North Central Regional Educational Laboratory

ALL STUDENTS REACHING THE TOP

Strategies for Closing Academic Achievement Gaps

A Report of the National Study Group for the Affirmative Development of Academic Ability

LEARNING POINT Associates™

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The National Study Group for the Affirmative Development of Academic Ability was organized in 2002 by Learning Point Associates, the Institute for Urban and Minority Education at Columbia University Teachers College, and the College Board. During the course of one year, the National Study Group engaged 20 scholars in dialogue and writing for the purpose of producing a national report on critical interventions to help close the academic achievement gaps among ethnic-minority groups of students. This report will be followed by the release of an edited book by Edmund W. Gordon and Beatrice L. Bridglall, *The Affirmative Development of Academic Ability,* in late 2004.

PREFACE

A comprehensive mission of public schools is to produce students who are intellectually competent and prepared for postsecondary education and the increasingly competitive workforce. However, differences in educational outcomes of students indicate that the impact of our current public school system is limited. One of the most urgent concerns among education stakeholders today is the underrepresentation of African Americans, Hispanics, and Native Americans among high-achieving students. Twenty years since the release of the report *A Nation at Risk* (National Commission on Excellence in Education, 1983), new efforts continue to emerge, promising to eliminate this academic disparity and to ensure that no child is left behind. Stakeholders have been working relentlessly to maximize educational outcomes and to respond to the unprecedented challenge of educating increasingly multicultural, multilingual, and disadvantaged students. Although the hard work indicates signs of progress, more work is necessary to continue to improve student performance.

Following up on the policy recommendations of the National Task Force on Minority High Achievement (1999), on which I served as cochair, I called for a national effort at affirmative development (Gordon, 2001). Affirmative development asserts that the purpose of learning—and, therefore, of teaching—is to acquire knowledge and technique to develop human intellect. In other words, affirmative development helps build the intellectual muscle that humans need to apply to changing situations, experiences, and contexts. These developed abilities are by no means restricted to subject matter knowledge. In sharp contrast, the student must now use his or her acquired knowledge and technique to adaptively and efficiently solve both common and novel problems.

This past year, I have been tremendously fortunate to chair the National Study Group for the Affirmative Development of Academic Ability. With the support of Learning Point Associates, the College Board, and the Institute for Urban and Minority Education at Columbia University Teachers College, I have purposely united 20 leading scholars from multiple disciplines to help craft a vision for affirming academic ability, nurturing intellective competence, and moving all students—particularly minority and low-income students—to high levels of academic achievement.

To be clear, what follows is a discussion about intellective competence—not intelligence. (Refer to the appendix for key terms and definitions that appear in this report.) The National Study Group maintains that intellective competence is not fixed but developed and, therefore, developable. Here, then, is our effort to marshal the chunks of knowledge needed to systematically nurture intellective competence and eliminate the academic achievement gaps among our children.

Edmund W. Gordon, Chair
National Study Group for the Affirmative Development of Academic Ability

ACKNOWLEDGMENTS

The National Study Group for the Affirmative Development of Academic Ability was organized with the support of three agencies: Learning Point Associates, Columbia University Teachers College, and the College Board. As cosponsors, these agencies committed financial and human resources to convene the National Study Group, commission several papers, and publish this report.

Gina Burkhardt, CEO of Learning Point Associates, deserves special acknowledgment. Under her leadership, the National Study Group first convened and defined its purpose. She recruited Edmund W. Gordon, Ed.D., endowed chair at Yale University and Teachers College, to lead the National Study Group. Dr. Gordon's presence and recognition in the academic and not-for-profit communities set the wheels in motion for the design and work of the National Study Group. Through his efforts, 20 researchers, scientists, and education practitioners committed to engage for one year in dialogue and substantive work on the issue of the achievement gaps. Also through Dr. Gordon, a vital partnership was forged with Howard T. Everson, Ph.D., vice president for academic initiatives and chief research scientist at the College Board. The College Board's well-known track record in the area of achievement helped galvanize the National Study Group.

In addition to the cosponsors, the National Study Group acknowledges the contributions of National Study Group members Judy Stewart, Ph.D., independent consultant and a former policy director with Learning Point Associates; Albert Bennett, Ph.D., professor, Roosevelt University; and Beatrice Bridglall, editor and assistant director, Institute for Urban and Minority Education, Teachers College, Columbia University. Dr. Judy Stewart first presented the idea of a National Study Group to CEO Gina Burkhardt, who authorized her to run with the idea. Dr. Stewart has been involved in every stage of the National Study Group's work from its inception, partnership development, meeting facilitation, to coediting the final report. Dr. Albert Bennett has been instrumental in managing the partnerships and work products of the National Study Group members. His critical insights helped keep the National Study Group on task and united. Beatrice Bridglall served as a constant source of expertise as a facilitator, researcher, writer, and coeditor.

In addition to peer review by National Study Group members, invaluable criticism was received by Joshua Aronson, Ph.D., New York University; Sigmund Tobias, Ph.D., Columbia University Teachers College; Andrew Rotherham, Progressive Policy Institute; and Allan Alson, Ed.D., Evanston Township High School District 202.

EXECUTIVE SUMMARY

Overcoming the continued academic underperformance of students of color requires a systemic approach—one that combines simultaneous interventions by families, teachers and administrators, and the larger society. The National Task Force on Minority High Achievement, a group organized by the College Board in 1997 and cochaired by professors Edmund W. Gordon and Eugene Corta-Robles, issued a report titled *Reaching the Top* (1999), which indicated that "until many more…minority students from disadvantaged, middle class, and upper middle class circumstances are very successful educationally, it will be virtually impossible to integrate our society's institutions completely, especially at the leadership levels" (p. 2). The Task Force concluded that these problems require a national effort at the affirmative development of academic ability.

Academic ability is one expression of human intellective competence that, increasingly, is recognized as the universal currency of technologically advanced societies. Academic ability references capabilities such as the following:

- Literacy and numeracy.
- Mathematical and verbal reasoning.
- Skill in creating, recognizing, and resolving relationships.
- Problem solving from both abstract and concrete situations, as in deductive and inductive reasoning.
- Sensitivity to multiple contexts and perspectives.
- Skill in accessing and managing disparate bodies and chunks of information.
- Resource recognition and utilization (help seeking).
- Self-regulation.

Academic ability appears to be the product of exposure to the demands of specialized cultural experiences—schooling being the most common—that interact with a wide variety of human potentials (Cole, Gay, Glick, & Sharp, 1971; Cole & Scribner, 1974; Hunt, 1966; Martinez, 2002; Sternberg, 1994). The National Study Group for the Affirmative Development of Academic Ability met together throughout 2002 and 2003 to investigate this issue. This report is one product of their work.

The National Study Group reviewed strong evidence that academic ability is a developed (and developable) ability, one that is not simply a function of one's biological endowment or a fixed aptitude. Recognizing academic ability as a malleable ability, the National Study Group argues that closing the gaps in academic achievement between groups of students from different social divisions (class, ethnicity, gender, and language) will require the development of intellective competence in a wide range of individuals through interventions in our homes, communities, and schools.

Affirmative development of academic ability is nurtured and developed through (1) high-quality teaching and instruction in the classroom, (2) trusting relationships in school, and (3) supports for pro-academic behavior in the school and community. These pedagogical and social activities and

environmental supports build a developmental "scaffolding" around and within which students find support for growth in abilities and dispositions to:

- Perceive critically.
- Explore widely.
- Bring rational order to chaos.
- Bring knowledge and techniques to bear on the solution of problems.
- Test ideas against explicit and considered moral values and empirical data.
- Recognize and create relationships between concrete and abstract phenomena.

Intellective competence reflects the effective orchestration of affective, cognitive, and situative mental processes in the service of sense making and problem solving. These competencies focus not only on what we want learners to know and know how to do, but also on what we want learners to be and become—that is, compassionate and independently critical thinking members of humane communities. Intellective competence reflects intellective character.

This report describes one approach—one that necessitates simultaneous interventions at the classroom, school, and community levels—in order to reach that goal. The National Study Group's conclusions and recommendations were guided by the following ideas and are addressed in the body of the report in the following order:

- The nature and extent of the academic achievement gaps between majority and minority students.
- Teaching and learning for knowledge acquisition, improved comprehension, and understanding in the classroom.
- The psychological processes, especially trust, associated with minority academic achievement in schools.
- The environmental supports necessary for the development of intellective competence and character.

The charge to the National Study Group and now to the nation is guided by the belief that we cannot overlook the essential need to focus on improving the learning opportunities and academic achievement of minority and low-income students. Demographic shifts in our nation's population mandate that we attend specifically to these students' achievement if we expect as a nation to maintain our standard of living, our level of prosperity, and our place in the global economy. Simply put, we need the knowledge and contributions of students of color—together with the knowledge and contributions of all our students and all our adults—to maintain our democracy.

A systemic approach to closing achievement gaps and improving learning for all students necessitates access to a combination of educational interventions in the classroom, school, and community. High levels of academic ability can be obtained for all students by applying proven pedagogical practices and adopting policies that are within our reach.

ACADEMIC ABILITY AND ACADEMIC ACHIEVEMENT GAPS

Educators generally are perplexed when trying to find ways to raise the achievement of black, Hispanic, and Native American students. For example, when superintendents of large urban school districts were surveyed recently, they listed the issue of the achievement gaps between minority and nonminority students as one of their major concerns (Huang, Reiser, Parker, Muniec, & Salvucci, 2003). Many of these educators spoke of their frustrations and said, repeatedly, that they need practical advice—research that tells them what to do in their schools and classrooms to address this challenge. The National Study Group for the Affirmative Development of Academic Ability believes that contemporary research in the learning sciences and on the transfer of learning may provide the guidance that educators need to help reduce the achievement gaps.

