LEARNING, COGNITIVE SUPPORT, AND SYSTEMIC REFORM

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GOALS:

- To provide a picture of conditions that engender failure
- To propose a solution for endemic problems of failure
- To introduce the process of systemic school reform
- To increase learning through IE for students at risk of failure
- To initiate cooperative and collaborative international relationships

It has been almost fifteen years since publication of "A Nation at Risk," the Carnegie Commission Report, warning that the United States' K-12 educational system could not continue on its present course. Since that time education has worked its way into the headlines of major city newspapers and emerged as a significant campaign issue for leading politicians, especially U.S. President, Bill Clinton. There are National Standards in teaching, learning, and evaluation for most of the major curriculum areas as well as a number of creative challenges to the current system of public schooling, like Charter Schools, privately financed schools, and a voucher system that permits a certain modicum of choice to parents and extended families regarding the education of their children.

Advances have also been made in research that lead to increased student learning, presumably the goal to which all change is aimed. For one thing, students have become the center of reform efforts that measure success in terms of what students know and are able to do. In many places, standards have been raised for ALL students and there has begun to emerge improvement among students from historically underrepresented groups---albeit at an unacceptably slow pace. Assessment and evaluation now include alternative performance tools and rubrics that go well beyond the traditional norm-referenced examinations that so greatly limit the arena students have available in which to "prove" what they know. Policies, reflected in changing graduation standards, human resource development, altered school structures, and budget allocations, have begun to emerge as well.

Amidst this background, certain fundamental changes are occurring that are neither good nor bad in themselves, but are sufficiently different and provocative to warrant watching. I have in mind the growing tendency for state and city "take overs" of education; the appointment of non-school people in the role of Chief Academic Officer (District Attorneys, business executives, etc.); sea changes in approaches to bilingual education; and aforementioned alterations in the nature of public schooling.

The backlash has already set in, and appears especially strident in the case of the many challenges to public education and to the future of the student support that has benefited students from backgrounds of diversity and economic poverty. A recent headline reported that large numbers of colleges and universities are rapidly moving away from scholarships that permit all students to secure higher education regardless of their economic conditions, toward those that are awarded for merit only. At the K-12 level, the movement to privately supported schools is seen by many as flight from public schools. The stress on test scores, coupled with higher standards, is frequently viewed as a threat to those students

whose preparation has been weak in the past and whose families are not able to provide the support typical of that supplied by middle and upper class families.

European researchers indicate similar trends. Throughout European societies between ten to twenty percent of children drop out of secondary school; almost sixty percent of this group is destined for a life of unemployment. Mathematics and science, which were the front runners in development of standards and new and innovative curriculum, are often targets of attack, both from within and outside of these disciplines. And the story continues! Many educators and politicians alike believe that the window is closing on this round of reform. They also believe that if success is not the end product this time, it will be a long time before a window opens again.

Unprecedented growth in automation and technology in the latter half of the 20th Century has radically transformed almost every sphere of life in developed free-market countries. Within the U.S. this growth produced once revolutionary changes that now seem almost commonplace – from the use of Automated Teller Machines and magnetic resonance imagining for diagnosing health disorders, to the use of advanced radar systems coupled with satellite technology to produce extremely accurate weather forecasts, to communication by electronic mail to every corner of the globe. In fact, the infrastructure provided by the global telecommunications system, the Internet, earth-orbiting satellites, and fiber optic cable, makes possible a good many of our daily activities. Technology transforms the essential character of the economies of free-market nations, and simultaneously alters the ways in which we organize and retrieve knowledge, what and how we think and value, and how we live, learn and play. It also radically alters the skills and talents that workers require to compete in an increasingly information and knowledge-based, global economy.

Unlike the farmers and domestic servants who dominated the workforce at the turn of the twentieth century, and who were retrained and retained to accommodate the factory model, today's "blue collar" workers face extinction, replacement by technologists, people who work both with their hands and with theoretical knowledge. This thesis, put forward by Peter Drucker, the noted labor historian in "The Age of Social Transformation," claims that the biggest casualties of the work force shift will be displaced workers who, unlike displaced farmers and domestic servants, lack the knowledge, skills, values, and beliefs necessary to participate in the information-knowledge society.

