
EDUCATIONAL ENRICHMENT VERSUS ACCELERATION: A REVIEW OF THE LITERATURE

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INTRODUCTION

The impetus for this report stems from current controversy over whether “enrichment” or “acceleration” is better suited to meet the special educational needs of intellectually able students. Of course, there are those who question the validity of *any* type of intervention designed especially for a subsample of the educable population. Vociferous claims of “antidemocratic” or “antiegalarian” are raised by parents and educators who believe equality of educational opportunity implies equal experiences during equal lengths of school time for all children and adolescents. On this point, however, the U.S. Office of Education recently reported to the Congress that “We are increasingly being stripped of the comfortable notion that a bright mind will make its own way. Intellectual and creative talent cannot survive educational neglect and apathy” (1972, p. 1). Thus, in the present review it is assumed that educational intervention on behalf of the intellectually able indeed is appropriate. Consequently, evidence related to the specific type of intervention, namely enrichment or acceleration, is reviewed.

Problems in the controversy over enrichment versus acceleration stem from at least four sources. First, age segregation in American education has been a “tradition” for only little more than one hundred years (cf. Kett 1974). Second, there remains opposition to the use of tests to identify promising talent at young ages. This opposition exists despite a sixty-year tradition, beginning with the work of Lewis Terman (1916), which has shown the high reliability and validity underlying psychometric tests of intelligence. Third, educators’ perceptions of the ensuing effects of acceleration often are biased through “selective” rather than “representative” recall of adjustment problems following such intervention (see Laycock 1964). Fourth, confusion over definitions of enrichment and acceleration often blinds educators to the communality of both interventions, that is, the desire to improve the quality of education for bright children and adolescents.

This introduction describes briefly the first three aforementioned problems for two reasons. First, it is believed that certain misconceptions concerning education of intellectually able youths are pervasive enough to warrant focusing upon these areas. Second, evaluation of the efficacy of different types of educational interventions for the gifted depends upon the delineation of certain assumptions and the elimination of common pitfalls. Following these remarks, this report focuses at length on a variety of enrichment and acceleration strategies implemented primarily during the past half century. Within these two major sections, the definitional problems are discussed.

History of Chronological Age Grading in America

In a recent report to the President's Science Advisory Committee, Joseph Kett (1974) expertly outlined the evolution of chronological age-grade grouping in America. Prior to 1860, heterogeneity in the schools was the rule. This was a simple extension of the age mixture characteristic of children's social and work experience. Concerning education around 1830 Kett wrote, "Few educators found the association of boys of 12 with young men of 20 in academics or college anomalous, perhaps because age heterogeneity in the schools reflected the more fundamental age heterogeneity of the family and the peer group" (*ibid.*, p. 11).

According to Kett, age segregation was a by-product of the educational reform movement led by Horace Mann and Henry Barnard. Similarly, age segregation was contemporary with industrialization and preceded the rising tide of immigration by only a few years. Thus, the structured school experience that resulted from "enlightened ideas about childhood" (*ibid.*, p. 18) after 1820 also served the economic and political needs of a society transformed by industrialization. Age-grade grouping was well suited to the Americanization of immigrants. Moreover, the elementary schools and later the high schools provided the practical training that was necessitated by the increased specialization of industry.

Chronological age-grade grouping initially affected elementary school children aged 7 to 14 years. Yet as early as 1890 there was a substantial rise in the high school population. Kett offered two possible reasons for this. First, greater family affluence permitted extended schooling for children who no longer had to work. Second, educational certification provided an opportunity for poor children to be upwardly mobile. It was the Depression of the 1930s, however, that solidified age-grade grouping in the high schools as an American institution. This was because "... the high school was defended in the 1930s more explicitly than ever before as a 'cure' for unemployment" (*ibid.*, p. 27).

Thus, age-grade grouping is a relatively recent phenomenon of the past 100 years or less, depending on the geographical region being considered. Although based upon well-intentioned concern for educational reform, the practice initially was well suited to the political and economic needs of the nation; however, age-grade grouping survives to this day essentially unchanged. Therefore, it is

important to underscore both the relative brevity of this “tradition” and the multifaceted considerations underlying age homogeneity in order to provide needed perspective for this literature survey. In addition, an objective evaluation of enrichment and acceleration as educational methods depends upon the elimination at the outset of unwarranted assumptions concerning chronological age-grade grouping.