The Nature of the Academic Achievement Gaps

Decades of data on national trends in standardized tests in reading, mathematics, and science confirm the existence of achievement gaps for certain ethnic-minority student populations and students living in poverty. Table 1 shows these differences in science, mathematics, and reading scores on the National Assessment of Educational Progress (NAEP) for samples of 8th- and 12th-grade students nationally from 1996 to 2000 for science and mathematics and from 1998 to 2002 for reading. At each grade level, black and Hispanic students perform significantly lower than white students in science, mathematics, and reading.

Table 1. NAEP Scores for Grades 8 and 12: Science, Mathematics, and Reading

	GRADE 8		GRADE 12	
Science	**1996**	**2000**	**1996**	**2000**
Blacks	121	122	124	123
Hispanics	129	128	130	128
Whites	159	162	159	154
Mathematics	**1996**	**2000**	**1996**	**2000**
Blacks	243	247	280	274
Hispanics	251	253	287	283
Whites	282	286	310	308
Reading	**1998**	**2002**	**1998**	**2002**
Blacks	244	245	269	267
Hispanics	243	247	275	273
White	270	272	297	292

Sources:
The Nation's Report Card: Science 2000 (O'Sullivan, Lauko, Grigg, Qian, & Zhang, 2003)
The Nation's Report Card: Mathematics 2000 (Braswell, Lutkus, Grigg, Santapau, Tay-Lim, & Johnson, 2001)
The Nation's Report Card: Reading 2002 (Grigg, Daane, Jin, & Campbell, 2003)

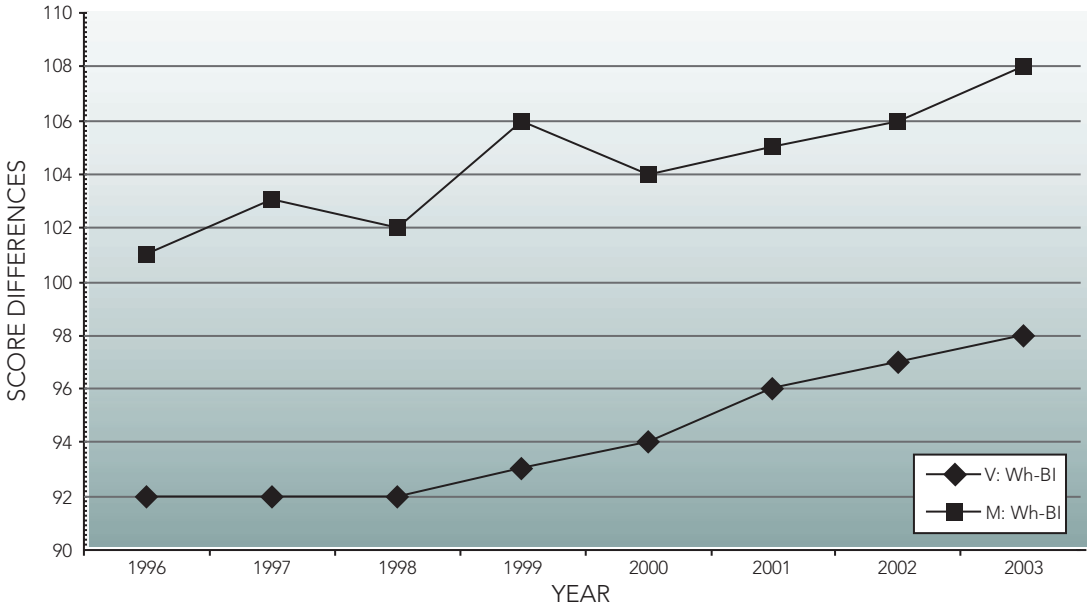
Trends in black and white average scores on the SAT, taken by college-bound high school juniors and seniors, tell much the same story. Table 2 shows the average SAT verbal and mathematical reasoning scores for black and white students over the past eight years—1996 through 2003. The black-white SAT score gaps are seen clearly in these trend lines; the gap is about one standard deviation (or 100 points) in the scale score metric—a significant difference by any standard. Graphing these differences makes it clear that the gaps increase in size over time (see Figure 1).

Table 2. Differences in SAT Verbal and Mathematical Scores for Black and White Students

	Mean SAT Verbal Scores		Mean SAT Mathematical Scores	
Year	Black	White	Black	White
1996	434	526	422	523
1997	434	526	423	526
1998	434	526	426	528
1999	434	527	422	528
2000	434	528	426	530
2001	433	529	426	531
2002	430	527	427	533
2003	431	529	426	534

Sources:
Digest of Education Statistics, 2000 (National Center for Education Statistics, 2001)
Digest of Education Statistics, 2002 (National Center for Education Statistics, 2003)
2003 College-Bound Seniors: Tables and Related Items (College Entrance Examination Board, 2003)

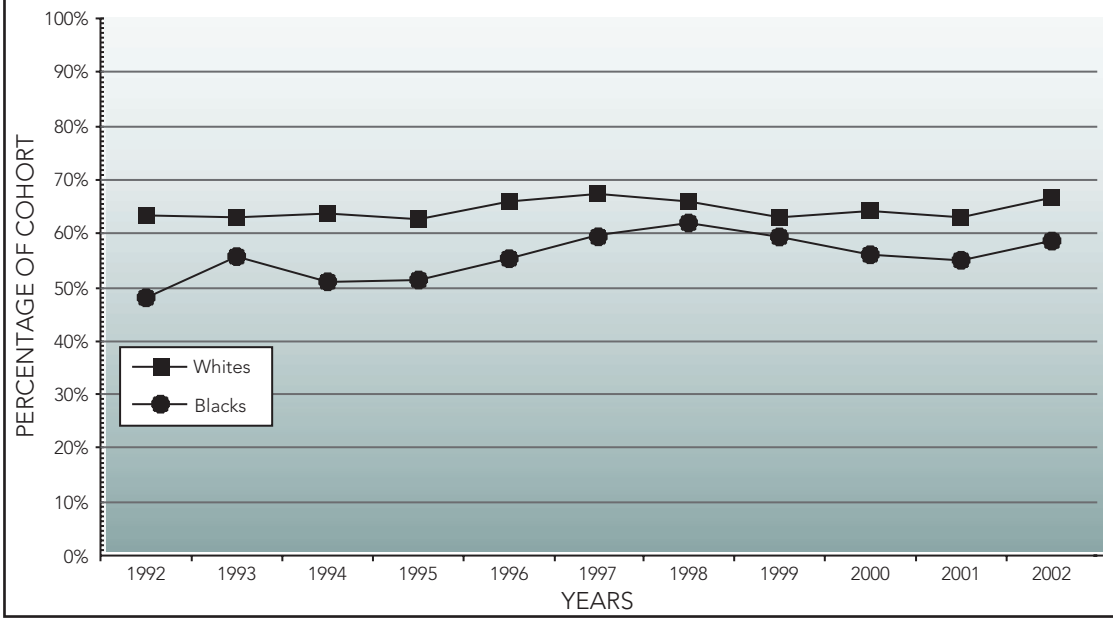
Figure 1. Differences in SAT Verbal and Mathematical Scores for Black and White Students



Sources:
Digest of Education Statistics, 2000 (National Center for Education Statistics, 2001)
Digest of Education Statistics, 2002 (National Center for Education Statistics, 2003)
2003 College-Bound Seniors: Tables and Related Items (College Entrance Examination Board, 2003)

These achievement scores have urgent ramifications for students' subsequent educational attainment. Success in high school and on the SAT and ACT controls who enrolls in college. For example, the 11-year trend in college entrance rates indicates a continuing, long-term gap between black and white students (see Figure 2). Although black-white enrollment rates nearly reached equality in about 1998, the gap soon reappeared and has not diminished since then.

Figure 2. 11-Year Trend in College Entrance Rates for Black and White Students



Source: *Opportunity*, No. 132 (Pell Institute for the Study of Opportunity in Higher Education, 2003)

A host of other indicators of academic achievement show similar differences by race and ethnicity. Indeed, compelling evidence has accumulated that suggests these achievement gaps appear even before disadvantaged African-American and Hispanic children enter kindergarten (Camara & Schmidt, 1999; Jencks & Phillips, 1998; Mickelson, 2003).

On the other hand, educational opportunities and academic achievement for some ethnic-minority groups in the United States appear to be on the rise, judging from several of the findings outlined by the National Center for Education Statistics report *Status and Trends in the Education of Blacks* (Hoffman, Llagas, & Snyder, 2003). The percentage of black children whose mothers have obtained a high school education has increased significantly since 1974. It also appears that more minority students have completed high school and gone on to college. Many black educators hold teaching appointments in institutions that are not historically minority. Unfortunately, we seem to have reached a plateau with respect to gains made in the 1960s, '70s and '80s in student academic achievement. The findings of Hoffman, Llagas, and Snyder (2003) include the following:

- Black children are more likely than white or Hispanic children to be enrolled in center-based preprimary education at the ages of 3, 4, and 5.
- Most minority students attend public schools where minorities represent the majority of the student body. Seventy-three percent of black 4th-grade students were enrolled in schools with more than half of the students eligible to receive a free or reduced-price lunch.

