically normal, or a statistically high probability of encountering failure, attrition or inadequacies with regard to their formal academic education. The latter group is called at-risk or high-risk, students. The former group, which should follow a normal distribution of risk, will be referred to as non-risk.

The Fieldstone Day School was selected because it had a population of 39 students in the Upper School, all of whom participated in the treatment. They were considered, as a group, to have an ordinary level of risk for encountering failure, attrition, or inadequacies with regard to their formal academic education. For the purpose of the

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paper, ordinary levels of risk are defined as "non-risk" students. The students at the Fieldstone Day School largely came from a middle class background. They ranged in age from 13 to 15 years.

Royal St. George's College was selected because it had 14 students in the Upper School who were willing to participate as a control group for students. The students at Royal St. George College were considered to have ordinary levels of educational risk. These students ranged in age from 11 to16 years. Although the entire Upper School has 144 students, participation was on a volunteer basis. Both the student and his parents had to consent for the student to stay after school to complete the questionnaire. Although the parents indicated a high level of interest, the student interest was low. The students at Royal St. George's College come from a middle class background. It is an all-boy school.

The Jerome D. Diamond Adolescent Center (the Diamond Center) was selected because it had population of 30 at-risk students, who are accessible and currently in the educational system. All of these students participated in the treatment. These participants, who had chosen to stay within the system, should theoretically be more trusting of adults and their efforts to help than would the youth be who have chosen to leave the educational system.

The Diamond Center is a children's mental health center that provides a day treatment program for at-risk youth who have failed to thrive in a traditional academic center. The focus of the treatment services is the ultimate re-integration of the students into their community schools. The individuals who attend this school exhibit a wide range of learning disabilities, emotional, behavioral, psychological, family, community, and social problems. Some of the challenges experienced by the students are: high levels

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of anxiety, bi-polar, obsessive-compulsive, eating or conduct disorders; suicide attempts or ideations; attention deficit disorder or attention deficit hyperactivity disorder. Some of these difficulties may be expressed as school failure, alienation, or psychological problems. The students may live with their biological families or with foster families. They may have experienced physical or emotional abuse. Each child in the school exchanges one academic for one therapeutic course per semester. Milieu therapy, where treatment is built into the entire program experienced by students in the school, is practiced. Students, who may learn in combined grade level classes, come from a broad cross-section of the economic spectrum. They range in age from 12 to 16 years.

The Merle L. Levine Academy Inc. was selected because it had 22 students who would act as a control group for educationally at-risk students. These students ranged in age from 12 - 16. Although the entire Upper School has 36 students, participation was on a volunteer basis. Both the student and her/his parents had to consent for the student to complete the questionnaire during class time. Some of the parents felt that their children were under enough stress without asking them to take an additional test. These parents choose not offer the opportunity to their children. The students at the Merle Levine Academy Inc. come from a middle class background. It is a co-educational school.

Although the school specializes in students with attention deficit disorder (ADD/ADHD), like the Diamond Center, it has a wide range of students with comparable behavioral and learning difficulties. Also like the Diamond Center, in the Merle Levine Academy both teachers and child-youth care workers interact with the students. Students completed the questionnaires in class time.

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The data from 6 students in the Jerome Diamond Center, and 11 students in the Fieldstone Day School was omitted from data analysis of the treatment groups because these students had missed four or more classes.

The educationally at-risk students have either learning disabilities and/or mental health issues. Learning disabilities (LD) range across the board from dyslexia to attention deficit disorder or attention deficit hyperactivity disorder to Asperger syndrome. Although an LD student may learn specific tools for dealing with her/his particular problem, s/he will continue to be an LD person for the entirety of her/his life. Learning disabilities do not go away. A student with mental health issues may suffers from behavioral and/or emotional problems. Mental health issues range from high levels of anxiety, to obsessive-compulsive, eating or conduct disorders, to suicide attempts or ideations.

The instructor for the problem solving cognitive skills training given to the treatment group was not informed as to which students had what problems prior to the commencement of treatment. The schools had recommended that it was better for an instructor to spend several weeks learning what students can and cannot do prior to reading her/his chart. In this manner, a student is not negatively pigeon-holed by an instructor who may excessively change her/his behavior and/or attitude towards a student on the basis of the student's history. It was only after treatment was concluded that the instructor was informed on the status of each student.

Procedure

The quasi experiment used a fully crossed factorial design. The population of concern was the at-risk students. The 2 X 2 design examined the influence of problem

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solving skills training (yes, no) and the student-risk level (at-risk, non-risk) on behavioral-outcome efficacy.

Students in each respective school participated in a problem-solving course where one 50-minute class was allocated each week for seven consecutive weeks to introduce the treatment. Classroom training occurred whereby each week the researcher taught the problem-solving course to three existing classes at the Diamond Center and to three existing classes at the Fieldstone Day School. Students learned tools to identify a problem, to make a problem statement, to generate and evaluate possible idea solutions, and to create a plan of action. The lesson plans were designed to generate success when utilizing the problem solving tools for specific problems and for problems that are student-generated and relevant to their personal lives.

The researcher explained that each school was participating in a study on problem solving and that each student must complete the measurement tests at the start of the course and also at the end of the course. Students were told that the instructor was using the questionnaires as a guide for how much improvement the students made over the course of the skills training. They were informed that there was no right or wrong answer to any of the questions and that they were not being graded on the course. The educational risk level of the students was determined a priori by the educational institutions.

The fluency, flexibility and originality aspects of problem-solving cognitive skill were measured by a creativity questionnaire with one single open-ended question. The open-ended question was different, but comparable, from the pre to the posttest. The approach-avoidance and problem solving confidence aspects of problem-solving

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cognitive skill were measured through self-report surveys along with self-efficacy, locus of control and behavioral outcome efficacy.

All students were required to maintain a diary of tool usage throughout the course of the problem solving skills treatment. The diary was used to corroborate the self-report data regarding behavioral outcome efficacy. The diary of tool usage was dropped as virtually none of the students completed this voluntary aspect of the course. Although anecdotal evidence provided by the students indicated that many did, indeed, use the tools at home (at least on occasion), this tool could not be used to substantiate this fact.

Materials

'Problem solving skills training' focused upon five generic tools: (1) problem identification, (2) brainstorming, (3) highlighting, (4) advantages, limitations, unique opportunities, and overcoming limitations (ALUO); and (5) planning for action. Each class was built on the material taught in previous classes. Problems were carried over from one class to the next. The instructor provided some problems; other problems were self-generated by students for themselves. The information from an earlier class was continually reviewed and incorporated into the subsequent classes.

The lesson plans for training students in the five generic tools is described below. Each of the five skills-training methods was derived from the lesson plans published in Big Tools for Little Thinkers by Keller-Mathers and Puccio (2000), and Avarello's (1993) exploratory study. Big Tools for Little Thinkers is a book with lesson plans specifically designed to teach primary students to generate and evaluate ideas more effectively. The Avarello study examined how a course on creativity would influence 22 at-risk students (ages 18-25) who took part in the introductory 15-week creativity course

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at State University of New York at Buffalo. Since this study is only interested in the problem solving aspects of the Avarello course, the other sections on process, product, press, person, creative style etc., were not included.

Problem Identification

Participants practiced identifying a problem by creating a problem statement. They were asked to think of a problem they wanted to solve. They were required to write the problem using: an invitational stem; clearly stated ownership of the problem; an action word; and an objective that they wanted to accomplish. When problem solvers had no ownership or control of the problem, or if they were not in a position to make changes, they were told that the problem was not theirs to solve. Problem solvers were asked to either select a new problem or to reframe the problem statement so that it represented some aspect over which the participant had control. If the problem statement accurately reflected the problem, identifying the problem was complete. If not, alternative words for the action and the objective, which were to be written beneath the original word, was mixed and matched by the participant until a problem statement was arrived at which most closely reflected the question that the problem solver wanted answered. The new problem statement may have differed from the old one with regard to specific words, or with regard to the entire idea. (For an in-depth discussion of how to identify a problem see Appendix 9; for an example of the how to identify the problem cheat sheet see Appendix 16; for an example of how to identify the problem lesson plan see Appendix 22; and for an example of the identifying the problem homework assignment see Appendix 23).

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Brainstorming

Participants worked together on a timed brainstorming session to propose possible idea solutions for a problem identified by the instructor. After completion, they collectively debriefed the brainstorming experience. Participants engaged in a second, timed, brainstorming session for a different problem identified by the instructor. This time, the participants were required to use the following brainstorming tools: a clear problem statement or goal to direct the session; a problem dependent on idea generation; withholding judgment; coming up with lots of ideas; coming up with wild and crazy ideas, and; piggybacking off another's idea by copying and changing it a little bit. Participants collectively debriefed the difference between the first and the second brainstorming sessions. (For an in-depth discussion of brainstorming see Appendix 10; for an example of the brainstorming cheat sheet see Appendix 15; for an example of the brainstorming lesson plan see Appendix 24; and for an example of the brainstorming homework assignment see Appendix 25).

Highlighting

Participants collectively identified criteria they used for making decisions. Participants categorized ideas generated in the brainstorming session from the previous week using highlighting tools: hits (marking the ideas which seem particularly promising), relates (grouping the hits into clusters of similar ideas), and hotspots (re-labeling the clusters). (For an in-depth discussion of highlighting see Appendix 11; for an example of the highlighting cheat sheet see Appendix 17; for an example of the brainstorming lesson plan see Appendix 28; and for an example of the brainstorming homework assignment see Appendix 29).

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Advantages, Limitations, Unique Opportunities and Overcoming Limitations (ALUO)

Participants engaged in a timed evaluation of an idea identified by the instructor. Upon completion, participants collectively debriefed their evaluation. Participants engaged in a second evaluation session for a different problem identified by the instructor. They were required to use the following evaluative tools: identify the advantages, strong points, plusses or strengths of an idea; identify the limitations, concerns, weak points or challenges of the idea; identifying unique, novel, or original qualities of the idea; identify the limitation(s) most important to overcome. Participants used hits to identify the limitation(s) most important to overcome. Once identified, participants collectively brainstormed ideas on ways to strengthen and overcome the limitations. ALUO was collectively debriefed. (For an in-depth discussion of ALUO see Appendix 18; for an example of the ALUO cheat sheet see Appendix 18; for an example of the ALUO lesson plan see Appendix 30; and for an example of the ALUO homework assignment see Appendix 31).

Planning for Action

Participants collectively engaged in planning for action and acceptance of student generated problems. Participants transformed an idea into concrete action steps by identifying who would assist and/or resist the idea, what would assist and/or resist the idea, where would idea assistance and/or resistance occur, when would idea assistance and/or resistance occur, and why would idea assistance and/or resistance occur. Participants brainstormed the answers to these questions. Participants identified start and stop dates for each of the short- intermediate- and long-term steps that they distinguished as necessary to put the plan into action. Participants were required to identify who would

carry out the action, where it would be carried out, why it would be carried out, how it would be carried out, and when the participant would know that the step has been successful. (For an in-depth discussion of planning for action see Appendix 13; for an example of the planning for action cheat sheet see Appendix 19; for an example of the planning for action lesson plan see Appendix 32; and for an example of the planning for action homework assignment see Appendix 33).

After each class the students were given a cheat sheet, as well as their homework exercises which were kept in the diary that records tool usage (see Appendix 8). Homework exercises focused upon problems that were student self-generated. Although there was opportunity to work with different problems, if participants desired, they could take a single problem and work with it from problem identification to plan of action.

Measures

Four self-report questionnaires, and one open-ended questionnaire, were used to obtain measures of problem-solving cognitive skill, self-efficacy, locus of control, and behavioral outcome efficacy. These measures were used in analyses testing the hypothesized path model. A fifth self-report measure was used to evaluate the course and the instructor.

Problem Solving Cognitive Skill

A composite score was used in this study to measure problem solving cognitive skills. The development of the composite score began with the consideration of several indicators. To begin with, the fluency, flexibility and originality aspects of problem-solving cognitive skill were measured by the Unusual Uses Activity (Form A, Cardboard Boxes and Form B, Tin Cans) in the Torrance Test of Creative Thinking (1966) (See

Appendix 4 and 5). The instrument was a timed measure (5 minutes) that focused on the participant's immediate thoughts and impressions regarding a specific open-ended question. Participants were requested to list as many interesting and unusual uses as they could think of for cardboard boxes or tin cans.

Each idea was placed in a coding category. If a subject's response was not present a priori in the coding categories the researcher consulted with a second individual, who was familiar with the coding manual, prior to making selections. Each coder determined her coding category for the disputed item independently, and answers were compared. When discrepancies arose, a final coding category was not selected until both coders agreed upon placement.

Fluency was determined by calculating the total number of different unusual uses produced for the tin cans and cardboard boxes. Fantastic or impossible uses beyond all possible reality were not counted (i.e.: inanimate matter could not be made animate). Each relevant use awarded the subject one point. Only relevant responses that received a fluency credit were scored for flexibility and originality. Higher scores indicated greater levels of fluency.

Flexibility was determined through the breadth of different unusual uses produced for the tin cans and cardboard boxes. The codebook indicated twenty-eight a priori coding categories, wherein each coding category had a title and specific examples of the kind of unusual uses that are subsumed within it. One point was given for each category used. No credit was given if a category was repeated. Higher scores indicated greater levels of flexibility.

Originality was determined through the novelty, or uniqueness of the unusual uses for tin cans and cardboard boxes. The codebook indicated 26 and 29 respective a priori "zero-originality" coding categories for the tin cans and cardboard boxes. If a subject's response was specifically highlighted on the "zero-originality" list, s/he received a score of zero for that idea. All other responses were given scores of one. Higher scores indicated greater levels of originality.

Previous tests of internal consistency for the Torrance Test of Creative Thinking (1966) showed fluency, alpha = .75, flexibility, alpha = .60, and originality, alpha = .64 (Yamamoto, 1962). Estimates of test-retest reliability were fluency, r = .75, flexibility, r = .74, and originality, r = .66. (Mackler , 1962).

The approach-avoidance and problem solving confidence aspects of problem-solving cognitive skill were measured using the Personal Problem-Solving Inventory (PSI) by Heppner and Petersen (1982) (See Appendix 1). The PSI used a 6-point, Likert-type format ranging from strongly agree to strongly disagree. It consisted of 32 self-report items that examined personal problem solving behavior and attitudes. The total score was comprised of three distinct subscales: Confidence, Style, and Control. For the purpose of this study only the first two scales were used, as the third scale was irrelevant to the focus of the study. Thus, only 26 of the 32 items on the scale were used.

The Confidence subscale (questions 1 to 10) consisted of items that assessed students' confidence in their problem solving ability: the Style subscale (questions 11 – 26) consisted of items that referred to one's style of approaching problems (either avoidance or direct action). A total score was derived by summing the individual item scores to get a general index of problem solving appraisal. The total ranges from 26 to

156. High scores indicated behaviors (e.g., generating multiple problem solutions), and attitudes (e.g., confronting rather than avoiding a problem), which were typically associated with successful problem solving.

Research across a number of populations and cultures has found the PSI to have acceptable internal consistency (e.g., Heppner, 1988; Heppner 2002). When summed across a variety of studies, the PSI total obtained average alpha coefficients in the high .80s, and problem- solving confidence and approach-avoidance style obtained average alpha coefficients in the low to mid .80s (Heppner, Witty, Dixon, 2004). Additional tests showed that these indicators were stable over a two week period (total PSI scores r = .80) (Heppner, 1988). The PSI scores have been significantly correlated with observational ratings of problem solving behavioral competence. It has not been correlated with social undesirability factors (Nezu, 1986).

The three primary scores (flexibility, fluidity, originality) were summed to create a higher level variable called Problem Solving Cognitive Skills. These sums comprised the composite scores used in this study. This decision was made both to make the model more parsimonious, and because the three variables are believed to be types or indicators of problem solving cognitive skills. The alpha reliability of the higher level variable called Problem Solving Cognitive Skills was .89. For non-risk kids M =15.13, SD = 7.55. For at-risk kids M = 14.80, SD = 7.51.

Two PSI subscales were NOT used because of measurement problems, specifically, poor reliability. Tests of internal consistency and parallelism were performed, and those measures did not pass. The decision to drop the scales from subsequent analysis was made for two reasons. First, the low reliability of the scale meant

that it would not be an accurate indication of the item that it was intended to measure. Second, the fact the even without the PSI scales, problem solving cognitive skills was able to be accurately measured by the new composite variable, comprised of the summed fluency, flexibility, and originality scores.

Self-Efficacy

The self-efficacy measure in this study was based on the Bosscher and Smit (1998) General Self-Efficacy Scale (GSES-12) (See Appendix 2), which was adapted from the General Self-Efficacy Scale created by Sherer, Maddux, Mercandante, Prentice-Dunn, Jacobs and Rogers (1982). It employed a 5-point, Likert-type format ranging from strongly agree to strongly disagree. Using confirmatory factor analysis, Bosscher and Smit (1998) produced a 12-item scale with three distinct factor loadings (initiative, effort and persistence) that measured the belief of generalized personal mastery expectations. The initiative subscale consisted of questions 1 to 3 of the questionnaire. The effort subscale consisted of questions 4 to 8 of the questionnaire. The persistence subscale consisted of questions 9 to12 of the questionnaire. Questions 1 to 3 and 9 to12 were reverse coded. Higher scores indicated a greater belief that one can successfully perform the behavior in question (Maddux, Sherer & Rogers, 1982). Bosscher and Smit reported estimates of internal consistency of alpha = .69 for the GSES-12; alpha = .64 for initiative; alpha = .63 for effort; and alpha = .64 for persistence. Test-retest scores were stable over a two-week period.

For the present study, participant scores on the Bosscher and Smit's (1998) General Self-Efficacy Scale (GSES-12) were reduced to a 7-item scale. Included were the first three initiative items and the first four perseverance items. Alpha reliability = .77.

The third subscale, effort, was dropped due to measurement problems. With the effort items included, reliability dropped below .60, which was designated as the minimum acceptable level. The reduced scale showed non-risk kids $M = 4.36$, $SD = 1.43$, and at-risk kids $M = 4.84$, $SD = 1.28$

Locus of Control

The locus of control was measured using the Nowicki-Strickland (1973) Scale for Locus of Control for Children, abbreviated version B[4]. (See Appendix 3). This scale was a 21-item yes/no format test that measures a person's belief or expectations about how reinforcement is controlled. With the exception of questions 4 and 13 (which were reverse coded), a yes response indicated an external locus of control orientation. Higher scores were associated with an external orientation. Nowicki-Strickland reported estimates of internal consistency of alpha = .63 (grades 3 to 5); alpha = .68 (grades 6 to 8); alpha = .74 (grades 9 to11); and alpha = .81 (grade 12). Test-retest reliabilities were .63 for the third grade, .66 for the seventh grade, and .71 for the tenth grade. In the present study, all but three of the 21 items were used. The dropped items were 4, 13, and 20 (See Appendix 3). The final 18-item index Alpha reliability = .76. For non-risk kids M =1.69, SD = .19. For at-risk kids $M = 1.59$, $SD = .19$.

Behavioral Outcome Efficacy

Treatment subjects were post-tested on a 15 item self-report measure (See Appendix 7) examining the behavioral outcome efficacy of tool usage. Most of these questions were taken from the Avarello (1993) study. Questions 1 to 3 focused on idea generation; questions 4 to 6 focused on idea evaluation; questions 7 to 11 focused on planning for action; questions 12 to 15 focused on efficacy of tool usage. The question

formats include a 5-point, Likert-type format ranging from strongly agree to strongly disagree, rankings, and closed-ended responses.

Students were specifically informed that the behavioral outcome efficacy questionnaire would ask them questions about whether or not they had used any of the tools outside of the class exercises. Students were also asked the circumstance surrounding their tool use or non-use.

In order to minimize response bias, the researcher stressed that since students were not being graded on the course, nothing bad could happen to them by being completely truthful. In fact, it was explained that in some ways the students were grading the course. It was spelled out that honesty was requested because the best way that the researcher could adapt the course to help other kids in the future was by using the comments and responses these students made as her foundation. Students were further told that the instructor's feelings would not be hurt if students did not use the tools, or if they did not use them very often.