Use of Tests in Identifying Intellectual Talent

A second problematic area involves selection strategies for the identification of precocious intellectual ability. These strategies are necessary precursors for assignment to either enrichment or acceleration programs. According to the 1972 Office of Education report, “Types of screening procedures commonly employed in identifying the gifted included teacher nomination and group tests. Both means have about the same level of accuracy, and both fail to identify large numbers of gifted children” (U.S. Office of Education, p. 18). Nearly three-quarters of a century of evidence, however, supports the notion that intelligence test scores actually are valid indices of scholastic aptitude and that they usually are superior to teachers’ judgments.

Two classic longitudinal investigations initiated during the 1920s attest to the reliability and predictive validity of intelligence test data. First, Terman’s retrospective account of more than 1,000 gifted California children unequivocally underscored the value of test scores in the identification of unusually high intellectual ability at young ages (see Oden 1968; Terman 1925, 1931, 1954; and Terman and Oden 1947, 1959). Second, Hollingworth’s independent investigations, conducted at about the same time but in the New York City public schools, corroborated Terman’s findings (see, e.g. Hollingworth 1942, Lorge and Hollingworth 1936). In addition, related research conducted during the Second World War reported results consistent with Terman and Hollingworth (Hildreth 1943, Witty 1940). Recent investigations have provided further evidence that tests of intellectual ability and intellectual aptitude indeed are valid predictors of precocious intellectual ability (see Chauncey 1958; Chauncey and Hilton 1965; MacDonald, Gammie, and Nisbet 1964; Mauger and Kolmodin 1975).

Perhaps the most convincing evidence in support of the validity of *group* measures of intellectual ability follows a series of recent investigations being conducted by the Study of Mathematically Precocious Youth (SMPY) at The Johns Hopkins University (Keating 1976; Stanley, Keating, and Fox 1974). SMPY researchers emphasize the importance of using appropriately difficult tests for the most intellectually able students. This use mitigates common “ceiling effect” problems associated with the use of conventional tests designed for less gifted agemates (Keating 1976, Keating and Stanley 1972). Adherence to this testing strategy has led to the outstandingly successful identification of large numbers of precocious mathematical reasoners who, as junior high school stu-

dents, perform as well as or better than high school seniors on the College Board Scholastic Aptitude Test. Even more surprising have been results from two SMPY studies in which group tests were found to be far *better* predictors than teachers in the identification of mathematical talent (Stanley 1976c, 1976d).

Educators' "Selective" versus "Representative" Biases

Excessive concern that potential social and emotional maladjustment will follow the acceleration of intellectually able youths represents the third problem area. Contemporary sentiment reflects a conservative educational perspective analogous to that which presupposes that teachers are as good as tests in identifying intellectual talent, despite evidence to the contrary. Moreover, educators' perceptions of chronological age-grade grouping as traditional and purposive do little to countermand widespread zealous caution regarding acceleration.

In an important monograph Pressey (1949) posed an interesting historical-political analysis of the antiacceleration sentiment that was prevalent following World War II. According to Pressey, the 1920s and the 1940s were similar in that during both decades acceleration was rather widely implemented, although certainly for different reasons:

Twice in recent educational history, efforts to vary the rates of progress through educational programs according to ability have been aborted by an inadequacy of method plus a handicapping circumstance. In the twenties, there was much interest in the ways of adjusting progress to ability, and in the gifted child. However, social maladjustment was not adequately guarded against and became unduly feared, and the depression made the hope of early graduation into employment seem futile. The second world war brought sweeping practical experiments in acceleration. However, the burdensomeness of the lengthened school year as a method, plus the apparent unwisdom of accelerating young persons straight from high school into collegiate or vocational competition with the great number of older veterans, brought a reaction against rapid progress. Instead, the tendency has been to lengthen professional programs and to emphasize the value of maturity because of the admirable record of the veterans in college. Educators, believing as they do in the great worth of their work, have an understandable hesitancy about plans which deliberately seek to reduce the total time the ablest students have to profit from their schooling. Furthermore, the unfortunate custom of expressing amounts of education in terms of time taken leads to the implication that shortening time inevitably reduces value. (ibid., pp. 140-41)

Pressey's remarks reflect an "interactive trichotomy" of sorts. Note that he reported that the acceleration interventions of the 1920s and the 1940s were curtailed through an "inadequacy of method plus a handicapping circumstance." However, it is impossible to separate the "method" and "circumstance" problems from what Pressey called the "unfortunate custom of expressing amounts of education in terms of time taken." Put differently, the educational "lock step," an intrinsic component of chronological age segmentation, provided only tenu-

ous support for the acceleration efforts of the twenties and forties. Consequently, these efforts faltered, probably due more to the “handicapping circumstance” than to the “inadequacy of methods.”