- Long-term trends in NAEP scores show increased performance in reading for minority students between 1971 and 1999. Trends in performance on NAEP mathematics and science also show improvements over the long term.
- Although black high school graduates completed more academic courses in 1998 than in 1982, their academic credit totals remained lower than those of whites in 1998. However, blacks' vocational credit totals were higher than those of whites.
- In 1998, black students were less likely than white students to take advanced mathematics courses and some advanced science courses and less likely than Hispanic students to take advanced foreign language classes. Between 1984 and 2000, the number of black students per 1,000 12th graders taking Advanced Placement (AP) examinations increased. However, fewer black students per 1,000 12th graders than white or Hispanic students took AP exams in 2000.
- In 1999, a lower percentage of minority and Hispanic children than white children were in private schools.
- Nearly one fourth of all bachelor's degrees earned by blacks in 1999 were earned at historically black colleges and universities.
- The proportion of blacks completing college increased between 1975 and 2000; however, blacks still remained less likely than whites to earn degrees.

According to the American Council on Education's *Minorities in Higher Education 2002–2003: Twentieth Annual Status Report* (Harvey, 2003) regarding the sciences and engineering, African-American students earned only 12,149 bachelor's degrees in social sciences, 4,851 degrees in biological/life sciences, and 4,324 degrees in engineering during 2000–01. The figures are even more alarming on the graduate level. With respect to doctoral degrees, African Americans earned only 80 degrees in physical science, 190 degrees in life science, 299 degrees in social science, and 82 degrees in engineering during 2000-01 (Harvey, 2003). These figures are cause for concern in light of the fact that minority students represent approximately 11 percent of all students enrolled in higher education (Wilds, 2000).

This reality is of particular concern not just for the gifted and talented African-American students who do not persist and graduate in the sciences but also for the K–12 education continuum and the nation, which increasingly privileges those skills and intellective competencies required for meaningful participation in an advanced technological society. These intellective competencies include the abilities to bring order to the chaos created by information overload; to reason; to uncover relationships between phenomena; and to use comparison, context, intent, and values in arriving at judgments. Such competencies are respected and sought after in both technologically developed and underdeveloped societies. Indeed, the capacity to function effectively in these domains is the essence of intellective competence, which increasingly is the universal currency in technologically advanced societies.

Almost 75 years ago, DuBois (1940) warned against the neglect of gifted and talented minority students. Current attention, however, is primarily focused on the overrepresentation of minorities on the left end of the academic achievement distribution to the neglect of those on the right end. These problems include a persistent gap between minority and majority students in general, a larger gap between high-achieving minority and high-achieving majority students, and the tendency of traditional indicators of high academic achievement to overpredict the subsequent academic achievement of many minority students. These often ignored findings were first reported in *Equality of Educational Opportunity* by Coleman et al. (1966) and in the 1980s and '90s by Durán (1983), Ramist, Lewis, and McCamley-Jenkins (1994), and W. W. Willingham (1985).

Affirmative Development of Academic Ability and Intellective Competence

The National Task Force on Minority High Achievement (1999) concluded that these problems require a national effort at the affirmative development of academic ability. Academic ability is one expression of human intellective competence that, increasingly, is recognized as the universal currency of societies that are technologically advanced. Academic ability references capabilities such as the following:

- Critical literacy and numeracy.
- Mathematical and verbal reasoning.
- Skill in creating, recognizing, and resolving relationships.
- Classification of information and stimulus material.
- Problem solving from both abstract and concrete situations, as in deductive and inductive reasoning.
- Sensitivity to multiple contexts and perspectives.
- Skill in accessing and managing disparate bodies and chunks of information.
- Resource recognition and utilization (help seeking).
- Self-regulation (including metacognitive competence and metacomponential strategies).

Such capabilities appear to be the products of exposure to the demands of specialized cultural experiences—schooling being the most common—that interact with a wide variety of human potentials (Cole, Gay, Glick, & Sharp, 1971; Cole & Scribner, 1974; Hunt, 1966; Martinez, 2000; Sternberg, 1994). We therefore conclude that academic ability is a developed ability—the quality of which is not primarily a function of one's biological endowment or fixed aptitudes. With the recognition of academic ability as a developed ability, the National Study Group for the Affirmative Development of Academic Ability begins with the assumption that closing the gaps in academic achievement between groups of students from different social divisions (class, ethnicity, gender, and language) will require the affirmative development of such ability in a wide range of individuals through certain interventions in our homes, communities, and schools.

Affirmative development of academic ability is based on the notion that such abilities are nurtured and developed through (1) high-quality teaching and instruction in the classroom, (2) trusting relationships in school, and (3) environmental supports for pro-academic behavior in the school and community. These pedagogical and social activities and environmental supports should reflect a type of developmental "scaffolding" around and within which students can find support for growth in the development of abilities and dispositions to:

- Perceive critically.
- Explore widely.
- Bring rational order to chaos.
- Bring knowledge and techniques to bear on the solution of problems.
- Test ideas against explicit and considered moral values and empirical data.
- Recognize and create relationships between concrete and abstract phenomena.

According to Gordon (2001), the mastery of academic learning is instrumental to the development of intellective competence. In Gordon's vision of teaching, learning, and assessment, academic outcome standards are central. However, it is the explication of what we want learners to know about specific disciplines and be able to do that must be considered as instrumental to what we want learners to become. There is no question about the importance of what students learn and are taught. Most of us would agree that teaching and learning independent of content (subject matter) is problematic. However, just as teaching and learning without subject matter are vacuous, teaching and learning should not be so constrained by content that the purpose of engagement with these pedagogical endeavors is precluded.

Gordon (2001) also argues that the purpose of learning, and the teaching by which it is enabled, is to acquire knowledge and technique to develop adaptive human intellect. Developed abilities are not so much reflected in the specific discipline-based knowledge a student may have, but in the student's ability and disposition to adaptively and efficiently use knowledge, technique, and values in mental processes to engage and solve both common and novel problems.

In summary, intellective competence is more than what advanced societies understand and measure as "intelligence." Intellective competence reflects the integration of academic content with mental processes such as reasoning and critical thinking applied within an ever-changing but highly relevant social context, which results in the mental activity that is necessary to make sense of experiences and to solve problems. This end goal is less focused on what we want learners to know and know how to do, and is more sharply focused on what we want learners to be and become—compassionate and independently critical thinking members of humane communities. From this perspective, intellective competence may be a reflection of intellective character.

The next three sections of the report describe the research base as well as educational applications at the classroom, school, and community levels that—if appropriately integrated and implemented—should lead to high academic achievement and the development of intellective competence in all students.

HIGH-QUALITY TEACHING AND INSTRUCTION IN THE CLASSROOM

Modern constructivist views of learning and cognition emphasize that the child is an active learner who engages the world in trying to make sense of it. In the ideal world, the home, school, and neighborhood serve as the child's laboratory; there are books at home, museums in the neighborhood, and adequate facilities in the school. The child has peers to serve as companions in exploration and adult guidance to structure interactions that are maximally conducive to learning. Support for learning continues and becomes more formalized in the classroom, with school serving as an extension of the learning environment in the home and community.

Although the above description may approximate the learning environments of affluent children in this country, it is a far cry from the settings in which too many others reside. Poor children—who are disproportionately African American, Hispanic, and Native American—often grow up in high-crime, inner-city neighborhoods. Parents often need to protect their children from these neighborhoods instead of letting them explore. In these same neighborhoods, adult authority figures often are lacking and peer interactions are as apt to result in harm as in good. (See Cauce et al., 2003, for a recent review of this literature.)

Nurturing Intellective Competence

The constructivist perspective of learning is based on a simple proposition: Students come to school with constructed understandings of the world—not with empty minds to be filled up through lectures, drills, and rote learning. They have prior knowledge, albeit sometimes incomplete, of their worlds and how things in it work. Contemporary theorists subscribe to the belief that the knowledge with which a learner comes to school affects his or her ability to learn and acquire new knowledge. By extension, if what teachers are attempting to teach conflicts with the previously constructed knowledge of the student, this new knowledge will make little sense and will be ill constructed and unavailable for future use in other settings (Anderson, 1987; Brooks & Brooks, 1999; von Glasersfeld, 1989; Resnick, 1987; Schauble, 1990).

Obviously, this constructivist perspective has important implications for promoting long-term retention and transfer. Much of the failure to transfer new learning to other contexts may stem from the buzz of confusion that learners experience when previously constructed knowledge and new knowledge (and novel contexts) conflict or are not well aligned (Everson & Renzulli, in press). Simply making the new knowledge clearer to students, the research suggests, will not enhance understanding or lead to adaptive forms of transfer (Cheng & Holyoak, 1985; Gentner, Ratterman, & Forbus, 1993; Gick & Holyoak, 1983). The drill and practice—as well as other direct teaching methods—found in many large, urban, and otherwise poorly funded schools might be working to mitigate against transfer. This type of instruction may be particularly damaging to minority students attending these schools.

More to the point, the achievement gaps between white and black children as early as kindergarten suggest that, indeed, all students are constructing knowledge long before they enter school. Some students, perhaps, have constructed understandings and acquired knowledge that may be more feasible and relevant to the classroom; others have not. Some students apparently

arrive at school with richer and deeper stores of prior knowledge—stories, words, and schemas for understanding the world around them (Lee, in press). Research indicates that the body of private understandings that many students have acquired before coming to school may be incomplete, inaccurate, and in conflict with what the curricula demand of them (Di Sessa, 1988).

With this caveat in mind, a handful of teaching and learning strategies can provide teachers and students respectively with a framework to refocus the learning process. These strategies include knowledge acquisition, improved comprehension through consolidation and automaticity, deep understanding, and learning for transfer. It is important to note that these strategies are defined in a somewhat arbitrary manner and do not represent clear demarcations in the learning process or distinct teaching techniques. They are merely an organizational device to ensure that our treatment of teaching is comprehensive and that we do not gloss over aspects of learning (such as automaticity and deep understanding) that typically get little treatment in the literature.

