

SUMMARY OF EVALUATION AND RESEARCH STUDIES ON EFFECTS OF INSTRUMENTAL ENRICHMENT

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Instrumental Enrichment (FIE) as an instructional intervention, emphasizing critical thinking strategies, has been found to have positive effects on many kinds of learners. Investigations into the effects of Instrumental Enrichment have been carried out over the past 25 years in several countries, including the USA, United Kingdom, Australia, South Africa, New Zealand, Israel, Spain, Venezuela, France, and Germany; more than 1000 studies have been completed and more are constantly in process. These studies have encompassed many kinds of populations of students. The following is only a sampling of the empirical studies that are most relevant to a varied group of school populations, both general and special-needs.

GENERAL POPULATIONS

Israel

A convincing study about the effects of IE occurred in Israel. Two groups of high school students, some of whom came originally from countries where they had had very little previous formal education and very little family interaction, were identified for the research study. One group received the general high school curriculum and then proceeded into the Israeli army; the other group received the general high school curriculum and IE, and then proceeded into the Israeli army. By the end of high school, the group who had had IE training had already outpaced the control group on the Primary Mental Abilities scale as well as on 3 standardized nonverbal tests of intelligence. But the results of the followup study are still more encouraging—two years after their training in high school, now in the Israeli army, both groups were tested again, this time on an intelligence test showing verbal and nonverbal aspects of intelligence. The researchers found that students who had had two years of IE were now outperforming the control group even further, concluding that IE had successfully increased the IE students' abilities to learn how to learn (Chance, 1981).

Cleveland, Ohio

A recent example is a study completed in 2002 in Cleveland, Ohio high schools, in which it was found that 9th grade students who had an approach which incorporated IE within their mathematics program, doubled their rate of improvement on the math test scores when compared to a matched control group (VLS, 2002).

Taunton, Massachusetts

A major empirical study over an extended time period was carried out in the Taunton, Massachusetts Public Schools where Instrumental Enrichment was implemented for

approximately 20 years in several schools at the middle-school level. The significant positive results from within a framework of experimental versus control groups is noteworthy and points out the value of a school-wide (and district-wide) commitment as well as the critical role of an FIE Program Coordinator. The results of a three-year study included: significantly increased school attendance by the FIE (experimental) group, significant increases in IQ scores by the FIE group, significant gains in scores on the state-mandated standardized reading test using data provided by the state department of education, and important increases for the FIE group on the Iowa Test of Basic Skills for reading, mathematics, social studies, and science. A more complete report is found in Williams and Kopp, 1993, cited in the References.

SPECIAL-NEEDS LEARNERS

In regard to special-needs learners, some brief excerpts of studies indicate a broad effect of IE in different ways on this variety of populations. In each case below, the reference is provided so that the reader may follow up further; also included in the References at the end of this paper are multiple other references that refer to studies done on special populations, but which are not cited in this particular paper.

It has been found that in working with special-needs learners, it is not necessary in every case to make major adjustments in IE instruction, since the materials provide a balance among the visual, geometric, verbal, and symbolic representations. Adjustments made by teachers for special populations include a somewhat slower pace, visual expansion of the pages into larger type size for visually impaired students and for those needing a slower pace, teaching the meaning of key terms to which special-needs learners may not have been exposed previously, and teaching the pre-requisite skills in a concrete modality before attempting the paper-and-pencil IE pages. In all cases, special-needs teachers make these adaptations readily, since they normally carry out such accommodations in their regular instruction as well.

Discussion remains at the “heart” of the methodology of “mediation”, and as such, this emphasis transcends many individual differences that are caused by some disabilities.

To examine now specific disability groups, the following summaries are provided.

Deaf/hard of hearing

In regard to deaf and hard of hearing learners, the effects have been fourfold:

1. For students having systematic 3-times-per-week experiences with IE, significant increase in reasoning skills, as measured by the Raven’s Progressive Matrices test, in comparison with students who have not had IE.
2. Increase in teacher-observed problem-solving behaviors such as identifying

more than one solution to a given problem, and staying with a problem until it is solved, as opposed to giving up quickly.

3. Significant improvement in results on standardized tests of academic achievement in reading comprehension, math computation, and math comprehension.
4. Ability to develop real-world solutions to given problems, through narrative description of steps to be taken; improvement seen in sequencing and completeness of the problem-solution steps (Martin, 1984).