In the information-knowledge society, which has characterized the last decade of this century, increasingly education becomes the greatest determinant of job access and social position, a belief echoed by America's global counterparts. Internationalism and new technologies make our societies move faster than ever and, as a result, "dropping out" has more severe consequences than it has ever had. Access back into the system gets increasingly difficult as matters grow more complex. According to Drucker the majority of new jobs require qualifications industrial workers do not have and are not easily able to acquire. He has claimed that acquiring the necessary qualifications are dependent upon extensive formal education; acquisition and application of theoretical knowledge; well developed analytical skills; a different approach to work; a different mind set; ability to learn how to learn; and continuous learning that permits rapid acquisition of new specializations.

Although different countries have different minority groups, all suffer from the same neglect and poverty. In the United States, minority groups most at risk of failure are African Americans, Hispanics, and Native Americans. The Children's Defense Fund has provided some extraordinary data that underscores the urgency for intelligent, purposeful, and research-guided action in regard to these groups.

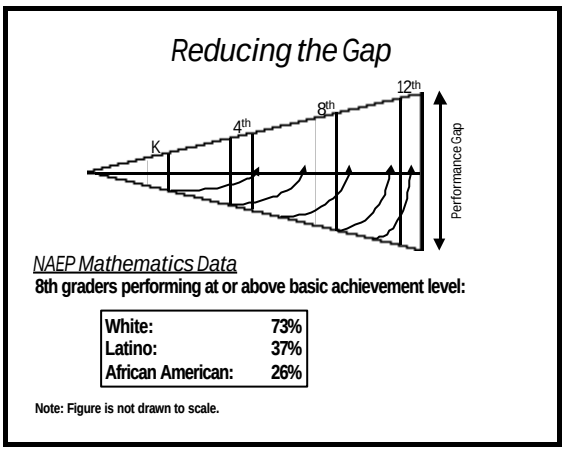
- Homicide is the leading cause of death among 5-14 year-olds; the second leading cause among African American children aged one through four.
- A gun kills a child every two hours (a classroom of children every two days).
- In 25 years, approximately 800,000 children will die from guns and 500,000 by other violent means, 3 ½ times the number of Americans killed in 20th century wars.
- Children are raising themselves as books and toys are being replaced by guns.
- More college age African Americans are in prison than in college dormitories.
- African American women have one in 21,000 chances of getting Ph.Ds. in science.
- One in five African American women have babies and one in two drop out of school.
- Nearly one in five Hispanics aged 16-24 leave school without either a high school diploma or an alternative certificate.
- While accounting for 56 percent of all U.S. immigrants, Hispanics account for nearly 90 percent of all immigrant dropouts.
- Today's dropout rate for Hispanics is two and one-half times the rate for African Americans and three and one-half times the rate for white, non-Hispanics.

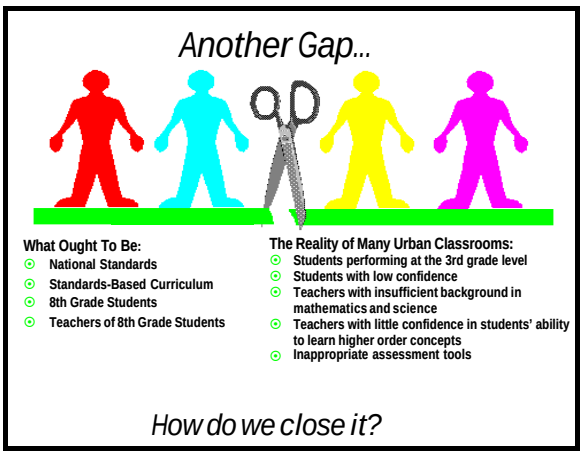
To those who need the best of what our educational system has to offer, we provide: the least well-trained teachers; the lowest level curriculum; the oldest books; the least instructional time; our lowest expectations; and inappropriate assessments. And, too often, minority students are treated as if they are invisible, a condition that Ralph Ellison discusses in his novel, The Invisible Man.

> I am an invisible man. No, I am not a spook.... nor am I one of your Hollywood-movie ectoplasms. I am a man of substance, of flesh and bone, fiber and liquids—and I might even be said to possess a mind. I am invisible, understand, simply because people refuse to see me. When they approach me, they only see my surroundings, themselves, or figments of their imagination—indeed, everything and anything except me. People refuse to see me. (Ralph Ellison, Invisible Man, 1952)

From such a situation, an information, knowledge-based society, coupled with extreme poverty and prejudice, there emerges a most significant challenge, the crucial need to ensure an appropriate education, especially in mathematics and science, for **ALL** members of society, especially those groups that have been historically denied access to critical knowledge, skills and resources. More than ever before, schools become the indispensable agents for producing a citizenry qualified to enter into and be successful within an economic order in which knowledge, not labor or raw materials, or capital, is the key resource. If the children of poverty, a growing percentage of the population, continue to live out the

meanness, futility, mistakes, and lack of opportunity to which contemporary society has sentenced them, every facet of society will lose—and every individual will suffer.
The gap that exists and persists between the poor and the economically secure, as well as between majority and minority students, must be narrowed, as must the gap that results from the disjunction between the ideal and the real, between what is and what ought to be. This gap is particularly destructive because it often allows us to concentrate on what we want while ignoring existing realities.