1. Teaching for Knowledge Acquisition

Knowledge acquisition remains a critical stage in the learning process; it is the building block for all other processes. The more that is learned about higher-order thought processes, the clearer it becomes that such processes do not occur independently of the information a child already possesses. All aspects of learning build upon the knowledge base that exists. Current understanding of pedagogical research strongly suggests that the first step in teaching for knowledge acquisition involves taking the time to find out what knowledge children already bring to the situation (Lee, in press).

During the acquisition stage, using conventional teaching techniques, new information is combined with these existing theories or preconceptions. This combination determines whether the resulting construction is accurate. Vosniadou and Brewer's (1992) work on the child's model of the world illustrates this point beautifully. They found that if children have a mental model of the world as flat (a model perfectly in tune with their experience of it), when they "learn" that it is round, their resulting model may be that of the world as a pancake. In other words, children take their original flat model of the world and superimpose roundness on it. This example nicely illustrates why it is the teacher's job to figure out what the student's mental model is and then teach from that as a starting point.

Inquiry-based instructional techniques do an exceptionally good job of drawing out a student's assumptions and using them as the building blocks for the construction of new knowledge. Such inquiry-based approaches begin with the learner's previous knowledge. They then actively engage him or her to search not only for answers but also for explanations. Inquiry-based approaches also involve the student in gathering new information, analyzing it, and—in the process—discarding some explanations that may have appeared to make sense. A growing body of research suggests that inquiry-based approaches lead to a broader and more robust acquisition of knowledge than a student obtains from a more conventional, didactic teaching approach.

Most of the research on inquiry-based techniques has been conducted on learning science and mathematics because inquiry-based approaches have been primarily used in these fields. A similar technique, *reciprocal teaching* (Palincsar & Brown, 1984), has been used to improve reading comprehension. This interactive teaching approach is based on questioning, clarification, summarization, and prediction. Each of these elements is aimed at understanding the meaning of

the text. Not only do students actively participate in these activities (e.g., questioning, clarification) that are necessary for comprehension, but they watch the teacher model these behaviors. This relatively simple teaching technique has shown some dramatic and durable improvements in student learning (Brown & Campione, 1994; Brown, Campione, Webber, & McGilly, 1992).

Because of the essential role of knowledge acquisition in all other aspects of learning, focusing on improving African-American and Hispanic children's knowledge acquisition, whether it be in terms of information or actual learning skills, is the first step in bridging the achievement gaps. As Resnik and Hall (1998) put it, "What we know now is that just as facts alone do not constitute true knowledge and thinking power, so thinking processes cannot proceed without something to think about" (p. 101). Or, to put it even more simply, how much one knows affects how well one thinks.

2. Teaching for Improved Comprehension Through Consolidation and Automaticity

After children acquire basic facts, they need to make this new information theirs, assimilating it into their existing network of ideas. The notion of improved comprehension primarily includes two key concepts: consolidation and automaticity. Both concepts are described in detail in this section. The process of *consolidation* is essential for new information to stick, or to stay with an individual for a prolonged period, becoming part of long-term memory. Consolidation happens best when learning is "deep" and goes beyond the simple ability to parrot information or to explain concepts at a surface level. It is likewise essential that basic skills become automated before they can be built upon effectively (Cauce, in press). *Automaticity* is the ability to perform a complex task without conscious awareness or effort. Through repeated practice, the task itself becomes an automatic process.

Information-processing models of knowledge acquisition distinguish between effortful and automatic processes. Effortful processes require the use of mental resources, including consciousness and intentionality, in addition to effort. The consolidation of knowledge and learning for automaticity are important because they free up energy for other activities that require mental effort. Indeed, younger, as opposed to older, children are less likely to use even basic memory and/or metacognitive strategies, or to benefit from such strategies when used, precisely because they are effortful (see Bjorklund, 1995, chapter 4, p. 116). It is only when cognitive processing becomes more efficient with age that children begin to effectively use more sophisticated learning strategies. For example, somewhere between fourth and eighth grade there is a shift from learning to read to reading to learn. But, this shift only occurs after—and if—reading becomes a practiced, automated skill. Until this happens, limitations in working memory capacity are too great to permit the interaction between syntactic, semantic, and pragmatic information that is necessary for comprehension. It is only after reading becomes more automatic and there is excess working memory capacity that comprehension becomes the primary task of reading.

Practice is the best strategy for developing improved comprehension. With practice, comprehending complex processes becomes less effortful and more automatic. Practice can be formal or not. For example, some parents may sit down very purposely with their children and go over the day's school lessons or listen to their child read aloud. Or, they may pay for tutors to do such activities. Others may simply provide an opportunity for practicing some skills during routine activities, such as bedtime reading. Some children, however, may not get any opportunities for practice outside the classroom.

Most children develop the underlying skills that make reading relatively automatic from the combination of what they get at school and at home. However, a small proportion of children, who may represent as many as 40 percent in some urban schools, benefit from having skills such as phonemic awareness and phonic word attack taught much more systematically (Hook & Jones, 2002; Sanders, 2001). Some evidence suggests early preventive intervention of this type can help students develop greater comprehension and fluency (Torgesen, Rashotte, & Alexander, 2001). This research suggests that children who do not get ready support for, or opportunities to practice, reading skills may benefit from more direct and explicit classroom support and instruction. The importance of developing comprehension, especially for children in environments that do not support learning, cannot be emphasized enough. What might readily appear to be deficits in higher-order processing might more accurately be attributed to a failure to develop fluency and comprehension of much simpler skills. Without the latter, the former may simply not be attainable.

3. *Teaching for Deep Understanding*

As Brown, Collins, and Duguid (1989) note, teaching of abstract concepts in the absence of authentic, naturalistic situations overlooks the fact that "understanding is developed through continued, situated use" (p. 2). The importance of this type of learning also places emphasis on the home environment or supplementary educational settings where learning and practice may occur in more naturalistic settings (Gordon & Bridglall, 2002; Steinberg, 1996). The cognitive apprenticeship approach emphasizes the role of collaborative learning and social interaction. In this sense, it is worth noting that while most school situations emphasize individual learning, most authentic learning situations involve collaboration, including social discourse (Resnick, 1988; Resnick, Soaljo, Pontecorvo, & Burge, 1997).

Two key approaches have been associated with learning that emphasizes understanding: *active learning* and *problem-based learning* (also called *concept-based learning).* Key to these approaches is the recognition that learning takes place through a dialectical process of active participation, and not just within an individual's mind. It is this type of participation that leads to what has been called *engaged learning.* Problem-based or engaged learning illustrates that to really understand what is learned, it is essential to place learning within an appropriate and authentic activity context. From the perspective of situated cognition, problem-based learning, and learning communities, learning is as much an act of socialization to "habits and skills of interpretation and meaning construction" (Resnick, 1989, p. 39) as it is a purely cognitive act.

This richer way of looking at learning and teaching is especially important for nonmainstream children because it highlights the fact that many important skills are learned implicitly, through the course of everyday or authentic interactions. If children already are engaged with their parents or other adults in planting a garden at home (or building a birdhouse, or raising a gerbil), they may not need to get this type of learning in the school context. But, to the degree that some youth are not exposed to environments in which such learning takes place and is encouraged, they will be at a disadvantage (Hung, 2002) unless such lessons are provided at school.

4. *Teaching for Transferability*

School learning is important only if one believes that what is learned in one context can be transferred to others. *Transferability* is the ability to make connections to skills learned in one context and transfer those skills to another context. Because of the importance of transferability, a great

deal has been written about the learning conditions that enhance this process. Key points to emphasize are the following:

- Strategies used to enhance deep understanding and automaticity also lead to transferability. For example, one of the most important factors influencing transfer is mastery. Students who learn specific subject material well find it easier to transfer that knowledge to other subjects or material (Bransford, Brown, & Cocking, 2000; Klahr & Carver, 1988).
- Comprehension enhances transfer (Bransford & Stein, 1993). Without an understanding of the deeper concepts and/or their connections to other information, problem-solving transfer may fail because students cannot see beyond superficial content-relevant aspects of a problem. In one study, Bassok and Holyoak (1989) showed that 90 percent of students who used a distance equation to successfully solve a physics problem could not use the same equation to answer a question about salary increases, although it was an analogous problem. When learning is overly contextualized or occurs only in the context of solving a very specific problem, transferability may be compromised (Cognition and Technology Group at Vanderbilt, 1997).
- Transferability can be greatly increased when issues of transferability (e.g., the implications of one task for another) are highlighted during instruction (Anderson, Reder, & Simon, 1996). For example, after students have learned to solve the distance equation mentioned above, the teacher could provide them with the additional example of salary increases to promote further transfer of knowledge. But, even more indirect strategies for transferability have been found to enhance it. For example, strategies similar to reciprocal teaching, which is used to improve comprehension, also have been found to benefit transferability (Scardamalia, Bereiter, & Steinbach, 1984). In addition, problem-based learning and lessons acquired in a situated learning environment are more likely to lead to the transfer of knowledge to real-life problems (Im & Hannafin, 1999). Thus, while there are unique issues involved in transferability, teaching for knowledge acquisition, teaching for consolidation and automaticity, and especially teaching for deep understanding also enhance the transferability of knowledge.

In most instances, instruction should involve some preparation in the form of modeling before students begin to work on a complex new problem. Equally important is for teachers to provide what Cazden (2001) calls "as needed" support while students are in the act of problem solving—whether individually, working in groups, or through whole-class work. Here, both the sequence of problem types and the manner in which students are socialized to engage with these problems are important. Key socialization strategies include exploring, articulating, and debating the following:

- The features of the problem to which the learner should pay attention and why.
- What each student already knows and doesn't know about these features.
- What these features signal about concepts and problem-solving strategies that may be relevant.
- The strengths and weaknesses of what will inevitably be multiple solution paths.
- The goodness of fit of solutions (i.e., what the solution explains or accounts for and what it does not).

