DOCUMENT RESUME

ED 349 812 FL 020 631

AUTHOR Walters, Joseph
TITLE Application in Multiple Intelligences: Research in Alternative Assessment.
PUB DATE Aug 92
NOTE 30p.; In: Focus on Evaluation and Measurement. Volumes 1 and 2. Proceedings of the National Research Symposium on Limited English Proficient Student Issues (2nd, Washington, DC, September 4-6, 1991); see FL 020 630.
PUB TYPE Information Analyses (070)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Bilingual Education; *Intelligence; Learning Theories; *Multicultural Education; Portfolios (Background Materials); *Student Evaluation
IDENTIFIERS Performance Assessment; Portfolio Approach

ABSTRACT

This paper introduces a theoretical treatment of the concept of intelligence that provides for intellectual diversity and contrasts this view with the more traditional notion of intelligence. Next, the paper draws from this theory several implications for education, paying particular attention to the question of assessment. It is shown why this view of intelligence forces the rethinking of some of the fundamental assumptions held about the assessment of learning. To conclude, a consideration of several specific implications for bilingual and multicultural learning are drawn from a discussion of multiple intelligences. Responses to the paper by Vera John-Steiner and Sue Teele are appended. (VWL)

Application of Multiple Intelligences Research in Alternative Assessment

Joseph Walters
Harvard University

Introduction

Like many urban areas, Harvard Square in Cambridge, Massachusetts, contains a number of restaurants that open onto sidewalks and public spaces. On a pleasant Sunday morning, one such area, near the center of the Square, is filled with people who have come together to talk, play games, and read. Clusters of players and spectators are engrossed in games of chess and backgammon; a musician plays an amplified guitar; a juggler performs in an open space; the Times crossword puzzle is the subject of debate at one table; and, of course, the entire area is filled with animated conversation.

What struck the author about this scene, especially as he was gathering ideas for this paper, was the diversity of the human skills on display in this small space. As he looked about, he could easily pick out a variety of pursuits and challenges -- the games of chess and backgammon, word puzzles, musical and kinesthetic performances, social interaction, and so on. And yet, nothing in this scene was unusual. The diversity that he was seeing was completely familiar.

Another striking feature of this scene was how much of it builds on problem solving. Games like chess and backgammon allow the players to pose problems for one another. Puzzles are taken up as a challenge posed by the puzzle's author. Performances in music and movement require the solution of problems of a different sort.

This scene was a reminder of the need that humans have to create challenges and pose problems as a form of recreation. What's more, there is an inevitable variety to the nature of those challenges. For one person, chess is a fascinating and fulfilling game, while for a second person chess is impenetrable, a foreign language. The crossword puzzle for these two people may appeal in just the opposite manner.

What is it about humans that yields this intellectual diversity? And how is this diversity reflected in learning? In this paper, the author will introduce a theoretical treatment of the concept of intelligence that provides for this diversity and will contrast this view with

the more traditional notion of intelligence. Next, he will draw from this theory several implications for education, paying particular attention to the question of assessment. He will try to show why this view of intelligence forces us to rethink some of the fundamental assumptions we hold about the assessment of learning. Finally, he will draw from the discussion of "multiple intelligences" and assessment a consideration of several specific implications for bilingual and multicultural learning.

The Question of Intelligence

To begin, the author defines the term intelligence as an individual's ability to solve problems or fashion products. In the traditional view -- one held by many psychologists -- intelligence is a human trait that varies from one individual to the next such that the individual with a great deal of this trait (the more intelligent individual) is more adept at solving problems and fashioning products. Indeed, it doesn't matter what the problem is. For any problem the highly intelligent person will be more likely to solve it than the less intelligent person.

To examine or test this trait in individuals, psychologists have constructed a large set of test problems and asked people to solve them. From the solutions offered to these test problems (some individuals solve these problems more accurately, quickly, insightfully, and so on) the psychologists predict which individuals will be most likely to solve any problem accurately and insightfully. In fact, the actual problems on the test aren't of particular interest and they are often quite trivial. "Who wrote The Iliad?" Or, "Recite these digits backwards, 2,5,3,4,7." Questions like these do not in themselves pose interesting problems but the psychologists use them to identify those individuals who are most effective problem solvers. Since there is a single trait of intelligence, these tests, with their rather trivial questions, identify all individuals who are well endowed with that trait. Psychologists then predict that those highly-endowed individuals will most likely display intelligent behavior in the future.

This traditional view of intelligence as a singular trait presents us with a difficulty. When we try to apply it to human behavior in the world, we find that many people who display particular talents and proclivities do not "test well" on our measures of intelligence. For example, in the Harvard Square street scene, we may find that the backgammon player can answer certain questions on the IQ test quite accurately but has trouble with others; the musician displays a very different pattern of answers. In other words, we can identify talented individuals in the world, but we do not find that the trait of intelligence, as revealed by intelligences tests, has much to do with

these talents. Indeed, when we look at the variety of things that people can do, we begin to think that there might be more to "intelligence."

We are left with this problem: We recognize "intelligence" as an important construct in understanding how humans learn and solve problems, but the traditional view of intelligence and the tests that have been designed to appraise it are too limited in scope. Human performance appears to be too complex and diverse to be captured in this single dimension. What we are left looking for, then, is a theory of intelligence that can reflect the complexity of skills and performances that humans exhibit in the world. By examining those skills, we might reason backwards to the "intelligences" that must be responsible.

The Theory of Multiple Intelligences

The theory of Multiple Intelligences (MI) takes this perspective as its starting point. Developed by Howard Gardner and described in his book Frames of Mind (1983), the theory posits seven distinct and universal capacities. These capacities, or intelligences, are innately endowed in all humans; but at the same time, they are manifested quite differently in different cultures. For example, the linguistic intelligence, an innate and universal capacity found in all societies, can appear through writing in one culture, public speaking in a second, and a secret anagrammatic code in a third. Or the spatial intelligence, another ability found in all societies, is displayed in many different ways, from navigation, to the game of chess, to the science of geometry. So, the intelligences are innate and universal, but they are distinctly shaped by the cultures they appear in.

To be useful, the capacities that we identify must be relatively few in number. A theory with too many capacities that were too finely sliced would be less interesting theoretically and much less useful to practitioners. The candidate capacities, to be certified as intelligences, must also be established as distinct and independent on empirical grounds. For example, we know from studies of brain damage, that the linguistic capacity can be damaged while other cognitive functions remain unchanged; this indicates that the linguistic function is separate from those other functions. Studies of idiot savants, who display one skill at a sophisticated level and yet are well below normal in other areas, again help identify distinct cognitive functions. Research from child development, child prodigies, cross cultural investigations, as well as the traditional research of psychological training studies and psychometric research complete the empirical criteria that are applied to candidate skills. Only those faculties for which there is reasonably strong evidence are included in the list of multiple intelligences.

