BEYOND PREDICTION

Commission on New Possibilities for the Admissions Testing Program

College Entrance Examination Board
New York

Commission on New Possibilities for the Admissions Testing Program

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Foreword

On October 28, 1988, John Casteen, then chair of the College Board, sent a letter to Derek Bok, president of Harvard University. It began:

> *Dear Mr. Bok:*
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> *From time to time, the College Board reexamines its programs to verify that they serve our national purposes for education and meet high standards of quality, and to learn whether changes might enhance the College Board's performance. I write to invite you to co-chair a Commission to advise the College Board on its New Possibilities Project, which is a current review of the Admissions Testing Program (ATP), including the SAT. In a letter similar to this one, I am asking David Gardner (President of the University of California) also to co-chair this group.*

The positive responses from Presidents Bok and Gardner, and the equally positive response from the 13 educational experts whom they subsequently asked to join them on the Bok-Gardner Commission, set in motion an initiative that, in my view, has resulted in one of the most important reports done in recent decades for the College Board.

From the outset, let me thank our partners in this effort, the Educational Testing Service. They have provided much of the support work with creativity and insight. There could be no significant change to the Admissions Testing Program without their inspired collaboration.

In advising the Board on its New Possibilities for the Admissions Testing Program project, this report has taken a broad view. In its pages are trenchant observations with regard to the process of college admissions and admissions testing, as well as the educational and demographic trends that the College Board needs to consider in planning for the future of its programs. Thus it represents an exceptional contribution to our work in the area of transition of students from high school to college, and it provides the Board with an important blueprint for future activities.

Overall, the Commission has made four specific contributions.

- First is an evaluation and endorsement of the proposed changes in the SAT, which represent the culmination of a three-and-a-half-year effort undertaken jointly by the College Board and the Educational Testing Service.

- The second contribution made by the Commission and found in this report are excellent suggestions for the directions that the Admissions Testing Program might follow in the future, especially with regard to the role of computerized adaptive testing.

- Third is the Commission's thoughtful examination of the question of other indices of ability and achievement, in addition to those assessed by current tests, that should be considered with regard to admission to college.

- Finally, the Commission has endorsed the view that the transition from high school to college must be seen in a broad perspective. It does not merely include only a few activities occurring in the last years of high school. Rather, it consists of a continuum of awareness, learning, and preparation that begins as early as primary school. And, since the ultimate goal is success in college, it does not end with the arrival of freshmen on campus but continues throughout the college years until a student graduates.

In moving "beyond prediction," therefore, the College Board must take a leadership position by reaching out to all students to facilitate this process, no matter what their social and economic background, level of educational attainment, or original aspirations about attending college.

Having had the pleasure of participating in the intense discussion and deliberations of this group, I can personally attest to its industry and diligence, and to the remarkable leadership provided by its co-chairs. I believe that not only the College Board, but all of education, and, thus, American society will benefit from the outstanding work of these wise, dedicated educational leaders. It is with profound gratitude and pride that we publish this report.

Donald M. Stewart
President, The College Board

FOR MOST of a decade, America has been gripped by concern over the quality of public education. Spurred by news of high drop-out rates, declining SAT scores, and surveys that show our children lagging behind their counterparts abroad, communities everywhere are looking for ways to improve their schools. Such times of reappraisal make us acutely aware of the gravity of our problems; they also cause responsible institutions, such as the College Board, to recognize new obligations and try to contribute in new ways. To this end, we propose an ambitious agenda for the Board that offers important opportunities to serve a broader set of educational needs.

While our proposals will improve the validity of the Scholastic Aptitude Test (SAT) in predicting college grades, they will accomplish much more than that. The tests we envisage will reinforce a rigorous high school curriculum by rewarding accomplishment as well as general ability and by signaling the importance of valuable academic subjects and skills. They will also deter educationally unproductive forms of coaching. By measuring a wider range of skills and knowledge, they will likewise give a fuller picture of the strengths of each student and a better measure of the varied talents of an increasingly diverse student generation. Finally, the SAT that we recommend will include a wider variety of assessments to improve academic advising, especially for students who are not fully prepared for college and need proper placement and remediation in order to succeed.