Since Avarello conducted a qualitative study, there was no quantitative analysis to determine the quality of the instrument. However, throughout the course of the problem solving skills treatment, participants were required to keep a diary of tool usage (see Appendix 8) that was used as a secondary measure validating the behavioral outcome efficacy data. The diary required students to record the date, the tools, the situation in which the tools were used, and whether or not the problem was satisfactorily resolved. The diary also required students to record if they thought about using the tool but didn't, and why the tool was not employed. Additionally, at the beginning of each class, participants were also routinely asked who used the tools to solve a problem. Participants

were invited to discuss what occurred. Everyone was reminded to attempt to use the tools and to keep maintaining their diary.

For the present study, the first 11 items from this scale were summed to form the behavioral outcome efficacy measure. Alpha reliability = .95. Non-risk kids M =3.32, SD = .80; At-risk kids M = 2.96, SD = 1.98. Items 12-15 were dropped due to measurement problems.

Course Evaluation

The last questionnaire completed by each participant was a 22-item survey (see Appendix 6) evaluating the course and the instructor. It was modified from the standard course evaluation from Michigan State University. The modification eliminated questions relating to student background since the researcher was cognizant of the background information. The modification included open-ended questions about what the student liked about the course, what the student would change about the course, and what part of the course, if any, most helped the student and why.

Chapter 3

Results

Analyses began by examining the data for issues concerning validity and reliability. Following this, descriptive analyses were performed. Finally, path analyses were conducted to test the hypothesized model.

Examination of Data

Two steps were taken to determine the validity of the data. The first step dealt with missing values. When a student had a missing value(s) from a questionnaire (from a single question up unto a page), the average score from all of the classes (either high or non-risk) was substituted for the missing value(s). If more than one page of a completed questionnaire was missing, the questionnaire was dropped from the study. For all instances where an entire questionnaire was missing, due either to absence on the day of testing or by the subject overlooking a booklet, the data from other questionnaires for this subject were broken down by questionnaire subscales for use in analyses testing relevant hypotheses. In this manner the researcher was able to utilize the vast majority of the information that was provided by each participant. The second step was to create histograms for each variable to check for outliers. There were never more than moderate outliers and no data points were dropped for this reason.

Descriptive Analyses

Prior to conducting path analysis, descriptive statistics for all key variables were run in the model. Descriptive statistics are shown in Table 1. Table 2 demonstrates the correlations among these variables.

Table 1

Descriptive Statistics for Key Variables in Path Model

Risk Level		Problem Solving Cognitive Skill	Self-Efficacy	Locus of Control	Behavioral Outcome Efficacy
Non-Risk	N Valid	42	42	42	28
	Missing	0	0	0	14
	Mean	16.12	3.86	1.69	3.32
	Std. Deviation	7.24	.78	.21	.80
	Minimum	.00	2.0	1.0	1.0
	Maximum	30.33	5	2	4.45
At-Risk	N Valid	46	46	43	24
	Missing	0	0	0	22
	Mean	15.80	3.59	1.60	2.96
	Std. Deviation	6.70	.70	.20	1.18
	Minimum	3.33	1.86	1.17	1.00
	Maximum	38.0	5	1.94	5.0

Table 2

Zero-Order Correlations Used to Calculate Parameter Estimates in Model

	1	2	3	4	5	6
1. Problem Solving Skills Training	*1.00*					
2. Risk Level	-.15	*1.00*				
3. Problem Solving Cognitive Skills	.25*	-.02	*.89*			
4. Self-Efficacy	.08	-.18	.17	*.77*		
5. Locus of Control	.20	-.26*	.11	.55*	*.76*	
6. Behavioral Outcome Efficacy	[a].	-.18	.17	.27	.22	*.95*

Note. Skills training was coded such that 1 = received skills training and 0 = did not receive skills training. Risk level was coded such that 1 = at-risk and 0 = non-risk. Standardized item alpha appears in the diagonal. *indicated $p < .05$, two tailed.

[a]. Cannot be computed because at least one of the variables is constant.

The results from Tables 1 and 2 were inspected both for abnormalities, and to establish whether or not the variables in the model were able to demonstrating the predicted relationships. If a variable manifested problems, its role in the model would have been reassessed. The variables appeared to have means, standard deviations and bivariate relationships that fall in the expected ranges and directions.

Independent samples *t*-tests were then run to compare non- and at-risk students on pre-induction measures of locus of control, self-efficacy and problem-solving cognitive skills. Results shown in Table 3 indicate that at-risk students score significantly lower on

pre-test measures of self-efficacy and locus of control than do non-risk students. There was no difference in problem solving cognitive skills prior to the manipulation.

Table 3

Pre-induction Comparisons of Non-Risk and At-Risk Students

Risk Level		N	*M*	*SD*	*SE*	*t*	*p* 2-tailed
Problem Solving	Non-Risk	42	11.5285	4.56924	.70505	-0.592	0.555
Cognitive Skills	At-Risk	46	12.2274	6.27390	.92504		
Self-Efficacy	Non-Risk	42	3.8469	.66513	.10263	2.599	0.011*
	At-Risk	46	3.4658	.70658	.10418		
Locus of Control	Non-Risk	42	1.6842	.16844	.02599	2.817	0.006*
	At-Risk	46	1.5782	.18322	.02701		

Test of the Hypothesized Model

Path analysis was performed on the hypothesized model using the least-squares method. This involves estimating the sizes of the model parameters and testing the overall model fit. Parameter size was estimated by regressing each endogenous variable onto its causal antecedent, and model fit was tested by comparing estimated parameter sizes to the reproduced correlations.

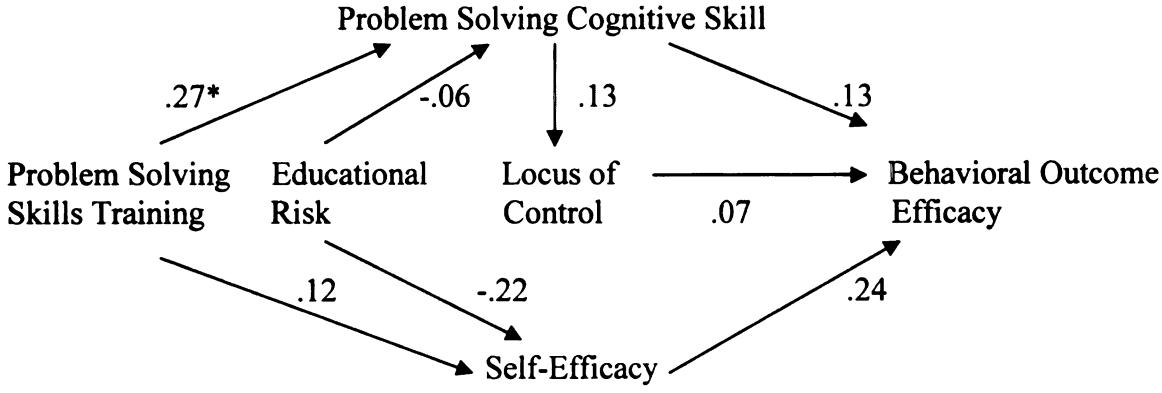
For the present study, a model was considered consistent with the data if (1) it passed the test of overall model fit, indicated by a non-significant chi-square goodness of fit result, (2) it had substantial path coefficients, and (3) it had differences between parameter estimates and reproduced correlations (errors) no greater than what would be expected through sampling error. A model was considered consistent with the data if it satisfied all three of these criteria. Specifically, in order to pass the test of overall model fit, a non-significant chi-square test would have to be observed. Second, a substantial path coefficient is one that passes a test of statistical significance at $p < .05$. Third, for parameter error to be acceptable, all error terms must satisfy a conservative criterion for z-differences set at $p < .10$. The PATH program was used to determine if each model met these rigid criteria. It should be noted that the correlations reported in the tables below were corrected for attenuation due to measurement error during procedures used for model testing.

The model hypothesized that problem solving skills training would positively affect problem solving cognitive skills and self-efficacy, depending on risk level. Skill, in turn, would affect locus of control, which would then affect behavioral outcome efficacy in conjunction with skills and self-efficacy. As the objective of the research was to

examine the roles of problem solving skills training and levels of educational risk on behavior outcome efficacy, all models were inspected for evidence of substantial continuous paths from the former to the latter. If this type of continuous path was absent from the model, the model was considered unable to demonstrate support for the logic underlying the study.

The correlations used to test the model are shown in Table 1. The results of the path model are shown in figure 2.

Figure 2. Path Model of Hypothesized Relationships



* Significant at $p < .05$, two-tailed.

Examination of these results reveals several significant things. First, the predicted model did not meet the three criteria established to determine if the model was consistent with the data. Second, the observed model does not show the type of substantial continuous paths from problem solving and educational risk to behavior outcome efficacy that was necessary to support the logic underlying this study.

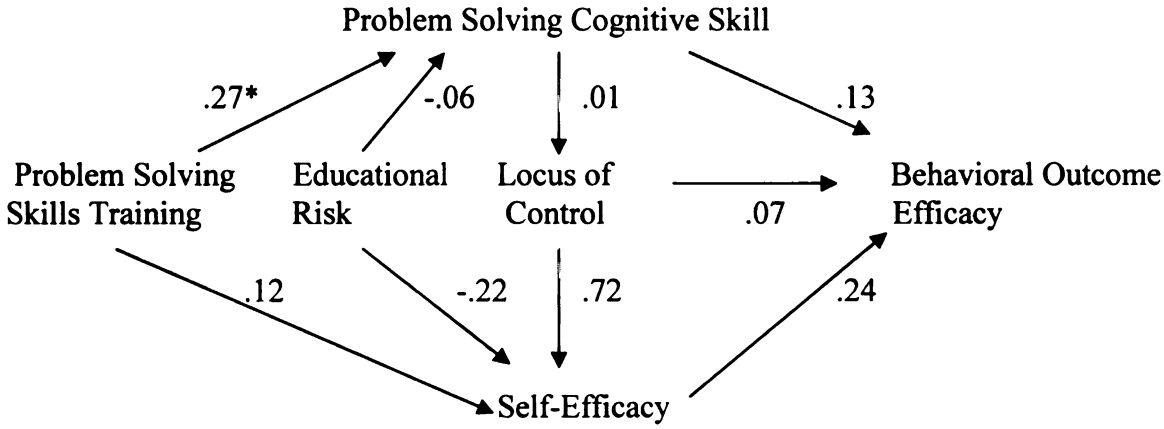
Notably, observations were not consistent with evidence of a good model fit. Results of analysis showed that although most paths appeared to be in the predicted direction, not all were large in magnitude. First, the only significant path was the one between problem solving skills training and problem solving cognitive skill, .27 P ($.05 \leq \rho \leq .49$) = .95. Second, examining predicted and obtained correlations for the unconstrained bivariate relationships shows one error was substantial for the association between self-efficacy and locus of control (difference = .71, $z = 3.60$, $p = .01$). Another error between locus of control and risk level was close to being substantial (difference = -30, $z = -1.70$, $p = .09$). Third, and most notable, the chi-square global test of goodness of fit was significant, $\chi^2(6, N = 88) = 18.81$, $p < .01$. The combined results forced a decision to reject this model. As a result, alternative models were searched for.

Although tests on hypothesized model did not satisfy the criteria needed to conclude an overall good model fit, patterns consistent with the model's logic were observed. In addition, inspection of error terms suggests that a better fitting model could be produced by small changes that would remain consistent with the original underlying logic. While realizing that using path analysis to test non-hypothesized models has considerable limitations, since only minor changes were suggested the decision was made to conduct post-hoc analyses on a revised model. Holbert and Stephenson (2002) argue that analysis on respecified models usually produce difficult to replicate findings. As such, any interpretation based on this type of post-hoc analysis should be viewed with skepticism. Moreover, the results of these analyses should be used to guide future research. The results of post-hoc analyses conducted here are reported with these caveats in mind.

Post-Hoc Analyses

Revisions in the post-hoc model were undertaken with two problems in mind: First, the substantial residual errors found for the predicted and obtained correlations between self-efficacy and locus of control, and between locus of control and risk level. Second, the weak paths observed for some links in the model. The large residual errors suggested that existing relationships between the paired variables were not represented in the model. Due to the large correlation between self-efficacy and locus of control, the first alternative model posited a positive relationship between the two variables, with the expectation being that more internal locus of control would lead to greater self-efficacy. This was the only change from the first model. The correlations used in this analysis are the same as those displayed in Table 1. The results of this analysis are shown in Figure 3.

Figure 3. Revised Model Adding Path Between Self-Efficacy and Locus of Control



* Significant at $p < .05$, two-tailed.

Although the new model still failed to meet the necessary criteria necessary for model fit, considerable improvement was observed from the previous model. Notably, no

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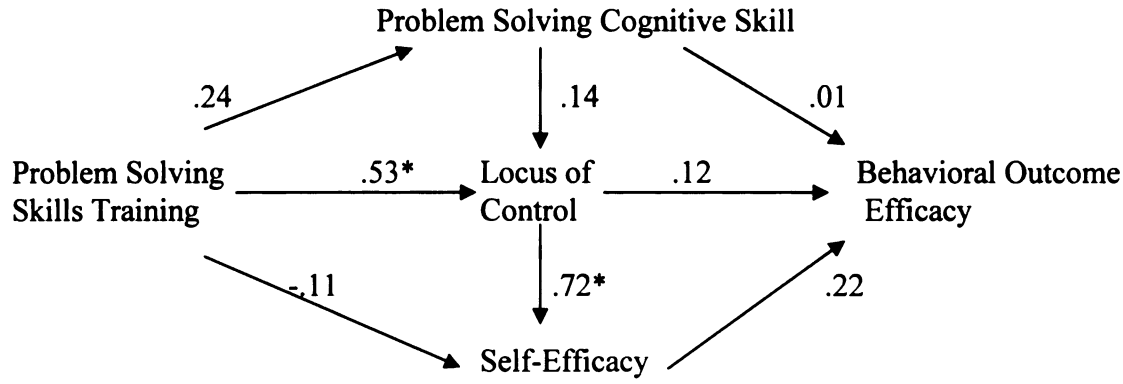
differences between predicted and obtained correlations in unconstrained bivariate relationships were significantly different than what would be expected by chance, and the chi-square test of global fit was non-significant, $\chi^2(5, N = 88) = 3.32, p = .651$. However, concern over the small path coefficients led to further revision. Specifically, the paths from problem solving cognitive skill to locus of control, educational risk to problem solving cognitive skill, and locus of control to behavior outcome efficacy were deemed to small to be acceptable.

The key difference in this revision was the designation of educational risk level as a moderating variable. This decision was made both because of the theoretical importance of educational risk level in this study and because of the considerable residual error observed between the predicted and obtained correlations for locus of control and risk level (difference = -.15, z = -.88, $p = .38$). The inclusion of educational risk level as a moderator was accomplished by testing separate models for both non-risk and at-risk kids. In essence, this provided an opportunity to compare how well the model applies to these two different groups.

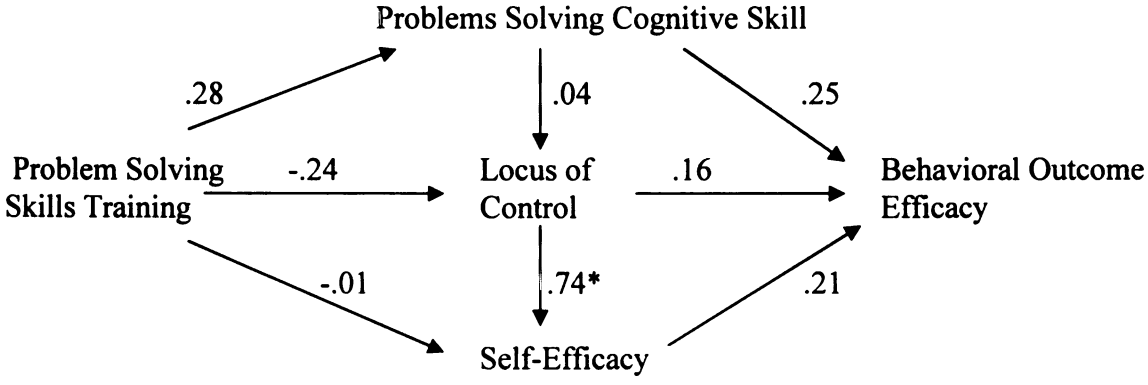
The results of these analyses are shown in Figures 4 and 5. Tables 3 and 4 show the correlations used to test these models. Both models are similar to the one in Figure 3. The only change is the addition of a path between skills training and locus of control. This path was added to account for expected increases in locus of control among at-risk kids with training.

Figure 4. Revised Model Using Only At-Risk Students



* Significant at $p < .05$, two-tailed.

Figure 5. Revised Model Using Only Non-Risk Students



* Significant at $p < .05$, two-tailed.

Table 4

Zero-Order Correlations Used to Calculate Parameter Estimates in Figure 4

	1	2	3	4	5
1. Problem solving skills training	*1.00*				
2. Problem solving cognitive skills	.24	*.89*			
3. Self efficacy	.26	.22	*.77*		
4. Locus of control	.49*	.23	.50*	*.76*	
5. Behavioral outcome efficacy	--	.10	.26	.23	*.95*

Note. Skills training was coded such that 1 = received skills training and 0 = did not receive skills training. Standardized item alpha appears in the diagonal. * indicates $p < .05$, two-tailed.

Table 5

Zero-Order Correlations Used to Calculate Parameter Estimates in Figure 5

	1	2	3	4	5
1. Problem solving skills training	*1.00*				
2. Problem solving cognitive skills	.26	*.89*			
3. Self efficacy	-.20	.11	*.77*		
4. Locus of control	-.15	-.02	.57*	*.76*	
5. Behavioral outcome efficacy	[a].	.26	.31	.26	*.95*

Note. Skills training was coded such that 1 = received skills training and 0 = did not receive skills training. Standardized item alpha appears in the diagonal. * indicates $p < .05$, two-tailed.

[a]. Cannot be computed because at least one of the variables is constant.

Inspection of the two models is informative. Given the small N resulting from splitting the sample, it is not surprising that the model was unable to satisfy all three criteria needed to consider the model consistent with the data. In particular, it is unlikely that all path coefficients would be found substantial at $p < .05$, and this was the case observed in both models. Yet despite the weak power behind these tests, several relationships still emerged as significant ($p < .05$), and several others approached significance ($p < .10$). Locus of control had a significant influence on self-efficacy in both instances (at-risk path coefficient = .72, P ($.28 < p < 1.00$) = .95; non-risk path coefficients = .74, P ($.44 < p < 1.00$) = .95). Among at-risk kids, problem solving skills

training had a significant, positive influence on their locus of control (path coefficient = .52, P (.24 < .80) = .95). This finding is in stark contrast to the one observed for non-risk kids, where skills-training seems to have had a negative (though non-significant) effect on their locus of control (path coefficient = -.24, P (-.60 < p < .12) = .95). When we examine the other two criteria used to evaluate model fit, we find that neither model had errors greater than what would be expected through sampling, and that both models passed the test of overall model fit determined by the observation of a non-significant chi-square. The chi-square for at-risk kids was $\chi^2(2, N = 46) = 3.07, p = .215$, and the chi-square for non-risk kids was $\chi^2(2, n = 42) = 5.65, p = .059$. As such, although tests failed to produce the type of evidence needed to conclude that the data provide a good fit for the hypothesized models overall, the observed outcomes provide some evidence consistent with the model.

Further evidence for these models being consistent with the data can be observed by examining additional global tests. The first test, a multiple correlation analysis, tells the strength of the relationship between each exogenous variable and the combination of the variables leading to it. Among both the high and non-risk kids, behavioral outcome efficacy (the main dependent variable in the study) was positively associated with the combination of problem solving cognitive skills, locus of control, and self-efficacy. In the case of at-risk kids, all of the exogenous variables except for problem solving cognitive skills were significantly associated with the variables preceding them (see Tables 5 and 6). As such, although all path coefficients were not significant at $p < .05$, the combined effect of these variables does seem substantial in most cases.

Table 6

Multiple Correlations for At-Risk Students

	R
Problem solving skills training	--
1. Problem solving cognitive skills	.24
2. Self-efficacy	.58*
3. Locus of control	.36*
4. Behavioral outcome efficacy	.32*

* Significant at $p < .05$.