Seven faculties survive this test. Next, I will examine these seven and make several observations about each one.

Linguistic Intelligence

Although it is easy to accept the idea that linguistic skill is an intelligence -- almost all tests of intelligence contain items that reveal this faculty -- we also find evidence from our various sources to include it. For one thing, there is a very specific region of the brain, "Broca's Area," that is responsible for interpreting linguistic information. Also, stroke victims reveal a loss of the linguistic faculty while other cognitive processes remain unchanged. A person with damage to Broca's Area can understand words but cannot assemble these components into anything other than the simplest sentences.

We can also find examples of child prodigies in the linguistic realm. For example, T.S. Eliot, at the age of ten during his winter vacation, created his own magazine, which he called "Fireside." There were eight issues and each issue contained poems, adventure stories, humor, recipes, and a gossip column. When examined this material displays the talent of this budding poet and critic (Soldo, 1982).

The gift of language is found in all populations and in all cultures. It develops according to a very predictable schedule in infants. For these reasons, the linguistic faculty passes the empirical test to be included in our list of intelligences.

Logical-mathematical Intelligence

Logical and mathematical abilities, like the linguistic skill, are often associated with the term intelligence; again, many items on tests of intelligence tap these abilities directly. However, the logical-mathematical aptitude must also be included on our list because it passes the empirical test that we have established for multiple intelligences.

The logical-mathematical ability is distinct from the linguistic ability and often the mind solves logical problems without putting them into words. An example comes from the biography of Barbara McClintock, Nobel laureate in genetics. McClintock studied maize and one day her field results, literally taken in a corn field, indicated a pollen sterility different from that predicted by the prevailing theory. McClintock returned to her office and thought about the problem for a while. Suddenly the solution came to her. She ran back to the corn field, announced her solution to her skeptical colleagues, and then sat down in the field and sketched out a proof on a paper bag.

> I worked out the solution, step by step, and I came out with [the same result]. [They] looked at the material and it was exactly as I had said it was; it worked out exactly as I had diagrammed it. Now, why did I know, without having done it on paper? Why was I so sure? (Keller, 1982, p. 104)

This story reminds us that the mathematical ability is distinct from the linguistic skill. It also shows the speed with which talented individuals can develop solutions to mathematical problems.

Spatial Intelligence

Like linguistic and logical-mathematical abilities, the spatial skill appears on numerous tests of intelligent behavior. The Wechsler Intelligence Scale for Children (WISC), for example, includes a subscore that measures spatial abilities through tasks that ask the subject to visualize objects in a rotated configuration.

The spatial intelligence is brought to bear in a variety of activities from solving geometry problems, playing chess, navigating a boat, or reading a map. Evidence from brain research, child development, and anthropological accounts support its inclusion on our list. For example, consider the spatial skills of sailors in the Caroline Islands in the South Seas:

> Navigation around the Caroline Islands is accomplished without instruments. The position of the stars, the weather patterns, and water color are the only sign posts. Each journey is broken into a series of segments. During the actual trip the navigator must envision mentally a reference island as it passes under a particular star and from that he computes the number of segments completed, the proportion of the trip remaining, and any corrections in heading that are required. The navigator cannot see the islands as he sails along; instead he maps their locations in his mental "picture" of the journey. (Gardner, 1983)

These various uses of the spatial intelligence remind us that although the intelligences are innate and universal, they appear in very different contexts from one culture to another. Also, spatial intelligence in the blind population underscores the important difference between the intelligence (the spatial ability) and the various modalities of sense data (seeing and touching). A blind person is perfectly competent spatially, creating mental maps of an environment or recognizing objects by touch, without receiving the visual data that are so important to spatial judgments for the seeing person.

Musical Intelligence

The biographies of famous musicians, like those of mathematicians, contain many stories of the early emergence of extraordinary talent at an early age, even before the child has received musical training. For example, at the age of 3, Arthur Rubinstein was taken to the great teacher and violist, Jacob Joachim, because his parents, who themselves lacked musical training, recognized his extraordinary talent. In this interview, young Arthur was asked to call out chords struck on the piano, to play a theme from a Schubert symphony after Joachim had hummed it, and to add the correct harmonies to the phrase and to transpose it. Joachim concluded from this brief interaction: "This boy may become a great musician... he certainly has the talent for it. Let him hear some good singing, but do not force music on him. When the time comes for serious study, bring him to me and I shall be glad to supervise his artistic education." (Rubinstein, 1978). Of course, Joachim was correct in his assessment and Rubinstein returned to Berlin to study with Joachim five years later.

Our review of the empirical evidence, including biographies of child prodigies like Rubinstein, studies of brain-damaged adults, reports on idiot savants, cross-cultural accounts, as well as the child development literature, supports the inclusion of musical aptitude on our list of intelligences. Even though it runs counter to our first intuitions of what constitutes "intelligent" behavior, musical aptitude belongs on our list along with linguistic and logical-mathematical aptitude.

In the view of Multiple Intelligences, all seven faculties are equivalent -- some are not more "important" than others. Although twentieth-century western society values the linguistic and logical skills most highly and offers rewards to those who excel in these areas, other cultures value the intelligences differently. We must be careful to distinguish the psychological level, on which the intelligences are equivalent, from the sociological level, on which the intelligences may be differentiated.

Bodily-kinesthetic Intelligence

Movement of various parts of the body is controlled by the movement cortex regions of the brain, a localized function that is well-documented in the research literature. This control is contra-lateral: the right hemisphere of the brain is responsible for control of movements on the left side of the body and vice versa. Support for the claim that bodily-kinesthetic activities constitute an intelligence is supported by the fact that impairment of voluntary movements through conditions of brain damage can occur while reflexive movements of those same body parts can occur on a non-voluntary basis.

The bodily-kinesthetic intelligence is responsible for such activities as athletics, crafts, and dance. Although the intelligences are independent and distinct, in a task of any complexity, several intelligences are usually deployed in concert. For example, playing the violin, a task that taps the musical intelligence, also requires a sophisticated form of bodily-kinesthetic ability.

Interpersonal Intelligence

Interpersonal intelligence builds on the core ability to notice distinctions among others, in particular contrasts in their intentions, temperaments, moods, and motivations. This skill appears in a highly sophisticated form in religious and political leaders, teachers, and therapists.

The relationship between Anne Sullivan and Helen Keller illustrates the fact that interpersonal intelligence does not depend on language. Anne Sullivan, the "miracle worker," was herself legally blind and she was not trained in special education. Nevertheless, she successfully faced the daunting challenge of educating a blind and deaf seven-year old, an education that was further complicated by the emotional struggle the child was engaged in as she tried to understand the world around her.