Changes in Society That Affect the College Board

A. *Trends in Public Education*

Before discussing our recommendations, we need to place the subject of college admissions tests in a broader social context. In particular, we would call attention to several pressures and trends, highlighted by the national debate over the quality of education, that have important implications for the work of the College Board.

1. *Increasing diversity of student populations.* Students at all levels are steadily becoming more diverse in age, nationality, and ethnic background. By 1992, college students who are full time, in residence, and less than 22 years of age will make up only 20 percent of the entire undergraduate population. "Minority" students already form a majority of public-school enrollments in some states, including California, and several other states are projected to reach this level over the next few years. Meanwhile, the declining number of 18- to 21-year-olds has caused many colleges to work harder to attract older students and to recruit from "non-traditional" sources. Such individuals in turn have been attracted to college by the growing tendency of employers to require at least some postsecondary education. The resulting diversity has brought greater variety in the skills, competencies, and needs of undergraduates; it has likewise produced an insistence on fairness and equal educational opportunities for all groups. These trends underscore the importance of strengthening advising and course placement; they also remind us of the need to be constantly aware of the legitimate needs of different segments of the student population.

2. *Increased demands for skills.* The purpose of education has long been to help people to experience meaningful and productive lives and to contribute as citizens to our democratic

society. In the past decade these traditional aims have been supplemented by strong pressures for a better-educated, more highly skilled work force that will meet the needs of a technological society and satisfy the demands of mounting global competition. Recent surveys show that over half of all new jobs will require at least some postsecondary education, yet corporate executives increasingly complain that many of their new employees lack even the most essential skills. These developments underscore the need to improve the quality of public education and to encourage more students to enroll in college courses appropriate to their talents and aspirations.

3. *Growing difficulties in the schools.* Pervasive concern over the quality of education has emerged at a time of mounting problems for the nation's public schools. States and communities labor under greater fiscal constraints, while increased demands and regulations hamper the efforts of schools to perform according to expectations. Further pressures have arisen from the persistence of poverty, crime, widespread drug use, excessive television-watching, the growing disintegration of families, and other seemingly intractable societal problems. Such difficulties have strained the capacities of teachers and guidance counselors, leaving them in need of help in trying to prepare their students for college as well as cope with many other responsibilities.

B. *Concerns about Testing in the Transition to College*

While responding to these social and educational trends, the College Board must be sensitive to the growing concerns over standardized testing in general and the SAT in particular. The attitudes of professional educators and the public toward standardized tests have shifted dramatically over the last quarter century. Twenty or thirty years ago, few people questioned the work of the College Board. SAT scores were seen as reasonable, reliable measures of the basic verbal and mathematical abilities needed to perform college work. In recent years, however, the willingness of the public to accept test scores "on faith" has been replaced by an intense interest in the content, format, and use of the SAT and other standardized tests. This shift in attitude takes many forms—frequent attacks on the SAT as "culturally biased," legislative initiatives seeking to regulate testing, coaching schools claiming to train students to outwit the test-makers, and widespread skepticism about the heavy reliance on multiple-choice questions, to list just a few.

We will not try to evaluate these criticisms in detail. They have all been the subject of extended discussion in other forums. We consider them here only to the extent required to support the recommendations we make later on in the report. But we would draw special attention to a point that is often overlooked. Even if attacks on standardized tests are unfounded or exaggerated, they frequently stem from deep-seated concerns that call for a thoughtful remedy or response. For this reason, like the challenges produced by changing conditions in society, the mounting criticisms of the SAT are a valuable source from which to build an agenda for the future.