There are at least two other reasons for contemporary antiacceleration sentiment among educators. First, it seems that a disproportionate amount of caution against acceleration stems from the unfortunate case of William James Sidis (see Montour 1977). Yet, according to Stanley, “For every William Sidis who renounces intellectual pursuits because of extreme—and apparently quite unwise—parental pressure, there are many persons . . . who benefit greatly from the time saved, frustration avoided, and stimulation gained” (1976e, p. 237).

The second point regards what some researchers have called educators’ stereotypes of gifted youths (e.g., Solano 1976) and, by extension, of gifted accelerants. According to Laycock, this stereotyping represents a problem in perception, what he terms educators’ “selective” use of evidence despite psychologists’ “representative” research concerning the effects of acceleration. “Administrators have reported the cases they remember best, while psychologists have insisted upon good samples. . . . It is particularly disquieting to realize that more administrators these days have at least had token exposure to survey methods, experimental-logic, and statistical reasoning” (Laycock 1964, p. 1006). In other words, administrators’ reluctance to endorse acceleration, despite evidence supporting the intervention procedures simply may reflect these individuals’ *choice* to overlook such evidence.

In this report, research is reviewed concerning enrichment and acceleration as educational interventions appropriate for the needs of intellectually able youths. Laycock’s point, however, is intended to denote a common pitfall; namely, some educators tend to disregard empiricism when the issue of acceleration arises. Moreover, the question of socioemotional adjustment following acceleration is perhaps the most typical point of disagreement among proponents of acceleration or enrichment. Therefore, throughout the report close attention is directed to data bearing on this issue.

ENRICHMENT

Lateral, Nonaccelerative Enrichment

This section reviews so-called lateral enrichment (cf. Havighurst, Stivers, and De Haan 1955). Stanley (1976e) uses two terms to describe this type of intervention: *irrelevant academic enrichment*, and *cultural enrichment*. According to Stanley, “Irrelevant academic enrichment . . . consists of setting up a special subject or activity meant to enrich the educational lives of some group of intellectually talented students. It pays no attention to the specific nature of their talents” (ibid., p. 234). Notice that this designation disregards the question of segregation based on ability. That is, it makes no difference whether the special

activity occurs within the regular classroom (heterogeneously grouped), or within an ability-segregated classroom (homogeneously grouped). The *nature* of the intervention actually is appropriate for most students—if not presently, then perhaps in a year or so.

Three criteria characterize lateral, nonaccelerative enrichment as discussed in this report. First, the intervention is *claimed* to be appropriate for individuals with superior intellectual ability. Second, there is great likelihood that such an enrichment intervention also is appropriate for less intellectually precocious individuals. Third, lateral, nonaccelerative enrichment maintains the individual's age-in-grade status; that is, no attempt is made to accelerate the educational pace of the students.

The Havighurst, Stivers, and De Haan (1955) definition of lateral enrichment corresponds to our definition: *lateral enrichment* is “encouraging older children to broaden their experience by working in areas not explored by the average student” (p. 21). According to Havighurst, lateral enrichment includes training in the following areas: art, music, drama, creative writing, and foreign language, provided such language is studied at an unusually young age, for example, during one's elementary school years.

The lateral, nonaccelerative enrichment literature reported in this section is divided chronologically into four subsections: pre-1950, 1950 to 1959, 1960 to 1969, and 1970 to the present. Additional reference lists, including citations to review articles, follow each subsection; in all, seventy references are cited.

Pre-1950. One of the earliest interventions (Danielson 1929) described an attempt to group homogeneously students at or above Stanford-Binet IQ 125 for a reading course in general literature. Separate special classes for bright students in California in the 1930s have been reported (Addicott 1930, Goddard 1933, and Gould 1939). Dransfield (1933) cited the administration of an in-class enrichment program for students of above-average ability. In addition, Osburn and Rohan (1931) noted that activities clubs were organized for the gifted in Wisconsin; such clubs were intended for individuals interested in radio, newspapers, forestry, mechanics, and arts and crafts.

During the 1940s considerable attention was paid to the formation of special enrichment classes for the mentally gifted (see, e.g., Brown 1949, Handy and Lindstrom 1944, Mosso 1945, Nelson and Carlson 1945, Shearer and Fannin 1949). For communities too small in population to offer special classes, Thorndike (1941) suggested the provision of a room where gifted children might work independently in order to avoid the repetition of classroom instruction. Mosso (1944) suggested starting a “library corner” for students of over 120 IQ in which they could engage in independent study or hold seminars. Seegers (1949) emphasized investigation, reading, and creative work within the heterogeneously grouped class for the child with an IQ above 135. Similarly, a national survey following World War II found strong support for within-class enrichment (Wilson 1949). Additional references on this topic are Cook (1948), Jensen (1927), Miles (1946), Newland (1941), Witty (1940), and Woods (1944).