Note. This table shows the results of four multiple correlation tests, in which numbered each row (other than row 1) indicates the results of *R* for the variable listed in that row with all of the antecedent variables listed in the rows above it. Row 1 is the simple correlation (*r*) between problem solving cognitive skills and problem solving skills training.

Table 7

Multiple Correlations for Non-Risk Students

	R
Problem solving skills training	--
1. Problem solving cognitive skills	.28
2. Self-efficacy	.23
3. Locus of control	.25
4. Behavioral outcome efficacy	.45*

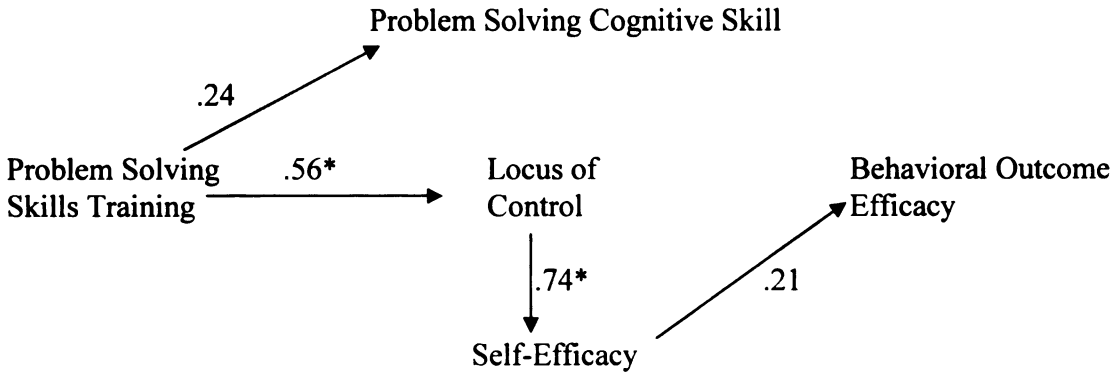
* Significant at $p < .05$.

Note. This table shows the results of four multiple correlation tests, in which each numbered row (other than row 1) indicates the results of multiple *R* for the variable listed in that row with all of the antecedent variables listed in the rows above it. Row 1 is the simple correlation (*r*) between problem solving cognitive skills and problem solving skills training.

Given indications that the variables envisioned as determinants of behavioral outcome efficacy operate in the proximal order hypothesized, I am hesitant to dismiss the hypothesized model as completely uninformative. Since the observations suggest a path between skills training and behavioral outcome efficacy mediated by locus of control and self-efficacy, a final model with fewer paths was tested. Notably, the indications of this model are stronger with the at-risk kids for whom this work has special implications. As such a final model was tested with the removal of several weak paths. The goal of the more parsimonious model was to observe the strength of associations and fit a model for at-risk kids that still represented the fundamental logic hypothesized without the residual error introduced by including weak paths in the initial model. The path between problem

solving and problem solving cognitive skill was retained due to the robustness of this relationship. Once again, this model was tested for evidence of substantial continuous paths from problem solving skills training to behavioral outcome efficacy. The final model for at-risk kids and its associated path coefficients is show in Figure 6.

Figure 6. Second Revised Model Using Only At-Risk Students, Corrected for Attenuation

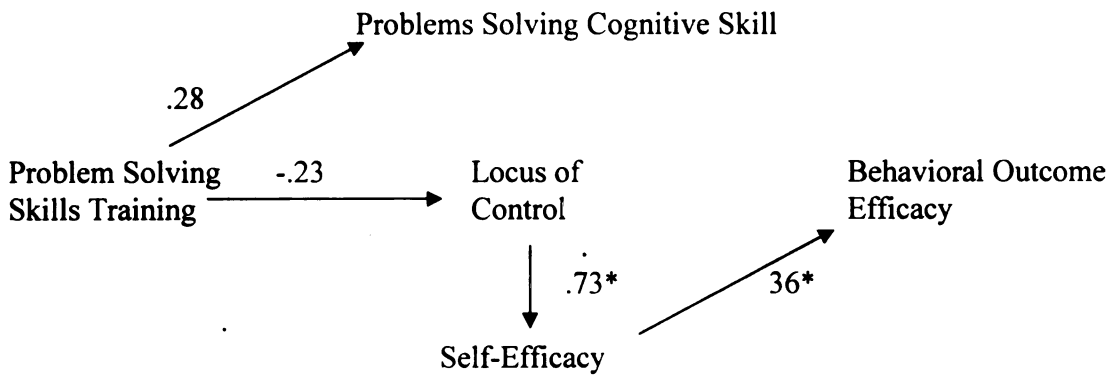


* Significant at $p < .05$, two-tailed.

This model received stronger support. Two paths (between problem solving skills training and locus of control, and locus of control and self-efficacy) were significant. The path from problem solving cognitive skills to locus of control was .56, P ($.28 < p < .84$) = .95, and the path from locus of control to self-efficacy was .65, P ($.35 < p < .95$) = .95). The other two paths approach significance. The path from problem solving cognitive skills training to problem solving cognitive skill was .24, P ($-.08 < p < .56$) = .95, and the path from self-efficacy to behavioral outcome efficacy was .30, P ($-.04 < p < .64$) =.95. The chi-square test of overall fit was highly non-significant, χ^2 (6, N = 46) = 1.32, p = .970, and no individual predicted and obtained correlations differ significantly.

For comparison purposes, the same parsimonious model was tested with non-risk students. The model and its associated path coefficients are shown in Figure 7. The results of analyses on this model also show considerable support. Two paths (between locus of control and self-efficacy, and self-efficacy and behavioral outcome efficacy) were significant. The path from locus of control to self-efficacy was .73, P ($.45 < p < 1.00$) = .95, and the path from self-efficacy to behavioral outcome efficacy was .36, P ($.02 < p < .70$) = .95. The other two (between problem solving skills training and problem solving skills training and problem solving cognitive skills) approached significance. Specifically, the path from problem solving skills training to locus of control was -.23, P ($-.57 < p < .11$) = .95, and the path from problem solving skills training to problem solving cognitive skill was .28, P ($-.02 < p < .58$) = .95. The chi-square test of overall fit was non-significant: $\chi^2(6, N = 42) = 2.13$, $p = .907$. Once again, no significant residual errors were observed between predicted and obtained correlations were observed.

Figure 7. Second Revised Model Using Only Non-Risk Students, Corrected for Attenuation



* Significant at $p < .05$, two-tailed

In order to inspect the strength of the model for all students, a final test on the parsimonious model was conducted with the entire sample of students. Figure 8 shows the model and its associated path coefficients. Table 7 shows the correlations used to test the model.

The results of tests on this model were the strongest yet. The chi-square test of overall fit was non-significant: χ^2 (6, N = 88) = 2.35, p = .885, and no significant residual errors were observed between predicted and obtained correlations. As for the path coefficients, all were significant but one, with the final path nearing significance at $p <$ .10. Problem solving skills training had a significant positive effect on problem solving cognitive skills, path coefficient = .26, P (.04 < p < .48) = .95. Locus of control continued to have a significant positive effect on self-efficacy, path coefficient = .72, P (.52 < $p <$ .92) = .95. Self-efficacy had a significant positive effect on behavioral outcome efficacy, path coefficient = .32, P (.02 $\leq \rho \leq$ .62) = .95. Finally, the path from problem solving skills training to locus of control approached significance, path coefficients = .23, P (-.01 < p < .47) = .95.

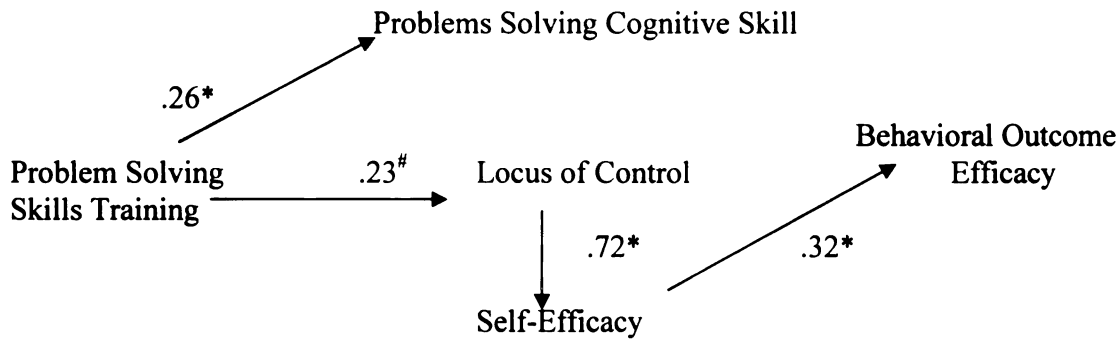
Table 8

Zero-Order Correlations Used to Calculate Parameter Estimates in Figure 8

	1	2	3	4	5
1. INDUCT	*1*	.247* .	.203	.080	.[a]
2. Problem Solving Cognitive Skill	.247* .	*1*	.107	.173	.166
3. Self-Efficacy	.080	.173	.545**	*1*	.267
4. Locus of Control	.203	.107	*1*	.545**	.217
5. Behavioral Outcome Efficacy	.[a]	.166	.217	-.267	1

Note. *. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
a. Cannot be computed because at least one of the variables is constant.

Figure 8: Second Revised Model Using Combined Sample, Corrected for Attenuation



* Significant at $p < .05$, two-tailed
# Significant at $p < .10$, two-tailed

Chapter 4

Discussion

The current study sought to examine processes relating problem-solving skills to the performance of adolescent at-risk students. This study began with a model based on the belief that both educational-risk level and problem solving skills training would influence behavioral efficacy. This influence was expected to occur both somewhat directly through their influence on self-efficacy and more indirectly through their influence on problem solving cognitive skills and cognitive skill's subsequent influence on locus of control. In the end, the results suggest that problem solving skills training does influence behavioral efficacy, but that this influence is a bit different for high and non-risk students. Although the findings clearly indicate that the combined influence on behavioral outcome efficacy resulting from problem solving skills training, problem solving cognitive skills, self-efficacy, and locus of control is significant for both non-risk and at-risk students, some aspects of this influence seem to differ for the two populations.

Whereas the affect of problem solving cognitive skill training on problem-solving skills seems similar for both groups, clear differences in the influence of problem solving skills training on locus of control and subsequent behavioral outcome efficacy are observed between the two groups. Most importantly in this regard, problem solving skills training shows a strong positive influence on locus of control for at-risk kids. No evidence of a positive affect on locus of control is found for non-risk students. Notably, with the small sample of at-risk kids, the positive path from self-efficacy to behavioral outcome efficacy did not reach the level of statistical significance required for us to conclude that heightened self-efficacy increased subsequent behavioral efficacy.

However, the positive path observed here is in line with this conclusion. Moreover, evidence that this type of heightened self-efficacy does increase subsequent behavioral efficacy can be seen in the sample of non-risk students. Finally, analysis on the combined sample of high and non-risk students shows a significant association between self-efficacy and behavioral outcome efficacy.

As stated earlier, any conclusions stemming from the results of the post-hoc analyses reported must be viewed with skepticism and used only as a guide future effort. Nevertheless, with this in mind, the results of this investigation offer food for thought. In particular, four things stand out in these findings: the influence of problem solving skills training on at-risk students, the influence of problem solving skills training on non-risk students, the influence on the combined sample, and questions about pre-existing differences between non-risk and at-risk students in terms of locus of control, self-efficacy and problem-solving skills.

The Influence of Problem Solving Skills Training on At-Risk Students

The most notable findings in this research are those concerning at-risk students. Three issues stand out here. First, the results clearly suggest that the type of problem solving skills training provided in this study can increase locus of control. Second, this increased locus of control leads to subsequent increased self-efficacy. The third and most critical issue at hand concerns outcome efficacy. And while the evidence related to this is tentative at best, there is some indication that this heightened self-efficacy may actually produce the desired behavior outcome efficacy in the at-risk students.

With regard to the first issue, this study strengthens contention that an increased locus of control may reduce the risk factors associated with educationally at-risk students since

students would no longer feel their life is subject to fate, luck, or the actions of another individual, but rather because a given act will lead to a desired outcome. Past research on at-risk high school, (Omizo, Cubberly & Omizo, 1985; Nowicki & Barnes, 1973) and undergraduate, students (Wege & Moeller, 1985) has demonstrated the problem solving skills training can lead to this outcome. This investigation extends the findings to a younger population of at-risk students for whom the results may be particularly relevant. If risk factors can be mitigated or eradicated at a younger age, students may have a lower probability of encountering failure, attrition or inadequacies with regard to their formal academic education.

When the at-risk students were provided with the problem solving skills training, they were essentially given a roadmap by which they could solve problems through the application of a systematic process. This researcher suggests that the step-by-step process of problem solving skills training may have increased their locus of control through two different (but potentially interacting) mechanisms: problem definition and milieu therapy.

The first step of the problem-solving-skills training required students to define their problems. This step may have highlighted for these students the fact that they were previously trying to solve problems in their lives by focusing on economic and/or sociological factors that they are unable to change (e.g., racism, a parent's alcoholic behavior, mental/physical/ emotional abuse from a family friend and/or relative...). When students have no ownership[7] of a problem they are bound to fail in their attempts to solve the problem. Students are also likely to feel that they have no control over their lives and what happens in it. However, training attempted to teach students to redefine problems in terms of what the student had ownership of (e.g., a smaller segment of the problem like

how a student can help to mitigate the economic independency of an alcoholic parent).When students begin to redefine problems into ones which they can solve because they have problem ownership and ones which they cannot solve because they have no problem ownership, the world may begin to seem like a more controllable environment. Students will hopefully begin to perceive the world more in terms that promote internal locus of control.

Alternatively, as mentioned above, the milieu therapy the students engaged in may have made them more open to alternative therapies and any benefits associated therein. Consequently, the at-risk students may have attended more closely to the problem solving skills training. By the very fact that the at-risk students chose to stay in the system they demonstrated that they were receptive to institutional guidance. Further, since some of their existing therapy was non-graded, these students were more used to a non-graded course, and teachers of these courses might command more respect.

Since the problem solving skills training was predicated on a foundation of problem-based learning highlighting clear connections from behavior to the resulting outcomes, students may have been lead to the realization that there is a way to control their environments. Successful problem-based learning may lead to an increased internal locus of control orientation by breaking the cycle of failure in which the at-risk student may have found her/himself.

With regard to the second issue, a strong positive path from locus of control to increased self-efficacy indicates that it is possible to improve the levels of self-efficacy among at-risk students. The heightened levels of self-efficacy may reduce risk factors

among at-risk students by increasing the student's perceived confidence levels in her/his ability to perform a given action.

Once students see that a given action can lead to a desired outcome (internal locus of control), they have to next believe in their ability to perform the action (self-efficacy). If this second step does not occur, students may display attributes of a defensive external (Bandura, 1982) wherein a person believes that a given act will lead to a given outcome, but that s/he does not have the ability to perform the required behavior. In order for belief in ability to occur, a clear demonstration must be made to explicitly highlight the student's ability to perform the desired action. Such 'mastery experiences' have been demonstrated as the most effective ways to create a strong sense of self-efficacy (Bandura, 1982; Pajares, 1996). Specifically, students have to either successfully execute a desired activity, or watch either a similar other or someone held in high esteem succeed in the activity through perseverance (Bandura, 1986).

In the present study, the whole problem solving skills training program was designed to create situations that lead to repeated student-initiated problem solving success. Each activity was designed to create situations where students successfully mastered the exercise. Specifically, when problem based learning was used, problems had unique characteristics: problem relevance to student's life; problem ownership by students; no one correct problem answer; problem definition, idea generation/evaluation/resolution; a chance to test the skills in a safe environment. Further, because there were systematic steps associated with the problem solving, students no longer had to feel that either their efforts or their successes would be random. They had explicit routines they could engage in to successfully solve – or master -problems. All of the above may have help at-risk

students to increase confidence in their ability to perform a given action and led to increased self efficacy.

With regard to the last issue, there is some indication that heightened self-efficacy may actually produce the desired behavior outcome efficacy in the at-risk students. Although these indications must be viewed with skepticism as they are based on revised models with significant findings found in tests of the combined samples, the potential benefits are so advantageous that future efforts should investigate this possibility more carefully.

The potential to increase behavior outcome efficacy among at-risk students has huge ramifications. Because the problem solving attempts of at-risk students often lack logical development, thoroughness and sufficient effort (Blum & Spangehl, 1982), they may, in fact, have less ability than other students to solve the acute and/or chronic problems they encounter in their life. One of the primary causes of their inability to successfully problem solve lies in the fact that at-risk students frequently lack effective problem solving structures (Blum & Spangehl, 1982; McCluskey, Place, McCluskey & Treffinger, 1998, p3). Any increases in behavior outcome efficacy resulting from a systematic procedure of problem solving skills training, would go a long way to help reduced risk factors associated with these students.

The Influence of Problem Solving Skills Training on Non-Risk Students

In addition to the implications for at-risk students, the findings in this study are of consequence for non-risk students as well. Once again, three issues stand out. First, though evidence of trainings' influence on non-risk students in this study is weak, evidence that the influence here differs from at-risk students is strong. Second, there is

strong evidence that locus of control increased self-efficacy. Third, subsequent to locus of control's influence on self-efficacy, there is convincing evidence that self-efficacy increased behavioral outcome efficacy.

The first issue for non-risk students is that problem solving skills training may have increased risk factors associated with non-risk students, as it produced a slightly negative, though not significant, decrease in locus of control. The training may account for this surprising finding in the following way: Non-risk students are better general problem solvers than are at-risk students (Houtz et. al, 1973). Although these students often achieve the correct answers, the process that they utilize to do so may be quite intuitive. When a formalized problem-solving technique is taught, the non-risk students may become cognizant not only of the multiple steps involved in successful problem solving, but of all the things that could possibly go wrong or be unconsidered, ultimately effecting the end result. Non-risk students may thus begin to second guess their ability to control their world as they become cognizant that any one act will not lead to a given outcome, but rather, that it takes multiple acts working in conjunction with one another to achieve a desired outcome. This is not necessarily a long term change, but may exist only during the height of the problem solving learning curve. Longer term testing should be done to establish this fact. Of course, as indicate above, evidence that problem solving skills training decreases locus of control for non-risk students is weak, with a path of -.23, $P(-.57 < \rho < .11) = .95$. At the same time, the influence clearly differs for non-risk versus at-risk students, where the path for at-risk students of .56, $P(.28 < \rho < .84) = .95$, has a confidence interval that does not overlap with the interval for non-risk students.

With regard to the second issue, the strong positive path from locus of control to increased self-efficacy indicates that it is also possible to improve the levels of self-efficacy among non-risk students. The rational for how locus of control could influence self-efficacy is consistent for both high and non-risk students. The observable success of the problem based learning activities might have created a sense of mastery in these students that positively influences their self-efficacy. In addition, the finding that locus of control may increase self-efficacy in educationally non-risk students has ramifications similar to those for at-risk students, since increases in self-efficacy may increase confidence levels with regard to the student's perceived ability to perform a given action. These students may subsequently find themselves with more confidence to act in the face of challenging scholastic or life experiences.

The last issue for educationally non-risk students was that self-efficacy led to a positive change in behavioral outcome efficacy. In this case, the facilitating influence is clear even from separate analyses on the subgroup sample. This finding is important as the goal of the study was to have students not only learn a new and beneficial skill, but also to utilize it in ways to resolve difficult and challenging problems which were negatively affecting their lives. The finding that self-efficacy increased desired outcome behaviors is consistent with results of research on non-risk students found by Sewell and St. George (2000). That study showed that high-efficacy students (defined here as non-risk) claimed to recognized the strategic value of their newly learned skills for problems found both within and without of the classroom. Self-reports from these students also indicated that they felt they were likely to use the skills outside of the classroom.

Moreover, the students spoke confidently about their ability to use the problem-solving skills effectively, and were able to clearly articulate each step.