1. *Use of multiple-choice questions.* Consider the oft-repeated claim that the SAT trivializes learning by using multiple-choice questions rather than higher intellectual skills. One can respond by pointing out that the multiple-choice format actually tests much more than memory, that it predicts college performance as accurately as more elaborate tests, and that it

costs less to score, thus lowering the price for students. For these reasons, multiple-choice questions can be defended as the cheapest, most reliable way of carrying out the Board's primary mission of helping admissions officers to select students. But this response takes too narrow a view of the issue. Because of the challenges facing American education, the Board must pursue broader aims than simply helping admissions officers choose a class. For better or for worse, the format of a test as important as the SAT sends a strong signal to high school students about the types of thinking and learning that are valued in our society. A multiple-choice format carries a subtle message that recognizing the right answer is more important than working out one's own solution, and that passive learning is sufficient to get ahead. In this way, the SAT can unintentionally weaken the very forms of active problem solving and critical thinking that most need to be emphasized in high school classrooms.

2. *Coaching*. Similar lessons can be learned from complaints that the SAT causes teachers to use precious class hours preparing students for the tests while leading parents to spend money on coaching schools in hopes of giving their children a competitive edge. In response, numerous studies can be cited showing that the great majority of students who are coached in these ways do not perform better than those who simply take the SAT a second time or practice by themselves with the sample tests widely distributed by the Board. Hence, one can argue that the fault lies not with the Board but with teachers and parents who spend valuable time and money on fruitless preparatory exercises. Nevertheless, coaching and "teaching-to-test" continue to flourish across the country. As a result, it is time for the College Board to acknowledge a share of the responsibility for these practices and to take such corrective action as it can. Since it is hard to imagine any form of test that would put an end to such activities, the wiser course is to devise exams requiring forms of coaching that teach students valuable knowledge and skills instead of petty stratagems to try to outwit the testing agencies. In this way, the SAT can reinforce valuable learning rather than encourage game-playing.

3. *Limited predictive power*. Another common criticism is that the SAT adds very little to high school grades in helping admissions officers to predict how well students will perform in college. The College Board has replied by pointing to studies showing that SAT scores do in fact improve predictability significantly. We agree with the Board and believe that the common measure provided by the SAT has become more important with the spread of grade inflation and the growing diversity in the educational background of college students. Still, the fact remains that the added predictive power of the SAT is limited and is important to admissions officers chiefly in colleges that have substantially more applicants than they can admit. Moreover, SAT scores measure only one of the attributes that admissions officers wish to know about in choosing a class: the developed capacity to perform academically, especially in the first year of college. There are other attributes that would also be valuable in selecting students if valid means of measurement could be found: creativity, practical judgment, perseverance in completing academic work, love of learning and ideas, to name only a few. These limitations remind us that testing for college admissions is still an imperfect art that requires continued effort to help colleges find a fully effective, enlightened means of choosing students.

4. *Ethnic and gender bias*. There are also constant claims that the SAT is biased against women and minority groups, especially black and Hispanic students. Once again, there are persuasive rebuttals to be made. If the SAT discriminated racially, one would expect to find that blacks

and Hispanics performed better in college than their test scores suggested. In fact, a long list of studies indicates that this is not the case, although the performance of minority students is undoubtedly a reflection of the educational and economic disadvantages that so many of them have experienced. As for gender bias, it is true that women score below men on both the verbal and mathematics tests. But the slight difference in verbal scores appears to arise because more women than men take the test and because more women come from families in which neither parent has attended college. The differences in math scores are more substantial. They seem to result from the fact that women tend to take significantly fewer math courses in high school, a tendency presumably fed by the persistent myth that females lack quantitative skills. (For example, women are only half as likely as men to have taken calculus or pre-calculus courses.[1])

Even if these claims of test bias are unsubstantiated or exaggerated, their persistence reminds us how important it is to avoid artificial barriers to educational opportunity and how hard one must work to minimize suspicion on this point. Fortunately, the Board has been making special efforts to work closely with women and minority groups in constructing its tests and has constantly evaluated the SAT to guard against racial and gender bias. We applaud these efforts and hope that they continue.