The experiences of Anne Sullivan and Helen Keller underscores the interpersonal understanding that is a necessary part of all teaching. Also, this situation again reminds us of the difference between an intelligence, a cognitive capacity of the brain, and the modes of receiving information, usually the eyes and ears. For Helen Keller the visual and auditory modes were blocked, but she was able to obtain that information through the mode of touch. Although Helen Keller was impaired in some ways, certainly there was nothing wrong with her intellectual capabilities.

Intrapersonal Intelligence

This final capacity is responsible for understanding one's own internal aspects -- access to one's feeling life, range of emotions, as well as the capacity to discriminate among these and eventually to label and draw upon them as a means for guiding one's behavior. This intelligence is most private and can only be seen at work when expressed through one of the other intelligences, such as language or music.

At the age of 21, Langston Hughes dropped out of Columbia University and went to sea. The first night out, he threw all of his books into the ocean. One book fell into the scupper -- he climbed down, picked it up and threw it overboard with the others. Why? In his autobiography, Hughes reveals his motivations:

> It was like throwing a million bricks out of my heart -- for it wasn't only the books that I wanted to throw away but everything unpleasant and miserable out of my past: the memory of my father, the poverty and uncertainty of my mother's life, the stupidities of color-prejudice, black in a white world, the fear of not finding a job, the bewilderment of no one to talk to about things that trouble you, the feeling of always being controlled by others. All those things I wanted to throw away. To be free of. To escape from. I wanted to be a man on my own, control my own life, and go my own way. I was twenty one. So I threw the books into the sea. (Hughes, 1986, c 1940, p. 99)

This anecdote reveals the intrapersonal intelligence, the individual's self-awareness, as well as the personal courage in creating an unflinching expression of that understanding.

Implications for Education

The theory of Multiple Intelligences has a number of significant implications for education. In this section I will examine two of them: the importance of establishing a rich, meaningful context for problem solving; and the relationship between self-esteem and the full identification an individual's intellectual profile.

Context in Problem Solving

The theory of Multiple Intelligences reminds us of the importance of a "hands-on" educational process. In the arts and in the crafts, students learn by doing. To learn to paint, students paint; to learn to operate a table saw, they operate a table saw. In the humanities and in the sciences, in contrast, students learn almost entirely by reading and talking, rather than by doing for themselves. In history class, students read summaries of the work of historians; they don't "do" history. In English class, they read interpretations of novels and analyses of plays; they don't write novels or perform plays. In science class, students review the procedures and findings of pivotal experiments, they don't design and conduct their own experiments.

The theory of Multiple Intelligences suggests that there are a number of shortcomings when education is restricted as it is in the humanities and sciences. The heavily verbal context favors students who excel in the linguistic intelligence while at the same time it does not challenge students to pursue problems using the other intelligences. The exercises, problem sets, and examinations in school are all solved in the same, "school-like" way.

Because the problem-solving context in school is uniquely structured and largely linguistic, students often fail to transfer the problem-solving skills they are developing in school to situations outside school. On the job, for instance, a person is expected to solve a problem using any intelligence that yields a useful solution. By focusing on structured, linguistic solutions to problems, schools do not give students sufficient opportunity to develop the necessarily flexibility in thinking. In this restricted context, schools establish a special context for problem solving that does not reflect problem solving in the world outside school.

Self-esteem

Working in this restricted context, students often create a false sense of themselves. Some students, those who are most successful in school because of their linguistic facility, may find themselves with less of an advantage after they leave school. They have come to think of themselves as efficient problem-solvers, and yet when they encounter problems in an unrestricted environment, they struggle to find adequate solutions. Other students, often those who are less successful in school, find that they have very important skills for solving problems in the working world that went unrecognized in school.

Two hypothetical examples illustrate this disparity. First, think of a student who answers correctly and quickly on all school tests, regardless of subject area. This student is also a class leader and involved in many extracurricular activities. However, success in school for this student does not lead to similar success later. Indeed, it is not difficult to imagine this student in a working situation in which he fails to respond with facility, especially when the setting is highly ambiguous and the tasks have no "right answer." The student struggles in this setting, despite his success in school.

Next let's imagine a very different student, someone who is rather ordinary in solving school tasks, but who has the special skill of quick adaptation to new situations. This student also has superior interpersonal and intrapersonal intelligences and can efficiently mobilize these capacities in the world outside of school. Forming teams of workers, managing limited resources, and handling ambiguous tasks all come naturally to her. The second student surprises her high school teachers by her success in the work place.

This is not to suggest that no "A" student will succeed in the working world or that no "C" student will struggle. What we find in looking at large numbers of students, however, is that there is surprisingly little correlation between school success and success on the job. The "C" student is just as likely to be successful outside of school as the "A" student. The problem is that in rewarding one type of student and not the other, school raises the self-esteem of the favored

group and lowers the self-esteem of the group that it does not favor. School tends to ignore the importance of certain intelligences, and in so doing it discriminates among students.

Multiple intelligences suggests that school need not be structured in this way. For instance, school can help students exercise their interpersonal intelligence by establishing settings for cooperative problem solving. In fact, research indicates that students working in groups actually learn more than individuals working alone. By recognizing students with superior interpersonal, spatial or bodily-kinesthetic skills, school can elevate the self-esteem of those students and provides them with a greater likelihood that they will apply those skills appropriately when they leave school.

Assessment from the Point of View of Multiple Intelligences

The theory of Multiple Intelligences instructs us to look carefully at the context of an activity as we try to understand individual proclivities. This need for rich contexts in problem solving extends to the task of assessing student learning as well. For example, if we want to evaluate an individual's skill in music, we ask that individual to play a piece on a musical instrument. If we want to assess a student's talent as a leader, we might observe that student interacting with her peers. From the performances that result from these situations, we can draw conclusions about what those students have learned about the art form or the social setting and we can generate some ideas about the specific intelligences that have been brought to bear.

In this section, I will examine the assumptions of traditional tests from the perspective of Multiple Intelligences; then I will outline an alternative called performance tests; finally, I will discuss the use of portfolios of student work with a focus on student reflection.

Traditional Tests from the Perspective of Multiple Intelligences

On objective tests, students read a question and identify the correct answer from a list of possible answers. These tests ask the student to exhibit a skill or reveal knowledge in the context of the test, not in the context of solving a problem in the domain. These tests rely heavily on sophisticated linguistic aptitude and performance on them can be seriously reduced for students who do not have this prerequisite linguistic skill. The results are usually reported in terms of the rank of the student within the population taking the test, not in terms of number of questions answered correctly.

These traditional tests alter the relationship of the student and the teacher to assessment. Since they rely on an external measure of competence or skill, these tests become the authority; neither the student nor the teacher has any responsibility for making a judgment of competence. In fact, both student and teacher are discouraged, even disallowed, from making this judgment. Because the results are reported as rankings, students compete; they do not demonstrate competence.

Consequently, tests do two things. First, they establish a very limited context for solving problems, one in which there are no tools, no materials, no collaborators, and a limited amount of time. The context consists entirely of a series of questions followed by correct and incorrect answers. Second, these tests assume all responsibility for measuring the intellectual capabilities of the students taking the test.

