

INSTRUMENTAL ENRICHMENT AND LOCUS OF CONTROL, SELF-ESTEEM,
BEHAVIOUR AND ACADEMIC PERFORMANCE IN GRADE FIVE

By

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ABSTRACT

Using a quasi-experimental design, this study examined the effect of a four and a half month program of Instrumental Enrichment (Feuerstein, 1980) on students' self-esteem, measured by Coopersmith Self-Esteem Inventory (Coopersmith, 1967/1991); perception of academic locus of control, measured by Intellectual Achievement Responsibility Scale (Crandall, Katkovsky, & Crandall, 1965); behaviour, measured by Teacher Student Behaviour Checklist (Schneider, 1994); and academic performance, measured by teacher selected written class work.

The treatment group (n = 14) of grade five students from an existing pullout learning assistance class and the control group (n = 23) attended two different inner-city elementary (K-7) schools in Vancouver, B.C. In the twice weekly 45 minute lessons, (approximately 15 hours total) the Learning Assistance teacher taught Organization of Dots and Orientation in Space instruments of IE.

Results indicated a statistically significant change in behaviour ($F(1,34) = 6.21$ $p < .02$) favouring the treatment group. A second finding linked the locus of control and behaviour raw change scores ($.62$, $p < .01$). The academic performance data were too dissimilar for comparison purposes.

Design improvements include: longer treatment time, similar settings for treatment and control groups (ie both closed or both open-area), monitoring of bridging activities, more effective researcher control over work used for academic assessment.

TABLE OF CONTENTS

	<u>Page</u>
ABSTRACT	ii
TABLE OF CONTENTS	iii
LIST OF TABLES	v
ACKNOWLEDGEMENTS	vi
CHAPTER I: INTRODUCTION	1
CHAPTER II: LITERATURE REVIEW	8
Historical and Theoretical Development	8
Overview	9
Goals	10
Theory and Terms	11
Research Studies	17
Overview	17
Original Study and Venezuelan Replication Study	20
Studies in Elementary Classrooms	23
School District Implementation	32
Criticism of Studies and Theory	40
Hypotheses	41
CHAPTER III: METHODOLOGY	43
Selection of Schools	43
Participants	44
Student Participants	44
Teacher Participants	45
Measures	46
The Intellectual Achievement Responsibility Scale (IAR)	46
Coopersmith Self-Esteem Inventory (SEI)	47
The Teacher Student Behaviour Checklist (TSBC)	48
Writing Samples	49
Treatment	49
Instrumental Enrichment Program (IE)	49
Organization of Dots	51
Procedure	52
CHAPTER IV: RESULTS	54
Preliminary Analyses	54
Demographic Variables	54
Attendance	54
Pretest Scores on Dependent Variables	55

Correlations among Dependent Variables	56
Reliability of Dependent Measures	56
Main Analyses	58
Academic Locus of Control	60
Self-Esteem	60
Classroom Behaviour	61
Academic Work Improvements	62
Summary	63
CHAPTER V: DISCUSSION	64
Results	64
Confounding Variables	66
Design Improvements	67
Areas for Further Investigation	68
Generalizability of this Study	69
The Place of Cognitive Skills in Education	69
REFERENCES	72
APPENDIX A: LIST OF COGNITIVE FUNCTIONS	87
APPENDIX B: DEPENDENT MEASURES	90
APPENDIX C: LETTERS, INFORMED CONSENT FORMS, AND NOTICE	96
APPENDIX D: TEACHER INFORMATION AND CONSENT	106

LIST OF TABLES

	<u>Page</u>
Table 1. Demographic Variables for Treatment and Control Groups	55
Table 2. Pre-test Scores on Dependent Measures for Treatment and Control Groups	56
Table 3. Correlations Among Dependent Measures at Pre-test for Both Groups	57
Table 4. Reliabilities of Dependent Measures at the Two Time Periods	57
Table 5. Pre- and Post-test Scores on Dependent Measures for Treatment and Control Groups	59
Table 6. Correlations among Change Scores on Dependent Measures	62

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CHAPTER I

INTRODUCTION

Over the last thirty years, the education curriculum has expanded past the 'basics' of reading, writing and arithmetic to include a variety of academic, technological, vocational and social topics. This expansion is driven by exponential increases in knowledge and technology as well as profound changes in the structure of society (Hughes, 1995; Levin, 1995; Lundquist & Molnar, 1995). The immensity of these changes requires continuous evaluation of all aspects of curriculum in order to provide students with educational opportunities that will enable them to thrive economically and socially after they leave school (Colker, 1993; Sullivan, 1988).

As educators in the 'information age' work within the framework of continuous change, curricular decision-making informs and at the same time is informed by theory and philosophy (Wasserman, 1992). In order to accommodate this continuous change in the education system, there has been a theoretical shift away from structuralism and toward the field psychology of structural relativism. Herbart's (Bigge & Shermis, 1992) view of students as passive recipients of teacher-imparted knowledge is being replaced by Dewey's (1938/1963) view of students as interactive participants in simultaneous interaction with the environment. The resulting changes in curricular content and methods reflect this process (Bigge & Shermis, 1992; McKnight, Crosswhite, Dossey, Kifer, Swaffort, Travers, & Cooney, 1987; Sullivan, 1988).

Concurrently with these developments in education, psychological theory and practice have been developing within the same framework of societal change. The evolution of the exchange of ideas between and amongst the theoretical positions has

moved psychology out of rigid adherence to particular theories which characterized psychology of the 1950s and early 1960s into the more eclectic theoretical syntheses of the 1980s and 1990s (Christensen & Pass, 1983; Dell, 1985; Hoffman, 1990). Since the society which frames these theoretical developments is increasingly dominated by the need to function effectively amidst continuous change, psychological theory has increasingly focussed more on various aspects of change: including the roles of cognition and emotion in decision-making (Bandura, 1977; Harter, 1988; Meichenbaum, 1980). The importance of self-esteem (Coopersmith, 1975/1991; Marsh, 1993), establishing an internal locus of control (Crandall & Lacey, 1972; Wilson & Rotter, 1986) and cognitive skills (Harter, 1986; Meichenbaum, 1980) arise out of this work.

In a parallel and related development in education, cognitive skills are emerging as a new fundamental in curriculum design (Kuhn, 1992; McTighe & Schollenberger, 1989; Spangenburg, 1995). Although society has always required citizens who think clearly, it has only recently been considered necessary that all, or almost all, citizens should be effective problem solvers (Resnick, 1987a). Meta-cognition, or the 'fourth R' of reasoning, includes a variety of terms such as thinking skills, cognitive skills, cognitive thinking skills, deductive and inductive thinking, divergent and convergent thinking, lateral and linear thinking, creative and critical thinking, problem solving and decision-making (Ruminski, Hanks, & Spicer, 1994). The overall purpose of programs which focus on these skills is to teach students how to think rather than what to think (Nickerson, Perkins, & Smith, 1985).

Although it is now generally agreed that personal agency skills and higher order cognitive skills develop through systematic training (Costa, 1991; Fry, 1992) and there is increasing consensus that the development of effective thinkers requires an interactive

approach to the teaching of cognitive skills and subject matter (Applebee, Langer, & Mullis, 1991) there is no general agreement on the most effective way to teach them. The two sides of this content vs. process dilemma are whether to embed cognitive skills within subject matter lessons or to teach them separately while providing adequate transfer activities. The dilemma centres around the fact that without adequate transfer activities, skills remain within the schema of the particular subject within which they are taught and are thus not accessible to the learner for use in other areas. Even though students come to school with a wealth of knowledge, Anderson, Hiebert, Scott, and Wilkinson (1985) have found that students have difficulty applying their non-school prior knowledge in school settings. The importance of meta-cognitive skills is further illustrated by the findings that their use while reading and learning to read distinguishes effective readers from ineffective readers (Resnick, 1987).

In response to the need to educate students to become more effective thinkers, a number of thinking skills programs have been developed (Costa, 1991). Many of these programs (Covington, Crutchfield, Davie & Olson, 1974; de Bono, 1983, Lipman, Sharp, & Oscanyan, 1979; Meeker, 1969; Whimbey & Lochhead, 1980) were designed for students who were already invested in the education process. Due to their reliance on well-developed reading and writing skills these programs tend to be inaccessible to students who lack them. While the goal of improving the thinking skills of successful students can be addressed through a number of programs, the goal of improving the thinking skills of unsuccessful students is more problematic (Resnick, 1987). A major source of difficulty is that there is, by definition, no baseline of knowledge or skills on which to base cognitive skills programs for unsuccessful students. The problem becomes more acute as the gap between interest level and capability level increases. Within the

complex interaction of classroom variables, the teacher's view of ability as multi-faceted and incremental emerges as a concept which is fundamental to student academic success (Marshal & Weinstein, 1984). This view of ability is central to the theoretical base from which the Instrumental Enrichment (IE) program emerges (Feuerstein, Rand, & Hoffman, 1979) and which forms the basis of the present study.

The fundamental premise of the theory behind Instrumental Enrichment is that given adequate mediation, everyone, regardless of age, IQ, or etiology of learning difficulty, can successfully engage in the learning process. Feuerstein's theoretical model divides the task of learning into three parts: input, elaboration, and output. Each of these is divided into several sub-tasks. Accordingly, an unidentified problem in any one of these sub-tasks may result in significant performance impairment (Feuerstein et al., 1979). Performance improvement evolves from appropriate individualized mediation of these sub-tasks. Incremental experiences of successful mediation enable ineffective or passive learners to develop the behaviours of effective active learning.

Although the Instrumental Enrichment Program (IE) (Feuerstein et al., 1979) was developed to assist students who had little or no interest in education, it also appeals to students who are successful in school (Dufner, 1988). IE has been used with a variety of populations including the deaf (Haywood, Towery-Woolsey, 1988), gifted (Waksman, Silverman, & Messner, 1982), culturally and linguistic different populations including ESL (Feuerstein Howie, Richards, & Pirihi, 1993), mentally handicapped (Howie, Thickpenny, Leaf, & Absolum, 1985), normally functioning, learning disabled children (Funk, 1987; Rand, Tannenbaum, & Feuerstein, 1979) and adults (Markus, 1993). The suggested lower age limit is about 9 years of age while there is no upper age limit. IE has been used in Belgium, Canada, England, France, Israel, USA and has been

incorporated into the teacher training programs in Venezuela. The same theory of mediated learning applied to specific cognitive functions led to the development of The Bright Start Program (Haywood, 1982) for the pre-school to first grade curriculum and the Cognet Program (Greenberg, 1989) for second and third graders.

IE was introduced into the Vancouver School District approximately 15 years ago by Ms. L. Williams (First Nations Co-ordinator). The population of this large urban school district has changed rapidly in the last ten years due to the numbers of refugees and immigrants choosing to live in the city and surrounding municipalities. More than 50% of the students in the district require English as a Second Language (ESL) services. Additionally, the problems facing the large First Nations student population are unique to their situation. The often profound dissonance between the 'home' culture and that of the 'school' culture which all these students experience can manifest in a variety of social and academic difficulties.

Based on her previous work with First Nations students, Ms. Williams felt that IE would be effective in assisting the First Nations students to apply and develop their cognitive skills in order to reduce their high dropout rate. (L. Williams, personal communication, July, 1992). Since IE is accessible to both successful and unsuccessful students, and includes opportunities to transfer knowledge and experience in a variety of areas, it can engage students of various capabilities and cultures simultaneously (Feuerstein, 1979). Thus, while one group of students may be the primary focus of the program, the entire group has the opportunity to benefit from participation in the IE lessons.

In order to facilitate teacher training as well as to provide teaching and assessment services for students, the Variety Club International and the Vancouver School Board

have established the Variety Learning Centre. To date the Centre has trained over 500 teachers in B.C. and the western United States. Approximately 25 teachers in the Vancouver School District are now using IE with their classes. One elementary school uses IE at all grade levels (L. Williams, personal communication, October, 1994).

A Vancouver School District plan Proposal for an Evaluation of the Instrumental Enrichment Program was developed in 1990 to provide a framework for IE program evaluation. This study is an element of that plan. The three objectives of the plan were:

1. To provide a comprehensive overview and assessment of the implementation of instrumental enrichment programs currently being established in the Vancouver School District.
2. To assess the short-term and long-range effectiveness of this program as a means of enhancing the cognitive and affective development of the students involved.
3. To assess the impact on teachers of being trained in and using this method.

The third objective of assessing the impact of IE on teachers who have been trained and are using the program was completed (Kettle, 1991; Miller, 1993).

Information from the Kettle study was used in developing the procedure for this study (See Appendix B). Due to the complexity of the required studies, lack of funds, teacher transfers and student attrition, the first and second objectives have not been completed. This study and Maxcy's (1991) study partially address the second objective which is to assess the short and long-term effectiveness of IE as a means of enhancing the cognitive and affective development of the students involved.

The purpose of this study was to investigate inter-relationships amongst academic locus of control, self-esteem, behaviour and cognitive skills over a six month period on an at risk ESL upper-elementary school population. The correlations amongst self-

esteem, locus of control and academic performance are areas of past and current research (Harter, 1981, 1986; Marsh, 1993; Meichenbaum, 1992). Specifically, this paper draws on Coopersmith's work on self-esteem (1967/1991); Crandall, Katkovsky and Crandall's (1965) work on academic locus of control and Feuerstein's work (1979) in the development of the cognitive skills program, Instrumental Enrichment.

CHAPTER II

LITERATURE REVIEW

This chapter is organized into four major sections. After covering the historical and theoretical development of Instrumental Enrichment (IE) in the first section, the second section provides an overview of the goals, supporting theory, and definition of terms used in this program. The review of IE studies relevant to this study comprises the third section and the chapter concludes in the final section with a statement of the hypotheses to be investigated in this study.

Historical and Theoretical Development

During the early 1940s, Feuerstein studied in Geneva with Inhelder and Rey under the direction of Jean Piaget (Ben-Hur, M. personal communication, August, 1996). Previous to these studies, Feuerstein had been working with emotionally disturbed children in Romania. In the early to mid-1940's, Feuerstein was hired by Youth Aliyah to provide academic and lifeskills training to refugee and immigrant youngsters from Europe and North Africa. Feuerstein observed "the prevalent use of 'elementary and primitive schemata that did not take into account the nature of the object and the specificity of the task' which characterized not only the test performances but also the characteristic daily functioning of these children" (Hunt, 1970, p.ix). Working within the framework of Rey and Piaget's conception of knowledge and skills as hierarchical and that conventional instruments were designed to indicate what the individual had already learned but not what he/she was capable of learning, Feuerstein began to develop alternative assessment and teaching methods that would enable 'retarded performers' to develop higher level cognitive skills (Hunt, 1979).