To close both gaps we must ask why so many fail, especially in areas like science and mathematics. In a sense, educators must learn to behave like scientists, digging out root causes prior to determining treatments and further actions. A solution cannot be prescribed unless causes and problems are understood: Bacetracin, applied many times on an open wound, will not cure a staff infection.

The following are frequently cited as conditions which result in school failure, failure characterized by dropouts, poor attendance, increased behavioral problems, violence, and truancy.

- Poverty, crime, drugs, and generally poor living conditions.
- Lack of nuclear family and support structures.
- Absence of cultural transmission.
- Unfamiliarity with the dominant language.
- Lack of belief in the ability of students to learn and succeed.
- Absence of cognitive skills.
- Absence of competition.
- Inexperienced, poorly educated teachers and high turn over.
- Insufficient expenditures and poorly equipped schools.
- Insufficient knowledge of what works - and why.
- The quest for quick, uncomplicated fixes.
- The condition of "invisibility."

The picture is not a pretty one. Again, like scientists, we must ask what forces of the school can be controlled and who can control them as we strive to discover and support

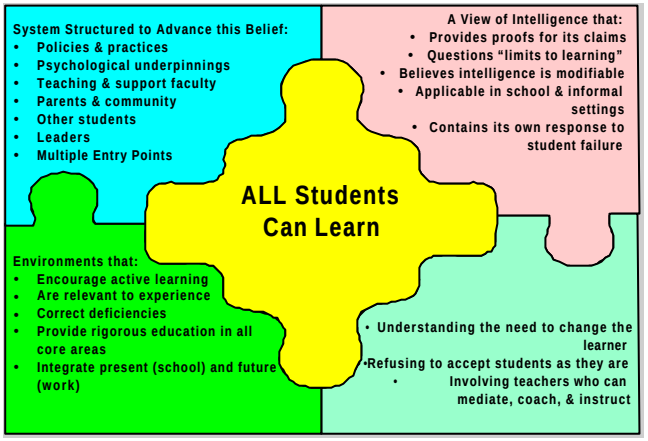
viable solutions. It is important to identify what is within the prerogative of the school so that efforts
can be used wisely, judiciously, and efficiently. We must ask what needs to change in schools if student learning is to improve significantly.

What Needs to Change

- ☑ What happens in classrooms. What we expect students to know and be able to do
- ☑ The demands we make upon students
- ☑ The tools we use to learn and teach
- ☑ Assessment of student performance
- ☑ How we prepare teachers
- ☑ How we support practices
- ☑ Accountability
- ☑ The role of external partners

What has been missing in attempts to ensure that all students learn standards-based content must also be identified. Clearly, the students must be located at the center of this quest for improvement, but what else must be factored in? What pieces of the puzzle are missing? How can they be fit together to achieve the goal of a society in which all students learn that which is necessary, sufficient, and substantive?

What's Missing in Attempts to Ensure that all Students Learn Standards-Based Content?



Rather than chronicling failure by ethnicity or economic status, let us examine the kinds of difficulties students commonly experience when attempting to master subjects like mathematics and science. As seen by Reuven Feuerstein, an Israeli cognitive scientist who designed "Instrumental Enrichment," typical cognitive problems for students who have difficulty learning include: (1) impulsiveness; (2) egocentricity; (3) lack of motivation; (4) failure to plan actions and responses; (5) episodic thinking and behavior (doesn't believe in the future); (6) inaccuracy; (7) non inclusiveness; (8) tendency to abandon difficult tasks; (9) inability to see cause and effect; and (10) inability to differentiate. Whatever the problems, failure to correct them will result in failure to succeed in school.

Instrumental Enrichment (IE), a theoretical and applied program, is built upon the fundamental belief that intelligence is dynamic and modifiable and that all students can be taught to learn how to learn. The IE program is based on many of the same cognitive functions that are necessary for success in mathematics and science. It operates by helping teachers identify deficiencies in particular cognitive abilities and by providing strategies and skills necessary for correcting the deficiencies and organizing experience. It is

one of the few programs that has developed a complete, theoretically-based program. IE goals include: narrowing the learning gap; improving achievement; correcting thinking patterns that inhibit learning; improving motivation to learn; helping teachers understand how students learn; and providing a repertoire of approaches for mediating learning.