One problem with this approach to assessment is that it is entirely unique to the school setting. Once students leave school, they may never again take a multiple-choice test. After they leave school, however, students must learn to do for themselves precisely what the tests have been doing for them previously. Students must figure out what they are learning (or failing to learn). They must draw these judgments from tasks that are heavily dependent on context, in which there are no "right answers." They must adapt their performance based on these judgments. Furthermore, they do not have tests (or teachers) to help them make these judgments.

The theory of Multiple Intelligences reminds us why these two issues of assessment -- context and responsibility for assessment -- are important. Context reveals the intelligences at work. Responsibility for assessment exercises the intrapersonal intelligence in a way that makes the students independent learners and successful problem solvers after they leave the very special environment of the school.

Performance Assessment as an Alternative to Tests

Building on this view of assessment derived from the theory of Multiple Intelligences, researchers, including those at Project Zero, are exploring assessment techniques that are built around authentic performances. In music, for example, a teacher evaluates a student's facility with a given piece by asking the student to perform that piece -- the performance itself is the "test." The assessment is "authentic" because performance on the test draws directly on the skills that the student is trying to master. The student practices the performance piece repeatedly, taking the "test" until she has mastered it.

The performances that are selected for assessment must reflect the actual skills and competencies that are valued in the field. For example, authentic skills in chemistry class might include designing an experiment around a question, gathering evidence, analyzing the resulting data, and reporting the results in a coherent and convincing manner. An authentic task in social studies might include conducting original research, reviewing relevant information in the library, and creating a video documentary that represents the results. In each case, students would practice these skills repeatedly until they have mastered them.

One example of a performance task in high school chemistry, developed by Dale Wolfgram and Compton Mahase for the Connecticut State Department of Education, poses this problem to students:

> You will be given two samples of soda; one regular soda containing sugar and one diet soda containing an artificial sweetener. Your task is to identify each sample as diet or regular. You must base this decision on the physical or chemical properties of the two different types of soda. As in any chemistry experiment, you are not allowed to taste any of the samples. Come up with a list of at least three possible ways to identify the samples and explain why you chose them.

Students start the task alone. Then they work in small groups for brainstorming and experimenting. Finally, students finish the task alone, answering a similar question concerning salt and fresh water.

As teachers evaluate student work on the Soda Task, they consider whether students can identify the appropriate properties of the liquids for the purposes of identification; can identify the information and steps needed to solve the problem; and can communicate those strategies through written means. (Baron, 1991)

Portfolio Assessment

Taking the notion of performance assessment one step further, the evaluation of these performances and their artifacts can be extended by collecting them in portfolios. As students work through a number of performances, they collect the results in a folder. Later, they select from these artifacts a specific collection that "tells the story" of what that they have learned and the skills that they have mastered. This collection, along with a description of what has been selected and why, comprises the portfolio.

The portfolio collection should not be restricted simply to the student's best work. It should also include drafts, outlines, and early attempts, since these are equally important to the task of demon-

strating what the student has learned and the specific skills and concepts mastered. Also, as the student looks back over the folder of work, selecting pieces for the portfolio, these interim pieces are an important element that fill in the "biography" of the process that the student went through.

A number of important things can happen with this portfolio collection. First, the portfolio captures the student's work over the entire course of the year. As an assessment it reaches well beyond the "snapshot" examination that captures only the student's knowledge and capabilities at a specific moment. The portfolio can encourage students to take risks, to explore novel solutions to familiar problems, and to attempt more difficult strategies that may require longer periods of time. The portfolio can also reveal patterns in students' growth and learning.

Second, the portfolios can link the students' work in school to the culture that surrounds the school. For example, if students are working in the community, they can use their portfolios to connect those efforts with their school work. For example, a high school student who is doing volunteer work in a hospital might use her portfolio to make connections between that volunteer work and her biology course. Without the portfolio, the two experiences may be disconnected; but by looking for points of contact over the course of the year and by documenting those connections in her portfolio, the student can demonstrate her learning about biology in an applied setting that is meaningful to her personally.

Finally, the portfolios encourage students to take ownership for their work and to reflect on their progress. Rather than simply hurdling a series of obstacles, students become increasingly responsible for establishing personal goals and then for demonstrating that they have reached those goals through a collection of work. To bring about this sense of ownership, students must consistently work with their portfolios, reviewing the materials that they contain, making selections for inclusion or exclusion, and analyzing and discussing their choices. Students should also take every opportunity to share their portfolios with peers, parents, teachers, and other interested adults. In short, the process of reflection and sharing amplifies the central importance of each student's portfolio and the work it contains.

Reflections by Students on Their Work

Student reflection is a meaningful ingredient in a portfolio not only because it fosters a sense of ownership, but also because it is instructive at the same time. Far more important than the specific facts and skills that students learn in school are the insights they develop into the learning process itself. Students must learn how to

teach themselves new skills and ideas, because once they leave school, they will no longer have the guidance of teachers and tests. Formal schooling can foster this ability by having students pay careful attention to their individual learning styles, by having them make important choices about their learning while they are in school, and by having them create portfolios that document those experiences.

Of course, the portfolio approach with its reflective component will not be effective immediately and automatically. Students must learn how to create portfolios and how to think about themselves as learners. The portfolio must become part of the educational experience of the classroom and part of the regular conversation between the teacher and the student as well as among the students themselves. When this happens, the focus of the classroom changes and the relative roles of the students and the teacher begin to change as well.

Summary

The move from the theory of Multiple Intelligences to performance assessments is straightforward. In order to analyze an intelligence, we must find problems that put it to work. We cannot learn about an individual's interpersonal intelligence or about his musical intelligence by asking him questions. We must pose for that person an interpersonal problem or a musical challenge. If we simply ask questions, we are evaluating the linguistic (and perhaps the logical-mathematical) intelligence instead.

Furthermore, if we want our schools to prepare students for the challenges they will face after they leave, we must constantly pose challenges in school that force them to invoke a variety of intelligences. These challenges should have different kinds of solutions, they should involve a variety of intelligences, they should encourage collaboration, and they should provide opportunities for reflection. In other words, to make our assessments more compatible with Multiple Intelligences, we must make them more authentic and more oriented toward performance.

At the same time, we want to foster the intrapersonal intelligence as well. To do so, we must pose problems and situations for students that evoke performances, and then encapsulate the resulting work in portfolios and help the students reflect on that work. If students leave school with plenty of practice self-consciously solving many types of problems, they will be better equipped to solve novel problems in the working world by drawing on a more complete understanding of themselves and their strengths and weaknesses.

Implications of the Theory of Multiple Intelligences for Multicultural Education

Finally, we turn to the implications of this theory of for multicultural education. I raise two questions in this regard. First, do different cultural or ethnic groups manifest different intellectual endowments? Second, what does our analysis of school from the standpoint of Multiple Intelligences suggest for the bilingual student?