When Feuerstein began this work, he embedded the cognitive skills within the academic subject lessons. However, since both the teachers and the students found that this disrupted the flow of the lessons, he then developed a separate program of cognitive skills training and transfer activities (Jensen, M., personal communication, July, 1996). Through the social process of developing trusting relationships with these youngsters, many of whom had been severely traumatized by their experiences during WWII, and by using the cognitive skills which he later formalized into the Learning Potential Assessment Device (LPAD) (Feuerstein et al, 1979) and Instrumental Enrichment (IE), Feuerstein was able to assess and teach them the cognitive and social skills necessary for a successful life in their new country (Bellanca, 1994). Feuerstein has retained this 'whole person' focus in his theoretical and practical work.

The theoretical sources for Feuerstein's focus on cognition developed from his studies with Jean Piaget and Andre Rey at the University of Geneva. Apparently, it was not until the early 1970s that Feuerstein, along with other western psychologists, was introduced to the work of L.S. Vygotsky. Even though Vygotsky and Piaget corresponded on theoretical topics for several years prior to his death in 1934, Feuerstein seems to have been unaware of Vygotsky's work, including the zone of proximal development, and cultural transmission of higher psychological functions (mediated learning of cognitive functions) which figure prominently in the work of both theorists (Ben-Hur, M., personal communication, August, 1996).

Overview

Instrumental Enrichment (IE) is a series of 15 'instruments' designed to mediate specific cognitive functions in a hierarchical sequence. The instruments consist of paper and pencil worksheets, designed for easy accessibility by non-readers, comprising over

500 hours of instruction. While utilizing as many cognitive functions as possible, each is also designed to emphasize, and thus develop, particular cognitive functions. For example, the first instrument, Organization of Dots, emphasizes the following: clear perception, conservation, precision and accuracy, visual transport, restraint of impulsivity, and elimination of trial and error behaviour. Appendix A details the complete list of cognitive functions.

The worksheets form the basis for discussions focussing on the use of cognitive functions (e.g. accurate perception, comparison, use of visual cues, problem solving, strategizing, planning) or the use of information on the sheets and how some aspects of the discussion or the sheet itself are similar to or different from experiences in other areas of academic work, school or homelife. These 'bridging' discussions enable students to transfer their knowledge of cognitive skills from the IE lesson to other areas of their lives. Typically, these discussions, involving both near and far-transfer examples are viewed by teachers and students as the most challenging aspect of the program (Williams, personal communication, July, 1992).

Goals

The primary goal of IE is to 'increase the capacity of the human organism to become modified through direct exposure to stimuli and experiences provided by the encounters with life events and with formal and informal learning opportunities' (Feuerstein, Rand, Hoffman, & Miller, 1980, p. 115). In other words, the purpose of IE is to teach people to be effective self-directed learners in both formal and informal situations throughout their lifetimes.

This goal of becoming an effective self-directed learner is implemented via the following six sub-goals:

1. Correction of deficient cognitive functions;
2. Enrichment of cognitive repertoire, including cognitive operations, strategies, concepts and relationships;
3. Establishment of the need to learn and to function at an adequate cognitive level through formation of habits;
4. Production of reflective, insightful thinking processes;
5. Creation of task-intrinsic motivation;
6. Arousal of retarded performers from their intellectual - passivity to become originators of new information and to encourage their creativity (Kaniel, Tzuriel, Feuerstein, Ben-Shachar & Eitan, 1991, p. 191).

These goals are implemented through the activities of the IE lesson.

Theory and Terms

Structural cognitive modifiability is the term that Feuerstein uses to describe what he believes is the inherent ability in all people to change their 'manner of interacting with, that is, acting on and responding to, sources of information' (Feuerstein et al, 1980, p. 9). The input, elaboration, and output phases of structural cognitive modifiability (SCM) are each made up of a number of cognitive functions. Dysfunction in any cognitive function may result in cognitive task performance impairment. The theory of structural cognitive modifiability states that regardless of age, ability, or etiology, everyone is capable of engaging in learning.

Although Piaget, Vygotsky (1934/1978) and Feuerstein all regard learning as a life-long activity requiring hierarchical acquisition of cognitive skills, Feuerstein takes the most optimistic view of the human capacity to learn and change. Unlike Piaget (1969), Feuerstein believes that while there are optimal times for learning there are no 'critical

periods'. Feuerstein further breaks with Piagetian theory in the area of the acquisition of information. He believes that cognitive modifiability occurs either through direct exposure to experience (as does Piaget) or through mediated learning experience (MLE) (Feuerstein et al, 1980) and that cognitive development is not necessarily sequential (Ben-Hur, personal communication, August, 1996). Sternberg (1983), Resnick (1987a) and Vygotsky (1934/1978) also indicate that cognitive functions may be modified if appropriate interventions are applied. Of the two types of learning, direct experience (stimulus - organism - response) and Mediated Learning Experience (stimulus - mediator - organism - mediator - response), Feuerstein believes that the latter is the more powerful because the role of the mediator is to organize, select, and focus materials and experiences from the environment and then to guide the learner's interaction with the stimulus (Feuerstein, 1990). Vygotsky's work with Luria in the 1930s on the history of the development of mental processes amongst people in Central Asia established a similar principle of the importance of mediation in the development of cognitive capacity (Cole & Scribner, 1978).

Of the 12 major criteria defining Mediated Learning Experience (MLE), the three which are considered essential are: mediation of intentionality and reciprocity, mediation of transcendence, and mediation of meaning (Feuerstein, 1990). The remaining criteria which may occur in combination with these three are: mediation of a feeling of competence, mediation of regulation and control of behaviour; mediation of individuation and psychological differentiation; mediation of goal-seeking, goal-setting, planning, and goal-achieving behaviour; mediation for challenge; the search for novelty and complexity; mediation of an awareness of the human as a changing entity; mediation

of the search for an optimistic alternative; and mediation of the feeling of belonging (Presseisen & Kozulin, 1994).

Since Feuerstein views learning as a lifelong social activity which is 'needed for adapting to the everchanging reality, and not as an activity limited to the period of school' (Egozi, 1991) and since by definition, anyone who engages in the first three criteria above is providing MLE there are potentially many mediators. In practice, however, parents, relatives, teachers, coaches, and in some cases friends, workplace supervisors or mentors and counsellors fulfill the criteria and thus provide MLE. By mediating the environment, the parent or other mediator is, in Piagetian terms, assisting the learner to accommodate the disequilibrium caused by the new experience.

Feuerstein views mothers or mother-figures as the first mediators. He also believes that this relationship shapes the child's ability and capacity to learn from other people and in other situations (Sharron, 1982). This view is similar to Winnicott's (1964) view of the 'good enough' parent who arranges and interprets experience for the child from the moment of birth. By including the parents as mediators, Feuerstein is clearly emphasizing the importance of mediating emotional as well as cognitive experiences. Feuerstein (Feuerstein et al, 1980) states that both 'emotional' and 'intellectual' events must be mediated because interaction occurs between them.

Although the cause of insufficient mediated learning experience within this fundamental social interaction may develop from the caregiver's inability, lack of time or lack of motivation or it may develop from the child's physical or mental makeup the result is always the same. The resulting cognitive dysfunction sets up a cycle in which, without intervention, the learner is prevented from thinking effectively. Feuerstein uses the term 'culturally deprived' to describe those who, regardless of etiology, have not had

sufficient mediated learning experience to become effective independent learners.

Conversely, if an individual has learned his/her own culture (cultural transmission), and thus developed effective cognitive functions, he/she has also developed the cognitive skills necessary to continue to learn independently including learning how to function in another culture.

The mediation of cognitive functions requires identification of cognitive dysfunctions or deficits, sufficient time, and the presence of a knowledgeable, caring mediator. Non-performance of a complex task may arise from cognitive deficits in the input, elaboration or output phases of the mental act. Conversely, in any given individual, an unidentified problem in a specific area may result in significant performance impairment. The etiology of non-performance (genetic, motivational, or experiential) shapes the amount and type of mediation and, to some extent, the expected mastery level.

Dynamic Assessment, also referred to as Dynamic Interactive Assessment, Learning Potential Assessment, or Process Assessment is a systematic attempt to measure an individual's ability to learn or 'zone of proximal development'. The zone of proximal development (ZPD) 'is the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers' (Vygotsky, 1978, p. 85-86). In contrast to the standard intelligence and achievement test format where instruction invalidates results, 'the basic format of the learning potential test is pretest-training-posttest' (Hamers, Sijtsma & Ruijsenaars, 1992, p. 371).

The training components of dynamic assessment are systematic attempts to (a) change various components of tasks in order to assure that the examinee understands what is required, and (b) experiment with different approaches to teaching the examinee how to complete the task. Both of these elements are included in order to determine specific instructional techniques that are most effective for each child (Delclos, Vye, Burns, Bransford, & Hasselbring, 1992, p. 317).

In addition to the Learning Potential Assessment Device (Feuerstein, Rand, & Hoffman, 1979) a number of process assessment measures have been developed by other researchers. They include: the Kaufman Assessment battery for children ages 2-12 (K-ABC) (Kaufman & Kaufman, 1983), Sternberg Multidimensional Abilities Test (Sternberg, 1985), and Cognitive Assessment System by Das & Naglieri (1994). Feuerstein's Learning Potential Assessment Device is unique in its reliance on the mediator's skill and judgement in eliciting task performance from the examinee.

The subtleties required of the mediator's role both in the learning potential assessment interviews and in the mediation of Instrumental Enrichment, are more fully acknowledged through the use of the word 'mediator' than through the word 'teacher'. The mediator is required not only to impart information but to ensure that the learner is able to incorporate and use the skills in this and other appropriate situations. In addition, the word 'mediator' probably has fewer negative connotations for those whose formal learning experiences have been unfavourable.

The Latin root, 'medius' meaning 'middle' conveys the information that the mediator is between the learner and the stimulus. By interpreting the stimulus in a manner meaningful to the learner the mediator brings an understanding of the stimulus to the learner. This includes providing meaning, including emotional meaning, and

orientation in time and space. The stimulus may be an event, an object or another person.

The word mediator has implications in addition to that of imparter of information. An understanding develops through examination of the role of the mediator as s/he attempts to develop solutions through the active participation of both participants in conflict situations. The success or failure of such mediation often rests on the trust the conflicted parties place both in the process and in the person who is mediating their conflict. Thus, Feuerstein's use of the term 'mediator' clearly establishes the necessity for a relationship of trust which is different from that of the 'teacher'.

The fundamental importance of the relationship between the mediator and the learner emerges from the case studies, demonstrations and video-tape interviews that he and other researchers have completed. Don't accept me as I am (Feuerstein, Rand & Rynders, 1988); NFB documentary, The mind of a child, (Marcuse, 1995) and the video interview, The making of the individual: Learning how to learn: An interview with Reuven Feuerstein (Bellanca, 1994) discuss several case histories which support the importance of the relationship between the mediator and the learner.

From these sources, it is clear that the effective mediator uses empathy, respect and genuineness which Rogers (as cited in Egan, 1990) identified as the "necessary and sufficient conditions of therapeutic personality change" (p. 124). The trusting relationship is formed within the carefully structured sequential progression of the IE exercises. These exercises and the discussions which relate them to many aspects of the learner's life ensure that the problem-management and opportunity-development stages of helping are continuously addressed. The change in cognition accomplished through the mediated learning experience of IE is similar to the change in thought leading to

changes in emotion of Rational Emotive Therapy (Ellis, 1989). The effective mediator thus seems to demonstrate similar qualities to those of the effective counsellor (Egan, 1990). Kaniel and Tzuriel (1992) state that there have not "been, as yet, any systematic experiments to study the MLE integrative approach with its implications for cognitive and emotional areas" (p. 406).

Beker and Feuerstein (1990) and Durkin, Beker, and Feuerstein (1995) have conceptualized the systematic use of the environment in the model of the 'modifying environment' which is designed to enhance residential group care and treatment services for children and youth. Within a safe environment, the use and adaptation of program resources and the workers' use of self facilitate the intervention prescription which is developed from the dynamic interactive assessment. A significant difference from other environmental therapies such as Bettelheim's milieu therapy is that modulated pressure is used to move the children toward the development of more mature patterns of cognitive and emotional functioning (Beker & Feuerstein, 1990).

Research Studies

Overview

Relative to other cognitive skills programs, a large number of studies researching the efficacy of Instrumental Enrichment (IE) have been conducted. In the first major study, Feuerstein and Rand (1977) examined the effect of a two year program of IE on low functioning low SES Israeli youths. This study combined with a follow-up study two years later has formed the basis for a number of articles by these researchers (Feuerstein & Rand, 1979; Feuerstein, Rand, Hoffman & Miller, 1980). Additionally, a number of studies on culturally diverse groups have been conducted in Israel (Kaniel, Tzuriel, Feuerstein, Ben-Shachar, & Eitan, 1991; Feuerstein, 1963). A replication study was

conducted in Venezuela by Ruiz (1983), and a series of large studies with children and youths were begun in the 1980's by Haywood, Waksman, Narrol, Jensen using school populations in five major centres in the US and Canada. Some, including the Haywood study were not completed for lack of funds.

In addition to these large studies, Dissertation Abstracts International has, since 1980, registered over 40 doctoral and masters level studies on a variety of populations in the US and Canada. In addition, four studies (including the present study) have been conducted on the Vancouver School Board IE program (Kettle, 1991; Maxcy, 1991; Miller, 1993).

Since the early 1980s a number of school districts in Toronto, Vancouver, B.C., Atlanta, Detroit, and Taunton, MA. have developed active IE programs; there may be others. Lexington School for the Deaf and Gallaudet University for the Deaf in Washington, D.C. incorporate mediated learning including IE training throughout their programs. Scott High School, which provides a college-preparatory program within the Catholic school system in Omaha, NE incorporates IE training as part of its ninth grade curriculum and also utilizes mediated learning principles throughout the program (Father Gilg, President of Scott High School, personal communication, August, 1996).