IE material is organized into fourteen instruments that develop specific cognitive domains such as orientation in space and time, comparative behavior, analytic perception, and syllogistic reasoning. Each instrument comprises individual tasks that become increasingly complex and abstract and reinforce cognitive functions in a cyclical manner. As students work with the instruments, they develop specific rules, principles, and strategies that enable them to handle each task and, through transfer, improve their performance in various curriculum areas. IE Instruments, designed to circumvent cultural and language barriers, vary from simple to complex and concrete to abstract. They include: Organization of Dots, Orientation in Space I, Comparisons, Analytic Perception, Categorization, Family Relations, Temporal Relations, Numerical Progressions, Instructions, Illustrations, Orientation in Space II, Transitive Relations, Syllogisms, and Representational Stencil Design.

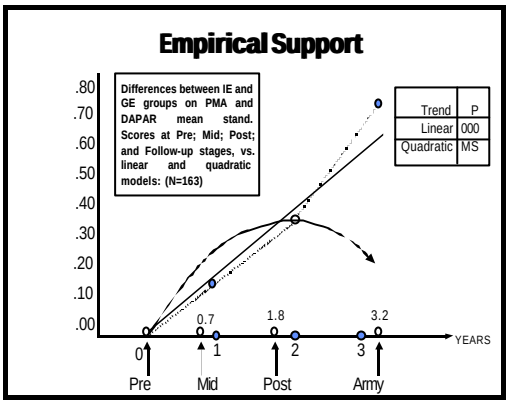
IE supports the belief that all students can learn and that learning problems can be eliminated through the development of certain cognitive abilities. It is critical because too few parents and teachers believe in the capacity of students to learn or know how to help them learn. IE *begins* with belief in children; addresses grades four to adulthood; covers all facets of learning; provides analysis and assessment and tools to ameliorate learning and behavioral problems; and includes

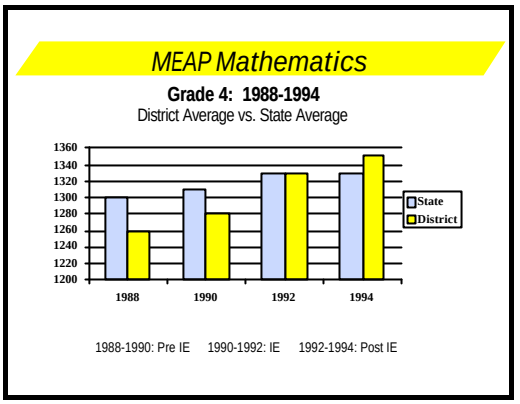
IE AND OTHER CURRICULUM AREAS

IE	SCIENCE	MATHEMATICS
• Record, analyze, organize and infer from data • Represent information in various models • Orientation in space and time • Compare, classify and plan • Formulate and test hypothesis • Reason inductively and deductively • Reason from cause to effect • Communicate clearly and precisely	• **GET IT:** gather, identify, compare, contrast, measure • **MANIPULATE:** arrange, classify. order, sequence, clarify • **INTERPRET:** draw conclusions, extrapolate, infer, explain, predict • **APPLY:** generalize, hypothesize, transfer, infer, relate to real life	• Employ logic and reason • Use evidence not "sole source" • Reason over memory • Conjecture, invent, and problem solve • Learn by applying in new situations • Base instructional decisions on analysis of student learning • Encourage lifelong learning • Connect and communicate mathematics to other areas • Focus on student thinking • Use assessment for teaching

professional development. The concerns and areas addressed by the IE program are very similar to those enumerated in the National Council of Teachers of Mathematics' (NCTM) Curriculum and Evaluation Standards and the National Academy of Sciences' (NAS) National Science Education Standards. IE is adaptable in all curriculum areas, especially in the areas of mathematics and science and is research based.