The Question of Intellectual Endowment

The question of whether intellectual endowment varies from one ethnic group to another is a particularly difficult one because it leads quickly to issues of bias. For example, I am occasionally asked if particular ethnic groups are more skilled in certain intelligences than others. One group might be especially musical and kinesthetic; another group might have special spatial skills; still another excels in the verbal realm. This brings quickly to mind the racial and ethnic stereotypes of the African-American athlete, the Irish politician, and the Korean science fair winner. My answer can be simply stated: there is no evidence to support intellectual differentiations based on racial or ethnic origins.

There is, of course, important variation in intellectual competence among individuals, both in the computational ability of each intelligence and in the combination of intelligences in the intellectual profile. However, membership in a particular ethnic group does not predict any of this individual variation. In any classroom, students will reflect a variety of intellectual profiles -- some students will be especially verbal, some interpersonal, some spatial, and so on. This intellectual variety appears in all classrooms; it does not matter if the students are all from the same racial or ethnic group or if they represent different groups.

Although the individuals vary, the various racial and ethnic groups have the same innate intellectual endowment that they manifest in different ways. For example, given the same linguistic intelligence, some groups rely heavily on written language, others favor an oral tradition and still others communicate through linguistic codes.

The fact that schooling relies heavily on particular forms of linguistic communication and administers examinations that are heavily dependent on a particular form of linguistic skill puts students from a different linguistic heritage at a disadvantage. Furthermore, this singular approach to language can establish a disjunction between the culture of schooling and culture of the community. The theory of Multiple Intelligences reminds us that this disjunction,

which may make school irrelevant and alienating to students from a different linguistic tradition, is a feature of cultures and not of intelligences (Banks, 1988, 1989).

A similar disjunction between the manifestation of the intelligence in school and its manifestation in the community can occur for each of the other intelligences as well. For instance, studies in school tap the spatial intelligence in geometry and geography; the culture of the community, on the other hand, may value graphic design or chess playing. School places little value on interpersonal skills, while the community may value those skills highly.

In sum, there are important differences in how students from different cultural groups deploy the various intelligences and how the intelligences are valued by those cultural groups. One strategy for coping with these differences might be for school to reduce the distinctions between the use of intelligences in school and in the community; a second strategy is for school to find ways of demonstrating a respect for those differences and celebrating the individual competencies in students even when those competencies are different from the basic expectations of school.

Implications for Bilingual Education

As for the bilingual student, it should be clear by now that the highly linguistic environment of school, with its focus on written language, places at a disadvantage any student with difficulties in the linguistic realm. The ability to learn and the ability to display that learning are both impaired in the bilingual student in this highly verbal setting.

Perhaps the most important implication for bilingual education from the theory of Multiple Intelligences is the importance of separating the intellectual capacity from the skill with using the language of the dominant culture. Just as school often fails to recognize the abilities of students who are successful in the world after leaving school, it also fails to recognize the abilities of students who have not mastered the language of school.

One remedy for this situation is to provide more situations in which students can display competencies that do not rely as heavily on specific linguistic skills. Projects, in both the arts and in the crafts, can be an excellent indicator of these capabilities. Working cooperatively in groups is a second. Display of diligence or creativity over a period of time is a third. If we can build this variety into the school setting, we can more accurately identify students with talents and students with difficulties, apart from their mastery of language. We can make our schools more reflective of and better preparation

for the world outside school. And we can give our students a more complete sense of themselves.

In summary, if we are to take Multiple Intelligences (and multiple cultures) seriously, then school must establish a meaningful context for problem solving; it must provide an opportunity for students to practice using a variety of intelligences; it must build self-esteem by helping students develop an accurate and complete picture of their capabilities; and it must establish assessment situations that facilitate and reinforce these ideas.

Schools that Provide Opportunities for Success

To a large extent school is a mechanism for transmitting the expectations of society and for sorting the members of that society. Because that transmission is based on language, the sorting is also based on language. The theory of Multiple Intelligences predicts that such an environment will place many individuals at a disadvantage and will unfortunately yield the view that not every student can learn. Indeed, with its focus on linguistic skill of a particular sort, traditional schooling consistently underestimates the capabilities of many very talented bilingual students. Indeed, this misrepresentation occurs for any student whose particular blend of intelligences does not match precisely what the traditional school requires.

There is an alternative. We might begin to think of school as a place where students pursue the successful accomplishment of meaningful activities rather than the locus of sorting and the gatekeeper to future opportunities. Schools for success must provide a variety of opportunities for students by considering the different intellectual proclivities and cultural predispositions that students bring to school.

Such a view takes seriously the notion that every student can learn; but it does not require that all students learn in the same way. Just as the musician and the backgammon player solve different problems and use different intelligences, they can both be remarkably successful at what they were doing but in very different ways.

Introducing multiplicity to this analysis and emphasizing success does not imply that school must lower its standards, that "anything goes." Quite the opposite is the case. Successful accomplishment requires genuine challenge, high standards, and definitions of accomplishment that are acknowledged publicly. Furthermore, we can bring demanding techniques of evaluation to these disparate activities via the assessment alternatives of performances, projects and portfolios. Using these techniques, the schools for success can document and evaluate a variety of performances while maintaining very high standards.

A school that evaluates on a normal curve is not a school in which all students can be successful, because only half of its students can be above average. In contrast, a school that respects and responds to the multiplicity of aptitudes, that builds on its students' bilingual backgrounds, and that allows for variety in student performance, can strive for success for all.

References

Banks, J., & Banks, C. (eds.). (1989). Multicultural education. Boston: Allyn and Bacon.

Banks, J. (1988). Ethnicity, class, cognitive and motivational styles: Research and teaching implications. Journal of Negro Education, 57, 452-466.

Baron, J. (1991, July). Performance assessment in mathematics and science: Scoring performance assessments. Paper presented at the Institute on Diversified Approaches to Assessment, Harvard University, Cambridge, MA.

Gardner, H. (1983). Frames of mind. New York: Basic Books.

Hughes, L. (1986). The big sea: an autobiography. London: Pluto.

Keller, E. (1982). A feeling for the organism. San Francisco: Freeman.

Rubinstein, A. (1978). My young years. New York: Alfred A. Knopf.

Soldo, J. (1982). Jovial juvenilia: T. S. Eliot's first magazine. Biography, 5, 25-37.

Response to Joseph Walter's Presentation

Vera John-Steiner
University of New Mexico

Although discussants are supposed to be either overtly or covertly critical, I have the pleasure of being enthusiastic instead. The two presentations that preceded my discussion have given powerful insights into the nature of knowledge acquisition and knowledge transformation. I plan to approach this issue with a similar spirit but with a slightly different data base and perspective.