The Influence of Problem Solving Skills Training on Combined Sample

The combined sample of at-risk and non-risk students produced two notable findings. The first finding of a significant, positive path from problem solving skills training to problem solving cognitive skills clearly suggests that the type of problem solving skills training provided in this study can increase problem solving cognitive skills in students. Although the path from problem solving skills training to problem solving cognitive skills was not significant in either of the revised models using only at- or non-risk students, we might attribute this to small sample size used in analyses on each subgroup. There were only 46 students in the at-risk model and 42 students in the non-risk model. The fact that it reached a level of significance in the combined model is probably can be attributed to the combined model sample equaled 88. As sample size increases, the statistical power of your analyses increases, reducing the probability of Type II error.

The implication of this significant path essentially means that students have learned the tools taught in the problem solving skills training. This is important because it means that prior to student engagement in problem-solving attempts they will have first internalized the following skill sets: how to identify a problem; how to generate ideas; how to evaluate ideas, and; how to plan for action. A fundamental goal of this study was to provide students with tools thought useful to help resolve the problems they encounter in their lives. It was imperative that the students first learned the skills so that they could then attempt to employ them. Although the evidence available in this study does not show

a clear link between possession of these skills and outcome efficacy, the low power stemming from small the subgroup samples makes it seems premature to dismiss this possibility. As Figure 5 shows, the path from problem solving cognitive skills to behavioral outcome efficacy among non-risk students was .25, P ($-.09 < \rho < .59$) = .95. Though this path falls just below the critical cut-off level, it would not be surprising to see this change with a larger sample. We might still expect that in learning the skills, all students could reduce risk factors associated with them because they will have the knowledge of a systematic process for problem solving. This is especially important for at-risk students since they typically lack the skills to negotiate and resolve many of the academic and social problems they experience in their lives.

The second notable finding is the ability of self-efficacy to produce the desired behavior outcomes in the combined sample. Since the goal of the study was to help students resolve the problems they encounter in their lives, this path helps establish that this training paradigm was successful.

The strong positive path from self-efficacy to behavior outcome efficacy in the combined model indicates that it is possible to improve the levels of outcome efficacy among at-risk students. This is an important finding since self-efficacy is a critical factor determining whether coping behaviors will be initiated, how much effort will be expended, and how long an effort will be sustained in the face of obstacles and aversive experiences (Bandura, 1982, 1986). The path from self-efficacy to behavior outcome efficacy might suggest that confident students are more likely to employ their problem solving skill sets, for longer periods, in the face of real challenges. This is of vital importance for any student, but especially for at-risk students whose problem solving

attempts lack logical development, thoroughness and sufficient effort (Blum & Spangehl, 1982).

As mentioned above, though educationally at-risk students did not show a significant path from self-efficacy to behavioral outcome efficacy in their individual model, the path approached significance. The fact that the influence from self-efficacy to behavioral outcome efficacy on the combined samples was significant, and that the pattern for the at-risk and non-risk subgroups were so similar gives us some indication that that the influence might exist for at-risk students also. As was the case with the influence of problem solving skills training on problem solving cognitive skills, falling just short of the critical cut-off level may be explained as a function of sample size. Once again, it would not be surprising to see this change with a larger sample.

Caveats on the interpretation of weak paths and respecified models are always well heeded. Nevertheless, the enormity of the potential ramifications associated with the positive findings of this study makes it difficult simply dismiss these findings. It seems well worth additional effort to determine if risk factors for all students – but especially for at-risk students – can be mitigated through the thoughtful employment of the problem solving skill sets capable of resolving the myriad problems encountered in their lives. Future efforts should look to replicate, and further extend this research.

Existing Differences Between Non-Risk and At-Risk Students

Pre-induction measures of problem solving cognitive skills, self-efficacy and locus of control were analyzed with regard to both high and non-risk students. The pre-induction scores were included to examine the extent to which the subgroup samples used

in the study reflected the populations they were intended to represent, not for the purpose of providing base-line scores for comparison in change scores for analyses.

Results indicated that the high and non-risk students differed on pre-induction measures of both self-efficacy and locus of control. The at-risk students had significantly less pre-test self-efficacy than did the non-risk students. Likewise, the at-risk students also scored significantly lower in locus of control. These results were consistent with regard to what the literature suggested should have occurred.

Existing literature also leads one to conclude that non-risk students are typically more effective problem solvers, and should thus have better problem solving cognitive skills than at-risk students. Nevertheless, there was no difference in problem solving cognitive skills prior to the manipulation.

Although research is split with regard to findings vis-à-vis differences on pre-induction measures of problem solving (Wege & Moeller, 1995 did find differences and Jason, 1980; Tellado, 1984; Omizo, Cubberly & Omizo, 1985 did not find differences), one explanation for the finding in this study may be due to the location from where the samples were generated. For instance, both the at-risk schools utilized in this study are "last stop" schools for challenging students. When children are non-functioning in a traditional school, they will be directed to a school like the Jerome Diamond Center or the Merle Levine Academy. In both centers milieu therapy is practiced. There is a focus upon student responsibility, whereby the students are cognizant of their problems and are in an active protocol to improve upon known deficiencies. Problem solving is an active and on-going endeavor. The result of such an endeavor may work toward evening the playing field between at-risk and non-risk students with regard to problem solving.

Limitations

Several limitations in the execution of this research must be considered when determining the degree of confidence we can have in the outcome of study. These include design constraints, training protocol, and the relevance of training to student concerns.

Design Constraint.

Specific limitations associated with this study's design constraints stem from concerns with the size of the sample, the class size, the duration of the course, course interruptions, the sample distribution, and the cross-sectional nature of the design.

Sample size. The sample size used in this study was minimal. A larger sample size would have provided a more reliable test of the association among variables in the hypothesized model. Initially, the Toronto District Public School Board had consented to participate in the study. However, due to contract negotiation talks between the public school board and the teacher's association, the board had to withdraw its consent until the contract negotiations were completed. The researcher was forced to solicit private schools for their participation. Although over thirty schools were contacted, only four schools agreed to participate in the study.

Class size. The class size used in this study was also an issue of concern. Most of the classes exceeded the recommended size of 6 -10 people ideally used for creative problem solving. However, as the classes came as intact units and the schools could not separate the students into smaller sizes, the researcher had no choice in this matter. In the upper end of the recommended range, and certainly when this size is exceeded, students receive less individualized attention. The instructor did not have enough contact with the students during the course of the treatment to know how they were really responding to

the program. Further, in a course where the text is based largely on the participation of the students, larger classes provide more opportunities for students to disengage via free riding, production blocking and social loafing. Each of these should minimize the effectiveness of the verbal text collectively created by the students. The resulting data will indicate diminished results of the educational program.

Free riding refers to a communication mechanism whereby some group members will withhold their contributions and rely on other group members to accomplish the work (Diehl & Stroebe, 1987). It increases a group members' perception that her/his contribution is dispensable and unnecessary for the group's success (Harkins & Petty, 1982; Van de Ven & Delbecq, 1971).

Production blocking refers to another communication mechanism whereby group members compete for air time with regard to contributory opportunities in group exchanges due to the fact that only one person can speak at a time (Diehl & Stroebe, 1987). Some students will attempt to hog the floor and others will barely speak. Production blocking invokes a high perceived cost of contributing because while waiting to speak students may forget what they wanted to say, ignore what others are saying because they are rehearsing their ideas, suppress their ideas because later they seem less relevant, original or redundant, and not generate new ideas because they are constantly listening to others so as to not risk missing contributions (Gallupe, Cooper, Grise, & Bastianutti, 1994.

Social loafing occurs when some people exert less effort when they pool their efforts toward a common goal than when they are individually accountable (Valacich,

Dennis & Nunamaker, Jr., 1992). When a student is able to social loaf in a course, there is less incentive for her/him to contribute to the course.

Course interruptions. Course interruptions broke the continuity of the planned teaching schedule. The instructor required emergency surgery and was absent for one week in the middle of the treatment. A second class was further interrupted at both Fieldstone Day School and the Jerome D. Diamond Center due to programmed events at the academic institutions. Although the treatment time was simply extended by one week in each instance, the discontinuities interrupted both the flow of learning and the momentum of the class.

Cross-sectional design of study. The cross-sectional nature of the design limited the ability to observe any lasting or delayed influence of training on the outcome variables in this study. This limitation was created by the inability to conduct follow-up measures at a later point in time. A longitudinal design would have allowed the researcher to observe change occurring in those students who allowed the information to geminate for a while before using it as well as those who might have used it right away and then ceased. However, the Jerome D. Diamond Center and the Fieldstone Day School could only schedule the intervention in the second half of the Spring school semester (ending the week prior to final exams). There was no opportunity to conduct follow-up measures. The researcher was discouraged by both the Jerome D. Diamond Center and the Fieldstone Day School with regard to a post-post test as the Schools felt that the response rate of their students to a self-report questionnaire with a stamped returned envelope would be insignificant.

Training Protocol

Several issues associated with training protocol placed limitations on this research. These included deficient access to relevant student files, the inability to mandate homework completion, and lack of cross-functional tool usage by students.

Access to student files. Deficient access to relevant student files prevented any tailoring of the problem solving skills training intervention to student learning styles. The instructor was not legally permitted access to the files of the at-risk students as she was not a staff member at either the Jerome D. Diamond Center or the Fieldstone Day School. Moreover, no one made the instructor aware of these needs. Consequently, she was unable to adapt class discussions to fit the particular needs of certain students. For example, students who suffer from disgraphia can only internalize written and not oral information. With no ability to modify training to meet such needs, it is very likely that some of the students were unable to fully comprehend all of the problem-solving techniques taught by the program and were thus unable to practice certain exercises to the extent for which the program had called.

Homework completion. The inability to mandate homework completion restricted full implementation of the training intervention. The instructor had no recourse if the students did not complete their homework since the course was not graded. Although both the Jerome D. Diamond Center and the Fieldstone Day School attempted to institute homework protocols for this course, they were largely unsuccessful. Consequently, homework duotangs were regularly lost and diaries were not completed. The students were not able to fully benefit from either the teaching sessions or the homework assignments.

Cross-functional tool usage. The lack of cross-functional tool usage by students hampered the internalization of skills taught in the intervention. There was no programmed carry-over to other academic classes or home-life that could help instill cross-functional tool usage. The teachers and Mental Health Care Workers in the treatment schools were not trained in the problem-solving skills. They were unable to model the tools by example, or effectively incorporate stratagems for helping the students utilize the problem-solving skills in their classes to solve academic and real world problems. Teachers and Mental Health Care Workers were non-participatory during training sessions. (Staff at the Fieldstone Day School generally chose to utilize it as spare time by engaging in prep-time activities for future classes. The Mental Health Care Workers from the Jerome Diamond Center attended class but largely maintained an observer status). These professionals did not get to practice utilizing the tools. Parents were not cognizant of the skills that their children were learning and were unable to help their children utilize the skills in the home environment. The instructor only utilized the Teachers and Mental Health Care Workers in the last two classes to help generate specific problem examples that were relevant to the students with whom she taught. Brainstorming sessions with professional staff and interested parents are needed to help identify ways for students to utilize these skills in a variety of settings.

Training Relevance to Student Concerns

Limitations associated with the relevance of training to student concerns include inadequate application of techniques to real-world problems, and the lack of self-perceived responsibility for action.

Application of training techniques. Inadequate application of techniques to real-world problems limited the potential for students to benefit from the training intervention. Students did not apply the problem-solving techniques to their real world problems in the manner to which the researcher had planned. Three plausible explanations are given. First, it is possible that students did not take this course as "seriously" as they did their graded courses. Homework assignments were left largely uncompleted, and students missed important opportunities to internalize the skills through practice on their individual real life problems. Second, in the non-risk school, the instructor encountered classroom norms of non-participation, apathy and class disruption. Students who were interested, and actively participating in the course, were often harassed by other class members for doing so. Considerable time was spent handling disciplinary problems with students. Although one would have expected the non-risk students to benefit more from the training program, the necessary time spent on classroom management meant that the instructor was often compelled to hurry through some units. As a result of having to hurry through some units the students did not get the opportunity to practice certain exercises to the extent for which the program had called. Third, students may have had other, less time intensive, more familiar problem-solving techniques which they preferred and so did not feel the need to apply the treatment skills to their own real-life problems.

Responsibility for action. The lack of self-perceived responsibility for action was apparent particularly among non-risk students. The Jerome D. Diamond Center and the Merle Levine Academy are schools that actively promote the acknowledgement and ownership of problems in order to help student's resolve them. Consequently, the students in the at-risk schools were, as a group, cognizant of their problems and were in

an active protocol to improve upon known deficiencies. This was found to be in direct opposition of the students in the non-risk schools who, as a group, did not acknowledge nor take ownership of personal problems. Neither the type of school from which the sample was drawn, nor the effects of acknowledgement and problem ownership, was accounted for by the logic underpinning this research. Expected results may have been confounded by this oversight.

Recommendations for Future Research

The observations recorded during this investigation along with the researcher's own experience during training give rise to several suggestions for the future. These include recommendations for changes in future intervention, recommendations for those working with at-risk students, and recommendations of future variables for study.

Recommendations for changes in future interventions. Future research should make amends for the short comings of this study relating to the design constraints identified in the limitations section (sample size, class size, course interruptions, sample distribution, and cross-sectional design). Specifically, attempts to replicate this study should both be conducted with a larger N, and be longitudinal in nature. The larger N will for allow greater accuracy of results. The longitudinal design is important as some students will let the information germinate for a while before using it and others might use it right away and then cease. These cases will not be identified in a pre-post test model. Class sizes for the intervention should be capped at 10 people and the course should be approximately 15 sessions long. Finally, cross checking is necessary when identifying potential subject pools to ensure that a school population really is as

substantially non-risk as it claims, as opposed to a higher risk school population masquerading as a non-risk one (a la the Fieldstone Day School).

Recommendations for those working with at-risk students. Future research should make amends for the shortcomings of this study relating to the design protocol identified in the limitations (inability to mandate homework completion and cross functional tool usage). The intervention must consist of a graded course where class participation, homework and an exam or essay constitute the basis for the final mark. A graded course will force the students to utilize the problem-solving techniques, thus giving them a chance to internalize the skills through practice on their individual real life problems.

In order to facilitate ease of the student's application of the problem-solving techniques to their unique problems, cross-functional tool usage must be employed. The following recommendations are designed specifically for those working with at-risk students. Teachers, Mental Health Care workers and interested parents should be trained in the problem-solving skills. They should be able to model the tools by example, participate in the training sessions, and effectively incorporate stratagems for helping the students utilize the problem-solving skills in their classes and home environments to solve academic and real world problems. Brainstorming sessions should be held with teachers, Mental Health Care workers and parent group participants to generate specific problem examples that will be relevant to the students, and to identify how to best aid students in skill utilization in a variety of settings. Evaluation and follow-up measures of student problem solving behavior should attempt to employ parent, teacher and peer ratings to observe program effects over time, and to determine whether participants are applying the skills learned in the training sessions to everyday life. Finally, in order to

mitigate both resistance and confusion associated with the learning of a new technique, teachers, Mental Health Care workers and parent group participants should employ enough flexibility to permit students to use (and/or modify) a problem-solving technique they are currently familiar with, instead of forcing students to learn an entirely new system.

Recommendations of future variables for study. If students are to be encouraged to solve problems and make better decisions, they should also be encouraged to discuss more effectively their decisions and their decision rational. Although not tested in this model, future research could include communication competence as an outcome measure. Increased communication competence should result as a by-product of the structured cognitive process by which problem solvers are engaged. The structured process should enable the problem solver to better communicate to others the decisions made and the rational behind those decisions.

Closing Thoughts

Discussions between the researcher and Drs. Treffinger and McCluskey (two of the leading North America researchers in the area of problem solving and at-risk youth) highlighted the need for planned interventions for at-risk students that focus upon the training of problem-solving techniques, and the applicability of these techniques to the real life problems of at-risk kids. Drs. Treffinger and McCluskey recognized problem solving as important for study, because teaching problem-solving skills to at-risk kids has great accrued benefits. Positive results could produce interventions that are more affordable and sustainable than the more complex social programs discussed earlier in the

paper like Second Chance or the Lost Prizes Project. Few studies of this sort have ever been conducted with at-risk students at the junior and high school levels.

Work must continue in this field as there is a paucity of outcome research on school-based group treatment with at-risk junior and senior high school students. Necessity for such work was established over a quarter of a century ago. In 1975, Feldhusen and Treffinger surveyed over 400 teachers from five different cities with regard to the subject of at-risk students. They found that: 60% of teachers believe disadvantage students not only need instruction in creative thinking and problem solving, they also need different materials and/or methods of instruction which are directly related to their interests and backgrounds; 96% of teachers believe class time should be used for instruction in creative thinking and problem solving; 50% of teachers believe that in addition to the context of curricular areas, specific class time, ranging from 15 - 60 minutes a day, should be used for instruction in creative thinking and problem solving. That said, 67% of teachers in the study expresses very little knowledge about special methods for fostering creativity and problem solving, and 19% said that they knew nothing at all about special methods.

In discussions with the Director of the Teacher's College, Faculty of Education, at York University, Toronto, Canada, this researcher was informed that no mandatory courses exist in Canada or the United States which stipulate the organized learning of specific methodologies for teaching creativity and/or problem solving. In fact, while there is likely to be some course of this type being taught at some Teacher's college somewhere in North America, the Director stated that she was unaware of one.

In the world of at-risk kids, even "the US childcare system has gathered minimal information from its clients of childcare services regarding the influence of programs in which they participated...it operates largely on assumption and tradition" (Brown, 1997). This negates the very real tangible costs associated with losing at-risk youth from the school system. "From a purely monetary perspective, Forbis-Jordan and Lyons (1992) estimated that the drop-out phenomenon results in $71 billion in lost taxes, $3 billion in increased costs for unemployment and social assistance, and $3 billion in costs as a result of crime" (cited from McCluskey, Baker, O'Hagan, & Treffinger, 1998). These numbers, which do not even begin to address the intangible aspects of the squashed promise inherent in all human beings, would only have increased in the intervening years. Studies must continue wherein at-risk students are taught the skills to not only solve their problems more effectively, but to also to make better decisions.

Endnotes

1. Examples of problem solving approaches which are frequently used for training purposes include: the Creative Problem Solving Group - Buffalo; the Purdue Creativity Program; the Chicago Institute Training Kit; Synectics; and CoRT.
2. A barrier is anything that interferes with one's ability to solve a problem.
3. Since Phares (1957), the following criticisms have been made with regard to the construct: the scale is not composed of a single dimension, but rather consists of a number of control-related beliefs (Fiske & Taylor, 1991); the scale may be more suited to white middle-class norms and values than to the values of minority-group members or lower social classes (Strickland, 1988); the internal locus of control items includes items that confound locus and ability (Weiner, 1986, cited from Fiske & Taylor, 1991, pp. 87); and, that there is greater diversity among externals than internals, due to the many different ways to have an external control orientation (Hersh & Scheibe, 1967).
4. The Nowicki-Strickland scale, which will be used in this study, has been extensively tested on members of lower socioeconomic positions (Nowicki, Jr. & Strickland, 1973). While results indicate that internality is significantly related to higher occupational levels, especially for males (Nowicki, Jr. & Strickland, 1973), the questionnaire is nevertheless shown to be valid and reliable when used on people of different ethnicities and socio-economic levels (Nowicki, Jr. & Strickland, 1973, Nowicki & Barnes, 1971).
5. Examples of divergent thinking techniques are Brainstorming (Osborn, 1953), Attribute Modifying (Davis, 1992), SCAMPER (Eberle, 1971), and Forced Relationships (Parnes, Noller & Biondi, 1977).
6. Examples of convergent thinking techniques are Advantages, Limitations, Unique Opportunities and Overcoming Limitations (ALUO) (Isaksen & Treffinger, 1985), and Highlighting (Treffinger, Isaksen & Firestien, 1982).
7. Ownership of a problem occurs when an individual is in a position to control change, to institute change, or to be responsible for changes (via time, money, personnel, decision making ability) with regard to the problem in question. If the problem solver cannot do these things, s/he has no ownership of the problem. The problem is thus not her/his problem to solve. However, it is possible that the problem solver could reframe the question in such a way so that s/he can control an aspect of the problem and take ownership for that part. (For example, "how do I stop X from using addictive drugs?" is a problem statement where the problem solver may have no control over the problem and cannot institute changes. However, "how can I behave when X is using addictive drugs?" may be a problem statement where the problem solver does have some personal control and is in a position to make changes.)