If such socialization experiences are a routine part of instruction across subject matters and grades, students are more likely to develop several important dispositions and competencies:

(1) a willingness to persist with difficult problems in the face of uncertainty; (2) a willingness and ability to search one's repertoire of existing knowledge to look for connections to new problems, particularly when the connections are not obvious; and (3) a sensitivity to look closely for recognizable patterns that help define the kind of problem one is tackling (known in the cognitive literature as *defining and constraining the problem space).* These dispositions or competencies are not developed in the short run, and especially not in erratic learning environments.

Transfer of Knowledge: Challenges and Educational Applications

Applying what is learned in school to address problems in other settings is the very essence of the product of effective learning. Indeed, the very reason children are sent to school is so they will acquire the knowledge, skills, and abilities that will serve them later in life, when they are in the "real world." Distressingly, the research on the problem of transfer of learning suggests that there is a wholesale failure of learning from instruction (Bransford & Schwartz, 1999; Haskell, 2001; McKeough, Lupart, & Marini, 1995). This problem is even more troubling when viewed in the larger social context of the black-white achievement gap (Mortenson, 2003).

A large (and growing) body of research evidence is available on how people learn and what teachers can do to promote learning for transfer, and this research ought to influence classroom practice. In this section of the report, we make the case for designing instruction based on principles of learning derived from the learning sciences—the interdisciplinary field of research from psychology, neuroscience, linguistics, philosophy, computer science, anthropology, and education—to enhance the critical thinking abilities of all students. We aim to transfer what nearly two decades of research has taught us about how to improve learning, problem solving, long-term retention, and the transfer of learning to novel situations. The research we review suggests we are poised to capitalize on knowledge of how people think, learn, and remember; it offers instructional design principles to improve classroom learning and promote transfer of learning for all students. Obviously, these views are not entirely our own but derive from our reading of a number of researchers and scholars, including Bransford and Schwartz (1999), Halpern and Hakel (2003), and DeCorte (2003). We then describe the key findings from the literature on transfer of learning and emphasize the cognitive perspective, which stresses students' ability to learn during transfer. We conclude by suggesting how these learning principles can be applied in the classroom to improve teaching, learning, and transfer for *all* students.

Scientific inquiry into the question of transfer of learning has a long history, dating back more than a century to the work of E. L. Thorndike (Thorndike & Woodworth, 1901). From the very beginning, this line of research has suggested that *transfer*—that is, how well what a person learns in one set of circumstances transfers or is adapted to other, novel situations—is both fragile and controversial. Indeed, the only clear finding from this long history of research is that there have been a number of failed attempts at achieving transfer, as well as a number of successes (Barnett & Ceci, 2002; Detterman & Sternberg, 1993). In an especially clear treatment of the research on transfer, Bransford and Schwartz (1999, p. 62) refer to the "agonies and ecstasies" that characterize this body of research. It would not be unfair, for example, to summarize the literature on transfer by concluding that "there is no evidence to contradict Thorndike's general conclusions: Transfer is rare" (Detterman, 1993, p. 15).

Despite the pessimism, a number of researchers have pointed out recently that research is uncovering a number of important learning perspectives and principles that appear to be capable of enhancing transfer (DeCorte, 2003; Halpern & Hakel, 2003). In a classic study that involved teaching subjects to throw darts while underwater, Judd (1908) demonstrated the value of promoting understanding as part of the initial learning experience. Judd's experiment demonstrates the benefits of guided practice. Two groups of boys practiced throwing darts at an underwater target. Prior to practice, the experimental group was instructed about how water refracts light and how this principle may affect the accuracy of their performance. The control group was not given this instruction, but simply practiced. Boys in the experimental group were more accurate at throwing darts at new targets at varying depths.

Building on these early studies, Bransford and Stein (1993) studied how learning with understanding affects transfer. In general, these studies show that when presented in a problem-solving context, knowledge and information are more likely to be recalled and activated in novel problem-solving situations. Rethinking the problem of transfer from a cognitive perspective may yield insights into how strategic knowledge about learning, including monitoring one's learning across domains and contexts (Bransford & Schwartz, 1999; Brown, 1978; Tobias & Everson, 2002), enhances performance in novel settings.

The question before us is: Do we have the strategies and principled pedagogical approaches that reflect our best understanding of how students learn? Work done recently under the auspices of the National Research Council (Bransford, Brown & Cocking, 2000) suggests that indeed we do, and the report makes a strong case for affecting students' long-term retention and transfer by improving how we teach. The authors write:

> Modern theories of learning and transfer retain the emphasis on practice, but they specify the kinds of practice that are important and take learner characteristics (e.g., existing knowledge and strategies) into account (e.g., Singley & Anderson, 1989). In the discussion below, we explore key characteristics of learning and transfer that have important implications for education:
>
> - Initial learning is necessary for transfer, and a considerable amount is known about the kinds of learning experiences that support transfer.
> - Knowledge that is overly contextualized can reduce transfer; abstract representations of knowledge can help promote transfer.
> - Transfer is best viewed as an active, dynamic process rather than a passive end-product of a particular set of learning experiences.
> - All new learning involves transfer based on previous learning, and this fact has important implications for the design of instruction that helps students learn. (p. 53)

Building on this work, Bransford and Schwartz (1999), DeCorte (2003), Halpern (1998), Halpern and Hakel (2002, 2003), Sternberg, (2002), and D. T. Willingham (2002, 2003), among others, provide specific guidance by applying the sciences of learning to the challenge of teaching for transfer and preparing students for future learning. Through a variety of collaborative efforts, these researchers have developed theories and extracted basic principles that, we suspect, can be applied broadly in schools and classrooms. On the following pages, we describe a representative set of these principles and offer examples of possible educational applications.

1. Provide Opportunities for Students to Practice at Retrieval

Research tells us that a powerful way to promote long-term retention and transfer is to allow students to practice retrieving previously taught material from long-term memory. Opportunities to practice can occur either during review for tests or in actual testing sessions (Cull, 2000; Dempster & Perkins, 1993; Glover, 1989; Wheeler & Roediger, 1992). Teachers are encouraged to work with students as they retrieve information and knowledge from both short-term and long-term memories. Doing so repeatedly, in varied contexts, strengthens students' ability to access these knowledge bases and solidifies their ability to recall previously learned material from long-term memory, thus promoting transfer across contexts. Halpern and Hakel (2002, 2003) also tell us that repeated testing helps in the recall of information. Teachers are encouraged to align classroom discussions, homework assignments, and tests so that important information will have to be remembered at different times throughout the academic year or course, enhancing long-term retention. Test questions also offer an opportunity for "practice at retrieval" and deepen students' knowledge of the material being tested. Ideally, tests should be cumulative; test items should probe for understanding of the material. The key idea is to cue students' prior knowledge in ways that are relevant to the learning context.

2. Vary the Conditions of Learning

The key idea here is that when learning takes place under a variety of conditions and contexts, conceptual understanding becomes more rounded and multiple retrieval cues are activated. Research from the learning sciences provides insights into the benefits of providing differing types of problems and alternative solution strategies. Though we are warned that learning may take longer and be somewhat less enjoyable to students, research suggests that students and teachers will see significant gains in long-term retention and transfer.

3. Maximize Time for Learning

Another factor to seriously consider in supporting minority-student learning is making sure that students have the time needed to learn. Research has demonstrated that when time to learn is allowed to vary, the best predictor of mastery learning is a student's prior knowledge. On the other hand, when time available for learning is held constant, a student's intelligence is the best predictor of mastery (Anderson & Block, 1977; Bloom, 1971). Regardless of what one thinks about the construct of intelligence or its validity, it is clear that when time to learn is held constant, as is typically the case in the present educational system, it leads to the outcome that ability is a better predictor than learning per se. Learning can be viewed as a result of opportunity to learn and perseverance. But, while the perseverance is up to the student, the teacher controls the opportunity to learn. Ideally, a learner-centered environment would allow opportunities to be better matched to the student's, rather than the teacher's, needs.

4. Represent Knowledge Using Alternate Forms

Learning is more powerful when students are prompted to take information presented in one format and "represent" it in an alternative way. Cognitive research tells us that we process information in multiple ways—visually and through auditory-verbal channels. Students' learning and recall can be improved by integrating information from both the verbal and visual-spatial forms of representation. Teachers are encouraged, therefore, to use both modes of representation in all their learning tasks, explicitly and consciously incorporating multiple forms of representation into their instructional designs.

5. *Build on Students' Prior Knowledge and Experience*

Research comparing experts to novices reveals that experts have a larger knowledge base, compared to novices, and can compile information into more meaningful chunks, which further facilitates learning. For example, relative to novices, chess experts have a better memory for positions of chess pieces on a game board (Chi, Feltovich, & Glaser, 1981). When chess pieces are placed randomly on the board, however, this advantage disappears, suggesting that chess experts do not have superior general memory; rather, they are able to draw upon their knowledge of common chess positions when useful for remembering and developing game strategies. As noted earlier, students arrive in the classroom with sets of assumptions and beliefs that serve as a mental framework for learning. As they construct knowledge, students build on their prior knowledge to infuse meaning into newly learned material. In this way, prior knowledge influences how students interpret new information and decide what aspects of this information are relevant and irrelevant.