In working with representatives of women and minorities, the Board must be quick to recognize valid problems that may arise for these groups. For example, it is likely that recent immigrants from Asia or Latin America, whose native language is not English, may experience difficulties on verbal tests that are temporary and remediable and hence not a permanent barrier to performing well in college. It is important, therefore, that the Board look for ways of helping colleges to identify whether this is indeed the case. In addition, the Board should encourage further research to understand more definitively why women do less well than men on the mathematics test. Finally, the Board should take the initiative in working with schools and other agencies to serve the needs of disadvantaged groups, including minorities, by encouraging them to take an early interest in attending college and by letting them know, along with their parents and teachers, what they need to do in order to prepare effectively.

C. *A Larger Agenda*

In sum, the Commission understands that the paramount purpose of the SAT is to provide colleges with the best possible prediction of academic performance at a reasonable cost and in a manner equally fair to all students. But we are convinced that changing conditions in our society require that the Board be responsive to other aims as well. The following goals are particularly important:

1. The need not only to help colleges screen and select but to encourage as many students as possible to obtain as much education as their abilities warrant.

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1. Critics also point out that women tend to receive better grades than men despite their lower test scores. Careful studies suggest, however, that this phenomenon is largely explained by differences in the types of courses taken in college and that the grade disparities largely disappear when men and women take the same academic program.

2. The need to reinforce sound curricular policies and good study habits in high school by devising tests that emphasize substantive knowledge as well as general ability while calling for skills of problem solving, writing, and the like as they are actually practiced in college.

3. The need to develop tests that lead students to prepare for the SAT in ways that encourage genuine learning.

4. The need to respond to increased diversity by helping schools and colleges guide a more varied student population to courses and programs appropriate to their talents and level of preparation.

This larger agenda presents many challenges to the Board. Fortunately, as we will show in the next section, recent advances in cognitive science, measurement theory, and computer technology open up important possibilities for achieving these goals.

Recommendations of the Commission

Our principal aim is to urge the Board to adapt its tests so that they assess a greater variety of skills and knowledge and thereby serve a wider range of needs. Most of the recommendations that follow speak directly to this purpose. We begin with the suggestions that can be put in use relatively quickly and go on to describe changes that will take a longer time to implement.

A. *Improve the Current SAT*

Several proposals to strengthen both the verbal and the mathematics components of the SAT are already under consideration by the College Board. If approved, these modifications will undergo development immediately and will be introduced in 1994. These changes will:

1. Increase the emphasis on critical reading in the verbal section of the test to approximate more closely the skills used in college and high school work by including longer reading passages and questions requiring interpretation.

2. Place somewhat more emphasis in the mathematics section on data interpretation and on application of math to problem solving in real-life situations and in forms similar to those encountered in college courses.

3. Include a significant number of math questions that call upon students to produce their own solutions rather than simply choose from a set of answers in a multiple-choice format.

4. Allow (but not require) students to use calculators on the math sections.

5. Reduce the speededness of the math and verbal sections in order to allow students to answer more questions and thus permit a better estimate of their proficiency.

These changes represent a useful, albeit limited, start in improving the SAT, and we recommend their adoption. We particularly applaud the decision to alter the mathematics test to include some questions that require students to generate their own answers. In the future, we hope that the Board will try to find ways to expand the number of questions of this type. We also urge the Board to explore ways of reporting results, such as proficiency scaling, that will convey more information to students about the meaning and interpretation of their scores and thus make the SAT more useful for guidance and placement purposes.

B. *Expand Achievement Tests*

In addition to the changes just described, we strongly encourage expanding the role and scope of the Achievement Tests. Much more than the SAT, Achievement Tests measure the mastery of particular skills and subject matter. As such, these tests have great potential in enabling the Board to serve a wider range of educational needs. Properly constructed tests of achievement reinforce the teaching of basic academic subjects and skills in high schools. In contrast to tests of general ability, they encourage ways of preparing that lead students to learn worthwhile material and master valuable skills. Finally, they serve much better as diagnostic tools to aid colleges in placing and counseling their students.

There are five principal changes that can increase the usefulness of the Achievement Tests. Each of them will help to address the broader range of educational objectives we have proposed for the Admissions Testing Program.