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Appendix 1

Heppner & Petersen's (1982) Personal Problem-Solving Inventory

Name _____

Age _____

Grade _____

School _____

This is a questionnaire to find out the way in which different people think about problem solving. Each question consists of 5 possible responses. Please select the one response that you believe to be the case as far as you're concerned. Be sure to select the one you actually believe to be more true than the one you think you should choose or the one you would like to be true. This is a measure of personal belief: obviously there are no right or wrong answers.

Please answer these items carefully by circling the response that corresponds to your answer. Do not spend too much time thinking about any one item. Be sure to find an answer for every choice. Also, try to respond to each item independently when making your choice; do not be influenced by your previous choices.

1. I am usually able to think up creative and effective alternatives to solve a problem.

1	2	3	4	5	6
strongly disagree					strongly agree

2. I have the ability to solve most problems even though initially no solution is immediately apparent.

1	2	3	4	5	6
strongly disagree					strongly agree

3. Many problems I face are too complex for me to solve.

1	2	3	4	5	6
strongly disagree					strongly agree

4. I make decisions and am happy with them later.

1	2	3	4	5	6
strongly disagree					strongly agree

5. When I make plans to solve a problem, I am almost certain that I can make them work.

1	2	3	4	5	6
strongly disagree					strongly agree

6. Given enough time and effort, I believe I can solve most problems that confront me.

1	2	3	4	5	6
strongly disagree					strongly agree

7. When faced with a novel situation I have confidence that I can handle problems that may arise.

1	2	3	4	5	6
strongly disagree					strongly agree

8. I trust my ability to solve new and difficult problems.

1	2	3	4	5	6
strongly disagree					strongly agree

9. After making a decision, the outcome I expected usually matches the actual outcome.

1	2	3	4	5	6
strongly disagree					strongly agree

10. When I become aware of a problem, one of the first things I do is to try to find out exactly what the problem is.

1	2	3	4	5	6
strongly disagree					strongly agree

11. When a solution to a problem was unsuccessful, I do not examine why it didn't work.

1	2	3	4	5	6
strongly disagree					strongly agree

12. When I am confronted with a complex problem, I do not bother to develop a strategy to collect information so I can define exactly what the problem is.

1	2	3	4	5	6
strongly disagree					strongly agree

13. After I have solved a problem, I do not analyze what went right or what went wrong.

1	2	3	4	5	6
strongly disagree					strongly agree

14. After I have tried to solve a problem with a certain course of action, I take time and compare the actual outcome to what I thought should have happened.

1	2	3	4	5	6
strongly disagree					strongly agree

15. When I have a problem, I think up as many possible ways to handle it as I can until I can't come up with any more ideas.

1	2	3	4	5	6
strongly disagree					strongly agree

16. When confronted with a problem, I consistently examine my feelings to find out what is going on in a problem situation.

1	2	3	4	5	6
strongly disagree					strongly agree

17. When confronted with a problem, I tend to do the first thing that I can think of to solve it.

1	2	3	4	5	6
strongly disagree					strongly agree

18. When deciding on an idea or possible solution to a problem, I do not take time to consider the chances of each alternative being successful.

1	2	3	4	5	6
strongly disagree					strongly agree

19. When confronted with a problem, I stop and think about it before deciding on a next step.

1	2	3	4	5	6
strongly disagree					strongly agree

20. I generally go with the first good idea that comes to my mind.

1	2	3	4	5	6
strongly disagree					strongly agree

21. When making a decision, I weight the consequences of each alternative and compare them against each other.

1	2	3	4	5	6
strongly disagree					strongly agree

22. I try to predict the overall result of carrying out a particular course of action.

1	2	3	4	5	6
strongly disagree					strongly agree

23. When I try to think up possible solutions to a problem, I do not come up with very many alternatives

1	2	3	4	5	6
strongly disagree					strongly agree

24. I have a systematic method for comparing alternatives and making decisions.

1	2	3	4	5	6
strongly disagree					strongly agree

25. When confronted with a problem, I do not usually examine what sort of external things my environment may be contributing to my problem.

1	2	3	4	5	6
strongly disagree					strongly agree

26. When I am confused by a problem, one of the first things I do is survey the situation and consider all the relevant pieces of information.

1	2	3	4	5	6
strongly disagree					strongly agree

Appendix 2

Bosscher & Smit (1998) General Self-Efficacy 12 (GSES-12) adapted from Sherer, Maddux, Mercandante, Prentice-Dunn, Jacobs & Rogers (1982) General Self-Efficacy Scale

Name _____

Age _____

Grade _____

School _____

This is a questionnaire to find out the way in which different people think about problem solving. Each question consists of 5 possible responses. Please select the one response that you believe to be the case as far as you're concerned. Be sure to select the one you actually believe to be more true than the one you think you should choose or the one you would like to be true. This is a measure of personal belief: obviously there are no right or wrong answers.

Please answer these items carefully by circling the response that corresponds to your answer. Do not spend too much time thinking about any one item. Be sure to find an answer for every choice. Also, try to respond to each item independently when making your choice; do not be influenced by your previous choices.

1. If something looks too complicated I will not even bother to try it.

1	2	3	4	5
strongly disagree				strongly agree

2. I avoid trying to learn new things when they look too difficult.

1	2	3	4	5
strongly disagree				strongly agree

3. When trying to learn something new, I soon give up if I am not initially successful.

1	2	3	4	5
strongly disagree				strongly agree

4. When I make plans, I am certain I can make them work.

1	2	3	4	5
strongly disagree				strongly agree

5. If I can't do a job the first time, I keep trying until I can.

1	2	3	4	5
strongly disagree				strongly agree

6. When I have something unpleasant to do, I stick to it until I finish it.

1	2	3	4	5
strongly disagree				strongly agree

7. When I decide to do something, I go right to work on it.

1	2	3	4	5
strongly disagree				strongly agree

8. Failure just makes me try harder.

1	2	3	4	5
strongly disagree				strongly agree

9. When I set important goals for myself, I rarely achieve them.

1	2	3	4	5
strongly disagree				strongly agree

10. I do not seem capable of dealing with most problems that come up in my life.

1	2	3	4	5
strongly disagree				strongly agree

11. When unexpected problems occur, I don't handle them very well.

1	2	3	4	5
strongly disagree				strongly agree

12. I feel insecure about my ability to do things.

1	2	3	4	5
strongly disagree				strongly agree

Appendix 3

Nowicki & Strickland (1973) Locus of Control Scale for Children Abbreviated Scale (B) for Grades 7 - 12

Name _____

Age _____

Grade _____

School _____

This is a questionnaire to examine the personal beliefs of students. There are no right or wrong answers. Be sure to select the one you actually believe to be more true than the one you think you should choose or the one you would like to be true.

Please answer these items carefully by marking the yes or the no that corresponds to your answer. Do not spend too much time thinking about any one item. Be sure to find an answer for every choice. Also, try to respond to each item independently when making your choice; do not be influenced by your previous choices.

1. Do you believe that most problems will solve themselves if you just don't fool with them?

   Yes_____ No_____

2. Are you often blamed for things that just aren't your fault?

   Yes_____ No_____

3. Do you feel that most of the time it doesn't pay to try hard because things never turn out right anyway?

   Yes_____ No_____

4. Do you feel that most of the time parents listen to what their children have to say?

   Yes_____ no_____

5. When you get punished does it usually seem it's for no good reason at all?

   Yes_____ No_____

6. Most of the time do you find it hard to change a friend's (mind) opinion?

   Yes_____ No_____

7. Do you feel that it's nearly impossible to change your parent's mind about anything?

   Yes_____ No_____

8. Do you feel that when you do something wrong there's very little you can do to make it right?

   Yes_____ No_____

9. Do you believe that most kids are just born good at sports?

   Yes_____ No_____

10. Do you feel that one of the best ways to handle most problems is just not to think about them?

Yes_____ No_____

11. Do you feel that when a kid your age decides to hit you, there's little you can do to stop him or her?

Yes_____ No_____

12. Have you felt that when people were mean to you it was usually for no reason at all?

Yes_____ No_____

13. Most of the time, do you feel that you can change what might happen tomorrow by what you do Today?

Yes_____ No_____

14. Do you believe that when bad things are going to happen they just are going to happen no matter what you try to do to stop them?

Yes_____ No_____

15. Most of the time do you find it useless to try to get your own way at home?

Yes_____ No_____

16. Do you feel that when somebody your age wants to be your enemy there's little you can do to change matters?

Yes_____ No_____

17. Do you usually feel that you have little to say about what you get to eat at home?

Yes_____ No_____

18. Do you feel that when someone doesn't like you there's little you can do about it?

Yes_____ No_____

19. Do you usually feel that it's almost useless to try in school because most other children are just plain smarter than you are?

Yes_____ No_____

20. Are you the kind of person who believes that planning ahead makes things turn out better?

Yes_____ No_____

21. Most of the time, do you feel that you have little to say about what your family decides to do?

Yes_____ No_____

Appendix 4

Torrance (1966) Unusual Uses Activity (Form A) - Torrance Tests of Creative Thinking

Important: This is a measure that is interested in your first thoughts and impressions. There are no right and wrong answers. Five minutes have been allotted for this measure.

Instructions: Most people throw their empty tin cans away. But tin cans have thousands of interesting and unusual uses. In the space below, list as many of the interesting and unusual uses as you can think of. Do not limit yourself to any one tin can size. You may use as many tin cans as you like. Do not limit yourself to the uses that you have seen or heard of, think about as many possible new uses as you can. Please begin.

Appendix 5

Torrance (1966) Unusual Uses Activity (Form B) - Torrance Tests of Creative Thinking

Important: This is a measure that is interested in your first thoughts and impressions. There are no right and wrong answers. Five minutes have been allotted for this measure.

Instructions: Most people throw their empty cardboard boxes away. But boxes have thousands of interesting and unusual uses. In the space below, list as many of the interesting and unusual uses as you can think of. Do not limit yourself to any one box size. You may use as many boxes as you like. Do not limit yourself to the uses that you have seen or heard of, think about as many possible new uses as you can. Please begin.

Appendix 6

Course Evaluation

Important: I hope to use your thoughtful responses for the improvement of instruction. Many students in the future may be affected by decisions that will be based on **your** reactions to this course. Therefore, your answers and comments on this questionnaire are highly significant. Please be completely frank. This is your opportunity to help improve the course for other students. You are not being graded in this course so your answers and comments will in no way affect your grade.

Instructions: Please answer these items carefully by circling the response that corresponds to your answer. Do not spend too much time thinking about any one item. Be sure to find an answer for every choice. Also, try to respond to each item independently when making your choice; do not be influenced by your previous choices.

1. The instructor's enthusiasm when presenting course material.

1	2	3	4	5
inferior	below average	average	above average	superior

2. The instructor's use of examples or personal experiences to help get points across in class.

1	2	3	4	5
inferior	below average	average	above average	superior

4. The instructor's concern with whether the students learned the material.

1	2	3	4	5
inferior	below average	average	above average	superior

5. Your interest in learning the course material.

1	2	3	4	5
inferior	below average	average	above average	superior

6. Your general attentiveness in class.

1	2	3	4	5
inferior	below average	average	above average	superior

7. The course as an intellectual challenge.

1	2	3	4	5
inferior	below average	average	above average	superior

8. Improvement in your competence in this area due to this course.

1	2	3	4	5
inferior	below average	average	above average	superior

9. The instructor's encouragement to students to express opinions.

1	2	3	4	5
inferior	below average	average	above average	superior

10. The instructor's receptiveness to new ideas and other's viewpoints.

1	2	3	4	5
inferior	below average	average	above average	superior

11. The student's opportunity to ask questions.

1	2	3	4	5
inferior	below average	average	above average	superior

12. The instructor's stimulation of class discussion.

1	2	3	4	5
inferior	below average	average	above average	superior

13. The appropriateness of the amount of material the instructor attempted to cover.

1	2	3	4	5
inferior	below average	average	above average	superior

14. The appropriateness of the pace at which the instructor attempted to cover the material.

1	2	3	4	5
inferior	below average	average	above average	superior

15. The contribution of homework assignments to your understanding of the course material relative to the amount of time required.

1	2	3	4	5
inferior	below average	average	above average	superior

16. The instructor's ability to relate the course concepts in a systematic manner.

1	2	3	4	5
inferior	below average	average	above average	superior

17. How would you rate this instructor?

1	2	3	4	5
inferior	below average	average	above average	superior

18. I think I will be able to apply what I have learned in this course in the future:

1	2	3	4	5
strongly disagree				strongly agree

Student Instructional Rating System Form (Written Comments)

One way in which an instructor can improve her class is through thoughtful student reactions. This instructor hopes to use your responses for self-examination and self-improvement. Room has been left for comments. If you have no comment to make please leave this section blank. If you need more room to make a comment, please number your answer and write on the back of the page.

1. What did you like about the course? Why?

   Comment:_____

_____

2. What would you change about the course? Why?

   Comment:_____

_____

3. What parts of this course helped you the most (if any) and how?

   Comment:_____

_____

4. Do you have any other comments, thoughts, or suggestions, of which you would like the instructor to know?

   Comment:_____

_____

Appendix 7

Behavioral Outcome Efficacy

Important: This questionnaire asks you a bunch of questions about whether or not you have used any of the tools that you have been taught over the last couple of weeks. If you did use any of the tools, than I am interested in the circumstance under which you used them. If you did not use any of the tools, I have some questions about that too.

Many students in the future may be affected by decisions that will be based on **your** reactions to this course. Therefore, your answers and comments on this questionnaire are very important. My feelings will not be hurt if you did not use the tools, or if you did not use them very often. Please be honest, because that it the best way that I can help other kids in the future. You are not being graded by me so nothing bad can happen to you by being completely truthful.

Instructions: Please circle the response that best describes your answer to the question. Room has been left for comments. If you have no comment to make please leave this section blank. If you need more room to make a comment, please number your answer and write on the back of the page.

1. I find that I am able to think up more ideas to solve problems than before this course:

1	2	3	4	5
strongly disagree				strongly agree

2. I find that I am more able to think up unique, or unusual, solutions to problems than before this course.

1	2	3	4	5
strongly disagree				strongly agree

3. I find that I am more likely to think of different approaches for solving a problem than before this course:

1	2	3	4	5
strongly disagree				strongly agree

4. Since taking this course I find that I spend more time thinking about how I can solve a problem, rather than just using the first thing that I come up with:

1	2	3	4	5
strongly disagree				strongly agree

5. I find that I am more likely to evaluate a potential solution to a problem than I was before this course:

1	2	3	4	5
strongly disagree				strongly agree

6. I find I am better able to figure out ways to overcome weak points in my idea solutions than before this course

1	2	3	4	5
strongly disagree				strongly agree

7. I find myself less likely to avoid problems and challenges than before this course:

1	2	3	4	5
strongly disagree				strongly agree

8. I find myself better able to cope with problems than before this course:

1	2	3	4	5
strongly disagree				strongly agree

9. I find that I have more confidence in my solutions to problems than before this course:

1	2	3	4	5
strongly disagree				strongly agree

10. I find that I have more confidence that I can implement a solution than before this course:

1	2	3	4	5
strongly disagree				strongly agree

11. I find that I am more satisfied with problem outcomes than before this course:

1	2	3	4	5
strongly disagree				strongly agree

12. Were there any situations that you thought about using these tools for and didn't?

No_____ Yes_____

What situations? _____

Please explain why you didn't use the tool(s): _____

_____

13. Please rank the tools from 1 - 5 from that which you found least useful (1) to that which you found most useful (5):

_____ identifying the problem
_____ brainstorming
_____ hits/highlighting
_____ ALUO
_____ planning for action worksheet

Comment:_____

14. How often did you use the tools? (please circle)

identifying a problem	0	1-2	3-4	5+
brainstorming	0	1-2	3-4	5+
hits/highlighting	0	1-2	3-4	5+
ALUO	0	1-2	3-4	5+
planning for action worksheets	0	1-2	3-4	5+

Comment:_____

_____

15. If this course helped you to solve particular types of problems, please circle all the problem types:

- school
- work
- home
- other
- I did not use the tools outside of the course requirements

Please explain: _____

Appendix 8

Diary Worksheet

TOOL USE	TOOL NON-USE
Date _____	Date _____
I used _____ tool(s) in the following	I thought about using _____
situation_____	tool(s) in the following situation
_____	_____
_____	_____
_____	I did not use it because _____
	_____
	_____
	_____

I am satisfied with the way the problem was solved.

1	2	3	4	5
strongly disagree				strongly agree

Appendix 9

Osborn's (1963) Brainstorming Technique

Brainstorming is a group process that is used for problems that primarily depend on idea-finding. It is generally conducted as a 30-minute exercise, although it can be compressed or lengthened according to the need of the group and the complexity of the problem.

Brainstorming is not used for problems that depend on judgment or in cases where a problem only has two or three alternative solutions. Each brainstorming session should start with a clear problem statement or goal that can be used to direct the course of the meeting.

Although brainstorming can be conducted as an independent exercise, the ideal group size for a brainstorming session is between 5 -7 people. Odd numbered groups work better than even numbered groups. The ideal group should be composed of a wide variety of people. It works equally well with men or women, young or old, neophytes alone, or neophytes and veterans.

The brainstorming group includes a facilitator, a client, and a resource group. The facilitator must help to ensure that all of the participants must follow the four guidelines for divergent thinking:

a. <u>Don't judge</u>
   -from young we are trained to judge things/ideas as good or bad, hot or cold, right or wrong
   -flip-side of don't judge is to BE POSITIVE
   -means that when we come up with ideas, we don't worry about whether they are good or bad. It's important to just say what comes to your head and not worry if it's a good idea. Also, we don't say anything at all about other people's ideas.

b. Lots of ideas
-means we want to come up with at least 30 ideas or many more than that, depending what we're working on
-1st 1/3 usual ideas (brain dump)
-2nd 1/3 more unusual ideas that help to form sophisticated ideas
-3rd third - most useful and sophisticated ideas
-when we work in a group we work as a team an we try to avoid the words 'mine' or 'my idea'---each idea generated is a valuable part of the team effort , and it doesn't matter who said the idea or which ideas are selected

c. Wild & crazy
-means that we can come up with ideas that are silly, far out, and strange
-some of the best solutions to problems come out of this craziness
-it's a lot easier to tame an idea down that it is to spice it up

d. Piggyback
-means we can think of ideas off another person's ideas
-it's OKAY to copy a person's idea and to change it a bit

The facilitator explains the problem and then has several choices of how next to proceed:

(1) Traditional brainstorming: The facilitator can ask group members to raise their hands and be systematically called upon;

(2) Brainstorming with post-it notes: The facilitator can distribute sticky pads and felt pens and ask the group members to write down their ideas, in the form of a head line. Idea headlines will be passed to the facilitator to place on a flip-chart or a wall. The group members read the headline as s/he passes it to the facilitator.

Appendix 10

Identifying the Problem Technique

Identifying the problem is a specific technique used to identify a correct problem statement. It is an important step in the problem solving process because if one takes the time to solve a problem, one should ensure that it is the correct problem that is being solved. The technique can be used individually or in groups.

The problem solver writes down the problem s/he has to solve and frames it as a question. Problem stems such as "how to...", "how might...", "in what way might..." are used to open up thoughts and invite speculation. Also added to the problem stem is a statement of ownership. If the problem solver has no ownership or control of the problem, or if s/he is not in a position to make changes, then it is not her/his problem to solve and s/he should not continue. The problem solver may then want to reframe the question in such a way so that s/he can control an aspect of the problem and take ownership for that part. (i.e.: "How do I stop X from using addictive drugs" is a problem statement where the problem solver may have no control over the problem and cannot make changes. However, "how to behave when X is using addictive drugs" may be a problem statement where the problem solver does have some personal control and is in a position to make changes.)

The problem solver should look at the problem statement. Does it accurately reflect the problem. If yes, then s/he has completed this stage. If no, then the problem solver should begin to "dance with words." On a piece of paper, 5-10 words, which can be used to replace the verb (action word) and the object (objective), should be written

down in two columns which stars beneath the verb and the object in the problem statement. The words do not have to be exact synonyms. Sometimes as words are generated, the problem solver will realize that s/he actually meant something different and those words should be added to the list. This clarification is a good thing.