6. *Emphasize Knowledge and Skill Development*

Teachers, teaching assistants, and tutors need to make explicit those concepts and processes that students need to know, understand, and internalize in order to achieve mastery. This approach is especially important if students have not had previous intensive exposure to mathematics and the sciences, for example. The research literature is replete with findings that support the idea that peer study groups create opportunities for academic and social support, which appear to contribute to higher academic achievement (Treisman, 1992). Peer study groups can serve more than the purpose of helping students master the concepts in their fields; they also enable students to regard themselves as part of an academic community. In addition, peer study groups promote conversations in which participants have to articulate their own ideas and listen to the ideas of others. Peer study group interactions also ensure that students make their work and thinking public; students are thus exposed to different perspectives and the knowledge fund of their peers. The peer study group setting exposes students to peers who also struggle with various ideas and subject content. The result is that students learn quickly that excelling in a subject does not mean being able to solve problems quickly and easily but rather working very hard and persevering.

7. *Infuse Lessons With Strategies for Learning*

For students, learning new concepts and developing understanding is often difficult and uncomfortable. Students' views of the world are challenged, and long-held beliefs are questioned in the teaching and learning process. Students and teachers often complain that some subjects, such as mathematics and science, are just too difficult for them to learn. All of us want learning to be easy. Thus, when students are faced with some school subjects, they become discouraged by the difficulty they encounter during the learning process. Halpern and Hakel (2003) remind teachers that optimizing learning depends on what we want students to learn and what students already know about that subject. Teachers can help students by discussing ways of learning, infusing their lessons with strategies for learning to learn, and surfacing students' own beliefs about learning.

8. *Provide Systematic Feedback*

Not surprisingly, and as discussed earlier, students come to school with preconceived ideas about the subjects they are taught in the classroom. Even if these notions are wrong, belief in them can solidify based on ordinary, everyday experiences, especially when objective, corrective feedback is not provided. This lack of feedback has serious implications for learning and performance.

For instance, students may come to believe incorrectly in causation by attributing an effect to a salient possible causal agent without considering plausible alternative causes, engaging in spurious causal reasoning. Similarly, students often may rely on self-created devices to judge or interpret events and outcomes. These mental shortcuts may not always lead to correct solutions or to the resolution of complex problems. We also know that students, typically, have poor metacognition—that is, they are poor judges of what they know and do not know (Tobias & Everson, 2002). These misguided notions and feelings of confidence about what they know may also develop in the course of learning. Learners may be fooled into believing that they are learning by the apparent ease of their performance; in contrast, optimal learning is usually derived from moderately difficult learning situations. Teachers can become more aware of students' common misconceptions and lead discussions in class that address such misconceptions. They also can provide systematic feedback on homework assignments, tests, and projects throughout the course of instruction to combat the persistence of erroneous thinking.

9. Use Dynamic Classroom Assessment

Research is emerging, largely from a psychometric perspective, indicating that some standardized test items and tasks are more difficult for black students than for white students, even when the two groups are equal with respect to their ability levels and have been taught by the same teachers in the very same classes. From a cognitive perspective, it has been suggested that the test items may have features or characteristics that are more or less salient with respect to classroom learning, and that these saliency characteristics differ for black and white students. These test items—which often are considered the final transfer task, particularly in high-stakes testing situations—have been viewed as presenting "sequestered problem solving" (Bransford & Schwartz, 1999, p. 68). In such situations, students rarely have the opportunity to seek help from other resources, such as other students, teachers, or texts. They rarely have the opportunity to engage in trial-and-error forms of learning, get feedback, or even revise their work.

By shifting to a perspective that looks at transfer in terms of preparing students for future learning, as DeCorte (2003) and Bransford and Schwartz (1999) suggest, we are then free to look at assessments as opportunities to gauge students' abilities to learn in knowledge-rich environments. The key idea is that assessments serve as opportunities to measure students' abilities to learn new information and relate this new learning to previous experiences. According to Bransford and Schwartz, "Assessments can be improved by moving from static, one-shot measures of 'test taking' to environments that provide opportunities for new learning" (p. 88). These dynamic forms of assessment hold promise for promoting transfer and reducing the achievement gaps. For example, teachers who direct their instruction to forms of "teaching to the test" often find that their students have difficulty engaging in metacognitive knowledge monitoring. By treating the testing situation as external to the learning environment, as a hurdle to be leaped, or as a one-shot maximal performance event, they are depriving students of the opportunity to assess their own learning, to monitor and regulate their learning strategies, and to capitalize on corrective feedback and engage in new learning. By incorporating dynamic forms of assessment in the classroom, teachers have a tool that will allow them to better measure how prior learning and experience have prepared their students for future learning—knowledge that in itself promotes transfer of learning.

THE IMPORTANCE OF TRUSTING RELATIONSHIPS IN SCHOOL

The social-psychological literature points to a clear message that feelings of trust in the institution, and in those who are seen to represent the interests of those institutions (e.g., teachers, professors, administrators), are a fundamental building block in the affirmative development of high minority achievement (Bryk & Schneider, 2002; Mendoza-Denton & Aronson, in press; Steele & Aronson, 1995, 2000). Yet successful minority students are increasingly likely, as they move up the achievement ladder, to encounter contexts and situations in which their group has been historically excluded and underrepresented.

Psychosocial Processes That Hinder the Development of Academic Ability

The past decade in particular has witnessed an explosion of research on the experience of being stigmatized, attributable in large part to research on two separate but related phenomena: One is attributional ambiguity (Crocker & Major, 1989), and the other is stereotype threat (Steele & Aronson, 1995, 2000). *Attributional ambiguity* involves the challenge that a student of color may face when receiving feedback about his or her performance and the difficulty of determining when feedback (particularly critical feedback) is accurate or is actually reflective of racial bias on the part of the one giving the feedback. *Stereotype threat* is the awareness that others may judge one's performance in terms of one's racial background, rather than in terms of one's individual background.

These general findings have been replicated with a variety of methodologies and seem to indicate a robust phenomenon. What implications does this have for affirmative development? As one begins to think about this issue, a particular conundrum begins to take shape for the high-achieving minority student. On the one hand, an important aspect of academic achievement comes from the integration of academic success into the self-concept (Steele, 1992). Similarly, people want to achieve mastery and have at least some control over their outcomes (Bandura, 1986). Thus, when faced with negative feedback or obstacles along the way that *all* high-achieving students are bound to face, minority students *in particular* may be faced with a catch-22 with attributional ambiguity at its heart. If one receives negative feedback, should one discount it because it may be more reflective of external bias than of one's own internal ability? Or does it in fact reflect one's own internal ability? Moreover, if one chooses to see it as reflective of one's own ability, is one ignoring or being foolishly blind to systematic biases that can affect one's evaluations? Such a state of uncertainty can be distracting and intrusive, and may moreover lead to confusion when thinking about effective coping strategies for addressing the negative feedback itself. The point here is that high-achieving minority students in particular have reason to be attracted to *both* explanations for negative feedback when it is received, and as such, may have a more difficult time resolving the state of attributional ambiguity.

Stereotype threat becomes a relevant psychological process when people find themselves in contexts where a stereotype about their group is applicable. As such, Hispanic and African-American students may be particularly vulnerable to stereotypes in the domain of academics, because the stereotype surrounding these students concerns a generalized suspicion about their

intelligence. Importantly, the effects of stereotypes can occur without the stereotyped individual himself or herself believing the stereotype—one simply has to have the knowledge of the stereotype and the awareness that others may view him or her through that stereotype. To the degree that schooling in general and standardized testing in particular place particular emphasis on diagnosis of ability as a gateway for tracking, or college admissions, or other future opportunities, the implications of feeling stereotyped in relation to minority student achievement are profound.

The effects of stereotyping are potentially more pronounced the higher one comes to reaching the top. As the College Board's National Task Force on Minority High Achievement (1999) notes, "The negative impacts of these beliefs do not seem to be confined to the most disadvantaged underrepresented minority students; they can undermine the achievement of high SES [socioeconomic status] students as well" (p. 16). Indeed, when combined with the possibility that the state of attributional ambiguity may be more pronounced, and more difficult to dispel, for students who succeed at succeeding, a picture of the psychological weight of being a high-achieving minority student in this country comes increasingly into focus.

Direct or vicarious experiences of exclusion, discrimination, and prejudice can lead people to anxiously anticipate that they will be similarly treated in *new* contexts where the possibility of such treatment exists. Minority students in particular are likely to experience doubts about their acceptance in educational institutions, and such concerns are likely to be accentuated in academic environments and institutions that high-achieving minority students strive for.

Longitudinally, students who entered the university with concerns about how welcome they would be experienced less diverse friendships and felt less trust and obligation toward the university at the end of their first year in college than students who entered with fewer concerns. As sophomores and juniors, they also reported decreased attendance at academic review sessions, as well as increased anxiety about approaching professors and teacher assistants with academic problems. Unsurprisingly, prejudice apprehension was predictive of students' change in grade-point average over the first five semesters of college, such that students who experienced prejudice apprehension were particularly likely to experience a decrease in their grades over time (Mendoza-Denton, Purdie, Downey, & Davis, 2002). "Since students have only a limited amount of time and emotional energy, those able to concentrate on their academic tasks, without constant concern about their place on the campus and their relationships to others, are most likely to do well academically," note Bowen and Bok (1998, p. 82).

Building Trust

If affirmative development is based on the notion that academic abilities are nurtured and developed through pedagogical, social, and interpersonal supports, the research cited throughout this report suggests that beyond the opening of doors and beyond the achievement of numerical diversity, educators—and the institutions that they represent—must work together towards the achievement of relational diversity (Fine, Weis, & Powell, 1997). By *relational diversity,* we mean a type of diversity in which institutions are not merely filling numerical quotas but instead are actively working to secure the trust and confidence of those students to whom they have opened their doors. As the summarized research implies, such trust and confidence is a critical component of minority students' achievement on several levels.