1. The College Board is currently considering a proposal to reclassify its tests into tests of general proficiency (SAT I) and achievement tests (SAT II). The former would include the SAT-Verbal and SAT-Math (which would be renamed the SAT I-V and SAT I-M). Among the achievement tests (SAT II-French, SAT II-Physics, etc.), the Board would introduce in 1994-95 a writing test that would require students not only to answer multiple-choice questions but to compose a 20-minute written essay. This new test, labelled the SAT II-Writing, would take the place of the Test of Standard Written English (TSWE) and the English Composition Test (ECT). Like other Achievement Tests, the SAT II-Writing would be optional in the sense that colleges could either require it or not, and students could choose to submit it as further evidence of their proficiency.

   Although costly to grade and hence more expensive for students, the introduction of a written essay offers great advantages. It will provide a welcome variation on the use of multiple-choice questions and send a signal to high schools about the importance of teaching students to write well. As a result, having been assured that the SAT II-Writing will be adequately tested to insure reliability among all population groups, we support its use with enthusiasm.

2. A valuable way of serving the needs of a more diverse college-going group would be to develop a test that will better distinguish among varying levels of English proficiency on the part of non-native speakers. Such assessments can serve several purposes in the Admissions Testing Program. They can help non-native speakers judge their preparedness to enter an American university. Performance on such tests can also help admissions officers in interpreting test scores by gauging the extent to which lagging performance on the SAT is caused by problems of general reasoning or by a lack of English proficiency, presumably a remediable difficulty. Finally, such tests can help colleges to identify students in need of continued assistance and can thus aid in making placement decisions.

3. The current selection of Achievement Tests is oriented toward able students taking traditional liberal arts subjects.[2] To meet the needs of a more diverse student population, tests should be added to evaluate a wider range of academic talents and accomplishments. For example, now that America's interests and ties have spread to all parts of the globe, consideration might be given to offering history tests that involve areas and civilizations in addition to North America and Europe. Similarly, at a time when Chinese and Japanese are among the most popular languages in many colleges, it seems especially appropriate to expand the testing of foreign languages by including these and possibly other languages. Such additions would yield two principal benefits: (1) they would encourage schools to introduce instructional programs in these languages, and (2) as previously mentioned, they would provide a means for recent immigrant students and others with strong foreign-language experience outside the classroom to demonstrate their proficiency.[3]

4. Advanced Placement (AP) tests have been among the most widely acclaimed of the College Board's offerings. Many colleges find them to be the best placement vehicle available. High schools have responded by mounting AP courses not only in affluent suburbs but in the inner city, as in the successful San Antonio experiment. In view of this record, the AP tests deserve to play a greater role, and the Board should do its best to expand their use. Just as in the case of Achievement Tests, consideration should be given to broadening the AP's to

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2. The Achievement Tests series currently includes the following 15 subjects:
   - English Composition (two versions: all multiple-choice and multiple-choice with essay), Literature
   - French, German, Modern Hebrew, Italian, Latin, Spanish
   - American History and Social Studies
   - European History and World Cultures
   - Mathematics Level I, Mathematics Level II
   - Biology, Chemistry, Physics

include Asian languages and the history of civilizations in addition to those of North America and Europe.

5. Finally, Achievement Tests could be more useful if they were adapted to help in the placement of students other than the most accomplished. The growing diversity of our students, coupled with the much-publicized problems of our public schools, has brought more young people to college who are unable to pass basic courses of traditional levels of difficulty. In New Jersey, for example, fully a third of the entering students in state colleges and universities are deficient in verbal skills, almost half are not proficient in computation, and almost two-thirds lack competence in basic algebra. Such students urgently need proper diagnosis, placement, and remediation. Where such services are available, the results can be dramatic. In a ten-year experiment in New Jersey, students who were identified as deficient and who took an appropriate remedial course were three times as likely to be still enrolled in college two years later as classmates with similar problems who were not properly placed in remedial courses.