The problem solver should than select the words from each of the two columns that most accurately reflect his/her problem. If none of the words are correct, the problem solver should continue to generate words. If, in this process, the problem solver realizes that the entire thrust of the problem statement is incorrect, s/he should recommence the process with a new, and more accurate, problem statement.

Appendix 11

Treffinger, Isaksen & Firestien's (1982) Highlighting Technique

At the end of a divergent thinking[5] session a group may be left with a lot of options, ideas, or possibilities. In order to make sense of this data the facilitator should use a convergent thinking[6] tool to help make sense of the ideas. Highlighting is such a technique.

There are several ways that one can employ a highlighting technique. The first step involves a review of all of the material that was generated in the divergent thinking session. The facilitator can read aloud, or have a group member read, all of the generated ideas, options or possibilities. Alternatively, the facilitator can also ask the group members to quietly read the generated list of ideas, options or possibilities to themselves.

The second step involves the facilitator asking the client to choose the ideas, options or possibilities that s/he finds most promising or intriguing. The facilitator puts a check mark or a sticky by the selected items if a flip chart has been used. If sticky-tape has been used, the selected items are removed to another section of the flip-chart or room. In such an instance, the group can sit quietly and watch the proceedings, or can be excused for a 5 minute break.

Alternatively, the facilitator can give each member of the group 3 - 5 sticky dots, and ask group members to place the dots by any of the ideas, options or possibilities which they deem most promising or intriguing. (In order to avoid bias, it helps to have the group members write the number of their hit down on the sticky, and then when everybody has finished selecting their items, the sticky dots are placed on the appropriate

numbers. This method avoids a growing clustering bias to influence the choice of hits made by group members. Writing the numbers on the sticky dots prior to placing them on the board ensures that group members stay true to their selections). The sticky dots are added up and the hits with the greatest number of sticky dots are selected for on-going consideration. If a flip chart is used the item is circled. If sticky tape has been used those items are removed to another section of the flip-chart or room

The third step is to take all of sticky dotted hits and place them into hot spots or clusters of similar ideas, options or possibilities. The facilitator should use a marker to make a circle around each cluster of ideas, options or possibilities. The encircled cluster should be relabeled in a headline format.

The last step involves creating a plan using the restated hot spots. The client must describe what action steps s/he sees her/himself doing next.

Appendix 12

Isaksen & Treffinger's (1985) Advantages, Limitations, Unique Opportunities Technique (ALUO)

When converging on many options, it is often the case that options that represent high novelty are overlooked, disregarded, or even openly criticized or attacked. The advantages, limitations unique opportunities technique is used to evaluate and strengthen ideas. Although the technique was first designed by Isaksen and Treffinger in 1985, in subsequent papers they have gone on to call this technique slightly different names. For the purpose of this paper, the designation of advantages, limitations, unique opportunities and overcoming limitations (ALUO) will be used.

The first step utilizes the affirmative judgment principle by examining the advantages, strong points, plusses or strengths of an idea, option or possibility first. The examination of advantages encourages active involvement in the analysis of the option and assists in avoiding the reflexive no response to novelty. The facilitator must emphasize that in order to identify the strength of the option it must be temporarily but truly be accepted for consideration. Some stretch may be involved in finding legitimate positives with regard to some ideas, options or possibilities.

Since few options, ideas or possibilities are perfect, the second step requires that the facilitator ask the group members to list the limitations, concerns, weak points or challenges associated with the idea, option or possibility. These are aspects of an idea, option, possibility or experience that are opportunities for improvement. In order to avoid a 'dump' of negatives, the group must state the limitations into a question format beginning with How to...? What might...? What if...? By having the group members turn

their limitations into questions (problem statements) the facilitator encourages the development of option by overcoming weakness through idea generation.

The third step involves the conscious consideration of new or unusual elements of options by identifying unique qualities of the idea(s), option(s) or possibility(s). These are aspects of the idea, option or possibility that may not have actually been advantages or limitations, but clearly identify novel or original features of the event. By posing the questions 'What does this option have that no other option has?' and/or 'What are some of the unique qualities or aspects to this option?' the facilitator helps to focus attention on retaining those novel aspects of the idea, option or possibility that are useful and valuable.

In the last step, overcoming limitations, the facilitator has the client and/or the group identify the limitations which s/he/they believe are most important to overcome. The facilitator can use the highlighting technique to identify the hits. Once identified, time and energy should be focused on actually developing ways to strengthen and overcome these limitations.

Appendix 93

Planning for Action and Acceptance Technique: 5 W's and an H

An idea or tentative plan of action is of no use to anyone if it simply remains in an idea format. The idea must be concretized and paired with specific actions and outcomes.

The first step a problem solver must do is determine her/his sources of assistance and resistance to the idea or action plan. Key questions which must be answered are the 5 W's: WHO, WHAT, WHERE, WHEN and WHY.

The key words that are used with the 5W's and an H are What about... What if... What else... What other?

Who are the people who can help you put your plan into action? Who will put barriers in place to try and stop you? Who will benefit directly or indirectly from putting your plan into action? Who will benefit directly or indirectly if they keep you from putting your plan into action?

What are the helpful things, objects or activities that will help you put your plan into place? What are the things, objects or activities that might block your progress?

Where should you go to talk to people about putting your plan into place? Are there any specific locations you should seek out or avoid? Where should you go to actually put your plan into action? Are there any preferred or useful locations or events? Are there any locations that may be inappropriate?

When should you speak to people about putting your plan into action. Are there any particular times or situations which are appropriate or inappropriate? When should you implement your plan of action? What situations are appropriate? What time is

appropriate? Are you being realistic in your time frame? Are there any inappropriate situations or times?

Why should people help you with your plan? Why should your plan work? Think of all of the reasons people may have to not accept your plan and try to think of ways to overcome them prior to pitching and/or implementing your idea.

Once the problem solver has identified the who, what, where, when and why of her/his plan, s/he must identify the HOW. In order to do so the problem solver must identify short- intermediate- and long-term steps that are necessary to put the plan into action. There should be some steps that must be taken in the immediate 24 hours upon determining the plan because momentum is very important for this type of action.

In the How phase, the problem solved must attempt to label each necessary step in the plan of action. A start and a stop date are required, as well as an identification of who will carry out the action, where it will be carried out, why it will be carried out, and how it will be carried out. Additionally, the problem solver must stipulate how s/he will know that the step has been successful.

Appendix 14

Guidelines for Divergent and Convergent Thinking Handout

Guidelines for divergent thinking:

(1) Criticism is ruled out. Adverse judgments of ideas must be withheld until later;

(2) Quantity is wanted. The greater the number of ideas, the more the likelihood of useful ideas;

(3) Free-wheeling is welcome. The wilder the idea, the better; it is easier to tame down than to think up; and

(4) Combinations and improvement are sought. In addition to contributing ideas of their own, participants should suggest how ideas of others can be turned into better ideas, or how two or more ideas can be joined into still another idea.

Guidelines for convergent thinking

(1) Use affirmative judgment. Maintain a positive attitude and approach when evaluating and selecting options

(2) Be deliberate. Select ideas in an intentional and systematic manner.

(3) Stay on course. Conscientiously continue to use convergent thinking and do not veer off track and begin to generate more options. Make sure that you remember, and stay true to, the original goal or purpose for converging on the options.

(4) Consider novelty. When selecting ideas make sure to consider those ideas that are novel, unique, or interesting.

Appendix 15

Brainstorming Cheat-Sheet

Brainstorming is a process that is used for problems that primarily depend on idea-finding. Brainstorming is not used for problems that depend on judgment or in cases where a problem only has two or three alternative solutions.

Each brainstorming session should start with a clear problem statement or goal that can be used to direct the course of the meeting. Ideas should be stated in the form of a headline (think of a newspaper headline - short, and to the point).

Brainstorming participants must follow the four brainstorming guidelines

(1) Criticism is ruled out
(2) Lots of ideas are needed
(3) The wilder the idea the better
(4) Combinations and improvement are sought.

Although brainstorming session can be conducted by yourself, when using a group the ideal size is between 5 -7 people. Odd numbered groups work better than even numbered groups. Ideally groups should be composed of a wide variety of people.

When brainstorming in a group you should have a facilitator, a client, and a resource group. (See handout).

Traditional Brainstorming - individually
The problem solver writes her/his problem statement at the top of a page and thinks up as many ideas as s/he can to come up with a solution. Ideas are written down in the form of a headline.

Appendix 16

How to Define a Problem Cheat-Sheet

STEP 1: PROBLEM IDENTIFICATION

Think of a problem that you would like to be able to solve. It must not be the type of problem where there is only one type of answer.

e.g.: -what do you really want to do?
-what do you hope to gain, accomplish, resolve?
-what is something for which you want more ideas?

STEP 2: HEADLINE FORMAT

Write your problem statement in a headline format. (Think of a newspaper headline). Make sure that the problem statement does not have limits or restrictions.

STEP 3: INVITATIONAL STEM

Turn your problem statement into a question by pairing it with an invitational stem.

e.g.: H2 -- How to...? IWWM -- In what way might... HM -- How might...?

STEP 4: ACTION WORD, OBJECTIVE, OWNERSHIP

Make sure that your problem statement has an action word and an objective that you want to accomplish. Make sure that it is clear whose problem it is (who has responsibility or ownership of the problem).

STEP 5: ALTERNATE WORDS

Underneath each of your action word and your objective, list 6-10 words which might mean the same thing as the action word/objective or the opposite. As your list gets longer, you may find that you are including words that you weren't originally thinking of...That is okay.

STEP 6: MIXING AND MATCHING

Mix and match the action words and objectives until you arrive at the problem statement that most closely reflects the question that you want to answer. The new problem statement may be different from the old one with regard to specific words, or with regard to the entire idea.

STEP 7: REVIEWING THE PROBLEM STATEMENT

Look at the final problem statement. Does it say what you want it to say? If yes, check to see that you have (1) an invitational stem (2) an action word (3) an object that you want to accomplish (4) identification of ownership (5) a headline format

Appendix 17

Highlighting Cheat-Sheet

STEP 1: HITS
Look at all of your ideas and star the one that appear to be particularly promising...grab you...give you a gut reaction. These are called HITS.

STEP 2: CLUSTERS
Scan through the hits and see which ones relate to each other, or are related to a common theme. Write to the side of the ideas the ones that relate to each other. These are called clusters.

STEP 3: HOT SPOTS
Rename your cluster. Give each hot spot/cluster a title.

STEP 4: PARAPHRASING (optional)
Look to see if you can combine the cluster. Use an invitational step to paraphrase each cluster. What I see myself doing is...Wouldn't it be nice if...

Appendix 18

ALUO Cheat-Sheet

ALUOs can be used to evaluate an idea, or if your ideas blend together, or suggest a tentative plan of action, than the ALUO can be used to evaluate a tentative course of action. In such a case write your idea in the form of an idea phrase: What I see myself doing is...

PROMISING OPTION(S)/TENTATIVE PLAN(S) (use a 1 sentence headline)

ADVANTAGES List at least four pluses or specific strengths of your idea. • • •

LIMITATIONS List whatever concerns or weak points of your idea. When listing concerns be sure to phrase them in the form of a problem statement so that you can overcome each one of those concerns to develop a plan for action. • • •

UNIQUE QUALITIES List three new or unusual elements (or possible outcomes) of the idea. Focus on the novel aspects of the option (What does this idea have that no other idea has?) • • •

IDEAS FOR OVERCOMING LIMITATIONS Pick the strongest limitation to generate ideas to overcome it. • •

Appendix 19

Planning for Action & Acceptance Cheat-sheet: 5 W's and an H

PROMISING OPTION(S) (use a 1 sentence headline)

	SOURCES OF ASSISTANCE	SOURCES OF RESISTANCE
WHO	Helpful people?	Critics or opponents. Who might have something to lose if your idea works or something to gain if it fails? Who might be threatened or uncomfortable in dealing with the idea?
WHAT	Helpful resources, things, objects or activities you need for successful action?	What important things or resources might be missing, unavailable when you need them, lost or overlooked?
WHERE	The best places to implement the plan?	The worst possible place to implement the plan?
WHEN	The best times or situations to carry out your ideas?	The worst possible time to carry out your ideas?
WHY	The best, most important, or most persuasive reasons or justifications for your idea?	The least persuasive justification for your idea. Why might people turn away from the idea?

* Key Words: What about... What if... What else... What other

TENTATIVE PLAN(S) (use a 1 sentence headline)

Three step plan

1. List the first steps that must be taken in order to put your plan into action. Be sure to make one of your first steps something you can accomplish within the next 24 hours because momentum is important. When making plans, consider whether you want to focus on immediate, short- or long-term plans... or all three.
2. Your plan of action may require more than three steps. Feel free to add specific details until you have reached the level of specificity that you think will be most beneficial to you.
3. Make sure that you include a criterion determining how you will know that you have been successful with regard to each of your steps.

ACTION	Who
	Start_____Finish_____.
	Where
Measure of success	Why
	How

ACTION	Who
	Start_____Finish_____.
	Where
Measure of success	Why
	How

ACTION	Who
	Start_____Finish_____.
	Where
Measure of success	Why
	How

Follow-up questions:

1. Who might you check with to get feedback on your plan in order to insure that it is working well and to help you identify specific ways to improve it in the future?
2. What future challenges might be created by implementing your plan of action?

Appendix 20

Lesson Plan 1: Pretest: Torrance Test of Creative Thinking, Locus of Control & Problem Solving Inventory, General Self-Efficacy Scale (GSES -12)

Instructional activities:

1. Announcements

a. Discuss who I am
-mother, wife, dog-owner, student, teacher
-Ph.D. - still in school myself
-teach CPS - specific tools for solving problems

b. Discuss why I'm here
-I'm here to help you learn how to solve some problems
-I'll show you some techniques
-won't work for all problems, all of the time
-it will work for many problems and we'll discuss which ones
-you're not going to walk away today knowing everything
-it takes time to learn this and we'll attack a little piece of the puzzle each week for 9 weeks
-will need your help...the more you practice the better you'll get.

c. Today
-We are going to do some creative thinking.
-I think you'll have a lot of fun doing the activities I have planned for this period. You are going to do some things that will give you a chance to see how good you are at thinking up new ideas and solving problems...There are no right answers and no wrong answers and so this isn't something that you have to be nervous about. Most people find these pretty neat to do so I hope that you'll like doing this as much as other kids have.

d. Note on pre-post test
-Before we start I want you to know that eight weeks from now you are going to get a chance to do these activities a second time. One of the reasons why we do this is because we would like to find out how much you improve between now and later in your ability to think up new ideas, use your imagination, and solve problems. It is the same kind of thing that your doctor does. If she wanted to find out how much you grow in weight or height during a particular period, she would weigh you or measure your height now and again at the end of that period. This is what we want to do regarding your ability to think up ideas. We are going to take a measurement today and another at the end of the session. So, put on your best thinking caps and let's get to work.

2. a. Torrance Test of Creative Thinking - Unusual Uses Activity
   b. Personal Problem Solving Inventory
   c. Nowicki-Strickland Locus of Control for Children (abbreviated version)
   d. Bosscher and Smit General Self-Efficacy Scale GSES - 12

3. If time...

Discuss the types of problems that members of the class experience. (These responses will be recorded on paper and will be utilized as real-life examples for problem solving exercises throughout the eight week course).

at: home...school...work...personally...other

Appendix 21

Homework 1: Problems and Barriers

- Make a list of 5 - 10 problems that occur in your life. They can be problems that happen at home, at school, at work, personally, or in other situations.
- Make a list of 10 barriers which keep you from solving problems in your life. They can either be general things that could apply to many problems, or specific things that only apply to one problem.

PROBLEMS	BARRIERS (something that keeps you from solving a problem)
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.
6.	6.
7.	7.
8.	8.
9.	9.
10.	10.

Appendix 22

Lesson Plan 2: Brainstorming

Goal: 1. To share goals and expectations.
2. To begin to develop a nurturing climate.
3. To understand the guidelines of generating options

Objectives: Students will be able to...
1. generate a large number of ideas in response to novel stimuli.
2. demonstrate the effective use of the principle of deferred judgment.
3. recognize and describe factors that help and hinder divergent thinking.

Instructional activities:

1. Announcements

a. Today we get to the meat of what we're doing

c. Discuss goals & expectations

(i) goals ---students will learn to more effectively solve problems they experience in their lives -- feel more self-confident --

(ii) requirements of the course---participation, withholding of judgment until appropriate, complete homework assignments, bring completed homework to each class because we will be referring back to the work that we have done)

d. Class rules
(i) participation
(ii) listen to all ideas
(ii) fell free to be different
(iv) allow freedom of choice
(v) stretch your brain
(vi) it's OK to disagree
(vi) it's not OK to fight
(viii) go ahead and try new things
(ix) take time to think
(x) make it fun

e. Any questions

2. Ice breaker: You take the high road; I'll take the low road

-Show students a transparency of their playground
-Identify point A at the front of the playground and point B at the back of the playground.
-Ask the students about all of the different ways of getting from point A to point B
-Highlight points with colored markers on transparency
-debrief:
-Q1: Why do you think different people came up with different routes?
-Q2: Why would someone choose one route over another?
-Q3: Was there a wrong way to get from point A to B? Why? Why not?

NOTE: Just like there are many ways to get from point A to point B, there are many ways to solve problems effectively...there is no one right answer to most problems

3. Divergent thinking technique

a. Brainstorming worksheet: How to eat ice cream?

Give students 5 minutes
Debrief:
-Q1: How many ideas did you come up with ?
-Q2: How many people thought that they could have come up with more ideas?
-Q3: Better ideas?
-Q4: What stopped you?

4. Brainstorming rules

-Phrase problem statement with an invitational stem to invite lots of ideas.

a. Don't judge ---from young we are trained to judge things/ideas as good or bad, hot or cold, right or wrong
-flip-side of don't judge is to BE POSITIVE
-means that when we come up with ideas, we don't worry about whether they are good or bad. It's important to just say what comes to your head and not worry if it's a good idea. Also, we don't say anything at all about other people's ideas.

b. Lots of ideas ---means we want to come up with at least 30 ideas or many more than that, depending what we're working on
-1st 1/3 usual ideas (brain dump)
-2nd 1/3 more unusual ideas that help to form sophisticated ideas
-3rd third - most useful and sophisticated ideas
-when we work in a group we work as a team an we try to avoid the words 'mine' or 'my idea'---each idea generated is a valuable part of the team effort , and it doesn't matter who said the idea or which ideas are selected

c. Wild & crazy ---means that we can come up with ideas that are silly, far out, and strange
-some of the best solutions to problems come out of this craziness
-it's a lot easier to tame an idea down that it is to spice it up

d. Piggyback---means we can think of ideas off another person's ideas
-it's OKAY to copy a person's idea and to change it a bit

5. Practice brainstorming: the Squirrelly brainstorm

a. Show a picture of a squirrel.
b. review generating skills.
c. Explain that you're tired of going into the backyard to pick a ripe peach only to find that the squirrel stole it.
d. Write the problem statement, "How to stop the squirrel from taking my peaches?" on the top of the chart paper and explain that you don't want to hurt the squirrel. You need help coming up with creative ideas.
e. 20-30+ ideas in 5 minutes.

6. Debrief brainstorming

a. How was this different from the first session (H2 eat an ice cream cone?)

b. What did you like or not like about it?
c. What is the advantage of deferred judgment?

Possible Q's:
-What did you notice about brainstorming?
-How did we do with wild ideas? piggybacking? examples? how did you feel about them?
-Did you experience any judgment? What was that like?
-Did any ideas come up a second time?
-Why do you think that they were written down a 2nd time?

d. What are some advantages of using brainstorming to come up with ideas?

Appendix 23

Homework 2: Brainstorming

Homework:

(1) Brainstorm 15+ ideas on "How to improve the playground?"

OR

(2) Brainstorm 15+ ideas on "How to have fun on the weekend?"

To Start:

a. List on a piece of paper a problem statement that needs creative ideas.
Begin problems with "How to... to invite ideas.

b. Review generating rules.