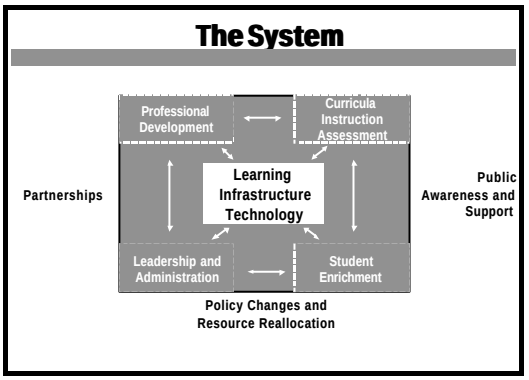
In excess of 1500 papers and studies written about IE demonstrate its success, especially in regard to the fact that behavior and learning can be modified over time, and that positive results extend well beyond program completion. Evidence from a meta-study done in Israel and a self study done by the Taunton, Massachusetts Public Schools are indicative of the program's success. Both studies indicate that student learning is increased by exposure to IE and that increases continue well beyond formal exposure to the program. In the case of Taunton, significant improvement is demonstrated on state achievement tests in mathematics, science, and social studies.





IE is important because old ways haven't worked sufficiently well; too many kids fail; and interventions tend to ignore individual problems and tend to be stop gap at best. A continued focus on remediation denies the richness of learning to those who need more, not less, of what makes education successful, engaging and exciting.

Although the program provides considerable evidence of success, implementation issues are complex. How to move a research-based program, and one that is the antithesis of a quick fix, into school systems that thrive on simplicity and immediate turnaround has always been problematic. In such instances, experiences of the last decade point to the importance of systemic approaches to school reform.



Systemic reform can be defined as fundamental, comprehensive, and coordinated changes made within systems on the systems' essential components. It occurs when all essential elements are engaged and operating in concert; one cannot attend only to selected elements and still succeed. When it works, it produces a synergy that makes it almost impossible to predict the behavior of the system by referring to the behavior of its individual parts. When it works, it also makes it harder to undo what has already been done! Systemic reform is an approach, a particular way of doing business, but the mere act of doing it does not ensure a good outcome, or a moral one, or one in line with particular standards or goals. Put differently, systemic reform is not an end-in-itself. It is a process for helping to ensure that goals are reached in a way that disallows the reformed system from ever again returning to its previous form. It is a process that enables lasting change.

Those who deal with systemic reform have identified those elements considered to be the most critical parts of the educational system. Those components considered to be essential generally include:

- Leadership and teaching
- Policies and practices
- Curriculum, assessment, professional development

- Support Systems
- Parents, other community members, and external partnerships
- Existing and necessary resources (budget and funding)
- Public relations and engagement
- Evaluation

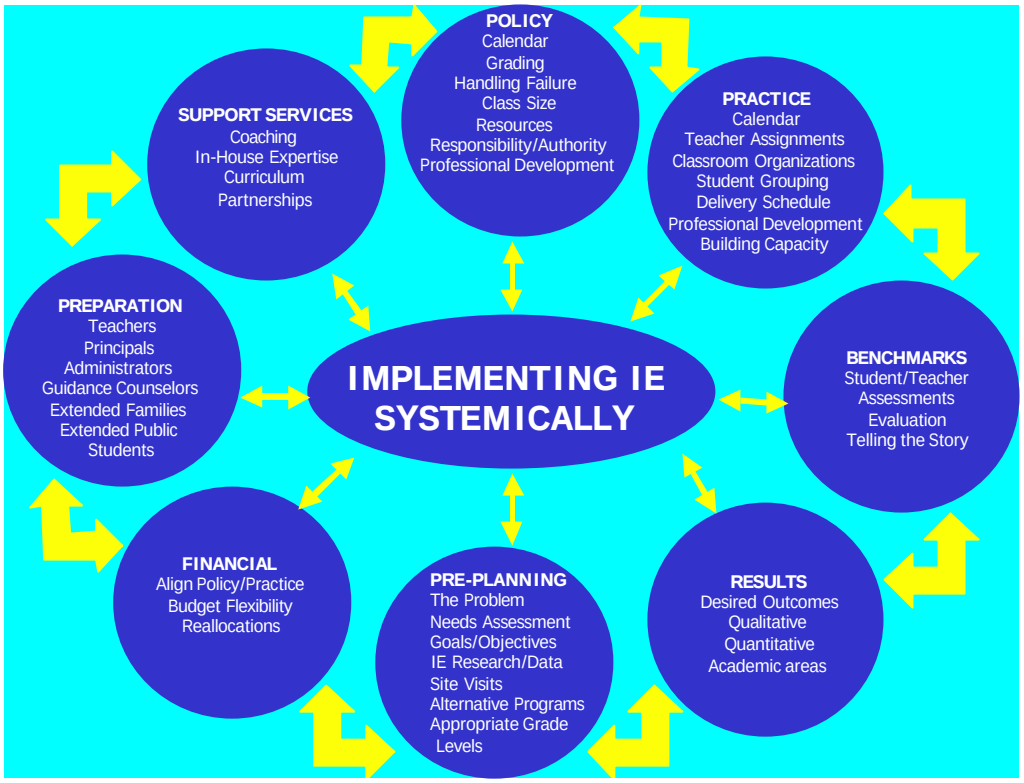
Strategic planning is normally associated with systemic reform, oftentimes confused with it. Strategic planning is a process of systematically evaluating the nature of the enterprise, defining its short and long-term objectives, identifying quantifiable and qualitative goals, developing approaches to reach them, and allocating resources to carry out these strategies. It begins by addressing questions: Where are we today? Where do we want to be? How do we get there? How will we know that we have gotten there? And what must be altered and reconfigured to get us there? It is a process whereby people make decisions based on an established and agreed upon vision about intended future outcomes, how outcomes are to be accomplished, and how success is measured and evaluated. A strategic planning model should: (1) establish a vision; (2) analyze the status quo; (3) set goal and objectives; (4) determine key participants; (5) assign roles and responsibilities; (6) create an implementation plan; (7) determine methods to accomplish the goals and objectives; (8) consider appropriate existing programs; (9) develop a time line; (10) establish benchmarks and outcome measures; (11) analyze cost factors; and (12) design/adapt assessment and evaluation tools.