Eighth grade students at the Lexington School for the Deaf in New York City over a period of four years found that on the Stanford Achievement Test for Reading and Math Problem-Solving, after using IE, showed the following increases, when compared to national data that indicate an average growth of about 3 months per year without using IE: 22% of the students increased 3 or more grade levels in Reading Comprehension, 14% increased 2 grade levels, and 33% increased one grade level; on Math Problem-Solving, 36% of the students increased 3 or more grade levels, 17% increased 2 grade levels, and 19% increased 1 grade level. The data are noteworthy in light of the fact that there are 24 different home languages in students' families, and 80% of the students qualify for some form of federal lunch (Keane, personal communication). Another study found that such students, as a result of IE, learned to categorize and compare things spontaneously (Berchin, 1991). The 4 results cited earlier above on the first page of this paper were also verified with deaf students (Martin, 1984).

Brain Injury

In regard to brain-injured students, the effects of IE were studied, and it was concluded that IE was a "valuable approach" for treating cognitive deficiencies in such students (Johnson, et al., undated).

Mental Retardation

In regard to mental retardation, Feuerstein and others have carried out numerous pieces of research. One of those describes a child was diagnosed as retarded and who had delayed speech and mental processing. After work with IE, the child mastered tasks of increasing complexity, graduated from high school, was trained as a bookkeeper and accounting, and is now responsible for the accounts department of a large chain of supermarkets (Feuerstein, 1980).

In regard to Down's Syndrome specifically, the interaction of an IE-trained mother with her Down's Syndrome boy, resulted in some significant changes. The result was that the child by age 9 was reading on a first-to-second grade level, with understanding even more developed than level; he also learned to keep account of days of the week,

anticipate the kind of meal he would have on the basis of the cutlery laid out, anticipate the reactions of adults and children by verbal and nonverbal cues, and generalize from one situation to another. Another Down's Syndrome child that is more typical of Down's Syndrome children, learned as a result of IE to make responses to a variety of stimuli to which she had been considered impervious, and discriminate between objects, learned object permanence (Feuerstein, 1980). With mildly retarded adults, IE was found to appeal to the students in terms of the format of regularity, discussion of instruments, and summarization of key points; they said they liked the sessions because it gave them the chance to think, and it helped them to become more independent (Matthews, et al.).

Autistic Spectrum

In relation to autism, autistic children after working with IE over two years began to show significant changes in behavior and interaction with the environment; in such cases it was helpful to have someone other than the parent be the mediator; IE has resulted in an ability to penetrate the child's resistance and bring about meaningful changes (Alpert and Crown, 1953; Hanegbi, Krasilowsky, and Feuerstein, 1970). A more recent study examined the effects of IE on 20 autistic children in Canada; the results indicated a high level of success for the students who had a mediated learning approach through IE, and these results have been presented at several international professional conferences in Europe and North America (ICELP, 2001). Another recent study (Gross and Stevens, 2005) indicates that in one-on-one instruction with IE and a younger autistic child, improvements were noted in visual attention and tracking, give-and-take, turn-taking, understanding of cause-and-effect, prediction, making choices, asking questions, following verbal instructions, and persistence.

Researchers into autism, a field that is only in the process of full development, state that autism is a state of being with many different causes, and is not necessarily a permanent condition. Some autistic children, for example, learn to speak by singing, others through sign language. The autistic child sometimes has a problem in seeing that a person could be both angry and loving at the same time; thus, in experiments in Israel, it was found that by raising the cognition of such children through mediation in IE with exercises showing how two opposing items can co-exist, autistic children grew to accept the concept of two apparently contradictory trends occurring at the same time. In this still-early stage of research, experimenters recommend of course an early start as soon as a diagnosis has been made, and to select a program and carry it out intensively.

The research staff at the international center for Instrumental Enrichment (ICELP) in Israel, who not only carry out some research but also review all IE studies from elsewhere as well, are at this time taking an understandably cautious approach to claims about IE as a true breakthrough, while studies can be verified and examined for quality.

Attention Deficit Disorder and Attention Deficit Hyperactivity Disorder

In regard to children with Attention Deficit Disorder (ADD), Kreiger and Kaplan (1990) studied 9- and 10-year-old students on the effects of IE over a twelve-week period. The

IE group, when compared to a control group that was matched, scored significantly higher in reading accuracy and reading comprehension, as measured by the 1973 edition of the Neale Analysis of Reading Ability.

A study was conducted in Europe involving Attention Deficit Hyperactivity Disorder (ADHD) students; ADHD students who had Instrumental Enrichment were found to improve significantly when compared to students who had not had IE, in their precision, representation of ideas on paper, finding relevant cues in problem-solving situations, and declarative knowledge (Roth and Szamoskozi, 2001).