When high-achieving minority students succeed, many times they will be faced with situations and environments where their group membership becomes particularly salient. As research on prejudice apprehension shows, concerns about one's belonging can directly impact one's achievement by leading people to not take advantage of the various resources that the institution may offer. Although this self-protective strategy minimizes the possibility of rejection and future prejudice, it also reduces the number of resources and support systems one can count on when faced with the difficulties that all students face.

We have argued that minority students may experience the psychological impact of being a member of a stigmatized group more acutely as they become more academically successful. The reasons for this are twofold: First, such success implies developing an academic identity, which for minority students is a threatened identity. Second, as minority students become more successful, the likelihood increases that educational opportunities and institutions will continue being overrepresented by majority group members—thereby increasing suspicions about one's belonging and acceptance.

SUPPORTS FOR PRO-ACADEMIC BEHAVIOR IN THE SCHOOL AND COMMUNITY

In our collective experience, most education-related policy stems from deficits-based approaches. We purposely have taken a developmental and strengths-based approach to the conceptualization of intellective competence. A number of key environmental supports are critical to the development of intellective competence:

- Access to education-relevant capital.
- Supportive family, community, and academic environments.
- Socialization to the attitudinal and behavioral demands of high academic achievement.
- Academic and social integration.
- Exposure to various forms of supplementary education.
- Exposure to models of academic excellence and exemplars of scholarly practice.

Access to Education-Relevant Capital

For students of color, the problems of inequality of access to many of the environmental supports that undergird pro-academic behavior in schools and communities are critical factors. What is the nature of the education-relevant capital that high-achieving students more often have access to through their families and communities? According to Bourdieu (1986), Coleman et al. (1966), Gordon (1999), and Miller (1995), there are several types of capital, as illustrated in Table 3.

Table 3. Education-Relevant Capital

Type of Capital	Definition
CULTURAL	Collected knowledge, techniques, and beliefs of a people.
FINANCIAL	Income; wealth; family, community, and societal economic resources available for education.
HEALTH	Physical developmental integrity, health, nutritional condition.
HUMAN	Social competence, tacit knowledge, and other education-derived abilities as personal or family assets.
INSTITUTIONAL	Quality of and access to educational and socializing institutions.
PEDAGOGICAL	Supports for appropriate educational treatment in family, school, and community.
PERSONAL	Disposition, attitudes, aspirations, efficacy, sense of power.
POLITY	Societal membership, social concern, public commitment, political economy.
SOCIAL	Social network relationships, social norms, cultural styles and values.

Obviously, wealth is more than money. It is the accessibility and control of resources. If we are correct in assuming that the effectiveness of schools and other institutions that serve students are in part a function of the availability of such wealth-derived capital for investment in human development, we may have in this relationship a catalyst for pedagogical, political, and social intervention.

Supportive Family, Community, and Academic Environments

Family Environments

In 1966, Coleman et al. concluded that differences in the family backgrounds of students, as opposed to school characteristics, accounted for the greatest amount of variance in their academic achievement. This finding was later found to be less so for low-income and ethnic-minority children than for the general population (Gordon, 1999), but typically, family background and income stand as strong predictors of achievement in school (Gordon, 1999; Jaynes & Williams, 1989; Sexton, 1961). In related works, Mercer (1973) and Wolf (1966, 1995) posited that the presence of family environmental supports for academic development may explain this association between family status and student achievement. They made the now obvious point that books, positive models, help with homework, and a place to study in the home are associated with school achievement.

Community Environments

Because learning is influenced in fundamental ways by its context, promoting student achievement via the community requires the development of norms for the classroom, schools, and the community that both support and inform core learning values. In some schools, the norms may require that students build their own information base; other norms may encourage academic risk taking and provide opportunities for students to make mistakes, obtain feedback, and revise their thinking. School norms also must support students' comfort in revealing their preconceptions about a subject, their questions, and their progress toward understanding new conceptual constructs related to the subject. Teachers need to design classroom activities and promote students' intellectual camaraderie and attitudes toward learning that build a sense of community and responsibility for each other. These activities may take the form of students solving problems together by building on each other's knowledge, asking questions to clarify explanations, and suggesting differing solutions (Brown & Campione, 1994). In this way, cooperation and argumentation in problem solving enhance cognitive development (Evans, 1989; Goldman, 1994; Habermas, 1990; Kuhn, 1991; Moshman, 1995a, 1995b; Newstead & Evans, 1995; Salmon & Zeitz, 1995; Youniss & Damon, 1992) and are factors in enabling student achievement.

Lave and Wegner (1991) found that a community-centered approach also supports teachers in establishing a community of learners among themselves. Such a community fosters comfort with questioning (not just with knowing the answer) and is a model for creating new ideas that build on the contributions of individual members. Community membership also can promote in teachers a sense of ownership of new ideas that they can transfer to their classroom. Ultimately, teachers need to develop new ways to link classroom learning to other aspects of students' lives. This strategy can be operationalized in requiring that students actively participate in community service.

For example, in some education programs, all students are encouraged or required to take part in a community service activity. This strategy can help to make concrete the value of "giving back" to the larger community and deliberately encouraging students to focus on outreach activities and service to the broader community. Community service could include volunteer work with at-risk youth, tutoring, organizing environmental projects, collecting food for homeless shelters, or participating in campus outreach activities to middle schools. Community service roles give students the status and responsibility of representing their school in the community. Although the program staff is responsibile for enabling community activity, the community itself grows

from the human relations and interactions among all the participants: students, former students, graduate students, teachers, program staff, and university leadership. The community is at its most vital when students take an active role in shaping their own environment (Hrabowski, 2002).

Academic Environments

In environments that are learner centered, teachers pay close attention to the knowledge, skills, and attitudes that students bring into the classroom. This strategy focuses on distilling students' preconceptions about various subjects while simultaneously promoting a better understanding of students. Teachers need to become aware of the following concepts:

- Cultural differences can affect students' comfort level in working collaboratively instead of individually. These differences also are reflected in the background knowledge that students bring to a new learning situation (Moll, Tapia, & Whitmore, 1993).
- Students' conceptions of what it means to be intelligent can affect their performance. Students who think that intelligence is a fixed entity are more likely to be performance oriented as opposed to learning oriented; they want to look good rather than risk making mistakes while learning. These students are especially likely to give up when tasks become difficult. In contrast, students who think that intelligence is malleable are more willing to struggle with challenging tasks and are more comfortable with risk (Dweck, 1989; Dweck & Legget, 1988).

Teachers in learner-centered classrooms are attentive to each student's individual progress and develop appropriate tasks that facilitate a more sophisticated understanding of the material. For instance, teachers can present students with challenging material that they can manage; that is, the difficulties are demanding enough to maintain engagement but not so difficult as to lead to discouragement. This approach demonstrates the teacher's understanding of his or her students' knowledge, skill levels, and interests (Duckworth, 1987). The underlying principle is Vygotskian (Vygotsky, 1978) in that most of the learning is within the learner's zone of proximal development at the growing edge of mastery.

Socialization to the Attitudinal and Behavioral Demands of High Academic Achievement

Although the challenges may be greater for minority students to excel academically (given issues related to race, gender, and culture bias), continuous monitoring and advising of students should emphasize the skills, values, and habits that students need to acquire and practice in their academic lives. Students should be socialized to (1) understand the importance of reading, knowing where to seek answers, solving problems, and asking questions; (2) accept their ethical and moral responsibility not only to work hard but also to work to be among the best; and (3) set high standards, follow through, be dependable, and understand how to work well with others. Similarly, given the universal importance of advanced technologies and complex communication skills, students need to learn how to use these technologies, and how to speak and write with clarity and confidence in the standard vernaculars. Students need to be reminded that these skills and abilities are necessary in the classroom and eventually in their professional lives. On yet another level, students should be coached on the importance of interacting, working, and coexisting effectively with diverse people and remaining open to new experiences without threat to their own identities. Academic socialization is thus directed at shaping the attitudes, dispositions, and habits of mind toward pro-academic intellective pursuits.

Academic and Social Integration

Research and contemporary practice show that the academic and social integration of students leads to higher grade-point averages, persistence, and retention (Maton, Hrabowski, & Schmitt, 2000; Treisman, 1992). This strategy can be operationalized in the social domain through steadfast commitment from district and school leadership, teachers, and students with respect to celebrating diversity; promotion of help seeking from a variety of sources; peer supportiveness; high academic goals; and meaningful community service. In the academic domain, consistent emphasis on solid preparation and conceptual mastery of difficult concepts; involvement in faculty research; and special faculty attention to the needs of underrepresented students collectively encourage and reinforce students' participation. These acts of inclusion are intended to ensure that all students develop academic and social competencies, have a sense of membership in the learning enterprise, and are capable of discharging the responsibilities of such membership in academic and social environments.

Exposure to Various Forms of Supplementary Education

Gordon (Gordon, Meroe, & Bridglall, in press) defines *supplementary education* as the formal and informal learning and developmental enrichment opportunities provided for students outside of school and beyond the regular school day or year. Some of these activities may occur inside the school building but are beyond those included in the formal curriculum of the school. After-school care is, perhaps, the most widespread form of supplementary education, but supplements to schooling also include the special efforts that parents exert in support of the intellective and personal development of their children. These efforts may range from provisions for good health and nutrition to extensive travel and deliberate exposure to life in multiple cultures.

Many activities, considered routine in the settings in which they occur, are nonetheless thought to be implicitly and deliberately engaged in to ensure adequate intellective and academic development of young people. These routines include reading to and with one's children; dinner table talk and inclusion in other family discussions of important issues; exposure to adult models of behaviors supportive of academic learning; active use of the library, museums, and community and religious centers as sources of information; help seeking from appropriate sources; and investments in reference and other education materials. In related but different domains are efforts directed at influencing children's choices of friends and peers, guiding and controlling use of their spare time, guiding and limiting their time spent watching television, and encouraging their participation in high-performance learning communities (Clark, 2002).