   Although proper placement is important to students at all levels of proficiency, it has not received the priority it deserves in most colleges and universities. It is a function too-often split among many offices and departments, none of which makes sure that proper diagnosis and advice take place. Colleges should take steps to overcome this deficiency. Whatever is done, however, placement officials stand to gain a great deal from better tools from the College Board to aid them in evaluating students.

   A simple but useful step in this direction would be to enlarge the Achievement series to include tests that help place underprepared students in appropriate developmental programs in basic subjects, such as English and mathematics. Although the Board currently offers such tests to individual colleges that wish to have them, the inclusion of these or similar measures in the Achievement Tests series would increase their use and add to the information provided by the Admissions Testing Program. Such tests would also be useful to schools in advising students.

C. *Integrate the SAT and Achievement Tests through Computer Technology*

Our most important proposal proceeds from a conviction that the ideal admissions test should include *both* assessments of general ability *and* assessments that measure the knowledge of particular subjects and skills. The former will help to insure that talented students are identified and not penalized unduly for having attended ineffective schools. The latter will reinforce the teaching of important skills and knowledge, reward students for what they have accomplished, and aid in placing them in courses appropriate to their level of accomplishment.

At present, taking both the SAT and Achievement tests is sufficiently expensive and time-consuming that it is required by only a small minority of colleges. Although the Board plans to encourage more colleges to require Achievement Tests, intense competition for a declining

pool of students over the next few years may inhibit colleges from imposing this added expense on applicants. Fortunately, however, new opportunities are at hand to solve this dilemma.

Over the next decade, technology will make it possible to integrate fully the SAT and Achievement Tests into a single, computer-delivered package that students can complete in little more than the time currently required to take the SAT. The new technique that will permit this integration is known as computerized adaptive testing. This method will also permit improvements in the type of questions asked. For example, in mathematics, it will be easier to ask students to produce their own answers; in composition, it will be possible to offer items requiring textual revision.

More important, computer-adapted tests will allow each student to take a test uniquely tailored to his or her level of proficiency. Sophisticated branching techniques, based on item response theory, quickly lead test takers to a series of questions targeted at appropriate levels of difficulty, thereby eliminating time spent on questions that are either too easy or too hard for individual students. Best current estimates are that a computerized adaptive test can measure proficiency at least as accurately as a conventional paper-and-pencil test in about half the time. These gains in efficiency permit the inclusion of tests measuring a broader set of achievements and abilities without increasing the total amount of time that students spend in the testing process.

Such integration would combine in a single assessment the advantages previously described in this report: better prediction of academic performance in college, stronger signalling of the value of important skills and knowledge, reinforcement of a sound academic high school curriculum, and encouragement of useful test preparation rather than intellectually trivial forms of coaching. In addition, the integrated test could include much more helpful placement information. Branching techniques will permit more detailed testing of students of very high and very low ability, thus helping with the proper placement of both groups. In addition, the College Board has already developed computerized placement tests for basic skills in English and mathematics. Under consideration are computerized tests for students with very low math skills, a critical thinking test, and an English proficiency test for students whose native language is not English. Together, these assessments will produce a richer body of diagnostic information about the academic strengths of students than advisors and guidance counselors in schools and colleges have possessed in the past.

The Commission understands that more research and planning will be needed to resolve various technical issues and to surmount the logistical problems of insuring that huge numbers of test takers all have adequate access to computers. In particular, the Board will need to do further work to confirm its initial findings that tests can be devised which will not confer an unfair advantage on those who are already familiar with computers. While appreciating these problems, the Commission urges the Board to make every effort to move forward and introduce a fully computer-integrated testing program by the year 2000.

D. *Renaming the Test*

A test that integrates measures of achievement as well as developed ability can no longer be accurately described as a test of aptitude. Its nature and purposes are much broader. Accord-

ingly, we propose that the College Board consider adopting the title *Scholastic Assessment Test* rather than *Scholastic Aptitude Test* and using it to describe the entire Admissions Testing Program. The new wording conveys a breadth sufficient to encompass the changes in format and purpose that we have recommended while allowing the Board to continue benefiting from the wide public recognition of the acronym SAT.