Learning Disabilities

In regard to learning disabilities, IE approaches were found to have a profound positive impact on learning-disabled youth, in particular the focus on identifying patterns (Messerer, et al., 1984). Also, Brainin (1982) conducted a study of rural Westchester County, New York underachieving 6th grade students, reading two years below grade leveling remedial classes. The experimental group had 59 hours of IE instruction over one school year, while the control group had equivalent hours in a remedial reading program; as measured by the Comprehensive Test of Basic Skills (CTBS), significant positive differences in favor of the IE group were found on Total Reading gain scores. Sanches (1994) conducted a three-year study with 8-year-old rural public school students who had poor language skills as measured by the Test of Language developed by Pozar in 1983; the study compared 25 IE students with 25 students in a control group. The comparison of pre-test and post-test scores indicated significant differences in favor of the IE group on all four subtests of language (oral, written, vocabulary, and grammar). Kaufman and Burden (2004) found that IE helped young adults with serious learning disabilities in peer tutoring and the ability to reflect, build confidence, articulate thoughts and feelings, and improve general language ability. Another study of the effects of IE on a learning-disabled population took place at the Ben Bronz Academy in West Hartford, CT; IE has been integrated across the curriculum in this special school, and significantly positive results beyond expectations were found with a middle-school population in a variety of subject areas. A complete report is attached as **Appendix H**.

Visually Impaired

Successful adaptation of IE instruments for blind and visually impaired students have been and are being made. Some of the verbal instruments have been brailled, while some of the geometric and pictorial instruments have been transformed into tactile form with raised figures that can be distinguished by number and texture. When such instruments are used, together with the normal mediation discussions, blind and visually impaired students make similar cognitive progress to that of sighted students. Specifically, in at least two carefully controlled studies, blind students as a result of the IE experience were found to: improve in symbolic and schematic representation of objects and processes, form mental images of space, integrate verbal labels and schematic images, demonstrate greater alertness and involvement during lessons, start interacting with sighted peers, improve in self-image, and set higher educational and career goals for themselves (Lurie and Gouzman & Kozulin, 1998; Gouzman, n.d.).

Promoting Cognitive and Affective Development

A study explored the effectiveness of the Instrumental Enrichment Basic program in enhancing the cognitive and affective functions of young children. Thirty 3-4-year-old children were assigned to experimental and control groups. The experimental group received the program for seven months and was compared to the control group before and after intervention on tests of knowledge acquisition and vocabulary. Cognitive change was evaluated using an assessment battery that measured children's language, cognition, and knowledge. The findings indicated that children in the experimental group improved their performance more than children in the control group. Results indicate that the program can be used with socially disadvantaged children as young as age 3-4 and that it leads to improvement in performance. Further, the intervention succeeded in organizing activities in such a way that children who initially demonstrated anxiety or antisocial behavior were successfully integrated. Modeling from peers and the instructor enhanced the child's ability to adopt new modes of behavior. (Salas, et al., 2010).

Culturally Diverse and Rural Populations

The Alaska Department of Education has conducted a project called The Alaska Community Preschool Project, whose core is the training in and use of the Feuerstein Instrumental Enrichment (Basic) program. The project is funded through the U.S. Department of Education. The project is designed to foster community partnerships among school districts and numerous early-care and education programs, while developing models for use in urban, rural, and remote Alaska settings. The project serves 250 children in 7 Alaskan communities and has contracts with 6 Alaskan school districts and 23 school-district pre-school and Head Start classrooms. At the end of the second year of implementation, the students in one of the communities showed growth in Motor, Concepts, and Language Development skills; Concept Development and Total Score growth were statistically significant in growth over only 5 months of time. In another implementation, Pre-K students showed more than 1 year of growth in 5 months of intervention, Kindergarten students showed nearly 2 years of growth in 7 months of intervention, and first grade students showed nearly 1 year of growth in 7 months of intervention; results for the Pre-K, Kindergarten, and first-grade groups were statistically significant. Another implementation showed significant growth for participating students in verbal concepts, visual discrimination, logical relations, and basic school skills. The project is continuing at this time. (Ben-Hur and Sugar, 2006).

Developmental Disabilities

A study explored the effectiveness of the Instrumental Enrichment "Basic" program, designed for younger learners. Emphasis was on systematic perception, self-regulation, conceptual vocabulary, planning, decoding emotions, and social relationships, along with transferring learned principles to daily life. Participants were 104 children from Canada, Chile, Belgium, Italy, and Israel who had development disabilities, cerebral palsy, genetically-based intellectual impairment, autism, or ADHD. Over a period of 30-45

weeks of intervention, research subjects showed statistically significant improvement in the WISC-R subtests of Similarities, Picture Completion, and Picture Arrangement, as well as on Raven's Coloured Matrices, by comparison with a similar group who received only occupational and sensori-motor therapy (Kozulin, et al., 2010).

Conclusion

Research studies are continuing at an impressive pace, as IE continues to be disseminated around the world. For example, in an international training seminar for IE trainers in the summer of 2003, delegates were present from 26 different countries and multiple languages, including Hindi, Korean, English, French, German, Spanish, Portuguese, and Dutch. Thus, this report is simply a work in progress, and further results are expected to continuously emerge.

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