1950 to 1959. During the early 1950s a number of reports called for special enrichment programs to meet gifted students' needs (Anderson 1954, Hayes 1954, Shufele 1953). Bowman surveyed twenty-four California school systems concerning provisions for gifted students. Enrichment in the regular classroom was cited most often, followed by elementary school "grade-skipping" in eleven of twenty-four California cities. Nevertheless, "double promotion," as this type of acceleration sometimes was called, was much less common in the secondary schools. Bowman suggested that this circumstance was due to decreased need because of "wider course offerings" in high school (1955, p. 199).

Three years prior to the Soviet launching of Sputnik, Oliver (1954) suggested the following five enrichment devices that fit the criteria for inclusion in the category "lateral, nonaccelerative enrichment":

1. Have gifted children do more toward planning, carrying out, and evaluating of their own work.
2. Expand the range of interests and experiences, especially through the activity program calling for full development of creative abilities.
3. Set high standards of accomplishment. . . . The gifted should become ready to prove their points.
4. Enlarge firsthand experiences through trips, excursions, construction activities, and supplementary reading. While it may be pointed out that such experiences are valuable for all pupils, again it is a matter of degree, of realizing that superior pupils "take away" much more from such experiences.
5. Develop civic responsibility through extra school projects. (Oliver 1954, p. 321)

Indeed, these activities inherently are worthwhile "for all pupils," yet they certainly are irrelevant for furthering skill in a particular area for which a youngster is exceptionally talented. Moreover, these suggestions seem better suited as principles of general education, rather than special education.

Blaudauf (1959) reported an evaluation of an in-class enrichment program in three Cedar Rapids, Iowa, schools for students of IQ 125 or higher. Slight overall differences between control and experimental groups prompted him to suggest, "The enriched curriculum may not have supplied a sufficient challenge to mentally advanced pupils, constituting a kind of interesting or uninteresting busy work" (p. 183). However, Blaudauf noted that teachers in the experiment had not been blind to subjects' group membership and "may have unconsciously and informally enriched their program" (*ibid.*, p. 183); therefore, results from this study are inconclusive.

Additional references include the following: Fliegler and Bish (1959), Gilfoy (1958), Lesse (1957), McWilliams and Birch (1957), Newland (1953), Powell (1954), West (1958), Williams (1958), and Witty (1956).

1960 to 1969. California's educational intervention for the gifted in the 1950s included enrichment in the regular classes, acceleration, and special grouping at the elementary and secondary levels (Martinson 1960). These pro-

grams received positive evaluations; according to Martinson, “[Those students] who started the program year with high achievements, good attitudes and motivation, and high status with their classmates, made striking gains academically with no penalty to themselves in personal-social areas” (1960, p. 343).

Gallagher et al. (1960) attempted to adapt educational programming to meet the individual needs of elementary school children. They reported positive subjective attitude changes, although objective tests failed to demonstrate program efficacy. Nine years later, Plowman (1969) reported the trend concerning individualized instruction in the education of gifted children to be as follows: “In general, enrichment programs in regular classes should provide greater breadth and depth of learning, more opportunities for developing creative behaviors, increased emphasis on rich social experiences, and ample freedom to pursue independent study” (ibid., p. 548). It would seem, however, that the individualized approach reserved for education of the gifted, like Oliver’s five enrichment strategies cited above, ought to be incorporated within the aims of general education.

Gross and Sabatino (1965) indicated positive gains in general reading ability for gifted first and second graders enrolled in an experimental class. According to Birch and Reynolds (1963), however, this has been the exception, since “Very little work [was] described in the literature which could be classified as research, as field testing, or as demonstration with built-in evaluation devices” (p. 93). The dearth of curriculum research contrasts markedly with developments in modern mathematics and physics as reported four years earlier by Fliegler and Bish (1959).

Perhaps the single most important shift since Terman’s work on educating the gifted followed major contributions in the area of creativity and intelligence (Torrance 1962, Getzels and Jackson 1962). Torrance and Myers (1962) succeeded in teaching gifted grade-school children research skills and concepts. They used the Torrance Tests of Creative Thinking, which have not been restricted solely to use with intellectually precocious children (nor should they be).