E. *Reaching Wider Audiences*

As it moves toward a computer-adapted, integrated test for high school juniors and seniors, the Board should also explore opportunities for working with other agencies and organizations to reach new groups of students who need additional help and guidance in seeking a college education.

1. *Older Students.* More than half of America's undergraduates are now over 22 years of age. Fewer than one-fourth receive a B.A. within six years after first enrolling; most others interrupt their studies at some point, often to resume them at a later time. Adults out of school who are contemplating college frequently lack easy access to counselors who can encourage them to complete their studies and help them to choose an appropriate college and educational program. Many of them are reluctant to take admission tests in competition with younger students. These handicaps often keep individuals of talent from acquiring the education they need.

   The Board might consider several steps to work with colleges, businesses, and other organizations in an effort to reach this audience. It could contact older students in the armed forces, in civilian places of employment, and through the media and offer them a service organized by the Board to help them find colleges with programs of study and financial aid opportunities appropriate to their needs. It could administer tests in convenient locations, including admission tests, tests of English as a second language, placement tests, and tests to gain credit, where appropriate, for work not performed in an academic setting. Finally, the Board could make available assessments that students could administer themselves, not only to measure their academic proficiency but also to gauge their vocational interests and aptitudes (since occupational needs are so often linked with educational plans in the minds of older students).

   It is true that services such as those just described are already available at certain universities and counseling centers. But many older students are not aware of these possibilities while others balk at paying the several hundred dollars needed to take the tests and receive personalized advice. As a result, the Commission would encourage the Board to consider whether it can devise ways to communicate effectively with large numbers of older students and provide them with information at a reasonable cost that will motivate and guide them to further their education in useful ways.

2. *Younger Students*. There is mounting evidence that more and more students (and their schools) wish to have earlier indication of their chances of attending college along with advice about the skills and knowledge they require to gain admission to the institution of their choice. Thus, 450,000 students now take the PSAT *before* reaching the 11th grade, and the numbers are growing. Experimental efforts in South Carolina and California indicate that testing as early as grades 7 to 9 can interest disadvantaged students in postsecondary education and stimulate them to think about what courses to take and how otherwise to prepare for college.

   If it is to provide such guidance, the Board must develop new tests appropriate for a younger audience. Presumably, the Board will need to adapt the PSAT to provide a suitable instrument for assessing basic skills of mathematics, reading, writing, and critical thinking. Tests of English as a Second Language might also be useful for those whose native language is not English. Ideally, these assessments should be computer-adapted in order to permit a richer array of questions for diagnostic purposes. The aim, we would emphasize, must not be to discourage students nor to screen them out but to motivate and inform them so that they will work effectively to increase their chances of entering a college of their choice. Hence, the Board should include plans to inform the parents of these students how to prepare for college and finance a postsecondary education.

   The Commission is aware of the widespread concern over the amount of testing that currently goes on in public schools. We do not advocate further assessment unless it will clearly further an important purpose not currently served in many schools. At present, there are plenty of tests to assess learning but a dearth of adequate guidance to motivate students to prepare for college and inform them of what they need to do to be admitted. This gap has recently increased with the drastic cutbacks in guidance counseling that are taking place in many districts across the country. As a result, the Commission would encourage the Board to press ahead with exploring ways of providing needed help and guidance for students in grades 7 to 9. In studying these possibilities, the key question should not be whether the Board can devise new tests but whether it can encourage delivery of appropriate, personalized advice to students that will truly help them (and their parents and teachers) to know their strengths and weaknesses for postsecondary study. In this way, parents and students can come to understand what courses and forms of study they need to pursue in order to maximize their chances of attending a suitable college.

