

Constructing Educational Bridges Between High School and College*

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For many intellectually talented students, high school is a period of marking time. The courses are not challenging enough and the pace of instruction is slow. As a consequence, some lose interest in education and/or develop poor study skills. For those who are eager and well motivated to further their educational development there are several ways to circumvent this situation. Derived while working for more than a dozen years with the thousands of gifted students in regional talent searches conducted by The Johns Hopkins University, the mechanisms basically involve the concept of entering college early and/or with advanced standing.

We shall outline various options the staffs of the Study of Mathematically Precocious Youth (SMPY) and the Center for the Advancement of Academically Talented Youth (CTY) (the latter now conducts the talent searches and the associated educational programs) present to those students who express a desire for more rapid educational growth. Extensive experience has shown how successful SMPY's approach has been for many students in a variety of settings (Benbow & Stanley, 1983; Stanley & Benbow 1982 a, b; 1983 a, b). The main attraction of these alternatives is that they are extremely flexible. Each student can choose and adapt them in ways best suited to their individual ability, needs, and interests.

1. *The alternative least unsettling for many students is to take as many stimulating high school courses as possible, yet enough others to ensure high school graduation. At the same time, he or she takes one or two college courses a semester from a local institution on released time from school, at night or during summers.* The student can thereby graduate from high school at the usual age but with the added bonus of half a year or more of college credit. Some of these courses may even be used for high school credit as well. The individual can, therefore, enjoy the atmosphere of high school while still being challenged intellectually.

2. *In lieu of the above option, or in addition to it, the bright student may also try to receive college credit for high school course-work through examination.* A nationwide program run by the College Board, called the Advanced Placement Program (AP), is already well established. Every May, AP examinations are administered in some 20 subjects. On the college-level examinations, scores of 4 and 5 on a five-point scale are usually accepted by

colleges for credit; often, even a 3 is accepted. Each college or university has its own guidelines. Quite a few high schools offer AP courses that prepare students for these examinations, but such classes are not always sufficient. To ensure receiving a high score, students should supplement the course-work by studying extensively on their own. Alternatively, if they know the subject matter well, at an advanced level, students can usually take departmental examinations at the college they enter. These examinations will not be standardized, however, and perhaps unreliable or too difficult.

3. *Take correspondence courses at the high school or college level from a major university, such as Wisconsin or California.* This approach requires so much self-discipline from the student, however, that frequently it is not a satisfactory alternative. Nevertheless, this is another possible option to bridge the transition between high school and college, especially if a procedure which is suitably motivating and pacing can be set up. The student must not count on receiving college credit, however, unless arrangements have been made in advance with the appropriate department in the college or university at which he or she will matriculate.

4. *The mechanism of choice for many gifted students is subject-matter acceleration.* For example, an individual may complete Algebra I and II and plane geometry in a single school year or during the summer. This can be accomplished by "doubling up," by working with a competent mentor, or through fast-paced classes (Bartkovich & George, 1980; Bartkovich & Mezynsky, 1981; Mezynski & Stanley, 1980). SMPY has pioneered the concept of fast-paced classes in several subject matters. These classes are offered during the academic year and in the summer by CTY, formerly called the Office of Talent Identification and Development (OTID). During the summer of 1983, for example, CTY offered residential and/or commuter courses in precalculus, calculus, biology, chemistry, physics, computer science (two levels), American history, German, Latin, writing skills (four levels), etymologies, and microeconomics. The biology, chemistry, physics, and American history classes were at the high school level, but the content normally covered in a school year was compressed into three weeks.

The fast-paced precalculus program used SMPY's Diagnostic Testing followed by Prescriptive Instruction (DT \rightarrow PI) model (Stanley, 1978; 1979). Via this model the student is taught only those topics in precalculus mathematics not already mastered. Progress is evaluated through

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standardized testing. The DT→PI model is also useful in an individual mentoring (or tutoring) setting. The fast-paced classes approach has been adopted by other institutions, such as the Talent Identification Program (TIP) at Duke University (Sawyer & Daggett, 1982), the Program for the Study of Academic Precocity (PSAP) at Arizona State University at Tempe, and the Midwest Talent Search, headquartered at Northwestern University (Van Tassel-Baska, 1983).

5. *Condense grades 9-12 into three years, thereby graduating from high school a year early.* Senior-year credits, such as English, may be taken during the junior year or during summer sessions. Another possibility is to take college courses that also specifically fulfill high school course requirements, such as supplanting high school calculus with an excellent college course in calculus. The key to this alternative is a school's exercising flexibility in allowing students to arrange individual programs. Without cooperation by the school and school systems, graduating early may be difficult.

6. *Attend an early entrance college or program in lieu of high school.* The three most notable schools are: Simon's Rock College of Bard College at Great Barrington, Massachusetts; the Freshman Program of the New School for Social Research in New York City; and the program run by Professor Nancy Robinson of the Child Development Research Group at the University of Washington, Seattle, Washington (Robinson, 1983).

7. *Enter college at the end of the tenth or eleventh grade without the high school diploma.* This may seem extreme, but actually it has become a fairly common practice for highly able students. In fact, a number of institutions have set up specific programs and procedures for applicants who wish to enter college at the end of the eleventh grade. Moreover, the rules of several state boards of education allow the substitution of one year or even one semester of college credit for one year of high school credit. Thus, the high school diploma may be awarded at the end of the first year of college.