When I first moved from New York to New Mexico, I was strongly committed to the central role of language in human thinking. This assumption reflected my European cultural upbringing where arguing and participating intensely in exchanging ideas around the dinner table seemed to be the most exciting thing a young child was allowed to do while joining his or her elders.

In contrast, I observed that Navajo and Pueblo children conveyed knowledge by dramatic play, by drawing, by re-enacting their experiences in spatial and kinesthetic ways. This observation was a challenge to my theoretical stance. It meant that I had to make a serious shift in my own approach to the nature of thought and theories of thinking. My approach is constructed within A Vygotskian framework, but a modified one, as developed in my book, Notebooks of the Mind. The impact of external activities -- such as computing -- upon the way in which we represent knowledge is central. In a culture where linguistic varieties of intelligence are dominant in the sharing of knowledge and information, verbal intelligence is likely to be widespread. In cultural contexts where visual symbols predominate, internal representations of knowledge will reflect visual symbols and tools.

One may think of schooling as a repertoire of resources, of culturally developed means to amplify one's own knowledge and intelligence. But if schooling only amplifies a limited set of knowledge representation (in our culture, verbal and mathematical approaches), learners are thereby restricted in using their own forms of intelligence, as the previous speaker described. My conception of intelligence is: those means by which we represent and transform received knowledge and prepare to contribute new knowledge.

Each of us is a subset of the total human possibilities. To develop our intellectual resources, we must focus our energies upon areas where we are most likely to be recognized as contributors, whether in our family, our preschool, or our communities. In studying cre-

ative individuals, I was impressed by how they chose to focus their attention on developing some of their strengths.

While our resources for education have been shrinking and while our stature as educators may have been diminished, our ideational fluency, our ability to come up with powerful new ideas has not been diminished. Indeed, it is now being nourished in new ways, partly because of our stronger commitment to cultural pluralism and to what I refer to as cognitive pluralism. My interpretation of the multiplicities of ways in which we represent knowledge does not have the strong biological base that Howard Gardner's theory of multiple intelligences does. Our approaches have in common our emphasis upon the diversity of knowledge acquisition and representation.

I would like to mention an additional point that has not been mentioned thus far. It concerns ways we create new knowledge in this last decade of the twentieth century. In the early decades of this century, Nobel laureates usually received the Nobel Prize for individual achievements. Ten or fifteen percent of them received a prize for collaborative work. Today well over two-thirds of the Nobel Prizes are given for collaborative work. Similarly, if you look at National Science Foundation applications, in the early years, most applications were by individual investigators. Now, 75 percent of all applications are either written collaboratively or include plans for collaborative execution of the project.

If we recognize that new knowledge is being developed through collaboration today far more extensively than heretofore, we must recognize the absolute necessity of learning how to work with complementary skills in group endeavors. And then we must recognize that the value of individualistic attributes such as IQ measures and other competitive assessments is rated out of proportion to its real social significance.

Currently we need to identify ways in which complementary intelligences are needed for joint endeavors that will contribute to the rapid development of new knowledge. By working from theoretical perspectives that emphasize multiple intelligences and cognitive pluralism, we must begin to pay serious attention to teaching and learning through projects, through cooperative learning, through interactional means. We are moving away from the traditional expectation that children on their own will master learning how to learn. To be a contributing member of our society means not only to assimilate knowledge but to communicate it, to share it, and in the process of sharing it, develop it further. The approaches to multiple intelligences that I find particularly exciting are revealed through ways in which individuals learn something about their own strengths and weaknesses through interaction with others. If you are asked to assess yourself in terms of Gardner's seven intelligences, you can reach

only a first approximation of your talents. To go beyond this first approximation, you really need to test your hypotheses about your own abilities through interaction with others. The multiple intelligence perspective implies a much stronger emphasis upon assessment of authentic performances than do the measurements of individual IQs upon which formal academic gatekeeping has relied for so long. In authentic performance, you address a real audience and accept the constraints of a real environment. You not only demonstrate your own learning but also invite the consequences -- in terms of impact upon audience and the fit with the environment -- of that which you have learned.

Performance assessment also means monitoring your own growth over time. For such achievement, I find the portfolio movement very promising. It encourages the growth of that deep self-knowledge which I have found characteristic of individuals who have been successful in constructing a creative life. They worked out their own rhythms of productivity and of absorbed receptivity by developing a critical awareness of the conditions of their performances. The intrapersonal level of intelligence, or condition of introspection, is crucial because it provides information about your own rhythms of productivity, your own ways of determining when you need to work with others and when you need to focus on your own development. We can provide opportunities for such engagement from kindergarten on.

Self-knowledge depends upon interaction with others, a seeming paradox that we rediscover whenever we study the values of cooperation, collaboration, and communication of individual achievements to a receptive audience.

I think that the growing recognition that intelligence cannot be measured by a single distributional measure urges us toward recognition of cultural pluralism. Cultural pluralism provides us, particularly in this country, with the opportunities to really examine the implications of various ways of representing, transforming, and adding to knowledge. If we move in this direction, we are also providing opportunities for children from homes where English is not the primary language. We are encouraging these children to introduce into their school experience ways of knowing already characteristic of their home experiences where they frequently already share and represent knowledge across generations. We are encouraging engagement with diversity. We make this engagement not simply a glimpse into the alien world of an esoteric culture but active participation through which learners utilize their diverse ways of knowing to contribute through new communication designs.

I must tell you again how stimulating it is to be a discussant on this panel. Often, I have felt the discouraging effects of our need as

educators to justify our existence through simplistic, even demeaning methods of assessment. Such effects are causing us to lose more and more potential educators, some the most promising members of our profession. We need to challenge such individuals, not discourage them.

Emphasizing cooperation and collaboration across as well as within generations highlights processes by which we can approach the extraordinarily demanding task of keeping the citizens of our society adequately informed rather than drowned in its flood of information. To achieve such coherent social engagement, we need to design curricula that are project based, that are vertically organized, that are cooperatively envisioned, that are linked to community concerns which extend beyond the confines of school walls. We need to utilize children's museums, local theater and other performance groups, community service agencies, a variety of available community resources -- utilize the many ways of learning that free us from the passive, frightened sitting that at present characterizes so much of our formal education.

Response to Joseph Walter's Presentation

Sue Teele
University of California, Riverside

My whole life is devoted to public education. I am married to a superintendent of schools, am a board member for the Redlands Unified School District, and an administrator at the University of California, Riverside. I work, live, and love public education. My goal is to make education the very best place for students and to enable all students to reach their fullest potential. Based on that premise, I would like to take you on a roller coaster ride, in twenty minutes, through what Dr. Walters has been saying about the Theory of Multiple Intelligences. I have been involved with the Theory of Multiple Intelligences for the last two years, and I believe, truly, that we have found a way to reach all students. As I look at education right now, I see having a window of opportunity for the next three to five years to make effective changes in public education. I would like to see the Theory of Multiple Intelligences and new methods of assessment be right up at the top of the list.