Since initial program results are often limited to near transfer tasks while far transfer task results such as improved academic performance may not be noticed for three or four years (cite), IE can be a difficult program to 'sell'. Although most districts using IE implemented some type of formal longterm research studies, program retention seemed to depend on funding availability and administrative support rather than program results. Schaumburg, IL. school district has retained the focus of mediated learning while switching to the more teacher friendly Infusion Technique (Park & Schwartz,). The

programs in Murphy Elementary School District, AZ., New York and Portland, OR. have not been retained although program reinstatement is being discussed in New York.

In addition to its use in Israel, IE is used in France and Belgium and has been incorporated into the teacher training program in Venezuela (Hamers, personal communication, June, 1996). At least five Local Education Authorities in London, England (Link, 1985) have implemented IE programs although limited documentation is available. Shayer and Beasley (1981) conducted a small group study in one of these London Education Authorities.

In reviewing the abstracts for 37 doctoral or masters level studies several trends emerge regarding near and far transfer effects for cognitive performance and/or cognitive skills development, locus of control and self-esteem. Of those which investigated near and far transfer cognitive tasks, 32 measured a positive effect or trend for near transfer and/or far transfer. The breakdown is as follows: near transfer (7 effect, 2 trend); far transfer (3 effect, 1 trend); near and far transfer (10 effect, 2 trend); near but not far transfer (3 effect, 1 trend) and an additional four measured no change. Three of the five studies reporting locus of control measured no significant change, one measured a positive change and one a negative change. Another study reported a positive change in field independence for a sample sub-group. Eight of the 10 studies investigating behaviour change reported a positive effect, the remaining two reported no change. Of the six studies measuring self-esteem, two reported a positive effect on sub-scales, one a negative effect and three reported no change.

The general trends so far seem to indicate that IE effects tend to be found for near transfer cognitive tasks and under some conditions, specifically considerable passage of time, far transfer cognitive effects emerge. Most of the studies investigating behaviour

change reported a positive effect. The results on locus of control and self-esteem measures seem to be inconclusive. This may result from a masking effect in which the overall group total covers significant changes in individual scores (Ben-Hur, personal communication, August, 1996).

Original Study and Venezuelan Replication Study

Feuerstein, Rand, Hoffman, and Miller (1979) report the results of the first longterm study of Instrumental Enrichment. The two by two design enabled researchers to investigate the relationship between residential vs daycare settings and Instrumental Enrichment (IE) vs General Enrichment (GE) treatments. Fifty-seven matched pairs were identified from a group of over 515 12 - 15 year old, low functioning, low socio-economic status, male subjects who were functioning well below the norm on academic and social measures. The participants were either living in a residential care centre or living at home while attending a daytreatment centre. During the two year study, half the participants in each setting received IE training while the other half received the equivalent time in General Enrichment lessons. Since the IE training occurred during school hours, the treatment group received 300 fewer hours of academic teaching than did the control group. Pre- and post-test measures were the Primary Mental Abilities (PMA) Test version 4 to 6 (Thurstone, 1965), Tannenbaum and Levine (1968) Classroom Participation Scale, and the Project Achievement Battery. Additional post-test measures were administered to explore setting/treatment interaction. Teachers were appropriately trained and supervised.

After adjusting for initial differences, it was found at post-test that the treatment group out-performed the control group in several areas whereas the control group did not out-perform the treatment group on any measure. There were significant

performance differences in favour of the treatment group on the PMA total score; the figure grouping and number subscales ($p < .01$) and the addition and spatial relations subscales ($p < .05$). The Project Achievement Battery indicated the treatment group performed significantly better on two subtests ($p < .01$; $p < .05$) and an interaction effect in favour of the treatment group was found on a third subtest ($p < .01$). Post-test results in favour of the treatment group were also found on the Classroom Participation Scales. One scale showed significant differences on the self-sufficiency and adaptiveness to work factors ($p < .01$) and the interpersonal conduct factor ($p < .05$) while the other showed significant differences only on the self-sufficiency factor ($p < .01$).

Two years later in follow-up using two Israel Defense Force (IDF) admissions tests, the Dapar Intelligence Test which measures both verbal and non-verbal intelligence and The Hebrew Language Development Test, the treatment group norm matched the general population norm while the control group norm did not.

Since the treatment group matched or exceeded the performance level of the controls on near and far-transfer tasks and in classroom participation measures while receiving 300 fewer hours of academic instruction, the post-test results can be taken to indicate that the treatment was effective. The follow-up test results indicate the divergent effect in cognitive functioning produced by IE.

The major concerns with this study are: that Classroom Participation Scale scores were biased because the classroom teachers completed them; that some of the measures such as the Project Achievement Battery were developed by the authors; that reliability and validity data on this and other test measures, including the IDF data, are not available; additionally, some of the measures used at post-test and follow-up (e.g. part of the Dapar test is based on the Raven's Progressive Matrices) are similar to some

treatment exercises. Thus, the significantly positive post-test and follow-up test results may be the result of 'teaching to the test'. However, even if this were the case, it does not explain the increased ability of the IE group and the decreased ability of the GE group at follow-up, two years after the end of treatment. A partial rebuttal lies in the fact that the follow-up test results were taken from the Israel Defence Force (IDF) induction battery. Since IDF is on active duty and service is compulsory, it is imperative that inductees are effectively screened for suitability, aptitudes, and intelligence. Thus, it is unlikely that the tests are unreliable.

At the beginning of this study both treatment and control groups were essentially at the same low level of functioning. IDF admissions data on youths from similar backgrounds indicate that without intervention, most of the study participants would not have been admitted to the army. The significantly increased follow-up scores of the treatment group which place them within the normal range of the population indicates that treatment benefits increased over time. In contrast, the control group (which had received General Enrichment) performance plateaued or diminished in the two years between post-treatment test and follow-up test. This pattern of divergent growth was expected by Feuerstein (1980) 'if Instrumental Enrichment is able to provide the individual with the necessary cognitive tools that permit and encourage a continuous process of development in response to exposure to novel experiences, then a divergent pattern of growth should be obtained' (p. 371). The follow-up test results provided evidence supporting the concept that IE training has the effect of 'promoting independence and autonomy in using cognitive processes for further learning and change (p. 423)'. The results of this study seem to indicate that it is possible to improve levels of functioning sufficiently to have increased access to opportunities.

The only other large scale longitudinal study was conducted in Venezuela by Ruiz, de Sardina, and Ortiz (Church, 1994). The 616 subjects aged 10 - 14 years were matched for IQ (Cattell-2), age, and gender in a 2 x 2 factorial design investigating the interaction between Instrumental Enrichment (IE) and socio-economic status. Treatment consisted of 275 hours of IE instruction over two years. The control group received no additional treatment. As with the Israeli study, positive changes in academic achievement, self-concept and classroom behaviour were hypothesized for the treatment group. Changes in teacher attitude were a secondary focus of this study.

At post-test, positive changes were reported in students' academic achievement, self-concept, and classroom behaviour. A positive change in teachers' attitudes was also reported. The authors reported that the 114 students tested at follow-up two years later, showed evidence of the divergent effects for general ability as measured by the Cattell 2-B, Thorndike and D-48. A closer examination of the study to determine the effect of design weaknesses is not possible because the original study was written in Spanish. An obvious possibility is the Hawthorne effect as a by-product of the treatment effect. Also, the classroom behaviour scale scores may be contaminated if an independent blind rater was not used.

Despite differences in setting, participants, and measures, and possible design flaws, the results of these two longitudinal studies lend some support to the hypothesis that IE positively changes students' cognitive capacities.

Studies in Elementary Classrooms

Additional support for the longterm effects of IE is found in the longitudinal studies conducted by Church (1994), Funk (1987) and Jackson (1983). The results of each of these studies, which were conducted on small populations from grades four to

eight, indicated that while significant near transfer results occurred after one year of treatment, significant far transfer effects were not found until the third year. The fact that the delay occurred whether the class received one year or three years of Instrumental Enrichment may lend support to the mediated learning theory which predicts a lengthy delay in far transfer results.

Church investigated the effect of a one year treatment of IE (64 hrs), given by an itinerant IE instructor, on sensory integration as measured on near transfer tasks by the Bender-Gestalt (Bender, 1938) and Visual Aural Digit Span (VADS) (Koppitz, 1977) tests and on far transfer tasks by the routine annual administration of the Iowa Test of Basic Skills. The control and treatment groups were two separate grade four classes in an elementary school, in Norman, Oklahoma. Although the school met several of the criteria for the designation of 'at-risk', the school population was stable and thus suitable for a longitudinal study. Each class had four students designated as gifted and three designated as remedial. After the treatment year, the students in the treatment and control groups were never assigned to a class on the basis of their IE experience. The treatment and control students were reassigned for grade five and subsequently, in grades six and seven, they attended a middle school with students from three other elementary schools. This assignment procedure was done to ensure as far as administratively possible that the IE treatment was the only difference between the treatment and control groups' school experience.

Although the study uses two previously existing classes post hoc examination revealed no significant differences. The demographics of SES and family makeup of each class were the same and each class had four gifted and three remedial students. Academically, the means on the MAT6 which had been administered at the end of grade

three for the treatment group was 76.85 with a standard deviation of 17.34 and for the control group the mean was 75.25 with a standard deviation of 17.81.

The two near-transfer tests measured different aspects of sensory input. Simultaneous sensory input was measured by the Bender-Gestalt test and the Visual Auditory Digit Span (VADS) was used to measure sequential sensory input. Due to the on-going length of this study, it was important to select measures that accounted for maturation.

Of the several scoring systems available for the Bender-Gestalt, the Koppitz (1958) developmentally based scoring system was selected. In this system a year's gain is required in one year in order to maintain the same score. This test is compatible with five out of the eight input and six of the seven output cognitive functions identified in mediated learning theory (Church, 1994). The inter-rater reliability and test score reliability is .83 to .96 ($p < .001$) (Miller, Loewenfeld, Lindner, & Turner, 1963) and there is no practice effect (Vega & Powell, 1970).

The VADS scoring system incorporates the effect of maturation and has adequate test-retest reliability (Koppitz, 1981). In measurement of sensory integration on sequencing and recall tasks it is compatible with six of the eight input and six of the seven output functions (Church, 1994). Scores have a correlation of .87 ($p < .001$) with Comprehensive Test of Basic Skills, Wechsler Intelligence Scale for Children (WISC) and Wide Range Achievement Test (WRAT) (Koppitz, 1981; 1982). Since there is no correlation with Bender Gestalt (Koppitz, 1981) it is likely that the two measures do measure simultaneous and sequential sensory processing as reported.

Since the Iowa Test of Basic Skills (ITBS) was administered annually by the district, it was used as the measure of academic achievement from grades four through

seven. The MAT6 had been used in grade three and the scores from the two tests were made comparable through the use of the Oklahoma Equating Tables developed by Riverside Publishing Co.

Students in the treatment group were tested on the near transfer measures (Bender-Gestalt and VADS) at the end of grade four and grade five. The control group received these tests only at the end of grade five. Both groups wrote the ITBS, measuring far transfer effect, at the end of grades 4, 5, 6, and 7.

Significant near and far transfer effects were found in favour of the treatment group. Near transfer effects were evident at post-test at the end of grade four (Bender-Gestalt effect size 1.2; $p < .001$ and VADS effect size .67; $p < .01$) and were maintained at the second post-test at the end of grade five (Bender-Gestalt effect size 1.8 $p < .0001$ and VADS effect size 1.3 $p < .0006$). Although there was a trend in favour of the treatment group in grades five and six, far transfer effects were not found until the grade 7 ITBS was administered, $F(1,39) = 8.22$; $p < .007$. Using Normal Curve Equivalent (NCE), the treatment group had gained five NCEs over the District gain. An additional measure of successful far transfer was the fact that none of the three students designated as requiring remedial assistance in grade four continued to require it in subsequent years. In contrast, seven control group students including the three designated remedial students plus one of the gifted students were assigned to Special Education classes in grades six and seven. The results of this study clearly indicate that IE had a positive effect on the near and far transfer capabilities of the treatment group in comparison to the control group.

Design weaknesses include: small sample size, lack of randomization of subjects, lack of control group pre- and post-test data from grade four administration of the near transfer measures.

The Jackson (1983) study was directed from the perspective that low SES environments foster the development of some cognitive functions but not others. By providing students the opportunity to develop the underutilized cognitive skills and teaching them the relationship of the skills with school performance, it was hypothesized that students' school performance would be enhanced and some gifted students would be identified. Due to the similarity between skills taught in IE and those required for successful math performance this study focused on math.

The treatment group consisted of a class of 25 Title-1 math students from the 803 fifth grade students within the Atlanta School District. In Atlanta, Title-1 services for math and reading development were available to students below the 27th percentile on the Math Concepts and Applications subscale of the California Achievement Test (CAT). IE was offered at all the Title-1 students in Atlanta schools at the time the study was conducted.

Since the CAT was routinely administered by the District at the end of every school year at several grade levels, for the purpose of measuring student academic progress, including Title-1 eligibility, it was selected as the far transfer measure in this study. Since the widespread familiarity with IE precluded the use of a non-IE control group the progress of the treatment group was compared with projected non-treatment scores developed using a historical techniques. Treatment group scores and Normal Curve Equivalent (NCE) were compared to the projected scores, national norms and Atlanta Title-1 program means using both a parametric and a non-parametric statistical

technique. In addition, the results of a district developed teacher survey of observed student skills were compared to the items on the Renzulli-Hartman Scale (Renzulli, 1975b) to determine the incidence of gifted learning characteristics in the treatment population. Due to the slow start up of the project, the grade five data were used as the baseline of the study.

For the three years of the study, treatment was delivered on a pull-out model and consisted of three days per week of IE instruction and two days per week of a math skills program. For the first two years (1978-1980) the Curriculum Development Association (CDA) supplemental skill development program was used and in the final year, a district administrative decision replaced it with a program based on text-book objectives. The teacher received ongoing in-service support. Bridging was a major focus of the lessons.

The CAT scores in grade five and six indicated a trend in favour of the treatment group with 14 of the 25 students showing positive gains. At the grade seven level both the parametric and non-parametric statistical techniques yielded significant positive treatment effects ($p < .001$). The grade six NCE scores showed a non-significant increase of .8 NCEs which did not meet the Title-1 criterion of program success defined as an annual gain of 5 NCEs. The 12.9 NCE increase in grade seven exceeded the grade six and seven Title-1 two year combined minimum annual increase by 2.9 NCEs. In fact, eleven of the 25 students were performing at or above the national norm for the CAT in grade seven compared to three in grades five and six. Gains of six students indicated that screening for giftedness was appropriate. Although most students improved their performance level from grade five to grade six, four performed less well. In contrast, all students improved their grade seven standing over their grade six standing.