F. *New Directions for Research*

Even if all of the preceding recommendations are put into effect, the Admissions Testing Program will still be an imperfect instrument for predicting how well students will perform in college and for identifying their strengths and weaknesses for placement and counseling purposes. These limitations make it imperative that the Board undertake vigorous efforts to

search for improvements. Fortunately, new developments in research hold forth at least the possibility of significant advances both in selecting students and advising and placing them once they have enrolled.

1. Recent research in psychology has added new weight to the view that intelligence is not a unitary phenomenon but multifaceted in nature. In particular, work is in progress to explore such relevant aspects of intelligence as creativity and insight and the practical ability to use knowledge effectively by fitting it to the real world in which it will be used. The Commission lacks the expertise to judge how promising these avenues of research may be. We merely note that the forms of intelligence just mentioned are highly relevant to success in college. As a result, the Board should be quick to encourage work along these lines whenever the opportunities for progress seem promising enough to merit support.

2. Advances in technology afford further opportunities for improving the work of the College Board even beyond the benefits of computerized testing already described. Audio tapes might be used to measure the ability to listen and comprehend the spoken word. Interactive video can provide new ways of assessing students' ability to speak and understand a foreign language. Expert systems may afford a means of allowing students to demonstrate their proficiency in solving complicated problems. Computer simulations can reproduce complex situations and measure students' ability to analyze them by formulating and testing hypotheses. Once again, the Commission cannot judge how much or how soon these developments can improve upon current testing methods. We merely note that the developments seem promising enough to warrant vigorous exploration by the Board.

3. Further research and development are also needed to improve ways of grading student-generated responses so as to move further away from multiple-choice tests. Such grading is relatively easy for mathematical problems but much more difficult in other areas. Still, work in artificial intelligence may eventually help to evaluate student answers even in such complex areas as tests of verbal ability.

4. Finally, much more research is needed to improve diagnostic tools for use in counseling and placing students. The simpler task is to provide measures for identifying how much students know and do not know about given subjects. This is especially useful in such subjects as mathematics where knowledge is sequential and tests can pin-point the level of comprehension that students have attained and thus determine the type of course they should take. More difficult is the ability to discover not just *what* students do not know but *why* they do not know it. Efforts to address this problem are still in their infancy. Nevertheless, some promising experimental work has been done in devising computer programs to discover why students cannot solve certain types of math problems correctly. Research of this kind could eventually lead to much more powerful tests to aid teachers in counseling and instructing students.

In sum, while testing has made considerable headway, immense opportunities for progress still remain. Fortunately, advances in cognitive science and technology make the possibilities seem bright at the very moment when the need for better testing is particularly acute. It is a time, therefore, for the Board and other research organizations to be vigorous and venturesome in exploring new frontiers of inquiry.

Conclusion

The principal recommendations in this report can be summarized in three broad proposals:

- That the Board include more questions calling on students to demonstrate the actual skills used in college work, such as writing and problem solving, rather than simply choosing correct answers in a multiple-choice format.

- That the Board develop and eventually integrate into the SAT a wider variety of Achievement Tests that cover more fields of knowledge and assess a broader range of abilities than those included in existing tests.

- That the Board reach beyond the college-bound high school population to help older students find a suitable college and to aid students in grades 7-9 in planning and preparing for eventual enrollment.

These improvements should allow the SAT to reinforce the growth of sound high school curricula and to assist school and college officials in guiding and placing a more diverse student population. In these ways, our proposals should help the Board to contribute more broadly to the array of educational needs and challenges that have become so urgent for our economy, our society, and our young people. At the same time, the changes we recommend should also respond, at least in part, to most of the underlying concerns that have led to increasing criticism of the SAT.

These many advantages cause us to press our recommendations with enthusiasm and conviction. Still, one cannot study current assessment techniques without acquiring a clear appreciation of their limitations and a keen sense of anticipation over the improvements that advances in cognitive psychology and technology may some day make possible. Despite their value, therefore, the proposals in this report are only temporary measures that will allow the Board to make the most of existing knowledge while pressing on with a vigorous program of research. With further investigation, we can all look forward to advances that will eventually lead to methods of assessment far more helpful and reliable than those heretofore conceived.