The staff of SMPY usually recommends that the student earn some college credits before leaving high school. This makes the transition smoother, when the student goes from high school to college early, either with or without a diploma. For many bright students, leaving high school early with advanced standing, via AP examination credits and/or college courses, seems to be the preferable mode.

Many of SMPY's protégés have entered college early and done well (see *Time*, 1977; Nevin, 1977; Stanley & Benbow, 1982b, in press). They attend or have attended a considerable percentage of the most selective universities and colleges. In SMPY's opinion, highly able, well-motivated, emotionally stable students can complete college by age 14 to 20, accruing considerable personal and academic benefit.

The following two case histories illustrate how students can use many of the options to bridge the transition from

high school to college, even though for most persons only a few of the mechanisms would be appropriate:

At 12 years of age, Sean (not his real name) scored 750 on the mathematics part of the College Board's Scholastic Aptitude Test (SAT-M) and 610 on SAT-Verbal. This test is normally taken by able high school juniors or seniors. Sean's scores were high, even for college-bound juniors and seniors, but truly remarkable for one his age. Through SMPY's first fast-paced mathematics class, which he began when he had just finished the sixth grade, Sean learned 4½ years of pre-calculus mathematics in weekly two-hour sessions over a period of 14 months, a total of about 120 hours of instruction. He skipped grades 7, 9, 10, and 12 and entered Johns Hopkins with sophomore standing through AP coursework and college credits earned while attending 8th and 11th grade. In December of 1976, the month he became 17 years of age, Sean finished his work for the BA degree in quantitative studies at Johns Hopkins. In September 1977, he went to the University of Chicago. There he earned his M.B.A. degree at 19 and was awarded the Ph.D. in behavioral decision theory at barely 22 with several research publications already to his credit. While still 21 he received an appointment as assistant professor at another major university. He is also a business consultant. For further details, see Holmes, Rin, Tremblay, & Zeldin in press.

A month after his tenth birthday, another student whom we shall call Hu took the SAT and scored 600 on the Verbal and 680 on the Mathematical parts. A year later he raised these scores to 710 and 750, respectively. Through diagnostic testing, it was discovered that Hu, who had taken only first-year high-school algebra, had by age 10 in the fifth grade, acquired much knowledge of Algebra II, Algebra III, and plane geometry. He learned trigonometry and analytic geometry in a few weeks, and at age 12 completed high school, while simultaneously taking calculus courses at a great university. In the fall of 1978, still 12 years of age, Hu entered college with sophomore standing acquired by means of four AP examinations. In May 1981, at age 15 he received his baccalaureate from a highly selective Eastern university with a major in physics. He also received general and departmental honors, the physics award, a Churchill Scholarship for a year at Cambridge University, and a three-year National Science Foundation Graduate Fellowship to work toward a Ph.D. degree in physics at the California Institute of Technology.

These two case histories are, of course, extreme examples of precocity and acceleration, but they illustrate well how bridging mechanisms can be used to ease the transition from high school to college. The determination as to which such combinations are best is governed by the individual's intellectual and educational needs. A moderately gifted student may take a college course or two on the side and perhaps some AP examinations but still graduate from high school at the traditional age, 17 or 18. Many more precocious students can benefit from taking college

courses on the side, along with the appropriate AP examinations, and thus finish high school early. The unique feature of these approaches is their flexibility. Whether the student is either moderately gifted or extremely precocious, the various aspects of the program can be tailored suitably to fit his or her needs.

Why entering college at a younger-than-average age or with advanced standing could be advantageous for gifted students may not be intuitively obvious to the reader. Thus, a discussion of our rationale follows:

1. Intellectually highly able youths will usually receive considerably more academic stimulation and breadth of coverage of subject matter at an academically selective college or university, as opposed to the last year or two of high school. Boredom is thereby avoided, while more advanced learning takes place.

2. By entering a more sophisticated educational environment, the intellectually precocious student is afforded greater opportunities to meet and interact with expert professionals in specific areas of interest.

3. By saving one or more years of schooling, the student gains flexibility in his or her educational development as well as in other related aspects of life. There is more time for career planning, educational enrichment, and compensating for obstacles and distractions that may develop along the way.

4. By entering a profession or vocation earlier, there are several extra years of vigorous youth in which to work more effectively. This can be especially important for physicians, who require many years of training and supervised experience before becoming full-time professionals. It is also important for researchers trained at the Ph.D. level, since their best work is often done while they are young (see Lehman, 1953).

The most common objection to the use of acceleration concerns possible detrimental effects on the student's social and emotional development. This possible ramification has been studied extensively by the staff of SMPY and others (e.g., Daggett, 1983; Daurio, 1979; George, Cohn, & Stanley, 1979; Robinson, 1983). No valid evidence has yet been found to justify the concern. Rather, for the highly able student who is reasonably well-adjusted and eager to move ahead faster than the usual rate, having to remain age-in-grade through the senior year of high school often has detrimental academic consequences without compensatory social or emotional benefits.

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