The results of the teacher survey indicated that IE seems to produce student behaviours similar to those of gifted students as measured by the Renzulli-Hartman Scale. The behaviours in the categories of learning, motivation, and leadership were similar whereas the IE students as a group did not meet the creativity criteria.

Overall, the results of the IE program showed significant increases in student performance by the end of the third year. The findings support the contention that IE is useful in identifying and developing the cognitive skills of gifted underachievers from this group of students.

Similar results supporting the effectiveness of IE in developing students' cognitive skills and showing significant evidence of near and far transfer by the end of the third year of the study were reported by Funk (1987). The 33 white, middle class Caucasian students in this study attended a remedial math and reading and learning disabilities class at Good Hope Middle School in Cumberland Valley School District, South Central Pennsylvania. The control group of 35 similar students attended Middle School West in the same district. Students in both groups were selected on the basis of low Stanford Achievement Test (SAT) scores in grade five. Due to attrition, the sample shrank to 29 in each group.

The two year program was offered to the treatment group in grades six and seven during the half hour Activities Program time on three of the six days of the school cycle. Thus, three days a week they had IE and three days a week they participated in the Activities Program.

Program effectiveness was measured using the scores of the SAT and the Otis-Lennon Mental Ability/School Ability Test (OLMAT/OLSAT). The SAT (far transfer) which has nine sub-categories measuring Reading comprehension, vocabular, listening

comprehension, spelling, language, concepts of numbers, math computation, math applications, science and social studies was routinely used by the district to assess grade five and eight remediation needs. The OLMAT/OLSAT which has four sub-categories of figural, verbal, and quantitative reasoning and verbal comprehension ability measures IQ and was used as the near transfer measure.

The test scores at the end of grade eight indicated a significant treatment effect for reading and math and IQ ($p < .025$ and $.05$). The treatment group distributions for both reading and math were normal at pretest and a reverse J curve at post-test. The control group distributions were normal for both pre- and post-tests. Allowing for the higher pre-test scores in the treatment group, the treatment group mean was still significantly higher at post-test than that of the control group indicating that the lower functioning treatment group students were performing closer to the mean at post-test than they had at pre-test. This shift was not seen in the control group. The grade eight IQ scores also presented interesting findings. Allowing for the higher treatment group pre-test mean IQ score, the difference in the group means at post-test was greater than at pre-test. While scores for both groups dropped, the treatment group mean dropped .24 while the control group mean dropped 5.5 points ($p < .0005$) to almost double the spread between the means. These results seem to indicate that IE is effective in reducing the drop in IQ scores that is typical with this school district. From a theoretical perspective, the results seem to indicate that the cognitive skills taught in the IE program may be beneficial to academic performance.

Taken as a group, these findings indicate that for children in grades five to eight, IE seems to develop cognitive skills over a period of three years that are useful in academic achievement. Taken together with the findings in the research conducted by

Feuerstein et al. (1980) and Ruiz et al. (Church, 1994) these studies indicate that IE is a useful program for students from age ten to fifteen.

The short-term effects, regardless of the length of IE treatment or age of the students, are generally limited to near transfer effects on cognitive skills and minimal effects on locus of control or self-esteem. Highlights of research in the last fifteen years on third to sixth graders are outlined below.

Ahearn (1988) reported significant effects on near transfer tasks and no effect on a far transfer essay task after one year of IE training for a group of 35 third to sixth graders who were either in a self-contained special education class or had been mainstreamed.

Brainin (1982) studied the effects of 59 hours of IE on a group of sixth grade underachievers. Significant within group changes in the treatment group for reasoning abilities were found but no significant between group effect. Criterion test performance was stronger for treatment than for control group and the reading gains of the treatment group were significantly greater than those of the control group. Teacher evaluations of the benefit of the training to the students were positive.

Dufner's (1988) study of grade four students' benefit from one year Future Problem Solving and IE programs showed that both groups' skill on solving well structured programs improved and that for ill structured problems, FPS students were more fluent IE came up with more answers but that the IE students' were more effective in analysis and elaboration IE they came up with fewer answers that were more useful in actually solving the problem. The behaviour of the IE students was also more similar to that of expert problem solvers than was that of the FPS group.

Troughton's (1986) one year study of 120 sixth graders looked at the effect of IE on cognition, locus of control, self-concept and tolerance of frustration. The only

significant finding was that field dependent males became field independent and females were more able to accept criticism on independent work and difficult tasks.

Uslianer's (1986) study of 12 educationally vulnerable fifth graders who were given the Organization of Dots and Comparisons instruments and worked collaboratively on classroom assignments showed a non-significant difference in correctly answering questions on the Degree of Reading Test (DRP), the tendency to make faulty predictions based on response to isolated words rather than to confirm textual information on the DRP; increased ability to interpret written discourse as measured by the Metropolitan Achievement Test (MAT); and no significant difference in time on task. Observation of student behaviour revealed that students' behaviour improved as they were able to monitor their learning and participate more actively in the process of learning.

School District Implementation

Since the mid 1970s a number of school districts have implemented IE programs. Some programs have been maintained while others have been dismantled. Two school districts with extensive IE programs are Taunton, a small city in southeast Massachusetts with a predominantly blue-collar population of 50,000 (student population of 7,300) (personal communication, Dr. Wm. Knopp, August, 1996) and Detroit, one of the largest cities in the United States. These two very different school districts have implemented the philosophy and practice of mediated learning on a district-wide basis.

Dr. William Knopp (personal communication, August, 1996) provided the following information on the Taunton mediated learning program. IE was initially implemented in 1987 as a pilot program with sixth grade students. The following year it was implemented in all grade four and five classes on the basis of the treatment group's 2 stanine increase over control group performance in reading scores on the Stanford

Diagnostic Reading Test. IE lessons of 45 minutes each are taught every other day to all students in grades four, five and six. After implementation, the Taunton District mean on the Massachusetts Educational Assessment Program (MEAP) rose and continues to rise compared to the state mean and in some subjects exceeds it. Prior to IE implementation, the district means were well below the state means. In addition, more students are now meeting the criteria for gifted than ever before. Mediated learning principles structure student and teacher assessments and administrative support. Counsellors will be trained in the use of mediated learning principles and assessment during the 1996-1997 school year. In a recent school year long study of the effect of IE on self-esteem as measured by the Piers-Harris scale, in two grade four classes, post-test scores showed that 42 students scored significantly higher while 12 scored lower and the rest showed no change. Other than this study, no formal evaluation has been conducted of the effects of the implementation of IE on performance or any other variable. The value of the program is, however, seen in continuously rising MEAP scores.

Janet Jones (personal communication, August, 1996) Special Education Administrator and Co-ordinator of Mediated Learning, Detroit, emphasized that systemic implementation of mediated learning rather than implementation of the Instrumental Enrichment program is the key to significant learning changes because the mediation changes cognition which in turn guides behaviour change. Mediated learning principles are applied throughout the school system from teaching methods in various subject lessons, to student and teacher evaluation procedures and to counselling and evaluations. Stavros, Moore, and Browne (1987) in their initial evaluation of the Detroit IE program observed positive changes in student behaviour and motivation at school and at home including spontaneous application of IE principles in non-IE settings. Although the

mediated learning program is now in its tenth year no formal program evaluation has been implemented. Rather, indicators such as improved test scores, less absenteeism, improved student behaviour are considered to provide documentation of success.

Both Dr. Knopp and Ms. Jones reiterated the importance of administrative support for mediated learning, the need to focus on mediated learning as a framework for and an approach to thinking with IE as the means of developing the necessary cognitive functions, and the value of the systemic implementation of mediated learning. Mediated learning thus provides the focus and the framework for managing the resulting changes. The positive effect on teachers' attitudes and skills was also mentioned by both administrators as a major factor in successful implementation. IE seems to encourage the flexible, thoughtful approach which empowers students to acquire the skills for successful learning and seems to foster a positive classroom learning environment.

The Vancouver School District program began about fifteen years ago. Over 500 teachers have been trained and the District and the Variety Club collaborate in the Variety Learning Centre which provides assessment, tutoring, and teacher training in various mediated learning techniques including Bright Start, Cognet, Instrumental Enrichment, and Learning Potential Assessment Device. A program evaluation plan has been drawn up and three program studies and a research review have been conducted to date. A study of teacher attitudes and behaviours (Miller, 1993) and a one year study of grade eight special education students (Maxcy, 1991) were completed in addition to the present study.

The teacher evaluation study (Miller, 1993) used a questionnaire and follow-up interview with selected respondents. All teachers trained in IE were sent the questionnaires which asked for information on background IE training and classroom

implementation, and solicited opinions via a Likert scale on 26 IE related items. There was an additional space for written comments. Ninety of the two hundred questionnaires (45%) were returned and a nine item telephone interview focusing on training and implementation issues was conducted with a representative sample.

The questionnaire was focused on four questions: Are curricula based on Feuerstein's mediated learning model successful in elementary and secondary classrooms? If yes, why is this program working well here? Is methodology easily adaptable to different types of learners? What is unique about the people involved? The respondents generally felt positive about the adaptability of mediated learning to elementary and secondary classrooms and to different types of learners. Reasons given for the program's efficacy were that the availability of retraining and consultancy, as well as peer group assistance, assisted teachers in working through the IE program. This process resulted in a number of teachers reporting changed attitudes to some students and teaching activities. Teachers strongly agreed that IE was easily adaptable to different types of learners and it was viewed as a major help in understanding students' needs as classroom learners. In response to the last question, teachers listed peer observation and feedback and teacher attitude about content as more important than various types of administrative support. General results indicated that the mediated learning curriculum has had a positive impact on teacher and student behaviours. Students tend to work harder and feel more positive about success. Years of teaching experience seem to impact the answers to some questions. For example, 75% of teachers with six or more years of experience strongly agree that IE can be adapted to any subject area whereas 43% of teachers with less than five years experience strongly agree.

While the results of this survey are interesting, they represent the opinions of those teachers who answered the survey. The other 110 teachers who have taken the training but did not respond to this questionnaire may well have different opinions. The finding that teachers value peer support and teacher attitude over administrative support seems to contradict the experience of the Taunton and Detroit School Districts. However, the explanation may relate to the difference in view point of an administrator actively implementing mediated learning principles versus a teacher who is working within a system that is not committed to administrative change focused through mediated learning.

Maxcy's (1991) study of at-risk adolescents in a special education class focused on the evaluation of cognitive skills such as figural and numerical sequencing, figural analogies, verbal memory and verbal reasoning; improved knowledge of IE concepts, vocabulary, and number of correct 'bridges'. It was hypothesized that this knowledge would positively correlate to attendance; retention of this knowledge and demonstration of far transfer at post-test three weeks after program completion and evidence of far transfer ability. The treatment group (n = 11) and the control group (n = 7) were comparable on intellectual, social and behaviour factors such as average to above average intelligence, high probability of learning disability, unstable family - often single parent, tendency toward violence, and erratic attendance. The pre-test scores on the following measures: Standard Ravens Progressive Matrices (SRPM) (Ravens, 1983), Test of Cognitive Skills (TCS) (CTB/McGraw Hill, 1981), Coopersmith Self-Esteem Inventory (SEI) (Coopersmith, 1967), and the Intellectual Achievement Responsibility Scale (IAR) (Crandall, Katkovsky & Crandall, 1965) were comparable for the two groups. However,

due to the small group size, it is possible that there was not enough statistical power to detect differences.

Students in the treatment and control groups were in similar programs at two different sites. The modified grade eight program offered the core subjects of math, english, social studies and science with electives being taken with mainstream students. Treatment was scheduled for three 50 minute classes per week for eight months of the school year. The actual delivery averaged between two and two and a half lessons per week because of scheduled holidays and other unscheduled interruptions. Although the total hours of IE training was 74, many of the students received less due to non-program related attendance issues. The treatment group was divided into two groups for IE lessons. An Alternate Programme Worker monitored each session to ensure that the two groups covered the same material in a similar manner and style.

Since one of the weaknesses of many studies is the lack of information on the quantity and quality of bridges, Maxcy's (1991) study took steps to ensure measurement. Observers experienced with and knowledgeable about IE and mediated learning made unscheduled class observations and recorded information on bridging activities which was later analyzed. After training, inter-rater reliability for intentionality and reciprocity, meaning, and transcendence ranged between .83 and .87.

Two techniques used that were not part of the IE program were a point system for grading assignments and for behaviour management purposes and the use of specially designed worksheets that enabled the IE instructor to work with individual students while keeping the other students focused on a related task. The observers noted that by the seventh month of the program, reference to the point system was much reduced in comparison to the first few months. An additional monitoring tool was the written

probes which were developed from the worksheets. Four probes were written during the treatment time frame and one was written three weeks after the end of treatment. Inter-rater reliability of .87 was obtained.

Although the Standard Ravens Progressive Matrices (SRPM) is frequently used in IE studies, its effects are inconsistent especially with older adolescents (Maxcy, 1991). Post-test scores on the SRPM indicated that although the treatment group scores were the same at post-test as at pre-test, it took less time for the students to achieve the same score. This post-test score may then indicate that IE enabled them to utilize time more efficiently. This was taken as evidence of medium transfer because although the physical activity was similar to some of the IE activities, the modality of analogic thinking was different. The SRPM requires figural analogic thinking while verbal analogic thinking was practiced during the IE lessons.

Since TCS tasks and IE tasks are somewhat similar, successful completion of the TCS would indicate medium transfer of skills from the IE tasks. The treatment group scores for the total TCS and all subscores except one indicate successful medium transfer.

The results of the Coopersmith Self-Esteem Scale were inconclusive.

The Intellectual Achievement Responsibility scores of both the treatment and control groups decreased over the treatment period. This was an unexpected finding and may indicate that the students experienced the delivery of the four core subjects within the special education program setting as negative. The treatment group score deterioration was less than that of the control group which may indicate that IE may slow the development of feeling 'out of control'.

The treatment group scores on the Canadian Achievement Test show gains in every sub-scale and the total. The total gain was just over one year and the math concept/application and total math scores show gains of over one year. The reading comprehension, language mechanics and total language sub-scales show gains of just under one year. Reference skills show a gain of over 2 years. Unfortunately, the control group results were not available for comparison.