Parents of high-achieving students understand and emphasize academic achievement by supplementing their children's education with travel, dance lessons, scouting, tutoring, summer camp, and other activities. Indeed, informed parents, scholars, and educators have known for some time now that schools *alone* cannot enable or ensure high academic achievement (Coleman, 1966; Gordon, 2001; Wilkerson, 1985). James Comer (1997) asserts this position more forcefully in *Waiting for a Miracle: Why Our Schools Cannot Solve Our Problems—And How We Can.* Colloquial knowledge among many parents "in the know" reflects awareness that a number of experiences and activities occurring outside of school appear to enable schooling to work.

Exposure to Models of Academic Excellence and Exemplars of Scholarly Practice

We advocate the pairing of students with mentors who are professional role models in students' areas of interest. Mentors can be recruited from a variety of settings, including universities, private laboratories, government facilities, and corporations. Pairings or assignments of students and mentors should ideally be long term but can be targeted to the developmental phase or stage of the student. Mentors can consult with students on educational and career issues, as well as topics ranging from class scheduling, internship experiences, school placements, career choices, and personal concerns. Lectures, business meetings, laboratory visits, and social encounters with mentors can express mentor and mentoree relationships formally. The mentoring relationship also can be expressed informally through social outings, letter writing, and recreational activities. These facets of mentoring can facilitate educational and professional growth across the learning continuum.

ALL STUDENTS AT THE TOP: WHAT WILL IT TAKE?

The state of education for minority students is clearly multidimensional and complex. Arguably, the most critical problem in education faced by minority students is the gap in academic achievement known to exist between minority and nonminority students. This problem is manifested at all achievement and socioeconomic levels.

To remedy this situation, the National Study Group for the Affirmative Development of Academic Ability proposes that the education community embark upon a deliberate effort to develop academic abilities in a broad range of students who have a history of being resource deprived and who, as a consequence, are underrepresented in the pool of academically high-achieving students. The deliberate or affirmative development of academic ability should include more equitable access to a variety of capitals and educational interventions.

The authors of this report and the National Study Group members chose the title of the report carefully to reflect our goal of enabling all students to reach the top, both academically and in their personal endeavors. Due to the urgency of the problem, there is a critical need for the education establishment to work together with the social and political institutions in this country to lead what we consider to be a charge to the nation. In describing this charge, we have attempted to marshal what we know from multiple research domains to address the achievement gaps. We recognize that our knowledge as researchers tends to be discrete and disconnected. What is most needed, then, is a bundling and systemic application of our best research, strategies, and practices to close the achievement gaps and to enhance learning opportunities for all students simultaneously in the home, classroom, school, and community.

Conclusions

Throughout this report, we have emphasized a developmental approach to teaching and learning—the affirmative development of academic ability—which we believe will lead not only to higher academic achievement for all students and closing the academic achievement gaps between diverse student groups, but also to the development of intellective competence in segments of the population with whom schools have typically not been successful. We have suggested that access to education-relevant forms of capital, combined with research-based educational interventions, may be necessary in closing the achievement gaps that exist between black, Hispanic, Native American, and low-income children and their European-American, Asian-American, and more economically advantaged peers. The conclusions and recommendations that follow provide a first step toward engaging education practitioners, policymakers, parents, and community members in leading the charge to ensure that all students receive the kinds of instruction and support necessary to meet the goals of the No Child Left Behind Act and to achieve high academic standards by the year 2014.

To move all students to the top by 2014, the National Study Group concludes that efforts at the affirmative development of academic ability should be guided by the following educational experiences in homes, classrooms, schools, and communities for all students:

- In local communities, attention should be given to socializing young people to the specific behavioral and dispositional requirements of high levels of academic work and to the explication of examples of what such efforts and products look like.
- Because academic success is associated with community and family environments that strongly support academic development, families and communities should be strengthened in their capacity to provide a wide variety of supplemental education supports for the academic and personal development of children.
- Schools and other educative institutions should give greater attention to the promotion of feelings of trust in our schools, trust in the people who staff these institutions, and trust in the processes by which teaching and learning transactions are managed.
- Schools can reinforce the belief that high levels of academic ability should be recognized as a universal civil right—a right that should not be compromised by fear of being stereotyped based on one's identity or the social division to which one is assigned.
- Attention should be given in schools and classrooms to reconciling the possible tensions between the several purposes of education—intellect development, skills development, and moral development (Wallace, 1966)—and the political agendas of diverse learners, to the end that academic learning can be seen as compatible with the purposes that inform those who must do the learning.
- Increased opportunities should be created for continuous exposure to high-performance learning environments in which children successfully experience high expectations and joyful but rigorous challenges that are at the growing edges of their zones of proximal development—the areas just beyond each student's learning comfort zone.
- Teaching and learning in the classroom should reflect a balanced focus between the content and processes that are expected to be mastered and the metacognitive understandings and strategies that are essential to making sense of one's experiences.
- For students, time and effort must be devoted to learning tasks that are relevant to the knowledge and skills to be mastered.

Recommendations

The National Study Group agrees that what we know about the development of high levels of academic ability can be reflected in pedagogical practices and polices that are within our reach. Yet determining the most appropriate and timely avenues to implement research-based proposals to improve education necessitates actively seeking opportunities to leverage existing national, state, and local policies and programs. In order to ensure that all students have access to educational experiences that are guided by the above conclusions, the National Study Group offers the following practical and immediately actionable recommendations at the national, state, and local levels.

National Level

- Colleges, universities, and policymakers should influence teacher preparation programs to refocus their curricula to strengthen teacher knowledge of subject matter and to reflect the research from the learning sciences. This task will ensure that classroom teachers will be able to introduce rigorous content and learning experiences leading to intellective competence

in all students. The current reauthorization of the Higher Education Act offers a timely avenue for influencing teacher preparation programs.

- As members of Congress and the U.S. Department of Education officials seek ways to enhance the No Child Left Behind Act, they should encourage states to broaden assessment programs to include the following: curriculum-embedded assessments, more frequent assessment probes, and dynamic measures of student learning behavior and outcomes—all of which are thought to lead to the type of school and classroom environments that support the affirmative development of academic ability.

State Level

- In collaboration with foundations and institutions of higher education, state education agencies should refocus the preparation of school leaders on the development of high-performance learning environments. In such environments, high expectations are widespread, and teachers are held accountable for content-rich instruction delivered in a context that is culturally relevant and free from prejudicial behavior for all students.
- Building on existing federal and state funding streams that provide enrichment opportunities for students such as the 21st Century Community Learning Center grants and the provisions for supplemental education services in the No Child Left Behind Act, state officials in Departments of Education and Departments of Health and Human Services should work together to refine the criteria that qualify providers of these services to design programs that set high expectations for all students.

Local Level

- In the continuing professional development of teachers and administrators, special attention should be given to better enabling staff to meet the instructional requirements of an increasingly diverse student body. Such instructional requirements should build on what we know from research about the conditions necessary for the successful transfer of knowledge.
- Teachers and school-level administrators need to reinforce daily with students, their families, and the community the belief that all students can learn to high standards and achieve intellective competence.
- Teachers who believe that affirmative development of academic ability is the key to achieving intellective competence—and structure their instruction accordingly—should receive incentives to nurture other teachers to follow a similar approach. At the very least, teachers who do not believe that academic ability is developable in all students should receive assistance with finding a more suitable teaching or work assignment. Clearly, students in the most high-need situations require teachers who believe in their ability to learn but who also can deliver the rigorous content and experience that undergird the development of intellective competence.

The charge to the National Study Group and now to the nation is guided by the belief that we cannot overlook the essential need to focus on improving the learning opportunities and academic achievement of minority and low-income students. Demographic shifts in our nation's population mandate that we attend specifically to these students' achievement if we expect as a nation to maintain our standard of living, our level of prosperity, and our place in the global economy. Simply put, we need the knowledge and contributions of students of color—together with the knowledge and contributions of all our students and all our adults—to maintain our democracy.

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APPENDIX: KEY TERMS AND DEFINITIONS

achievement gap. The statistical phenomenon of predictable lower performance on standardized tests by African-American, Hispanic, Native American, and low-income students as compared to their white, Asian, and more economically advantaged peers.

affirmative development of academic ability. The deliberate effort to equip students with strategies that build knowledge and develop techniques to solve both common and novel problems in pursuit of high academic achievement.

attributional ambiguity. The challenge that a student of color may face when receiving feedback about his or her performance and the difficulty of determining when feedback (particularly critical feedback) is accurate or is actually reflective of racial bias on the part of the one giving the feedback.

automaticity. The ability to perform a complex task without conscious awareness or effort. Through repeated practice, the task itself becomes an automatic process.

intellective competence. Systematic ways of reasoning, of inferring patterns from one's environments, and using them to maintain practices and to invent new ones; highly adaptive, rich habits of thinking; engagement in meaningful problem solving. *Academic* intellective competence is a highly specialized set of abilities that are a direct result of particular kinds of experiences over long periods of time in Western schooling.

stereotype threat. The awareness that others may judge one's performance in terms of one's racial background, rather than in terms of one's individual background.

supplementary education. The formal and informal learning and developmental enrichment opportunities provided for students outside of school and beyond the regular school day or year. Examples of supplementary education include reading with and to one's child on a daily basis, family trips to the museum or other learning environments, and community-based after-school tutoring programs, to name a few (Bridglall & Gordon, 2002).

transfer. How well what a person learns in one set of circumstances is adapted to other, novel situations.

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