One of the reasons why we must change public education is because our students are very diverse with multi-faceted problems. I am going to share with you some statistics stated by California State Superintendent of Public Instruction Bill Honig concerning an average group of high school sophomores. In a class of thirty sophomores, Honig states that four will speak no English, eight are two or more levels below in math and reading, one is a victim of child abuse, three will be teen parents, three will grow up in public housing, eight will be on public assistance, seven will not graduate, and seven will not be employable. Now, those of you in the audience, who are logical-mathematical, can quickly add that up, and what do you find? It's more than thirty. What does that imply? We have some students that fit more than one statistic and have multi-faceted problems. What that means is we have to look strongly at what we are doing in public education, and ask the question, are we providing a quality education for all students? I suggest a change in philosophy. The change in philosophy of education is this: we must create an educational system in which an individual learning plan enables <u>all</u> learners to proceed at a rate and a pace that is challenging and achievable, makes no unfair comparisons with the progress of others, assures positive reinforcement and creates positive self-esteem for all students. This is not a simple sentence, and it is not an easy task. However, it is what I would like to see happen in public education, and I truly believe that the Theory of Multiple Intelligences is a way to do this. It is a way to reach <u>all</u> students.

Now, for those of your who are visual-spatial learners, I am going to show you some information about the seven intelligences. These are the seven, if you didn't have them memorized, take a look at them visually, so you can become familiar with them: Linguistic, logical-mathematical, intrapersonal, spatial, musical, bodily-kinesthetic, and interpersonal. I am going to give you a very quick run though all seven intelligences to help you have an understanding of them. If you want to informally assess yourself, please do so on a scale of 1 to 5. Everyone in this audience has all seven intelligences, so zero is not an acceptable answer. You have all seven, but each one of us is unique, because our strengths are in different combinations of the intelligences. We are a microcosm of every single classroom in our nation. That is why we must recognize the diversity of our student population in our schools and teach to that diversity. We must help all our students find ways to succeed. This is a critical component in order for effective change to occur in our schools.

Let me describe for you linguistic intelligence. If you are strong in linguistic intelligence, you have highly developed auditory skills. You like to read and write. You like to listen. Your vocabulary is well developed. You enjoy writing stories and using a computer for word processing and editing. You often spell words accurately and easily.

The next intelligence is logical-mathematical. If you are logically-mathematically intelligent, you explore patterns, categories, and relationships. You enjoy mathematics. You like to work with computers, not the word processing necessarily, but the problem solving, data base, and spread sheet aspects. You are able to group and order data and make interpretations and predictions. You prefer order in your life. You reason things out logically and enjoy problem solving to find solutions.

If you are intrapersonally intelligent, you have a deep awareness of your inner feelings, strengths, and weaknesses. You have strong opinions when controversial topics are being discussed. You prefer your own private inner world, and often, when given a choice, like to be alone rather than be with groups.

If you are spatially intelligent, you think in images and pictures. You like to draw, paint, and participate in art activities. You are able to report clear, visual images when thinking about something. Often, you can read maps, charts, and diagrams. You respond positively to movies, slides, pictures, and anything that has a visual image. Spatially intelligent individuals respond positively to a visual medium.

If you are musically intelligent, you are sensitive to a variety of sounds in the environment. Some of you were more sensitive to sing-

ing "Happy Birthday" than others. Some of you found yourself humming the song. Often, you like to have music on when you are studying or when you are working. We are conducting research at UCR in the area of musical intelligence and looking at what kinds of music are appropriate in classrooms. We are finding that Baroque music is pleasant for students. It is very relaxing and has a tempo the same rate as the heart beat. I did an experiment at the junior high level and let the students have headphones to listen to their own music while taking a test. Guess what I found? They couldn't concentrate on taking their tests because their music was distracting. More research needs to be done regarding how and when to create a musical environment in our schools.

If you are bodily-kinesthetic, this conference is difficult for you as you have to sit for long periods of time. It has been estimated that about 80 percent of our high school dropouts and between 60 percent to 80 percent of students in special education have bodily-kinesthetic intelligence as their most dominant intelligence.

Please understand that I am in charge of two special education programs and trained as a special education teacher, as I am going to make a statement that may upset some of you. I believe that many of our students who are in special education are not learning handicapped, that we in education are simply handicapped in teaching them how to learn. Because many students are dominant in bodily kinesthetic intelligence, they require active learning activities. Bodily kinesthetic individuals learn through their bodily sensations. They like to touch, feel, and tap things. They have difficulty sitting still long periods of time and thrive on hands-on active learning activities. They need manipulatives, role playing, simulations, physical exercises, competitive sports and action-packed stories. They require movement; and to sit in a classroom at a high school level five to six hours a day is very difficult for them; that may be why many drop out. We need to include many activity-based experiences in all our classrooms to engage more actively the bodily-kinesthetic students in the learning process.

The seventh intelligence is interpersonal intelligence. These individuals enjoy being around people. They have many friends and socialize everywhere. They enjoy participating in cooperative learning groups. Roger Johnson is a good friend of mine. We have discussed interpersonal intelligence and the relationship between multiple intelligences and cooperative learning. Interpersonal intelligent individuals have a lot of empathy for the feelings of others and can respond to the moods and temperament of other individuals.

Let me show you something interesting. As I said, I have worked with about 2,000 educators. I asked them to do an individual assessment of themselves and select their three most dominant intelli-

gences. This information has been analyzed and we discovered that of the 2,000 educators, 17 percent were linguistic, 12 percent logical-mathematical, 19 percent intrapersonal, 10 percent spatial, 14 percent musical, 11 percent bodily-kinesthetic, 17 percent interpersonal. The great thing about this discovery is that not all educators are linguistic and logical-mathematical. As Dr. Walters was saying, we must teach to all seven intelligences in the classroom. Well, guess what! There's only a 9 percent differential between high and low with educators, and that is so exciting to me, because what that says is we can incorporate multiple intelligences into the classroom because we, educators, represent all seven intelligences in a diverse way. What we must do is represent all seven intelligences in every single classroom in this nation and that means our methodology must be very different. We must have a repertoire of strategies that we use.

Do you want to see something interesting? I have been observing elementary classrooms in Southern California. I designed a pictorial multiple intelligences inventory that is appropriate for elementary schools. I asked 600 kindergarten through sixth grade students to circle the picture that they thought was most like them. Let me show you what I discovered. I have been working at an elementary school that has a demographic profile of 76 percent Hispanic, 10 percent Black, 11 percent Anglo, and 3 percent Other. It's an interesting school to study as one-third of the students are LEP students.