In a round table discussion after the end of the treatment, the IE instructor asked the students what they thought they had learned. They replied, vocabulary, improvement in their reading and ability to speak more precisely, and to better express their feelings, and solve problems. Despite spontaneously offered student examples of using IE principles and techniques outside of the IE class, the students said they did not use what they had learned outside of the class. They all said that the class was good for 'kids like us' and would recommend that others take it.

Despite the small sample size (due to attrition) and the unavailability of the control group CAT scores, Maxcy's study was a carefully constructed study which attempted to address issues such as near and far transfer, the quality and quantity of bridging and obtaining students' impressions of their experience with IE.

In this study completed for the Vancouver School Board the experimental group of 11 'at risk' grade eight boys significantly outperformed the control group on three of five scores on the Test of Cognitive Skills; the self-esteem and perceived locus-of-control scores remained stable; the experimental group had a 40% higher attendance rate and a lower attrition rate than the control group; the experimental group showed significant gains on the post-test scores for near and medium transfer. This study was the first study to adequately control for the quality of the MLEs during the IE sessions. Maxcy believes

that this is a critical and necessary element in the effectiveness of the IE program and that lack of adequate MLEs contribute to the somewhat ambiguous results of other studies.

Although Feuerstein et al (1979) state that the personal and emotional aspects of the learner must be developed at the same time that the cognitive skills are developed the original study and the follow up study focus more on cognition than on emotion. Subsequent studies also tend to focus on cognitive change rather than emotional change. Also, although schools now focus on the development of the 'whole child' the primary focus remains on the development of knowledge and thinking. Thus, the cognitive focus is more comfortably within the school mandate. However, with guidance from a knowledgeable mediator, the bridging or transfer discussions can become opportunities for students to mediate emotional events (Kaniel, Tzuriel, Feuerstein, Ben-Shacher & Eitan, 1991).

Criticism of Studies and Theory

Savell, Twohig and Rachford conducted the first meta-analysis of IE in 1986. Their comments on the original Israeli study indicate concern over such things as lack of random assignment to treatment or control groups, lack of data on attrition, the difficulty of eliminating the possibility of practice effect to account for post-test gains when the measurement instrument is similar to the treatment, the use of teachers to rate behaviour, the lack of difference in self-concept and the increased probability of Type-I error when multiple F-tests are used. Despite these difficulties with this and other studies, Savell, Twohig and Rachford conclude that the results warrant further study and they include a number of suggestions to improve the research design.

Buchel and Scharnhorst (1992) criticize Feuerstein's theory on a number of theoretical and methodological points. The issues they raise which impact on IE are: the lack of a consistent theory of cognitive functioning, overlapping definitions of the various cognitive functions, lack of definition of operations which are used in the cognitive functions, definitions which function on different levels, lack of inclusion of school subject matter and lack of response from Feuerstein and others regarding these criticisms. Campione, Brown and Ferrara (1982) also criticize Feuerstein's work because it is not focussed on academic subject matter. Hamers (personal communication, April 12, 1996) indicated that despite its weak theoretical base some good practical work is being done with IE.

Hypotheses

There were four hypotheses in this study:

1. It is hypothesized that students who study Instrumental Enrichment will take greater responsibility for their academic work, ie. increase their internal locus of control, as measured by the Intellectual Achievement Responsibility Scale (Crandall, Katkovsky, & Crandall, 1965) than the control group.
2. It is hypothesized that students who study Instrumental Enrichment will show greater improvement in self-esteem, as measured by the Coopersmith Self-Esteem Inventory (1967/91), than the control group.
3. It is hypothesized that students who study Instrumental Enrichment will show improved control of their behaviour, as measured by the Teacher Student Behaviour Checklist, than the control group.

4. It is hypothesized that students who study Instrumental Enrichment will show greater improvement, as measured by grade appropriate criteria in their academic work, than the control group.

CHAPTER III

METHODOLOGY

The selection of the schools, participants, measures, treatment, and procedures used in the study will be described in this chapter. The focus of the study was the effect of IE on self-esteem, locus of control, behaviour, and academic performance. In its investigation of the short-term effects on a group of grade five students of a brief exposure to Instrumental Enrichment (IE), this study operationalized part of the second objective of the Vancouver School Board assessment plan, Proposal for an Evaluation of the Instrumental Enrichment Program. The original plan called for three treatment schools and three control schools. The study began in October, 1993 with the school selection procedures and data collection was completed in June, 1994.

A quasi-experimental repeated measures design was used to investigate the effectiveness of the Feuerstein Instrumental Enrichment Program (IE) on the development of students' cognitive abilities, academic achievement, self-esteem, school attendance, and perceived control over school success (locus of control). All Vancouver School Board and University of British Columbia protocols regarding studies of human subjects were followed.

Selection of Schools

The school selection period began in October, 1993 and was completed by mid-January, 1994. Schools with existing IE programs were initially identified in order to comprise the treatment group. The preponderance of schools offering IE were located in the inner-city. Therefore, in order to match the student populations, only inner-city schools were invited to participate in the study as either treatment or control schools. Of

eight elementary schools, four of which had teachers using IE and four of which did not have IE programs, invited to partake in the study, two schools participated. One of these two schools offered IE, and it formed the basis of the study's treatment group. The other school, which did not offer IE, served as the control/comparison group. Since IE was only being offered to 5th graders at the treatment school, only 5th grade students from both the treatment and control schools participated in the study.

Both schools were located in inner-city Vancouver areas. Poverty, drug addiction, and prostitution are common problems in the communities surrounding these schools. The area is ethnically diverse, with most residents (and students, see below) being from immigrant or refugee families. Both schools offered a Kindergarten to Grade Seven program with an overall enrolment of approximately 470 students. The average class size was 25 students.

Participants

Student Participants

In total, thirty-seven 5th grade students participated in the study. The treatment group consisted of fourteen students from two classrooms in the school offering IE, while the control group consisted of twenty-three students from three classrooms in the school that did not offer IE. Table 1 shows the age, gender, and ethnicity distributions of treatment and control groups. As Table 1 indicates, the two groups were rather similar on demographic characteristics (see Results section below.) Most of the students in both groups were in ESL education programs; 78% of the control group participated in ESL in comparison to 86% of the treatment group. Consistent with the characteristics of the community, most students were from immigrant or refugee families (see Table 1 on page

65). Across both groups, female students outnumbered males, in an approximate 2:1 ratio.

The treatment group students were pullouts from two classrooms attending a pre-existing learning assistance class with the learning assistance teacher. Of the twenty students in this class, six refused to participate in the study. Most of the students at this school and thus in the treatment group were Asian (Vietnamese, Chinese, other Asian) or Spanish speaking from Latin America or First Nations. Eight Chinese and six Vietnamese students participated, while the Spanish-speaking students and the First Nations students refused to participate. Most of the control group had the same teacher, the rest were taught by another teacher in the open area. There were 17 Asian students (Chinese, Vietnamese, Indian), four from Eastern Europe and two from South or Central America. Although the ethnic mix was similar in both schools the participation rate was noticeably lower in the treatment than in the control group. There was a higher percentage of ESL students in the treatment group and there were no European students in the treatment group.

Teacher Participants

There were two classroom teachers for the control group and two classroom teachers for the treatment group, in addition to the IE teacher. All five teachers had a minimum of five years experience and three had over twenty years of teaching experience. The IE teacher performed all IE functions in the treatment group. All teachers in the treatment school were enthusiastic about participation in this study.

Measures

The Intellectual Achievement Responsibility Scale (IAR)

The IAR (Crandall, Katkovsky, & Crandall, 1965) is a 34-item forced-choice instrument designed to assess the degree of responsibility that students take for their academic work (see Appendix B). It is written at a grade five reading level. For scoring purposes, each item is assigned to one of two subscales: the I- Scale measures responsibility for negative events; the I+ Scale measures responsibility for positive events. The subscales are combined to provide the total score (I). As the name suggests, the IAR measures the extent to which students view themselves or others as the active or controlling agents in their lives. The scale has been used on a number of studies including evaluating the intervention effects of seven different reading programs in the 1960-70's in a US national sample of 13,000 students (Crandall & Crandall, 1983).

The IAR was one of the first of the locus of control scales to be developed. It was developed from the theoretical foundation of Rotter's work on Social Learning Theory of Behaviour (Rotter, 1954). Reber (1988) defines locus of control as "a general term in social psychology used to refer to the perceived source of control over one's behavior" (p.407). It is measured along a dimension running from high internal to high external, with internal persons being those who tend to take responsibility for their own actions and who view themselves as having control over their own "destiny", and externals as those who tend to see control as residing elsewhere and to attribute success or failure to outside forces. Note that reality is not being measured here; the question is not whether true control derives from endogenous or exogenous sources but how the individual perceives it. Test-retest reliability is moderately high at the .001 level of confidence (Crandall, Katkovsky, & Crandall, 1965). There was no evidence of gender-related

difference in this test-retest. The internal consistency of the positive and negative test items was computed using split-half reliabilities. Moderate reliability was established. The normative data indicates that the test can be used with caution on a variety of populations (Crandall, Katkovsky, & Crandall, 1965).

The IAR was selected for this study because it is designed to measure students' perception of internal or external locus of control for academic work. Within the Vancouver School District, this instrument is used to assess students in alternate education settings. Since a number of studies have shown the link between locus of control and academic achievement (Maxcy, 1991; Stipek & Weisz, 1981), the use of the IAR in this study places it within an existing body of knowledge.

Coopersmith Self-Esteem Inventory (SEI)

The SEI (Coopersmith, 1967/1991) is a 50-item forced choice self-rating scale that measures different facets of self-esteem. There are three forms for use with different populations. The School Form, for use with students, was used for the present investigation (see Appendix B). It has five subscales: general self; social; self-peers; home-parents; school-academic and an additional 8 item lie scale. Reliability coefficients (KR20s) (School Form) on a sample of 1407 grade 5 American students was .87 (Kimball, 1972). This study's sample was a similar group since it included students from a wide variety of socio-economic status, as well as Black and Spanish-surnamed students. The scores of 135 American Indians students were the same as those of the Caucasian students at the fifth grade level (Martin, 1976). Since the IE program in the Vancouver School district is aimed in large part at the First Nations students, it is important to know that the SEI is a reliable measure for this group. The Canadian version was tested on 198 children in grades 3 through 6. The correlations ranged from .71 to .80 (Battle,

1977). A variety of validity studies have been conducted (Donaldson, 1974, Kokenes, 1978). This test is used in alternate education settings in the Vancouver School District. In sum, in numerous studies the SEI has shown adequate reliability and validity.

The Coopersmith Self-Esteem Inventory (SEI) was selected for this study for both practical and theoretical reasons. Firstly, Coopersmith's construct definition is based on generally accepted theory of self-esteem. His definition is similar to that of Reber (1988). Thus, from a construct point of reference, the instrument is designed to measure the concept self-esteem as understood in the literature. Another very important reason for selecting the SEI is that it is based on the belief that self-esteem and effective functioning are linked. This is one of the underlying principles of the Instrumental Enrichment program and one of the areas that this study is designed to investigate.

The Teacher Student Behaviour Checklist (TSBC)

This instrument was developed for use in this study by the researcher. It was developed from the results of the Teacher Efficacy Scale (Gibson & Dembo, 1984), used by Kettle (1991) in her initial assessment of teacher self-reports of how IE training had effected teaching behaviours and students' behaviours. The TSBC contains six behavioural items rated on a four-point Likert scale (see Appendix B). The items were the most frequently occurring comments/answers about student behaviour found in the first part of the Vancouver School Board study on teacher experience with IE. Teachers who had completed the IE training and were using IE in their classrooms also reported anecdotally that many of their students improved in one or more of these areas.

Each of the six behaviours in the TSBC is a typical classroom management issue which all teachers and students must address in one way or another. On a scale of 1 to 4, the teacher is asked, for example, to assess the student's ability to persist at a boring

or frustrating task. A low score indicates that the student is behaving appropriately while a high score indicates behaviour difficulties.

The reliability of all dependent measures is discussed in Chapter V: Results under the heading 'Reliability of Dependent Measures' on page 68 (see Table 4 on P. 69).

Writing Samples

Samples of each student's written work were collected before and after the treatment. The variables that were examined were: number of words, number of run-on sentences, and errors in the following: use of capital letter and period, use of capital letter and quotation marks, use of capital for proper nouns, within sentence punctuation, verb tense, verb-subject agreement, subject-object agreement, spelling, missing words, missing phrase, and word choice. These errors were recorded by category and totaled.

Treatment

Instrumental Enrichment Program (IE)

IE (Feuerstein, Rand, & Hoffman, 1979) comprises the "active ingredient" of this study, and was administered to the students in the treatment group. The treatment group received IE instruction twice a week for 40 minutes per session for the three and a half months of the study. This was a total of 23 classes for a total of 15 hours of IE lessons. There is a specific sequence and methodology for the delivery of the IE program.

IE consists of two equally essential parts. The first is the fifteen 'instruments' or paper and pencil exercises each of which focuses on the development of a specific cognitive function. The second essential component of IE is the teacher led discussions or 'bridging' sessions during which aspects of the lesson are linked or 'bridged' to other areas of the students' lives. There are at least four such bridging sessions during each lesson. Successful utilization of knowledge and skills learned in one area to another area

is dependent on effective management of transfer activities (Waksman, Silverman, & Messner, 1982; Walter & Marks, 1981). Feuerstein (1980) states that the bridging or transfer discussions enable students to utilize their newly learned thinking skills in other academic and non-academic areas (Salomon & Perkins, 1989).

The IE program is designed for presentation sessions of 45 minutes to one hour in individual or group settings three to five times per week. In order to make non-readers feel comfortable, the program has been deliberately designed not to include high level reading skills. The complete program of over five hundred pages of exercises may be completed in two to three years. The teacher receives a forty hour training program and follow-up assistance.

Each IE lesson consists of three parts: the introduction, the completion of the exercise, the consolidation of the experience. In the bridging discussions which occur in each part of the lesson, the teacher focuses discussion on specific aspects of the lesson. The level of concreteness or abstraction in the bridging discussion varies with the sophistication of the students and the teacher. Typically, more experienced students tend to make more abstract bridges.

The introductory part of each new lesson is usually extensive as the teacher introduces new material and reviews previously learned material. The new sheet of exercises is examined, new vocabulary is introduced and entered in the student's vocabulary book, use of vocabulary from previous lessons is encouraged, the new sheet is compared (similarities and differences) to the previous lesson sheet, and at least one bridging discussion. The activity required to complete the new sheet of exercises is then introduced with a discussion of strategies and another bridging discussion.