Don't judge - Just say what comes to your head and don't worry about whether it is a good or bad idea... BE POSITIVE

Lots of ideas - come up with at least 15+ ideas

Wild & crazy -come up with ideas that are silly, far out, and strange

Piggyback -copy a person's idea and change it a bit

c. Begin by generating 15+ ideas on a piece of paper for each brainstorming question.

Appendix 24

Lesson Plan 3: How to Define a Problem

Goal: Students will be able to appropriately define a problem to begin problem solving

Objectives: Students will be able to...
1. identify a problem.
2. define a problem.

Instructional activities
1. Announcements

a. Review highlights of last class
b. Any questions
c. Discuss homework
d. Review goals for today
(This is the hardest day. If we can wrap our minds around this then from here on it'll be much easier sailing. Ask questions. Speak out. If you're having a problem chances are that someone else is, too);
(... easier to exert self physically than mentally...)
e. Did anybody use the brainstorming technique for anything since I last say you? What? Why? Did anybody think of using it for something and didn't? What? Why?

2. How most people frame problems

a. -what does it mean to frame a problem?
-why is it important to frame problems?
- must solve the right problem
- "the formulation of a problem is far more often essential than its solution, which may be merely a matter of mathematical or experimental skill" Albert Einstein

-purpose of today is not to find answers but for best way to ask questions
-always remember to ask WHY... WHY ELSE

b. show examples of problems

The problem is...

- I don't have enough money to buy the (...)
- I can't do that because I don't know how.
- I can't make my bed in the morning because I don't have the time.
- no one cares about how much effort I put into this.
- it still works okay so why bother changing it?
- it takes too much work to do (...)
- SHOW EXAMPLES FROM LAST WEEKS BS SESSIONS

c. What's wrong with these problem statements?

(i) negative ---discouraging & self-defeating even before anyone tries to change something
(ii) turns thinking off---give people reasons not to act rather than to try and change something
-build in suggestion that says "nothing's going to work so why bother trying?"

(iii) problem solving statement must identify what you want to move towards, not what you want to avoid

3. How we are going to frame a problem

a. Let's pick a problem from our list to work with... OK

b. Elements of a good problem statement

(i) invitational stem:
-begins with a phrase that invites group members to be creative thinkers (turn statement into a question)
-should be free of limiting criteria (i.e.: no limitations, restrictions, qualifications, or criteria)

- HM -- how might... H2 -- How to.... IWWM – In what way might...

-Let's rewrite the problem using an invitational stem.

(ii) clearly stated ownership ---should clearly express on whose problem you're working

- IWWM I ... (I have ownership & responsibility of problem)
- IWWM we ... (we share ownership & responsibility of problem)
- IWWM John ... (John has ownership & responsibility of problem)

-This problem has to belong to someone because s/he has to make some decisions. Whose problem is it going to be?...

-OK, let's add you to the problem statement.

-Does the problem statement say exactly what the problem is?
-**Yes**... Great. Let's try someone else's problem.
-**No**... let's take it a little further than.

(iii) action word and objectives (dancing with words)---the problem statement should concisely state the action and objective for the question

- IWWMI increase students' motivation in the classroom?
- H2 prioritize my use of work time?
- IWWMW increase chances of success for all students?
- H2 help the class expand their interest in improving their creative and critical thinking?
- IWWMI earn the students' trust?
- HMI excite the students' imagination?
- H2 insure students practice tools?

-Let's make a list of 5 different action words that we can use instead of the one that we have.
-Let's make a list of 5 different objectives that we can use instead of the one that we have.
-OK, XX, it's time for you to make some decisions.
- Is there another word that comes to mind when you are rereading the list?
-Can you come up with a mix and a match that more accurately describes your problem?...

4. If Time
a. Reframe problems from last week. b. Does anybody want to add to the list?

Appendix 25

Homework 3: How to Define a Problem

1. Think of a problem in your life that you would like to be able to solve. The problem must not be the type where there is only one possible answer. Remember that you are not looking for the answer to the question, but the best way to ask the question.

   If you are having trouble coming up with a problem, maybe these questions will help...
   - What do you really want to do ?
   - What do you hope to gain, accomplish, resolve, see, do, or have happen?
   - What is something for which you want more ideas?

   e.g.: I want to be able to talk to my Dad without arguing every single time.

2. Try to write your problem statement in as few words as possible. Make it sound like it is a newspaper headline. Also, make sure your problem statement does not have limits or restrictions.

   e.g.: I want to be able to talk to my Dad without arguing.

3. Turn your problem into a question by pairing it with an invitational stem.
   - How to...
   - In what way might ...
   - How might...

   e.g. (1) How to talk to my Dad without arguing?
   (2) In what way might I talk to my Dad without arguing?
   (3) How might I talk to my Dad without arguing?

4. Make sure your problem statement has an action and an object that you want to accomplish. The problem statement must also let us know who has responsibility, or ownership, of the problem.

   (e.g.: If I want to talk to my Dad without arguing, and I am upset about this and he is not, then it is MY problem and not his.)

	Invitational Stem	Action Word	Objective	Ownership
e.g.	(1) How to	talk to my Dad	without arguing?	(my problem)

5. Select one of the three problem statements you just created.
   a. Underline or circle the action word . Under the action word list 6 - 10 other action words that might be used instead. Some of these words may mean the same thing or different things from your original action word. You may find that as your list gets longer your thinking often gets refined. You may find yourself including ideas or words that you weren't originally thinking of...this is OK.

   b. Underline or circle the object. Under the object list 6 - 10 other objects that might be used instead. Some of these words may mean the same thing or different things from your original action word. You may find that as your list gets longer your thinking often gets refined. You may find yourself including ideas or words that you weren't originally thinking of...this is OK.

	Invitational Stem	Action Word	Objective	Ownership
e.g.	(1) How to	talk to my Dad	without arguing?	(my problem)
		communicate	peacefully	
		speak	quietly	
		explain myself	non-competitive	
		tell things	without sarcasm	
		ask questions	with good feelings	
		share ideas	like he loves me	
		break my news	complaining	
		inform	whining	
		disagree	grumbling	
		be unlike	compromise	
		be different	getting mad	

6. Mix and match the action words and objectives until you arrive at the problem statement that most closely reflects the question that you want to answer. The new problem statement may be different from the old one with regard to specific words, or with regard to the entire idea. It might be that your first attempt was the best one. It might also be that you have come up with a more precise problem statement that would better suits your needs.

e.g. How to be different from my Dad without getting mad?

7. Look at the final problem statement. Does it really say what you want it to say? If it does, check to see that you have (i) an invitational stem (ii) an action word(iii) an object that you want to accomplish (iv) identified ownership of the problem (iv) and that you have written it like a newspaper headline.

Appendix 26

Lesson Plan 4: Blocks and Barriers to Problem Solving

Goal: To identify and examine types of problems faced by students, as well as the obstacles which prevent individuals from effectively solving their problems.

Objectives: Students will be able to...

1. identify and discuss blocks and barriers which prevent them from being more effective problem solvers.
2. develop a list of personal blocks and barriers and assist others in developing strategies for overcoming one block or barrier.

Instructional activities:

1. Announcements

a. Any questions
b. Debrief last week

-Last week we did some activities on creative thinking...

What did you think about it?
Was the activity painful? scary? stressful? interesting?
What did you like about it?
Any questions from last week?

-What I find interesting about creativity is that everyone is creative in some way or another, and sometimes we know that we have certain skill and sometimes we aren't even aware that we have these skills. Sometimes, when we learn new skills , or start to consciously use old skills in different ways, it really changes the way that we can approach a problem, draw a picture, or even make a sandwich...It's like you begin to say to yourself "hey, I am a creative person. I don't have to just have a peanut butter sandwich, I can make a sandwich with meat and tomatoes and avocado and cheese and chutney..." So creativity, and creative problem solving, can touch things even as simply as what you eat.

c. Review goals for today
d. Did anybody use the brainstorming technique for anything since I last say you? What? Why? Did anybody think of using it for something and didn't? What? Why?

2. Ice breaker: the Brainy Woodpecker
a. Show a picture of a woodpecker
b. Review generating skills.
c. Explain that outside of your bedroom window is a woodpecker who likes to peck at the window sill. It starts pecking a 4:30 every morning and continues on until 7am. You are woken up every day by this annoying bird.
d. Write the problem statement, "How to stop woodpecker from pecking on my window sill?" on the top of the chart paper and explain that you don't want to hurt the woodpecker. You need help coming up with creative ideas. You cannot kill the animal.
e. 20-30+ ideas in 5 minutes.

3. Discuss the types of problems that members of the class experience. (These responses will be recorded on paper and will be utilized as real-life examples for problem solving exercises throughout the eight week course).

At: home...school...work....personally....other

4. Discuss the types of barriers that that keep class members from effectively dealing with their problems. (These responses will be recorded on paper and will be utilized as real-life examples for problem solving exercises throughout the nine week course). (A barrier is anything that keeps you from solving a problem).

5. Discuss how you solve problems.

6. Discuss internal barriers to problem solving.

a. Preferred problem solving approach (strategic blocks) ---addresses questions of:
(i) how do you like to solve problems?
(ii) how effective is your approach?

-...I have a hammer so any problem I experience must be a nail
-(e.g.:)...like to write feelings down and read them aloud...doesn't work with Henry...what should I do?

-ask for example

b. Value blocks---address issue of degree of flexibility an individual displays in applying personal values, beliefs, and attitudes.

-(e.g.:)...when I married Ron the Orecks decided that it was more important to stick to their principles and drive a schism through our collective families than be supportive and come to our wedding because my partner of 8 years was not Jewish
-(e.g.:)...Gus is a Greek man who overemphasizes the traditional ways of doing things (religion; social; cultural norms)...women in the kitchen, men out back...do not spoil my wife.

-ask for example

c. Perceptual blocks---addresses issue of the degree to which individuals perceive something in a rigidly familiar way.

-(e.g.:)...-ask for example

d. Self-image blocks---addresses issue of how individuals assert themselves and make use of available resources.

(e.g.:)...asking for help makes me look stupid, and since I'd rather look cool I won't ask for help, even if it means failing an assignment

-ask for example

7. Debrief internal barriers to problem solving

a. How do the four types of blocks relate to the list of barriers which we put on the board?
b. What do you think might be some benefits of understanding your blocks?

Appendix 27

Homework 4: Blocks and Barriers to Problem Solving

Divide a sheet of paper in half. On the left half of the page write down two problems in your life that you would like to solve. On the right side of the paper write down how you might use what you learned about the problems and the barriers you face to help you in solve your problems.

Appendix 28

Lesson Plan 5: Highlighting

Goal: To understand the essential elements of highlighting

Objectives: Students will be able to...

1. identify guidelines for convergent thinking.
2. apply an affirmative judgment technique in small groups (Highlighting).

Instructional activities:

1. Announcements

a. Review highlights of last class
b. Any questions
c. Review goals for today
d. Did anybody use any of the problem solving techniques for anything since I last say you? What? Why? Did anybody think of using it for something and didn't? What? Why?

2. Introduction to convergent techniques:

a. Purpose of today's class is to introduce an idea evaluation technique. This means we are going to make some decisions.
b. Remember that we have to BE POSITIVE.
c. It's like the analogy of the car; we spend some time working on the acceleration of the car, now it is time to enhance our braking system.

3. Guidelines for convergent thinking

a. Be positive ---Pick ideas by saying the ones we like, not complaining or crossing out ones we dislike.

b. Look at new items -Don't forget about an idea that might be a bit weird.
-Think about whether it might be good, also.

c. Use your head -Plan out the tools you'll use and the choices that are best for you.

d. Look where you're going: Know what your goal is and keep your eyes on the target.

4. Decisions

a. Think of a decision you have had to make lately.
b. What was the decision? Ask for example.
c. How did you make that decision? [e.g.: buying sneakers, how did you go about deciding on what kind of sneakers to buy (price, color, fit)].
d. Okay, what other criterion could be used to make this decision?
e. We can lots of unconscious choices every day. However, when you have to make a conscious choice, criterion help you narrow down your choices.

5. Hits

a. Highlighting is used when you have a lot of ideas and you need to narrow down the field of possibilities
b. These are our ideas from the Squirrelly Brainstorm - I've rewritten the ideas and put them on stickies.
c. Look at all of our ideas.
d. Do any ideas appear to be particularly promising...grab you...give you a gut reaction?
e. These are called HITS
f. I'm going to give everybody three sticky dots.
g. Scan through the list and sticky dot the ideas that seem particularly promising to you. Don't hesitate to dot ideas that seem a little off beat.
h. All three sticky dots can go on one idea, or you can divide the sticky dots up into three ideas.
(x) It's okay to put your dot on any of the choices whether it already has many dots or whether it doesn't have any at all
(xi) How many hits do we have in total?

6. Hits Debrief

a. What did we do?
b. How were we able to narrow down such a large number of ideas so fast?
c. What are the hits?
d. How do hits help us make choices?

7. Find the ideas that relate to one another (relates)

a. Scan through the hits and see which ones relate to each other, or are related to a common theme.
b. Star the ideas that relate to one another.
-Need a volunteer to demonstrate.
-Which ones relate? #2 #7 #24?

8. Name the groups (hotspots)

a. Each of these groups is called a hotspot or cluster.
b. Rename your groups.
c. Any questions so far?

9. Highlighting debrief

a. Advantages of highlighting?
b. Disadvantages of highlighting?
c. How can you overcome the disadvantages of highlighting?
d. Anything good that might happen in the future because of using this?
e. How can you use highlighting immediately?
f. How can you use highlighting in your life?
g. How does highlighting relate to the problems we described in the 2nd week?
h. How does highlighting relate to the barriers we described in the 2nd week?

Appendix 29

Homework 5: Highlighting

On the accompanying sheets of paper are the ideas we came up with for: (1) the types of problems that members of the class experience, and (2) the types of barriers that that keep class members from effectively dealing with their problems.

Use the highlighting technique to select and begin to evaluate the issues that you think are most important to you.

Begin by:

1. Reviewing the guidelines for convergent thinking

    a. Be positive -Pick ideas by saying the ones we like, not complaining or crossing out ones we dislike.

    b. Look at new items -Don't forget about an idea that might be a bit weird.
    -Think about whether it might be good, also.

    c. Use your head -Plan out the tools you'll use and the choices that are best for you.

    d. Look where you're going -Know what your goal is and keep your eyes on the target.

2. Select the hits by starring the items.

3. Examine the hits and group ideas that relate to each other by rewriting them at the bottom of the page.

4. Name the groups.

Appendix 30

Lesson Plan 6: ALUO

Goal: To focus on positively evaluating and giving feedback after playing a game using the ALOU tool.

Objectives: Students will be able to...

1. use ALUO to point out the strong points, picking out areas for improvements, and discussing what's unique about an activity.

Instructional activities:

1. Announcements

a. Review highlights of last class
b. Any questions
c. Review goals for today
d. Did anybody use any of the problem solving techniques for anything since I last say you? What? Why? Did anybody think of using it for something and didn't? What? Why?

2. Evaluating ideas: The wheelbarrow

a. I'd like you to comment on my new wheelbarrow design.

3. The wheelbarrow debrief

a. I asked for comments and what did I get?
b. How do we typically react to ideas, particularly when they are novel or different?
c. What happens when you come up with all kinds of negative comments about an idea?
d. How does that make you feel?
e. How likely are you to feel good about your idea?
f. How likely are you to follow through on your idea?
g. Do you think that there might have been any difference in my feelings/actions if we talked about all of the positive things my wheelbarrow might allow us to do than if we focused on the negative?
h. (example of Jake and a 4-legged animal)

2. Since we're learning about ALUO today, we're going to play a game today and then learn a tool to help us figure out what we liked about the game, how we might play it better, and whether we'd like to play it again. It may be a different kind of way of judging something than you're used to.

3. Show an ALUO worksheet and explain how:
   +++ plusses tell us all the things we like about the game;
   --- minuses point out what we didn't like; they are the things that bug you;
   *** are the things that stand out as different in our minds. They are also the good things that might happen in the future as a result of our game.

4. Play Simon Says

5. Explain that we want to think about whether we like the game or not. We'll start with the plusses first.

6. Draw a plus sign on a large chart paper. Ask the students to share all of the plusses, good points, or advantages of the game. Record answers.

7. Draw a minus sign on the chart paper. Ask the students to share their minuses, bad points, or limitations of the game. Help the students rephrase the limitations or minuses starting with "How to...?" and record on chart paper.

8. Draw a star on the chart paper. Ask students to share all of the good things that might happen as a result of playing the game. Ask them to finish the sentence "It might...," "We might...," or "It is..." Record answers.

9. Give each student three stars and ask them to pick the biggest limitation. They can put all of their stars on one limitation or separate them onto different ones. They should try to ignore where other people are putting their stickies and just stay true to what they really think needs improving the most.

10. Select the limitation with the most stickies. Rewrite the "How to...?" statement on a new sheet of chart paper. Have the students help you brainstorm ideas to solve the problem. Select a few and discuss how it helps to solve the problem.

Debrief:

1. What did we do?
2. How did you judge the game?
3 Why did you tell me all the plusses first?
4. How do the plusses make me feel?
5. Why did we start the minuses with "How to ...?"
6. How does the ALUO help us decide if the game is good?
7. How does it help us make the game better?
8. How does it help us decide whether we'd want to play it again ?

    a. What are the advantages of ALUO?
    b. What are the disadvantages of ALUO?
    c. What is interesting about ALUO?
    d. How can you use ALUO immediately?
    e. How can you use ALUO in your life?
    f. How does ALUO relate to our initial list of problems?
    g. How does ALUO relate to our initial list of barriers?

Appendix 31

Homework 6: ALUO

Last week we used highlighting on: (1) the types of problems that members of the class experience, and (2) the types of barriers that that keep class members from effectively dealing with their problems.

Look at your newly renamed groups. Select one idea from the types of problems that members of the class experience OR one idea from the types of barriers that keep class members from effectively dealing with their problems and use ALUO on these ideas.

Begin by:

1. Reviewing the guidelines for convergent thinking

    a. Be positive -Pick ideas by saying the ones we like, not complaining or crossing out ones we dislike.

    b. Look at new items -Don't forget about an idea that might be a bit weird. -Think about whether it might be good, also.

    c. Use your head -Plan out the tools you'll use and the choices that are best for you.

    d. Look where you're going -Know what your goal is and keep your eyes on the target.

2. Generate all of the advantages of the idea. (You must have at least four).

3. Generate the limitations of the idea. (You must have at least four). Phrase the limitations "How to...?"

4. Generate the unique qualities of the idea. Ask yourself, "What is new about it? What are the star qualities?" Try to finish the sentence "It might...," "We might...," or "It is..." (You must have at least four).

5. Select at least one key limitation (use hits).

6. Generate ideas to overcome the key limitation (s). (Try to think up 2-4).

7. IF YOU WANT, generate ideas to overcome a second key limitation. Compare ideas to see which idea should be carried forward.

Appendix 32

Lesson Plan 7: Planning for Action and Acceptance

Goal: To have students develop a plan of action.

Objectives: Students will be able to...

1. Experience and practice tools and techniques learned in the last 4 weeks.
2. Experience the balance of divergent and convergent thinking.

Instructional activities:

1. Announcements

a. Review highlights of last class
b. Any questions
c. Review goals for today
d. Did anybody use any of the problem solving techniques for anything since I last saw you? What Why? Did anybody think of using it for something and didn't? What? Why?

2. Salesperson and 5W's and an H

a. Introduction to concept:
   (i) Have any of you ever had a part time job?
   (ii) Have any of you ever been a sales person? Where?
   (iii) Would about the rest of you, have any of you ever bought anything?
   (iv) The reason that I'm asking is because today we're going to be discussing planning for action, and a when you're trying to do this you're taking on a role very much like a salesperson.

b. Role of salesperson
   (i) For instance, what are some of the things a salesperson would do?
   -use highlighting to cluster ideas

c. What are we going to sale? - let's make it relevant to all of you.....
   -baby-sitting skills?
   -tutoring skills?
   -right to go to a concert that your parents don't want you to go to?
   -increased permanent curfew?

d. How to sell a... idea generation and idea evaluation

	salesperson	Acceptance
idea generation	-looks at all the possible things that will ASSIST/RESIST in selling product	-generate assisters & resisters of the solution(s) and over-come resisters
idea evaluation	-prepares a plan to sell the products based on the assisters & resisters	-develop a step-by-step plan for implementing the solution

e. How to sell a ... resisters & assisters

(I) What is an assister? Resister?