I would like to discuss a graph that depicts the intelligences profile of kindergarten, first, second, and third graders. For some of you who may be in the back, these bar graphs represent linguistic, logical-mathematical, intrapersonal, spatial, musical, bodily-kinesthetic, and interpersonal intelligences. Here's what I found. At the kindergarten level, the number one dominant intelligence when I assessed the students on the pictorial inventory was intrapersonal intelligence. Number two was linguistic intelligence and number three was bodily-kinesthetic intelligence.

When I moved into the first grade, the findings indicated the number one intelligence was spatial intelligence. Number two was logical-mathematical intelligence. Number three was linguistic intelligence. In the second grade, I found the most dominant intelligence was bodily-kinesthetic, second was spatial, and the third was logical-mathematical. In the third grade, spatial intelligence was first, logical-mathematical intelligence was second, and bodily-kinesthetic intelligence was third. You will notice something very interesting. The kindergarten level was totally different from any other grade level. Let me show you something interesting. When I examined the fourth, fifth, and sixth grades, I discovered a very interesting pattern here. Let me remind you that first and third grades were most dominant in spatial intelligence, second grade in bodily-kinesthetic intelli-

gence, and kindergarten in intrapersonal. When I studied the fourth grade, I found bodily-kinesthetic intelligence first, logical mathematical intelligence second, and spatial intelligence third. I studied the fifth grade and found spatial intelligence first, logical-mathematical intelligence second, and bodily-kinesthetic intelligence third. There was a direct correlation between third and fifth grades. Isn't that interesting? As I studied sixth graders, I found bodily-kinesthetic intelligence first, logical-mathematical intelligence second, and spatial intelligence third. These were the same three dominant intelligences as for fourth graders. The interesting thing is that logical-mathematical intelligence was second in grades 3, 4, 5, and 6.

After completing the inventory, I went back to the teachers and asked them to validate this information. They thought that these findings were very accurate and agreed that is where they perceived their students.

Those of you who are studying research will say, that's only one school studied and is only preliminary findings at one school. I agree. It is only one school, and I am going to work with several other schools this year to compare them with this one. I want to see if there are commonalities of intelligences between certain grade levels. I don't know what I will find. Stay tuned as it will be interesting to see. If I do find commonalities that are specific to certain grades, there may be important curriculum implications for elementary schools.

I recently began studying the middle school and found in a preliminary study with seventy 8th and 9th grade students that 6 percent were dominant in linguistic intelligence, 4 percent in logical-mathematical intelligence, 7 percent in intrapersonal intelligence, 12 percent spatial, 23 percent musical, 30 percent bodily-kinesthetic and 18 percent interpersonal intelligence. How do we teach at the middle school level? We teach using linguistic and logical-mathematical intelligence. What should we be doing at the middle school level? We should be teaching methodologies that reach all seven intelligences and, according to these findings, emphasize bodily-kinesthetic, musical, interpersonal and spatial intelligence. We must tap into the seven intelligences in order to get all students engaged in the active learning process.

I also recently studied a high school speech class and an ESL class. I also found spatial, musical, bodily-kinesthetic, and interpersonal intelligence as the highest intelligence in both classes. The only difference between the two classes was logical-mathematical intelligence. In the ESL class, the students, who were predominantly from Mexico, scored that intelligence as their second highest.

Education in America is at a turning point where it is important to accept the theory of multiple intelligences and incorporate into the instructional process the philosophy that all students can succeed. The concept of authentic assessment should be included as we have to look at assessing students very differently. We have had a lot of discussion on authentic assessment today. Portfolio assessment, performance assessment, scientific investigations, open-ended questions that allow the students to think and problem solve, and untimed and integrated testing are all a part of authentic assessment. Research is being conducted at Chico State University in California in regard to untimed tests in mathematics and its relationship to gender. They found that, when time was not a factor, there was no significant differences between boys and girls on their mathematics tests. Girls tend to respond to mathematics linguistically. Boys tend to respond spatially and logical-mathematically. As a result, girls take longer to solve problems in mathematics. How do we solve that? Simply allow students more time on tests. Encourage them to solve problems through their dominant intelligences.

Student self-assessment is absolutely essential. We have to involve students in their assessment process. In student self-assessment, students evaluate their own progress. They evaluate solutions to problems. They decide if they have contributed appropriately and made progress in their development and become aware of what they know. Are they aware of what they now know and still feel they need to learn? In authentic assessment, students must become actively involved in the assessment process. It is also extremely important that we combine instruction with assessment.

We are currently working at UCR on a project with three high schools in regard to college admission. These high schools will submit to the University, with their applications, portfolios from grades 10 and 11 for English and mathematics. We feel we may be able to learn more about their content level than we can learn only through a SAT score. We are going to track those students' progress for four years through UCR.

I would like you to remember this. Some of you may have seen this -- WYTIWYG (What you test is what you get). You get what you assess. You do not get what you do not assess. We need to be sure we build assessments that measure what we as educators teach and want taught. This is so important.

"The ultimate purpose of all strategies is to foster student achievement and engage students in the active learning process. We should emphasize individual differences in all their qualitative richness. This means that education should always provide for differences of interests, not just once in a while, but always, and not merely permit, but encourage diversity in the way students sp nd

their time in school. It means to give students significant choice, to let them become responsible in every possible way, the regulation of their own learning," said Hawkins. William Glasser said something that I think is very important, "We learn 10 percent of what is read, 20 percent of what we hear, 30 percent of what we see, 50 percent of what we both see and hear, 70 percent of what is discussed with others, 80 percent of what is experienced personally, 95 percent of what we teach to someone else." Why can't we provide opportunities for students to teach to one another, if that retention rate is that high?

My work with the Renaissance Project has provided opportunity for me to observe some interesting things happening in the classroom. One of the most exciting observations was made in a study in a bilingual first grade classroom. In that classroom, I saw a non-English speaking student move very quickly into the world of reading and writing in English. Do you know why? Because the teacher discovered he was spatially intelligent and asked him simply to do spatially intelligent activities when he first entered. She didn't say, "You must read and write in English, right this minute." She said, "We are so happy you are here. Welcome to our classroom. Aren't you a wonderful artist!" What we found was that because the student's self-esteem was enhanced by the teacher and elevated by all the students in the classroom, he learned how to read and write in English because he was in a comfortable environment conducive to learning. That is what we must do in education.

In closing, I have a vision that takes us beyond the 1900s and into the year 2000. My vision is that we will change the philosophy of education so that all students will have an opportunity to reach their fullest potential. To do that, we have to change assessment and we have to move into the theory of multiple intelligences. We have to believe that every student is gifted and can succeed. We have to provide staff development to everyone involved. We need to be involved in legislation because, I believe, we in education should be telling legislators what needs to happen in education. We must recreate the thirst for education with all students, and we must provide opportunities for students to succeed. That is our absolute responsibility as educators. It is true that children are 25 percent of our population, but they are 100 percent of our future. We in education can make the difference in children's lives.

(Editor's note: Dr. Teele has developed a teachers' Certificate in the Study of Multiple Intelligences program at Riverside.)