Students then complete the exercise sheet using the strategies outlined in the introduction. The teacher circulates among the students helping to focus attention or to assist students to apply the strategies that have been discussed. Students who have finished sooner than others in the class may be challenged with an additional activity or may assist other students.

The consolidation part of the lesson includes a discussion about what was learned (e.g., use of new strategies, why some strategies are not effective; identification of the cognitive skills used; comparison with the previous lesson or lessons; a bridging discussion from some aspect of the lesson, and a log entry of 2 or 3 bridging examples).

During the course of the lesson, at least 50% of the time is used for discussion purposes including bridging. The discussions of the exercise sheet itself and of the strategies used to solve the exercises assist students to name and thus 'own' what they see and think. The bridging discussions are opportunities for the students and mediator to apply strategies identified during the lesson to other areas of life - both academic and social. The richness of the experience depends on the number and type of examples given. These discussions prepare the students to think of the strategies and skills used in solving the exercises in other situations in their lives. The following description of the 'Organization of Dots' provides examples of topics which may be covered in a lesson.

Organization of Dots

This is the first of the fifteen IE instruments. In order to encourage non-readers and poor readers, this set of paper and pencil exercises does not require any reading. The first task in each lesson is to find the geometric figures in the seemingly random groupings of dots. As the exercises become progressively more complex, increased skill is required for successful completion.

As with all the instruments, this instrument is designed to develop and use many of the cognitive functions Feuerstein grouped as input, elaboration and output skills. Particular emphasis is placed on the development and use of the following: clear perception, organization of space, conservation and constancy, precision and accuracy, visual transport, summative behaviour, restraint of impulsivity and elimination of trial and error.

The second task in each lesson is the bridging or transfer discussions whose purpose is to focus student attention on a particular aspect of the lesson and then to get the students to think of other instances where that particular skill or item occurs. Typically, bridging discussions focus on two types of questions: open-ended 'where else' type questions which encourage consideration of both concrete and abstract solutions and questions which ask students to identify underlying principles of organization or procedure (Feuerstein & Hoffman, 1980). Students' opportunity for transfer is further extended when the teacher identifies IE-related skills or knowledge during subject lessons (Brainin, 1976; Adams, 1991).

Procedure

After securing the teachers' agreement to participate, the students were asked for their voluntary participation. After their role in the study was described, the students had the opportunity to question the researcher. They were then given explanatory and permission letters for their parents to read, sign and return. In order to ensure communication with the parents, these letters were translated into the three languages spoken by the largest ESL groups (see Appendix C). The signed returned permission letters were accepted as parental authorization for the students to participate in the study. The students' verbal consent was also obtained before the research was begun. Once

consent was obtained, students moved into the active phase of the study, which lasted from February to June 1994.

All students completed pre- and post-test, which were in February and June, respectively. During pre- and post-test, all students completed the SEI and IAR. Students also provided writing samples. As stated in the SEI and IAR protocols, students were read the instructions and scale items by the researcher. Also, at both pre- and post-test, teachers completed the Teacher Checklist of Students Behaviour. From February to June 1994, students in the treatment group received IE instruction. Additionally, at pre-test, information on class attendance, ESL, ethnicity, gender, and age was obtained.

CHAPTER IV

RESULTS

The results of the study are discussed under two main headings: Preliminary Analyses and Main Analyses. The Preliminary Analyses yields demographic and attendance information on the student population as well as group pretest scores. The correlation and reliability information on each of the dependent variables is also tabulated. Treatment results on each of the measures are provided in the Main Analyses section. This section also includes a statement of whether the results lead to acceptance or rejection of the null hypothesis for each of the study's hypotheses.

Preliminary Analyses

Demographic Variables

Table 1 shows information regarding the treatment and control groups on age, gender, and ethnicity variables. As Table 1 indicates, the two groups were similar in age, with the mean age for both groups being approximately 10 1/2 years old. The gender and ethnic distributions in the two groups were also similar. In general, it appears that the two groups did not systematically differ in demographic composition.

Attendance

There was a difference in the attendance records between the two groups. The students in the control group were absent almost twice as frequently as the students in the treatment group. The average absence from school during the treatment period was 1.4 days for the control group and 0.6 days for the treatment group. The IE teacher was absent for three IE classes.

Table 1. Demographic Variables for Treatment and Control Groups

Variable	Treatment Group (n=14)	Control Group (n=23)
Age (Mean year)	10.6	10.7
Gender		
Male	4.0	9.0
Female	10.0	14.0
Ethnicity		
Chinese	8.0	3.0
East European	0.0	4.0
First Nation	0.0*	0.0
Other Asian	2.0	8.0
Spanish	0.0*	2.0
Vietnamese	4.0	6.0
ESL	10.0	18.0
Absence (Mean days)	.6	1.4

Note: * All the First Nations and Spanish speaking students in the treatment group refused to participate in the study.

Pretest Scores on Dependent Variables

In order to assess any initial differences, the treatment and control groups were compared on pretest scores on the dependent variables examined in the present study. Table 2 shows the mean pretest scores for the two groups on the dependent measures: Self-esteem Inventory (SEI) (Coopersmith, 1967) Intellectual Achievement Responsibility Scale (IAR) (Crandall, Katkovsky, and Crandall, 1967) and the Teacher Student Behaviour Checklist (TSBC) (Schneider, 1993) used in this study. At pre-test, the two groups scored in the average range on the IAR and SEI. No data were available for comparing the TSBC score as this test was developed from a previous study in this school district. As

Table 2 indicates, the two groups did not initially differ on any of the dependent measures at pre-test.

Table 2. Pre-test Scores on Dependent Measures for Treatment and Control Groups

Measure	Treatment N=14		Control N=23		F(dfs) and p	
	Mean	SD	Mean	SD		
IARTOT(a)	23.57	3.59	21.61	4.49	(1,35)= 1.92,	ns
SEITOT(b)	28.00	6.92	30.41	11.10	(1,33)= 1.84,	ns
SEIGEN(c)	11.21	3.02	11.22	4.06	(1,34) < 1	ns
SEILIE(d)	2.64	1.60	3.04	1.52	(1,34)= 1.13,	ns
TSBC(e)	13.50	4.24	12.22	5.15	(1,33) < 1	ns

Note: Total possible raw score: SEITOT: 50; SEIGEN: 26; SEILIE: 8; FTBC: 6

(a) Intellectual Achievement Responsibility Total Score

(b) Coopersmith Self-esteem Inventory Scale

(c) Coopersmith Self-esteem Inventory General Sub-scale

(d) Coopersmith Self-esteem Inventory Lie Scale

(e) Teacher Student Behaviour Checklist

Correlations among Dependent Variables

Table 3 shows the correlations among the dependent measures at pre-test. With the exception of the expected high correlation (.9) between the General subscale score and the total score of the self-esteem instrument, these scores do not correlate with one another. This lack of correlation indicates that the instruments selected for this study were measuring different constructs.

Reliability of Dependent Measures

In order to assess the internal consistency of the scales used in this study, reliability coefficients (Cronbach's alphas) were computed for each measure. Table 4 shows the reliability coefficients for each scale by time period (pre-test and post-test).

Table 3. Correlations Among Dependent Measures at Pre-test for Both Groups

Measure	IARTOT	SEITOT	SEIGEN	TSBC
IARTOT(a)	1.00	.10	.13	.01
SEITOT(b)		1.00	.90*	.01
SEIGEN(c)			1.00	.09
TSBC(d)				1.00

Note:

(a) Intellectual Achievement Responsibility Total

(b) Coopersmith Self-esteem Inventory Total

(c) Coopersmith Self-esteem Inventory General

(d) Teacher Student Behaviour Checklist

* $p < .01$ **Table 4. Reliabilities of Dependent Measures at the Two Time Periods**

Measures	Pre-test	Post-test
IARTOT(a)	.66	.71
SEITOT(b)	.89	.84
SEIGEN(c)	.79	.65
SEILIE(d)	.27	.33
TSBC(e)	.77	.75

Note: (a) Intellectual Achievement Responsibility Total

(b) Coopersmith Self-esteem Inventory Scale

(c) Coopersmith Self-esteem Inventory General Sub-scale

(d) Coopersmith Self-esteem Inventory Lie Scale

(e) Teacher Student Behaviour Checklist

Within this study, most of the scales showed moderate to good reliability (alphas in the range of .66-.89), with the exceptions of the lie scale on the Coopersmith Self-Esteem Inventory. In general, the reliabilites obtained on these scales in this study are consistent with those found in previous research (Coopersmith, 1975/1991; Crandall, Katkovsky, & Crandall, 1965).

As there is no normed or reliability data on the Teacher Student Behavior Checklist (TSBC), I had teachers fill out the post-test checklist on three separate occasions during the month of June in order to obtain reliability data. Since all three administrations of the TSBC pertained to the same post-test time period, one would expect high correlation among the resulting scores. As expected, the checklists correlated .97, .97, and .75. As an analog to a test-retest reliability, I conducted a multivariate analysis of variance (MANOVA), using the three separate administrations of the post-test TSBC as a within-subjects factor (this is similar to conducting a repeated-measures test on the three administrations of the instrument). If the TSBC in fact reliably measured similar behaviours, the repeated-measures result should indicate no differences across the three administrations. Again, as expected, the scores on the TSBC did not significantly differ across the administrations, $F(2,26) = 1.21, ns$.

Main Analyses

In order to examine whether the treatment and control groups differed at post-test on internalized academic locus of control, self-esteem, and classroom behaviors, one-way analyses of covariance (ANCOVAs) were conducted on post-test scores on the Intellectual Achievement Responsibility Scale (IAR), Coopersmith Self-Esteem Inventory (SEI) and the Teacher Checklist of Student Behaviors (TCSB). I examined both total scale scores, as well as subscale scores when appropriate. The independent variable consisted of group membership in either the treatment or control group. In order to partial out any variance due to initial scale scores, pre-test scores of whichever scale was being analyzed were entered as a covariate in the analysis. Given the small number of male participants in the treatment group, as well as the lack of gender-specific information with regard to the scales utilized, analyses were conducted across gender. Table 5

contains the mean scores on each of the dependent measures at both time points by group.

Table 5. Pre- and Post-test Scores on Dependent Measures for Treatment and Control Groups

Pre-test					
	Treatment N = 14		Control N = 23		
Measure	Mean	SD	Mean	SD	
IARTOT(a)	23.57	3.59	21.61	4.49	
SEITOT(b)	28.00	6.92	30.41	11.10	
SEIGEN(c)	11.21	3.02	11.22	4.06	
SEILIE(d)	2.64	1.60	3.04	1.52	
TSBC(e)	13.50	4.24	12.22	5.15	
Post-test					
	Treatment N = 14		Control N = 23		F(dfs) and p
Measure	Mean	SD	Mean	SD	
IARTOT(a)	24.57	3.63	22.78	4.89	(1,34) < 1, ns
SEITOT(b)	28.07	5.81	30.30	8.95	(1,33) < 1, ns
SEIGEN(c)	11.86	1.99	12.35	3.24	(1,34) < 1, ns
SEILIE(d)	2.57	1.70	2.78	1.41	(1,34) < 1, ns
TSBC(e)	10.21	2.55	12.35	3.89	(1,34) = 6.21 p = .02

Note: Total possible raw score: SEITOT: 50, SEIGEN: 26, SEILIE: 8, FTBC: 6

- (a) Intellectual Achievement Responsibility Total Score
- (b) Coopersmith Self-esteem Inventory Scale
- (c) Coopersmith Self-esteem Inventory General Sub-scale
- (d) Coopersmith Self-esteem Inventory Lie Scale
- (e) Teacher Student Behaviour Checklist

Academic Locus of Control

It was hypothesized that the students who studied Instrumental Enrichment would take greater responsibility for their academic work as measured by the Intellectual Achievement Responsibility Scale (IAR; Crandall, Kantkovsky, & Crandall, 1965) than the control group. ANCOVAs were conducted on the post-test scores on the IAR to examine whether groups differed in locus of control and responsibility for academic work. Results revealed that the two groups did not differ in post-test IAR total scores, after pre-test scores were taken into account, $F(1,34) < 1$, *ns*. Since the total IAR score was not significant, subscales were not examined, as I did not have specific hypotheses regarding the subscales.

Self-Esteem

It was hypothesized that students who were exposed to Instrumental Enrichment would show greater improvement in self-esteem as measured by the Coopersmith Self-Esteem Inventory (SEI; Coopersmith, 1975/1991) than the control group. In order to examine whether the treatment group showed greater gains in overall self-esteem, as measured by the Coopersmith Self-Esteem Inventory (SEI), an ANCOVA was conducted on posttest SEI total scores, with SEI pretest total scores as a covariate. Results revealed that after adjustment for pretest scores, the two groups did not differ on posttest SEI total scores, $F(1,33) < 1$, *ns*. Since I was also interested in differences between groups in particular areas of self-esteem, I examined differences in SEI subscales, with subscale posttests as dependent variables and pretest scores as covariates. After partialling out pretest scores, the two groups did not differ in posttest scores on the School-Academic subscale, $F(1,34) = 2.20$, *ns*; the Social-Self subscale, $F(1,33) < 1$, *ns*; the Home-Parents subscale, $F(1,33) = 1.11$, *ns*; or the General subscale, $F(1,34) < 1$, *ns*.

In sum, there were no significant differences between groups in self-esteem at post-test, with pre-test scores covaried out, even when different dimensions of self-esteem were examined.

Classroom Behaviour

It was hypothesized that the classroom behaviour, as measured by the Teacher Student Behaviour Checklist (TSBC), of students who studied Instrumental Enrichment would show greater improvements than that of the control group. In order to examine whether treatment and control groups differed in classroom behavior, ANCOVAs were performed on post-test scores on the TSBC. Since the separate post-test administrations correlated highly (see above under Reliability of Dependent Measures), I will report results only on the first administration of the TSBC. After adjusting for pre-test scores, results revealed that there was a significant difference between groups on post-test TSBC scores, $F(1,34) = 6.21, p = .018$. Examining adjusted group means on post-test TSBC scores, students in the treatment group were reported by their teachers as behaving better in the classroom at post-test (Mean = 9.97) than their control counterparts (Mean = 12.58).