	SOURCES OF ASSISTANCE	SOURCES OF RESISTANCE
WHO	Helpful people?	Critics or opponents. Who might have something to lose if your idea works or something to gain if it fails? Who might be threatened or uncomfortable in dealing with the idea?
WHAT	Helpful resources, things, objects or activities you need for successful action?	What important things or resources might be missing, unavailable when you need them, lost or overlooked?
WHERE	The best places to implement the plan	The worst possible place to implement the plan?
WHEN	The best times or situations to carry out your ideas?	The worst possible time to carry out your ideas?
WHY	The best, most important, or most persuasive reasons or justifications for your idea?	The least persuasive justification for your idea. Why might people turn away from the idea?

* Key Words: What about... What if... What else... What other

f. How to sell an implementation plan

(i) List the first steps that must be taken in order to put your plan into action.
(ii) Be sure to include something you can accomplish within the next 24 hours because momentum is important.
(iii) When making plans, consider whether you want to focus on immediate, short- or long-term plans... or all three.
(iv) A plan of action may require more than three steps. Feel free to add specific details until you have reached the level of specificity that you think will be most beneficial to you.
(v) Make sure that you include a criterion determining how will you know that you have been successful with regard to each of your steps.

ACTION: H2...	Who Start_____Finish_____. Where
Measure of success	Why How

3. Planning for action debrief:

a. What are the advantages of planning for action? (when would you use it?)
b. What are the disadvantages of planning for action? (why would you not use it?... ALUO)
c. What is interesting about planning for action?
d. How might you come up with a contingency plan?
e. In what way did looking at the assisters and resisters help us make a plan?

f. How can you use planning for action immediately?
g. How can you use planning for action in your life?
h. How does planning for action relate to our initial list of problems?
    i. How does planning for action relate to our initial list of barriers?

Appendix 33

Homework 7: Planning for Action and Acceptance

Last week we used ALUO on: (1) the types of problems that members of the class experience, and (2) the types of barriers that that keep class members from effectively dealing with their problems.

Plan for action on the idea that you decided to carry forward on EITHER (1) the types of problems that members of the class experience OR (2) the types of barriers that keep class members from effectively dealing with their problems.

Begin by:

1. Reviewing the guidelines for convergent thinking

a. Be positive -Pick ideas by saying the ones we like, not complaining or crossing out ones we dislike.

b. Look at new items -Don't forget about an idea that might be a bit weird.
-Think about whether it might be good, also.

c. Use your head -Plan out the tools you'll use and the choices that are best for you.

d. Look where you're going -Know what your goal is and keep your eyes on the target.

2. Identify as many of the assisters and resisters as you can. The key words to think about when you are doing this are: WHAT ABOUT... WHAT IF... WHAT ELSE...WHAT OTHER...

	SOURCES OF ASSISTANCE	SOURCES OF RESISTANCE
WHO	Helpful people?	Critics or opponents. Who might have something to lose if your idea works or something to gain if it fails? Who might be threatened or uncomfortable in dealing with the idea?
WHAT	Helpful resources, things, objects or activities you need for successful action?	What important things or resources might be missing, unavailable when you need them, lost or overlooked?
WHERE	The best places to implement the plan	The worst possible place to implement the plan?
WHEN	The best times or situations to carry out your ideas?	The worst possible time to carry out your ideas?
WHY	The best, most important, or most persuasive reasons or justifications for your idea?	The least persuasive justification for your idea. Why might people turn away from the idea?

* Key Words: What about... What if... What else... What other

3. List the steps necessary to put your plan into action.

a. List the first steps that must be taken in order to put your plan into action.
b. Be sure to include something you can accomplish within the next 24 hours because momentum is important.
c. When making plans, consider whether you want to focus on immediate, short- or long-term plans... or all three.
d. A plan of action may require more than three steps. Feel free to add specific details until you have reached the level of specificity that you think will be most beneficial to you.
e. Make sure that you include a criterion determining how you will know that you have been successful with regard to each of your steps.

Appendix 34

Lesson Plan 8: Complete Planning for Action if Uncompleted, Questions, Uncertainties and Concerns; Course Evaluation Survey; Begin Post-Test

Instructional activities:

1. Announcements

a. Any questions about what we did over the course of the last 8 weeks?
b. If time, review key steps of tools
c. If time, conduct ALUO on tools use

2. Post-Test

-Eight weeks ago we did a class using a creative thinking tool, and I told you that you would have a chance to do it a second time. Today is that time. One of the reasons why we do this is because we would like to find out how much you improve between now and later in your ability to think up new ideas, use your imagination, and solve problems. It is the same kind of thing that your doctor does. If she wanted to find out how much you grow in weight or height during a particular period, she would weigh you or measure your height now and again at the end of that period. This is what we want to do regarding your ability to think up ideas. We are going to take a second measurement today and then compare them with the work that you did the first day we met each other. So, put on your best thinking caps and let's get to work.

-There is a new questionnaire that you have not seen before. One questionnaire asks you 6 questions about the course. It also leaves you room to let me know if there is anything that you really liked, or didn't like, or just thought that I should know about.

Appendix 35

Lesson Plan 9: Complete Post Test: Torrance Test of Creative Thinking, Locus of Control, Problem Solving Inventory, General Self-Efficacy Scale (GSES-12), Behavior Outcome Efficacy Survey

1. Announcements

a. Note on post-test surveys

-Today we are going to continue to redo the questionnaires that we did eight weeks ago. Just like we talked about last week, I am only asking you to do this so that I can know how effective the course was and how much change, if any, occurred.

-There is a new questionnaire that you have not seen before. It asks you a bunch of questions about whether or not you have used any of the things that you have been taught over the last couple of weeks. If you did use any of the tools, than I am interested in the circumstance under which you used them. If you did not use any of the tools, I have some questions about that too.

-My feelings will not be hurt if you did not use the tools, or if you did not use them very often. Please be honest, because that it the best way that I can help other kids in the future. You are not being graded by me so nothing bad can happen to you by being completely honest.

2. Testing (complete)
a. Unusual Uses Activity Test
b. Personal Problem Solving Inventory
c. Locus of Control
d. Outcome Efficacy Survey

3. Follow-up
a. Any questions about what we did in the last 9 weeks?

Appendix 36

94 Ways of Saying Terrific

(Adapted from Roger Firestien's 101 Ways of Saying Very good for Adults (1992) and Roger Firestien's 101 Ways of Saying Very Good for Children (1992)

1. You're right!
2. Good Work!
3. Well done.
4. It's a pleasure to work with you.
5. Now you have it.
6. You did a lot of work today.
7. Fine job!
8. That's right!
9. You must have been practicing it.
10. Super!
11. Nice going.
12. That's coming along nicely.
13. That's great!
14. You did it that time!
15. Fantastic!
16. Terrific!
17. Good for you.
18. Excellent!
19. That's better.
20. Good job (name).
21. Good going.
22. That's really nice.
23. WOW!
24. You're a great example.
25. Keep up the good work.
26. Outstanding!
27. What talent!
28. Good thinking.
29. Fantastic.
30. Exactly right!
31. You make it look so easy.
32. YES!
33. You had a good day.
34. Way to go.
35. Perfect.
36. OKAY!
37. You've really tried hard.
48. You/re learning fast.
49. You certainly did that well today.
50. I'm glad your approach is working.
51. Keep it up!
52. I'm proud of you.
53. That's the way!
54. You're learning a lot.
55. That's better than ever.
56. Quite nice.
57. You've figured it out.
58. Perfect!
59. Fine!
60. Thank you for helping others.
61. Excellent example.
62. I like the way you're working together.
63. You really out-did yourself.
64. Your imagination is soaring.
65. I like the way you worked that out.
66. Your best yet.
67. I really like it.
68. Do it again for me.
69. I knew you could do it.
70. What a good listener.
71. You did it without reminders.
72. You are really improving.
73. You're learning a lot.
74. That's better than ever.
75. You certainly did well today.
76. Now that's what I call a fine job.
77. I couldn't do it better myself.
78. Congratulations.
79. You don't miss a thing.
80. Thank you.
81. Clever idea.
82. I couldn't have done it better myself.
83. Impressive.
84. Very resourceful.

38. Thanks for finishing what you started.
39. This is worth repeating.
40. I like the way you thought it through.
41. Very imaginative.
42. You're always willing to try.
43. Good observation.
44. You're really good at that.
45. What an improvement.
46. You did it all by yourself.
47. You rise to the challenge.
85. You're learning fast.
86. What a great idea.
87. That's good thinking.
88. You're going in the right direction.
89. You should be proud of this.
90. That is a good observation.
91. I like the way you're working together.
92. What an improvement.
93. Can I share this with others?
94. Well done.

Appendix 37

Parental Consent Form (Control Group - Royal St. George's College)

Dear Parent:

I am a researcher who is studying the effects of creative problem solving skills training on a student's belief that he has the ability to control his environment in important life situations. A person's belief about the degree to which he can control the events in his life is associated both with problem-solving skills and with academic success (especially at the high school level). The information derived from this study will be therefore be useful to schools in designing better programs to help students solve the academic, personal, interpersonal, and professional problems which they may encounter in the course of their lives.

The Royal St. George's College has given permission for this study to be carried out in your son's school. If sufficient interest is expressed in the opportunity to obtain problem-solving skills, RSGC may offer such training next year to interested students.

This study will follow the ethical standards for research set forth by the Ontario Institute for Studies in Education and Michigan State University.

Your son will be asked to complete two sets of questionnaires (each taking approximately 1 hour), on Thursday, April 5 and Thursday, May 24, from 3-4 PM. The questionnaires will include questions about: idea generation (e.g.: I generally go with the first good idea that comes to my mind); idea evaluation (e.g.: I have a systematic method for comparing alternatives and making decisions); planning for action (e.g.: I trust my ability to solve new and difficult problems); belief in one's ability to control the environment (e.g.: Most of the time, do you feel that you can change what might happen tomorrow by what you do today?); and, belief in one's ability to successfully accomplish a task (e.g.: When I make plans, I am certain I can make them work).

Participation in this study will not affect your son's attendance in class or his evaluation by the school. Your child may withdraw from the research at any time. Although the information will be shared with the primary educators involved in your child's academic education, the data will otherwise only be published or reported in the aggregate. Subject confidentiality will be protected to the maximum extent allowable by law. All information collected will be strictly confidential. After the data have been collected, the students will not be identified individually.

Please indicate on the attached form whether you permit your son to take part in this study, and return it to Nancy Steinhauer by March 30th. Your cooperation will be very much appreciated. Contact me at (416.446.1799) if you have further questions. Additionally, if participants have any questions regarding their role and rights as a subject of research, they may contact David Wright, Ph.D. Chair, University Committee on Research Involving Human Subjects, Michigan State University. His telephone number is 517.355.2180.

Thank you very much.

Julie A. Morton

I would be interested in enrolling my son if workshops were to be offered in problem solving at RSGC.
Y / N (please circle)

I agree to allow _____ to take part in this study.
(Son's name)

I do not want _____ to take part in this study.
(Son's name)

Parent's signature _____

I,_____, agree to take part in this study.
(Student's name)

I,_____ , do not agree to take part in this study.
(Student's name)

Date _____

Please return this form to Nancy Steinhauer at Royal St. George's College as soon as possible.

THANK YOU

Appendix 38

Parental Consent Form (Control Group – Merle L. Levine Academy)

Dear Parent:

I am a researcher who is studying the effects of creative problem solving skills training on a student's belief that he has the ability to control his environment in important life situations. A person's belief about the degree to which s/he can control the events in her/his life is associated both with problem-solving skills and with academic success (especially at the high school level). The information derived from this study will be therefore be useful to schools in designing better programs to help students solve the academic, personal, interpersonal, and professional problems which they may encounter in the course of their lives.

The Merle L. Levine Academy has given permission for this study to be carried out in your daughter/son's school. If sufficient interest is expressed in the opportunity to obtain problem-solving skills, Merle Levine Academy may offer such training next year to interested students.

This study will follow the ethical standards for research set forth by the Ontario Institute for Studies in Education and Michigan State University.

Your daughter/son will be asked to complete two sets of questionnaires (each taking approximately 1 hour). The questionnaires will include questions about: idea generation (e.g.: I generally go with the first good idea that comes to my mind); idea evaluation (e.g.: I have a systematic method for comparing alternatives and making decisions); planning for action (e.g.: I trust my ability to solve new and difficult problems); belief in one's ability to control the environment (e.g.: Most of the time, do you feel that you can change what might happen tomorrow by what you do today?); and, belief in one's ability to successfully accomplish a task (e.g.: When I make plans, I am certain I can make them work).

Participation in this study will not affect your daughter/son's attendance in class or her/his evaluation by the school. Your child may withdraw from the research at any time. Although the information will be shared with the primary educators involved in your child's academic education, the data will otherwise only be published or reported in the aggregate. Subject confidentiality will be protected to the maximum extent allowable by law. All information collected will be strictly confidential. After the data have been collected, the students will not be identified individually.

Please indicate on the attached form whether you permit your daughter/son to take part in this study, and return it to Merle Levine by March 30th. Your cooperation will be very much appreciated. If you have any further questions please call the Merle Levine Academy with your queries, and they will in turn contact me. Alternatively, if participants have any questions regarding their role and rights as a subject of research, they may contact David Wright, Ph.D. Chair, University Committee on Research Involving Human Subjects, Michigan State University. His telephone number is 1.517.355.2180 (long distance charges will occur).

Thank you very much.

Julie A. Morton

I would be interested in enrolling my son if workshops were to be offered in problem solving at the Merle Levine Academy. Y / N (please circle)

I agree to allow _____ to take part in this study.
(Daughter/Son's name)

I do not want _____ to take part in this study.
(Daughter/Son's name)

Parent's signature _____

I, _____, agree to take part in this study.
(Student's name)

I, _____, do not agree to take part in this study.
(Student's name)

Date _____

Please return this form to Merle Levine at the Merle Levine Academy as soon as possible.

THANK YOU

Appendix 39

Parental Consent Form (Treatment Group – Fieldstone Day School)

Dear Parent:

I am a researcher who is studying the effects of creative problem solving skills training on a student's belief that s/he has the ability to control her/his environment in important life situations. A person's belief about the degree to which s/he can control the events in her/his life is associated both with problem-solving skills and with academic success (especially at the high school level). The information derived from this study will be therefore be useful to schools in designing better programs to help students solve the academic, personal, interpersonal, and professional problems which they may encounter in the course of their lives.

The Fieldstone Day School has given permission for this study to be carried out in your son/daughter's school.

This study will follow the ethical standards for research set forth by the Ontario Institute for Studies in Education and Michigan State University.

Your daughter/son has been selected to take part in this study. Your child will be asked to complete two sets of questionnaires (each taking approximately 1 hour), in March and May 2001. The questionnaires will include questions about: idea generation (e.g.: I generally go with the first good idea that comes to my mind); idea evaluation (e.g.: I have a systematic method for comparing alternatives and making decisions); planning for action (e.g.: I trust my ability to solve new and difficult problems); belief in one's ability to control the environment (e.g.: Most of the time, do you feel that you can change what might happen tomorrow by what you do today?); and, belief in one's ability to successfully accomplish a task (e.g.: When I make plans, I am certain I can make them work).

Between these two questionnaires, your child will participate in a seven week problem solving skills training course. S/he will be taught how to select and define a problem, how to brainstorm potential solutions, how to evaluate potential solutions, and how to create a plan of action.

Participation in this study will not affect your daughter/son's attendance in class or her/his evaluation by the school. Your child may withdraw from the research at any time. Although the information will be shared with the primary educators involved in your child's academic education, the data will otherwise only be published or reported in the aggregate. Subject confidentiality will be protected to the maximum extent allowable by law.

Please indicate on the attached form whether you permit your daughter/son to take part in this study. Your cooperation will be very much appreciated. Contact me at (416.446.1799) if you have further questions. Additionally, if participants have any questions regarding their role and rights as a subject of research, they may contact David Wright, Ph.D. Chair, University Committee on Research Involving Human Subjects, Michigan State University. His telephone number is 517.355.2180.

Thank you very much.

Julie A. Morton

I agree to allow _____ to take part in this study.
(Daughter/Son's name)

I do not want _____ to take part in this study.
(Daughter/Son's name)

Parent's signature _____ Date _____

I,_____, agree to take part in this study.
(Student's name)

I,_____ , do not agree to take part in this study.
(Student's name)

Student's signature _____ Date _____

Please return this form to the Fieldstone Day School as soon as possible.

Appendix 40

Parental Consent Form (Treatment Group - Jerome Diamond Center)

Dear Parent:

I am a researcher who is studying the effects of creative problem solving skills training on a student's belief that s/he has the ability to control her/his environment in important life situations. A person's belief about the degree to which s/he can control the events in her/his life is associated both with problem-solving skills and with academic success (especially at the high school level). The information derived from this study will be therefore be useful to schools in designing better programs to help students solve the academic, personal, interpersonal, and professional problems which they may encounter in the course of their lives.

The Jerome Diamond Center has given permission for this study to be carried out in your son/daughter's school.

This study will follow the ethical standards for research set forth by the Jerome Diamond Center, the Ontario Institute for Studies in Education and, Michigan State University.

Participation in this study will not affect your daughter/son's attendance in class or her/his evaluation by the school. Although the information will be shared with the primary educators involved in your child's academic education, the data will otherwise only be published or reported in the aggregate. Subject confidentiality will be protected to the maximum extent allowable by law. After the data have been collected, the students will not be identified individually in any report of that data.

Your child will be asked to complete two sets of questionnaires (each taking approximately 1 hour), in March and May 2001. The questionnaires will include questions about the generation, evaluation, planning and belief about one's ability to accomplish problem solving. Between these two questionnaires, your child will participate in a seven week problem solving skills training course.

Please sign the attached form agreeing to your child's participation in this study, the results of which will be used for research purposes. Your cooperation is very much appreciated. If you have any further questions please call the Diamond Center with your queries, and they will in turn contact me. Alternatively, if participants have any questions regarding their role and rights as a subject of research, they may contact David Wright, Ph.D. Chair, University Committee on Research Involving Human Subjects, Michigan State University. His telephone number is 1.517.355.2180 (long distance charges will occur).

Thank-you

Julie A. Morton

I agree to _____'s participation in this study.
(Daughter/Son's name)

I do no agree to _____'s participation in this study.
(Daughter/Son's name)

Parent's signature _____ Date _____

Please return this form to JDD as soon as possible. THANK YOU

Dear Parent:

Upon receiving written consent, your child has completed the first of two sets of questionnaires. The questionnaires included questions about: idea generation (e.g.: I generally go with the first good idea that comes to my mind); idea evaluation (e.g.: I have a systematic method for comparing alternatives and making decisions); planning for action (e.g.: I trust my ability to solve new and difficult problems); belief in one's ability to control the environment (e.g.: Most of the time, do you feel that you can change what might happen tomorrow by what you do today?);and, belief in one's ability to successfully accomplish a task (e.g.: When I make plans, I am certain I can make them work).

Some parents have asked if they can have access to the individual results of their child; some students have also asked for the individual results. However, the consent form stipulated that subject confidentiality will be protected to the maximum extent allowable by the law and that the individual score information will only be shared with the primary educators involved in a student's academic education.

In order to share individual student information with anybody other than a primary educator, a second consent form must be completed and returned to your school. If you have any further questions please call me with your queries (Julie A. Morton, 416.446.1799). Alternatively, if participants have any questions regarding their role and rights as a subject of research, they may contact David Wright, Ph.D. Chair ,University Committee on Research Involving Human Subjects, Michigan State University. His telephone number is 1.517.355.2180 (long distance charges will occur).

Thank you very much.

Julie A. Morton

I _____request that I might have access to the results of my individual test scores.
(please print student's name)

_____ _____
student's signature date

I _____request that I might have access to the results of my child's individual test scores
(please print student's name)

_____ _____
student's signature date

_____ _____
parent's signature date