Today's focus is on helping students learn how to learn through the systemic implementation of "Instrumental Enrichment," a program that has high probability of success when used appropriately with students in an academic setting. Two equally important issues are involved: the programs and approaches selected and the manner in which these programs are implemented. The selection of programs should be done carefully, and in accordance with sensible and tested criteria, criteria similar to those suggested below.

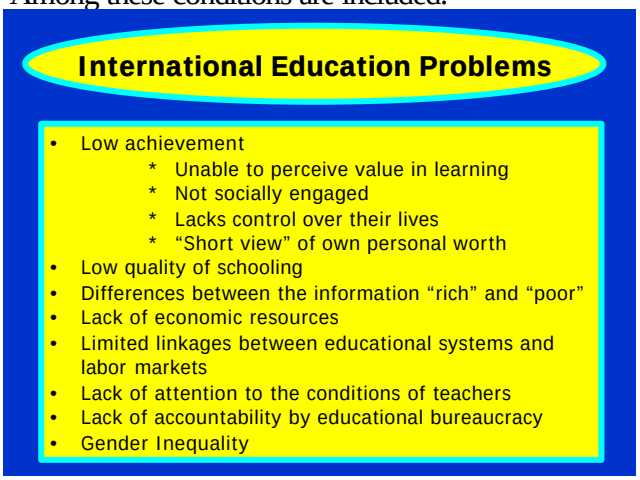
- Belief in all students' ability to learn
- Coherent and comprehensive vision
- Accessibility and mutual entry points
- Standards-based content
- Professional development schema
- Transferability of skills
- Embedded assessments
- Inclusiveness (Learning Modalities)
- Evidence that it works (research–based)
- Affordability

Although I have suggested a particular program it, too, should be tested against such criteria. What interests most of us here is bringing students to a state in which they are able to learn mathematics with facility and competence. Accomplishing this would appear to involve the ability to understand the nature of the problems as well as the possession of particular cognitive tools. I have claimed that learning gaps are real and significant; that a disproportionate number of minorities find themselves at the low end of the gap; that all people can learn under appropriate circumstances; and that IE is effective when used with students who experience difficulties learning. If, in fact, this is so it would appear to be the appropriate time to take action and to implement IE/MLE on a large scale. Such implementation will not be easy. If it is not accomplished systemically, it will not take hold and strong starts will quickly dissipate themselves. I present, for your consideration and analysis, one method of approaching a

systemic implementation of IE. Consider it, critique it, and alter it. Use it to help you understand your own system and how change will best work within it.



Those of us present at this Conference represent an international audience interested in helping at-risk students succeed. Separately, and together, we face a number of serious conditions that threaten the well being of civilization. Among these conditions are included:



Let us vow to work together as colleagues, across ethnic, political, economic, and social divides, to narrow learning gaps and improve academic and social conditions for all students. Let us vow to return to produce a litany of accomplishments that can be shared and improved upon. Let us vow to help

Reuven Feuerstein demonstrate to people all over the world that ALL students can learn mathematics. And let us all do our share to make certain that they will learn.