Examination of the correlation of the raw change scores (see Table 6) indicates a significant positive correlation between the treatment group change scores for the IAR and the TSBC measures ($.62, p < .01$). Since the correlation occurs between a self-report measure (IAR) and a measure completed by the teachers (TSBC), the correlation between the scores provides stronger evidence that the scores were not due to reporter bias. While the pre-post score change on the IAR by itself was not statistically significant, the correlation of the changes in the IAR in correlation with the pre-post TSBC score change was significant.

Table 6. Correlations among Change Scores on Dependent Measures

Treatment Group n = 14			
Change Scores	IARTOT	SEITOT	TSBC
IARTOT(a)	1.00	.09 (ns)	.62*
SEITOT(b)		1.00	.02 (ns)
TSBC(c)		1.00	
Control Group n = 23			
Change Scores	IARTOT	SEITOT	TSBC
IARTOT	1.00	.11 (ns)	.14 (ns)
SEITOT		1.00	.26 (ns)
TSBC			1.00

Note: (a) Intellectual Achievement Responsibility Total
 (b) Coopersmith Self-Esteem Inventory Total
 (c) Teacher Student Behaviour Checklist
 * $p < .01$

Academic Work Improvements

The hypothesis that the treatment group would show greater improvement in their academic work, as measured by grade appropriate criteria, than the control group could not be reliably investigated because of the variation in the type of writing samples that were submitted. Due to the variety of within group and between group writing samples, it was not possible to interpret the data in a meaningful way on the basis of writing proficiency.

Summary

A significant positive treatment effect was found in the behaviour scores of the treatment group. This was supported by the correlation between the treatment group change scores for the locus of control and behaviour measures. Although there is no evidence at the group level of significant pre/post-test differences in the self-esteem or locus of control scores, visual examination of the individual scores indicates a trend that scores on the locus of control, self-esteem and locus of control measures are more closely aligned for the treatment group than for the control group. This may indicate that IE has a positive effect on these measures.

CHAPTER V

DISCUSSION

This chapter discusses the results of the study, examines the confounding variables, suggests improvements to overcome design weaknesses, and discusses the place of a cognitive skills program in the educational curriculum and the perceived need of improved cognitive skills in society at large.

Results

This study was an attempt to examine the short-term efficacy of Instrumental Enrichment Programs (IE) among inner-city 5th grade students. It was an initial attempt to understand the timing and mechanism of IE. In this study I examined both 'internal measures' such as self-esteem and locus-of-control as well as measures of overt behaviour obtained from an instrument developed specifically for this study.

IE seemed to impact only overt behaviour in the four month time frame of this study. That is, while the treatment and control groups did not differ on post-test locus-of-control and self-esteem measures, they did differ significantly on overt behaviour at post-test. Specifically, students who were exposed to 15 hours (23 sessions) of IE were reported by their IE and classroom teachers as behaving significantly better at post-test than comparable students who were not exposed to IE. In addition, however, there is a trend in the data indicating a closer connection between the scores on the three measures for the treatment group over the control group.

From a theoretical perspective (Feuerstein et al, 1979) it appears that in developing the relevant input, elaboration and output cognitive functions such as clear perception, systematic planning, and overcoming egocentric communication, the IE

treatment enabled students to make cognitive changes which enabled them to consider behaviour options and thus control their impulsive behaviour more effectively. The fact that both the classroom teacher and the IE teacher saw these changes in behaviour indicate that the students were able to transfer the new skills from the IE class to other settings. These cognitive changes may also contribute to the students' growing ability, evidenced by increased cohesion amongst the scores for the three measures, to make increasingly realistic evaluations of their performance and self-esteem. This cohesion tends to support the teachers' improved behaviour scores for the treatment group. The control group teachers' assessment of no change in group behaviour score is also supported by the lack of cohesion amongst the control group scores on the three measures. Examination of individual patterns of cohesion over time amongst these three measures may emerge from the examination of a sufficiently large sample.

There is some evidence that even though overall group score changes are not evident, that the changes in self-esteem and locus of control scores for individual students may reflect the development in the student of a more realistic self-perception relative to others (Ben-Hur, personal communication, August, 1996). In the present study, although there were no statistically significant changes at the group level, at the level of individual scores, the trend within the treatment group indicates a closer link between the three measures of locus of control, self-esteem, and behaviour. This trend was not seen in the control group. Since self-esteem may be linked with performance (Bednar & Well, 1991; Kohn, 1994) it is possible that significant changes in these measures will occur with longer exposure to IE. Other studies investigating the effect of IE on self-esteem and locus of control have yielded similar findings of lack of change at the group level in these measures (Maxcy, 1991).

Confounding Variables

Since, in this type of study, it is not possible to control variables which may occur in the students' lives either at school or at home such as student/class assignments, availability of friends with similar interests, illness of student or family member, personal losses, birth of a sibling, parental employment, etc., in this type of study, it may be that the improvement in students' behaviour was attributable to non-treatment causes. Since the students' teachers completed the behaviour scale, it is also possible that the improved scores for the treatment group may be a function of teacher bias. Additionally, the correlation between the Intellectual Achievement Responsibility (IAR) scale and the Teacher Student Behaviour Checklist (TSBC) change scores may be an indication of the Hawthorne effect rather than a genuine change in the treatment group.

There were three important differences in setting between the control and treatment groups which may have contributed to the difference in the final behaviour scores. The control group was in an open area classroom while the treatment group came from closed classrooms. Another very important variable in the school setting is the teacher. The interaction of student/ teacher/ classroom setting may have been a very powerful influence on students' behaviour (Marshall & Weinstein, 1984). Also, the control group school was situated in a neighbourhood where the residents were actively campaigning to move the illicit sex trade out of the area. In doing so, there was a lot of media coverage of the area in addition to more direct methods used by the residents. This 'shame the johns' campaign had been going on for several months and had a big impact on neighbourhood activities. These changes undoubtedly affected the school children and it is possible that this campaign may have impacted the children's behaviour.

Design Improvements

Areas in this study that could be improved upon because they were within the researcher's control focus on treatment issues, the writing task, and behaviour assessment. More systemic areas that were not so closely within the researcher's control focus on availability of classes for treatment and control purposes and the willingness of potential participants to engage in a research study. However, it is not clear that a larger sample would have been obtained by conducting the study in a previous or subsequent school year when the impact of budget reductions would not have limited the availability of administrators and teachers to participate in research activity, and a school that was the site of a documentary film about IE may have been available because other factors such as teacher transfers may have been operative.

Suggestions for design improvement are listed below:

- Longer treatment duration,
- Larger sample size,
- Ensure the quality of bridging by monitoring the frequency and type of bridging. For example count the number and type of bridges which occur in each lesson.
- Monitor the quality of the mediation as a means of determining that effective mediation occurred during treatment. This could be operationalized by identifying the number of mediated learning experiences as defined by theory in each lesson and then counting the number and type of criteria exhibited by each one.
- Evaluate changes in academic achievement by either assigning a short tightly structured writing task of perhaps fifteen minutes (Uslianer, 1986) or use report card grades.

- Use of a blind independent rater would eliminate the possible effects of reporting bias on the Teacher Student Behaviour Checklist (TSBC).

Areas for Further Investigation

Based on the results of this study and the literature review, there are several areas which seem rich in possibilities for further study. These include investigation of classroom management styles including teachers' relationship building strategies, the amount and type of bridging and mediated learning experiences, and the correlations over time of locus of control, self-esteem and cognitive skills acquisition as demonstrated on near and far transfer tasks. More specific suggestions follow:

- Investigate the classroom management styles of all the teachers involved in an IE study as it may be that these impact the effectiveness of the IE training and students' ability to learn;
- Investigate whether the methods the IE teacher/mediators use to establish a trusting relationship with their students are the same or different from those used by the control group teachers. Compare these with methods used by counsellors to establish the therapeutic relationship.
- Investigate the frequency and type of bridging occurring in the IE class and if it is used by grade and/or subject teachers during non-IE lessons.
- Investigate the appropriateness of the mediation during the IE lessons including the type of events that are mediated.
- Use more powerful instruments than the IAR or the SEI in order to 1) detect other significant differences at the individual and group levels and 2) detect cohesion amongst the instrument scores in order to determine if there were treatment effects at an individual level.

- Use instruments such as the Bender-Gestalt or the Visual Aural Digit Span (VADS) which are compatible with mediated learning theory in combination with the self-esteem and locus of control measures to determine if there is a correlation which may help to determine the validity of teacher reported anecdotes of improved student attitude and learning behaviours.
- Follow-up at the end of the next two school years to determine the intervention effect for the group and for individuals.

Generalizability of this Study

The results of this study indicate that a short exposure to IE may be effective in assisting 5th grade inner-city students in the Vancouver School system to change their cognition so that they are able to more effectively control their behaviour. Due to the design weaknesses it is difficult to generalize the results of this study beyond this group of children. However, since the IE program was effective with this group of students and has been shown to be effective with other groups of students of a similar age (Ahearn, 1988; Church, 1994; Funk, 1987; Jackson, 1983) taken collectively, the results of these studies indicate that exposure to IE benefits a variety of students. Continued use of IE and the theory of mediated learning in schools seems to be a positive step toward improving students' educational opportunities.

The Place of Cognitive Skills in Education

The proliferation of information in all subject areas necessitates the development of cognitive skills with which to determine the relative value of items in the array and what to do with them (Resnick, 1987b). This is a relatively easy task if the situation is clearly structured, however, by the nature of the increase in information, such challenges are usually ill-structured (Gagne, 1970). Most 'real life' situations tend to be of this ill-

structured and often open-ended variety. Through the mediated learning experiences and structured lessons of the Instrumental Enrichment program, students acquire the cognitive skills and application experience required for successful well-structured and ill-structured problem solving (Dufner, 1988). These skills can then be applied in a variety of challenging situations, both educational and social (Feuerstein, 1979).

When mediated learning principles are applied systemically, opportunities for developing effective solutions to the inevitable challenges increase as different elements within the system become more aware of and understanding of one another. As these experiences are integrated within the system, new understandings leading to new patterns of behaviour emerge (Feuerstein, 1979). This cognitive theory of change appears to be working effectively in the Detroit and Taunton School Districts as they implement mediated learning systemically. The cognitive theory of change also seems to work at the group and individual level as indicated by the link between change in locus of control and behaviour found in this study and the near and far-transfer results documented by other researchers (Church, 1994; Jackson, 1983; Uslianer, 1986).

The mediator holds the key role in the mediated learning experience process through effective use of the three essential components of intentionality and reciprocity, mediation of transcendence, and mediation of meaning (Feuerstein, 1990). Feuerstein (1979) has stated that emotional as well as cognitive events must be mediated which clearly establishes parents as mediators. In their role of enabling clients to become more self-directed agents in their own lives (Egan, 1990) the counsellor also frequently meets the criteria of the role of the mediator.

In providing evidence that a change in locus of control (as measured by the IAR) is linked to the change in behaviour (as measured by the TSBC) the results of this study

provide support for the theory (Feuerstein et al, 1979) that Instrumental Enrichment is a potentially powerful tool for behaviour change. The nature of the effect seems to be related to locus of control.

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APPENDIX A
LIST OF COGNITIVE FUNCTIONS

INSTRUMENTAL ENRICHMENT COGNITIVE FUNCTIONS

INPUT or GATHERING INFORMATION

clear PERCEPTION

SYSTEMATIC SEARCH

LABELLING

TEMPORAL & SPATIAL orientation (WHEN & WHERE)

CONSERVATION of size and shape

using TWO or more SOURCES of information

precision & ACCURACY

ELABORATION or USING INFORMATION

DEFFINING the problem or task

selecting RELEVANT cues

INTERIORIZATION: having a MENTAL PICTURE

SYSTEMATIC WORK: making a PLAN

REMEMBERING various BITS of information

looking for RELATIONSHIPS

COMPARING both SIMILARITIES & DIFFERENCES

CATEGORIZATION: find the clasas to which something belongs

HYPOTHETICAL thinking: If ... then....

using LOGICAL EVIDENCE to prove and defend

OUTPUT or EXPRESSING THE SOLUTION

overcoming EGOCENTRIC COMMUNICATION by clear & precise language & behaviour

overcoming TRIAL & ERROR by thinking through

restraining IMPULSIVE BEHAVIOUR

overcoming BLOCKING - use a strategy to stay calm

PRECISION & ACCURACY in response

VISUAL TRANSPORT

APPENDIX B
DEPENDENT MEASURES

SCHOOL FORM

SEI

Coopersmith Inventory

Stanley Coopersmith, Ph.D.
University of California at Davis

Please Print

Name _____ Age _____

School _____ Sex: M ___ F ___

Grade _____ Date _____

Directions

On the next pages, you will find a list of statements about feelings. If a statement describes how you usually feel, put an X in the column "Like Me." If the statement does not describe how you usually feel, put an X in the column "Unlike Me." There are no right or wrong answers.

- | Like Me | Unlike Me | |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | 1. Things usually don't bother me. |
| <input type="checkbox"/> | <input type="checkbox"/> | 2. I find it very hard to talk in front of the class. |
| <input type="checkbox"/> | <input type="checkbox"/> | 3. There are lots of things about myself I'd change if I could. |
| <input type="checkbox"/> | <input type="checkbox"/> | 4. I can make up my mind without too much trouble. |
| <input type="checkbox"/> | <input type="checkbox"/> | 5. I'm a lot of fun to be with. |
| <input type="checkbox"/> | <input type="checkbox"/> | 6. I get upset easily at home. |
| <input type="checkbox"/> | <input type="checkbox"/> | 7. It takes me a long time to get used to anything new. |
| <input type="checkbox"/> | <input type="checkbox"/> | 8. I'm popular with kids my own age. |
| <input type="checkbox"/> | <input type="checkbox"/> | 9. My parents usually consider my feelings. |
| <input type="checkbox"/> | <input type="checkbox"/> | 10. I give in very easily. |
| <input type="checkbox"/> | <input type="checkbox"/> | 11. My parents expect too much of me. |
| <input type="checkbox"/> | <input type="checkbox"/> | 12. It's pretty tough to be me. |
| <input type="checkbox"/> | <input type="checkbox"/> | 13. Things are all mixed up in my life. |
| <input type="checkbox"/> | <input type="checkbox"/> | 14. Kids usually follow my ideas. |
| <input type="checkbox"/> | <input type="checkbox"/> | 15. I have a low opinion of myself. |
| <input type="checkbox"/> | <input type="checkbox"/> | 16. There are many times when I'd like to leave home. |
| <input type="checkbox"/> | <input type="checkbox"/> | 17. I often feel upset in school. |
| <input type="checkbox"/> | <input type="checkbox"/> | 18. I'm not as nice looking as most people. |
| <input type="checkbox"/> | <input type="checkbox"/> | 19. If I have something to say, I usually say it. |
| <input type="checkbox"/> | <input type="checkbox"/> | 20. My parents understand me. |
| <input type="checkbox"/> | <input type="checkbox"/> | 21. Most people are better liked than I am. |
| <input type="checkbox"/> | <input type="checkbox"/> | 22. I usually feel as if my parents are pushing me. |
| <input type="checkbox"/> | <input type="checkbox"/> | 23. I often get discouraged at school. |
| <input type="checkbox"/> | <input type="checkbox"/> | 24. I often wish I were someone else. |
| <input type="checkbox"/> | <input type="checkbox"/> | 25. I can't be depended on. |
| <input type="checkbox"/> | <input type="checkbox"/> | 26. I never worry about anything. |
| <input type="checkbox"/> | <input type="checkbox"/> | 27. I'm pretty sure of myself. |
| <input type="checkbox"/> | <input type="checkbox"/> | 28. I'm easy to like. |
| <input type="checkbox"/> | <input type="checkbox"/> | 29. My parents and I have a lot of fun together. |

- | Like Me | Unlike Me | |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | 30. I spend a lot of time daydreaming. |
| <input type="checkbox"/> | <input type="checkbox"/> | 31. I wish I were younger. |
| <input type="checkbox"/> | <input type="checkbox"/> | 32. I always do the right thing. |
| <input type="checkbox"/> | <input type="checkbox"/> | 33. I'm proud of my school work. |
| <input type="checkbox"/> | <input type="checkbox"/> | 34. Someone always has to tell me what to do. |
| <input type="checkbox"/> | <input type="checkbox"/> | 35. I'm often sorry for the things I do. |
| <input type="checkbox"/> | <input type="checkbox"/> | 36. I'm never happy. |
| <input type="checkbox"/> | <input type="checkbox"/> | 37. I'm doing the best work that I can. |
| <input type="checkbox"/> | <input type="checkbox"/> | 38. I can usually take care of myself. |
| <input type="checkbox"/> | <input type="checkbox"/> | 39. I'm pretty happy. |
| <input type="checkbox"/> | <input type="checkbox"/> | 40. I would rather play with children younger than I am. |
| <input type="checkbox"/> | <input type="checkbox"/> | 41. I like everyone I know. |
| <input type="checkbox"/> | <input type="checkbox"/> | 42. I like to be called on in class. |
| <input type="checkbox"/> | <input type="checkbox"/> | 43. I understand myself. |
| <input type="checkbox"/> | <input type="checkbox"/> | 44. No one pays much attention to me at home. |
| <input type="checkbox"/> | <input type="checkbox"/> | 45. I never get scolded. |
| <input type="checkbox"/> | <input type="checkbox"/> | 46. I'm not doing as well in school as I'd like to. |
| <input type="checkbox"/> | <input type="checkbox"/> | 47. I can make up my mind and stick to it. |
| <input type="checkbox"/> | <input type="checkbox"/> | 48. I really don't like being a <small>boy.</small> <small>girl.</small> |
| <input type="checkbox"/> | <input type="checkbox"/> | 49. I don't like to be with other people. |
| <input type="checkbox"/> | <input type="checkbox"/> | 50. I'm never shy. |
| <input type="checkbox"/> | <input type="checkbox"/> | 51. I often feel ashamed of myself. |
| <input type="checkbox"/> | <input type="checkbox"/> | 52. Kids pick on me very often. |
| <input type="checkbox"/> | <input type="checkbox"/> | 53. I always tell the truth. |
| <input type="checkbox"/> | <input type="checkbox"/> | 54. My teachers make me feel I'm not good enough. |
| <input type="checkbox"/> | <input type="checkbox"/> | 55. I don't care what happens to me. |
| <input type="checkbox"/> | <input type="checkbox"/> | 56. I'm a failure. |
| <input type="checkbox"/> | <input type="checkbox"/> | 57. I get upset easily when I'm scolded. |
| <input type="checkbox"/> | <input type="checkbox"/> | 58. I always know what to say to people. |

Short

Gen

Soc

H

Sch

Total x2 =

L

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APPENDIX II: THE GRANDALL
INTELLECTUAL ACHIEVEMENT RESPONSIBILITY QUESTIONNAIRE*

The IAR Scale

1. If a teacher passes you to the next grade, would it probably be
 - (a) because she liked you, or
 - (b) because of the work you did?
2. When you do well on a test at school, is it more likely to be
 - (a) because you studied for it, or
 - (b) because the test was especially easy?
3. When you have trouble understanding something in school, is it usually
 - (a) because the teacher didn't explain it clearly, or
 - (b) because you didn't listen carefully?
4. When you read a story and can't remember much of it, is it usually
 - (a) because the story wasn't well written, or
 - (b) because you weren't interested in the story?
5. Suppose your parents say you are doing well in school. Is it likely to happen
 - (a) because your school work is good, or
 - (b) because they are in a good mood?
6. Suppose you did better than usual in a subject at school. Would it probably happen
 - (a) because you tried harder, or
 - (b) because someone helped you?
7. When you lose at a game of cards or checkers, does it usually happen
 - (a) because the other player is good at the game, or
 - (b) because you don't play well?
8. Suppose a person doesn't think you are very bright or clever.
 - (a) Can you make him change his mind if you try to, or
 - (b) are there some people who will think you're not very bright no matter what you do?
9. If you solve a puzzle quickly, is it
 - (a) because it wasn't a very hard puzzle, or
 - (b) because you worked on it carefully?
10. If a boy or girl tells you that you are dumb, is it more likely that they say that
 - (a) because they are mad at you, or
 - (b) because what you did really wasn't very bright?
11. Suppose you study to become a teacher, scientist, or doctor and you fail. Do you think this would happen
 - (a) because you didn't work hard enough, or
 - (b) because you needed some help and other people didn't give it to you?
12. When you learn something quickly in school, is it usually
 - (a) because you paid close attention, or
 - (b) because the teacher explained it clearly?
13. If a teacher says to you, "Your work is fine," is it
 - (a) something teachers usually say to encourage pupils, or
 - (b) because you did a good job?
14. When you find it hard to work arithmetic or math problems at school, is it
 - (a) because you didn't study well enough before you tried them, or
 - (b) because the teacher gave problems that were too hard?
15. When you forget something you heard in class, is it
 - (a) because the teacher didn't explain it very well, or
 - (b) because you didn't try very hard to remember?
16. Suppose you weren't sure about the answer to a question your teacher asked you, but your answer turned out to be right. Is it likely to happen
 - (a) because she wasn't as particular as usual, or
 - (b) because you gave the best answer you could think of?
17. When you read a story and remember most of it, is it usually
 - (a) because you were interested in the story, or
 - (b) because the story was well written?
18. If your parents tell you you're acting silly and not thinking clearly, is it more likely to be
 - (a) because of something you did, or
 - (b) because they happen to be feeling cranky?
19. When you don't do well on a test at school, is it
 - (a) because the test was especially hard, or
 - (b) because you didn't study for it?
20. When you win at a game of cards or checkers, does it happen
 - (a) because you play real well, or
 - (b) because the other person doesn't play well?
21. If people think you're bright or clever, is it
 - (a) because they happen to like you, or
 - (b) because you usually act that way?
22. If a teacher didn't pass you to the next grade, would it probably be
 - (a) because she "had it in for you," or
 - (b) because your school work wasn't good enough?

23. Suppose you don't do as well as usual in a subject at school. Would this probably happen
- (a) because you weren't as careful as usual, or
 - (b) because somebody bothered you and kept you from working?
24. If a boy or girl tells you that you are bright, is it usually
- (a) because you thought up a good idea, or
 - (b) because they like you?
25. Suppose you became a famous teacher, scientist or doctor. Do you think this would happen
- (a) because other people helped you when you needed it, or
 - (b) because you worked hard?
26. Suppose your parents say you aren't doing well in your school work. Is this likely to happen more
- (a) because your work isn't very good, or
 - (b) because they are feeling cranky?
27. Suppose you are showing a friend how to play a game and he has trouble with it. Would that happen
- (a) because he wasn't able to understand how to play, or
 - (b) because you couldn't explain it well?
28. When you find it easy to work arithmetic or math problems at school, is it usually
- (a) because the teacher gave you especially easy problems or
 - (b) because you studied your book well before you tried them?
29. When you remember something you heard in class, is it usually
- (a) because you tried hard to remember, or
 - (b) because the teacher explained it well?
30. If you can't work a puzzle, is it more likely to happen
- (a) because you are not especially good at working puzzles, or
 - (b) because the instructions weren't written clearly enough?
31. If your parents tell you that you are bright or clever, is it more likely
- (a) because they are feeling good, or
 - (b) because of something you did?
32. Suppose you are explaining how to play a game to a friend and he learns quickly. Would that happen more often
- (a) because you explained it well, or
 - (b) because he was able to understand it?
33. Suppose you're not sure about the answer to a question your teacher asks you and the answer you give turns out to be wrong. Is it likely to happen
- (a) because she was more particular than usual, or
 - (b) because you answered too quickly?
34. If a teacher says to you, "Try to do better," would it be
- (a) because this is something she might say to get pupils to try harder, or
 - (b) because your work wasn't as good as usual?

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TEACHER CHECKLIST OF STUDENT BEHAVIOURS

DATE: _____

STUDENT: _____

Please indicate how much each of the following behaviours is like or not like the student.

- 1 student usually chooses the behaviour,
 2 student often chooses the behaviour,
 3 student often does not choose the behaviour,
 4 student usually does not choose the behaviour.

BEHAVIOUR

Controls her/his impulsive behaviour.	1	2	3	4
Persists at boring or frustrating tasks.	1	2	3	4
Hands in assignments on time.	1	2	3	4
Needs to be reminded to complete assignments.	1	2	3	4
Has a systematic approach to solving problems.	1	2	3	4
Uses language precisely	1	2	3	4

APPENDIX C
LETTERS, INFORMED CONSENT FORMS, AND NOTICE

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CONSENTIMIENTO INFORMADO

Este estudio, Emplazamiento de Control Academico, sera los primeros seis meses de un estudio planeado para dos años para la Direccion de Colegios de Vancouver. El proposito de este estudio es determinar si el programa para Enriquecimiento Instrumental de Feuerstein (FIE) es efectivo en mejorar el auto-estima de los estudiantes y su capacidad para auto-dirigirse en su trabajos escolares (emplazamiento de control academico). Este estudio cumple parcialmente con los requisitos para mi Titulo de Masters en Psicología para Consejeria de la Universidad de British Columbia.

Se solicitara que por lo menos cuatro y a lo mas seis clases de estudiantes del quinto año escolar participen en este estudio. La participacion en este estudio es voluntaria. El retirarse o negarse a participar en cualquier momento no perjudicara su posicion en clase de ninguna forma.

A intervalos de cada seis meses, comenzando en Enero de 1994, se les pedira a todos los estudiantes participantes que entreguen una muestra de su trabajo y que completen dos cuestionarios cortos durante las horas de clases. Tambien se solicitara informacion sobre la asistencia a clases. Durante los dos años de este proyecto, los estudiantes participaran por un maximo de seis horas y se les pedira que continuen participando aun si cambian de colegio. A los mismos intervalos de seis meses, se les pedira a los profesores que completen un listado de preguntas.

La informacion obtenida se mantendra confidencial con respecto a la identidad del estudiante. Los estudiantes seran identificados por un codigo solamente. Todos los materiales se mantendran bajo llave en un archivo. Solamente los investigadores de este proyecto tendran acceso a los archivos.

Los resultados del estudio de este grupo seran publicados en el formato de un tesis y pueden ser utilizados para hacer presentaciones o en articulos que se presentan en jornales.

Si tiene preguntas o quiere saber mas sobre este estudio, por favor llameme al numero 264-1935 o llame a mi supervisor, Dr. John Allan, al 822-4625.

Muchas gracias por su consideracion de este pedido. Por favor complete la informacion que sigue para indicar si Ud. y su hijo(a) estan dispuestos para que el/ella participe en este estudio de investigacion.

Yo, _____, estoy legalmente

autorizado(a) para dar permiso a _____

para que participe/no participe en este estudio de investigacion. He leído y comprendo la carta que describe el estudio. Ademas me he guardado copias de la carta y del formulario de consentimiento.

Yo,

 Firma de la persona legalmente autorizada para dar consentimiento

 Relacion con el/la estudiante

 Fecha

FRENCH

Ce document est très important. S'il vous-plait, demander à quelqu'un de le traduire pour vous.

SPANISH

Informacion Importante Pide
La Traduccion

VIETNAMESE

Đây là chi tiết rất quan trọng,
hãy nhờ người thông dịch
giúp bạn

CHINESE

這是非常重要資料
請人員代你翻譯

JAPANESE

これは大變重要な情報ですから
誰かに 番言 と頼みなすい

CAMBODIAN

លិខិតនេះ ជាព័ត៌មាន ដ៏សំខាន់មួយ
សូមរកគេម្នាក់ជួយបកប្រែឲ្យអ្នកស្តាប់

POLISH

To jest bardzo ważna wiadomość
prosimy zatem kogoś przetłumaczyć

ENGLISH

This is very important information,
please have someone translate it for
you.

GERMAN

Es ist sehr wichtig, dass Sie sich
diese Auskunft übersetzen lassen

ITALIAN

Quest' informazione è molto
importante, per favore la dia a
qualcuno per tradurre

KOREAN

이것은 중요한
사항입니다. 이것
번역 좀 부탁드립니다.

PUNJABI

ਇਹ ਬਹੁਤ ਜ਼ਰੂਰੀ ਸੂਚਨਾ ਹੈ ਕਿਪਾ
ਕਰਕੇ ਇਸ ਨੂੰ ਕਿਸੇ ਕੋਲੋਂ ਸਮਝ ਲਉ।

HINDI

यह बहुत जरूरी सूचना है। कृप्या इसे
किसी से समझ लें।

APPENDIX D
TEACHER INFORMATION AND CONSENT

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INFORMED CONSENT

I, _____, a classroom teacher at
_____ school in Vancouver have read the attached
letter and am willing to participate in the study Academic Locus of Control and Self-
Esteem. I understand that I may withdraw at any time without penalty.

Signature

Date