Shouksmith and Taylor (1964) and Ewing and Gilbert (1967) reported positive effects on academic performance resulting from high-ability intermediate-school pupils in Great Britain and high-ability college students in the United States. Despite the appropriate use of high-ability, noncounseled control groups in both studies, the question remains as to whether counseling alone might improve the academic performance of *less able* students as well. More research is needed to answer this question.

Additional references: Braunstein (1968), Enzmann (1963), Frierson (1969), Gallagher and Rogge (1966), Gowan (1961), Hanson (1968), Hausdorff and Farr (1965), Rippin (1969), and Rowe (1967).

1970 to the Present. Frierson (1969) reviewed the literature on the gifted and the talented and reported that “Since 1965, research related to the gifted has indeed shifted dramatically from a concern for the gifted child to a concern for the creative process” (p. 25). Continuing this trend was Torrance (1970), who

advocated inclusion of creativity within a broader definition of giftedness. Gowan (1971) recommended lowering conventional IQ cutoffs for inclusion within the gifted child category because it was maintained that creativity and intelligence correlated substantially below IQ 120. Other researchers reported a continuation of lateral, nonaccelerative creativity training for the gifted (e.g., Bachtold and Werner 1970; Bachtold 1974; Wilson, Greer, and Johnson 1973).

Ryder (1972) reported enriching the lives of gifted fifth graders through museum study. Similarly, Isaacs (1971) suggested the use of Greek mythology in the education of the gifted. Toomin and Toomin (1973) recommended biofeedback as a potential means of enhancing the gifted child's self-discovery, self-awareness, and self-determination. Martinson, Hermanson, and Banks (1972) described an independent study program for gifted students covering a wide range of course materials. Finally, Dunn's (1972) evaluation of one-day excursions for gifted sixth and eighth graders to a college campus was negative mainly because of the time that was wasted on the bus and because of the late hour associated with termination of the excursion.

Each of these interventions—museum trips, courses in mythology, biofeedback, independent study, and one-day excursions—undoubtedly are broadening experiences in and of themselves. They exemplify the kinds of lateral nonaccelerative enrichment advocated for intellectually precocious youths. However, no research has demonstrated the suitability of such enrichment solely for those individuals gifted in mental ability. A need exists for systematic evaluation of lateral, nonaccelerative enrichment of the type described in this section—an evaluation involving use of matched control groups of average and below-average ability.

Additional references on this topic include Feldman and Bratton (1972); Crockenberg (1972); Isaacs (1973); Lazar, Gensley, and Gowan (1972); Sato (1974); and Stanley, George, and Solano (1978).

Relevant Academic Enrichment

This section reviews the literature termed *relevant academic enrichment* (Stanley 1976e, p. 235). The term *relevant* is intended to connote the idea that this type of enrichment fits the special educational needs of students with specific superior intellectual abilities. In contrast with lateral enrichment, relevant academic enrichment is appropriate solely for intellectually precocious youths because it acknowledges the inadequacy of conventional education, given the above-average special talents of a small number of students. Relevant academic enrichment contrasts with outright acceleration because it maintains the age-in-grade lock step discussed earlier. Therefore, if one endorses the notion that individual differences in mental ability exist but agrees with the relatively recent tradition of age segmentation in schools, then one probably would advocate some type of relevant academic enrichment.

One problem arises upon completion of such an enrichment program. Ac-

cording to Stanley, "The more relevant and excellent the enrichment program, the more it calls for acceleration of subject-matter or grade placement later. Otherwise, it just puts off the boredom awhile and virtually guarantees that eventually it will be more severe" (1976e, p. 235).

It is not difficult to discover why educators are reluctant to follow up true enrichment with acceleration (see Keating 1976). In 1951 the principal of the Princeton (New Jersey) High School commented:

By his very nature, the gifted child has an enriched life in his experiences, insights, and appreciations. But the child cannot grow to his potential with self-direction only. He needs planned enrichment. The enrichment of subject matter and other educational experiences seems to have the advantage of adopting the material and teaching to the individual without the accompanying possible danger of social maladjustment involved in "skipping." (Meister and Odell 1951, p. 43)

According to Odell (1933), educators' concern over acceleration's potentially detrimental social effects warranted maintenance of chronological age-grade grouping within enrichment programs. Yet such programs were designed initially for students of superior *mental* ability in order that such students could progress at rates appropriate to their ability. Undoubtedly, such contradictory educational practices engender academic boredom for gifted students, if not in the short term, then, ultimately at some point in time when education appropriate to their abilities terminates.

In the following sections, three types of relevant academic enrichment implemented during approximately the last forty years are presented.

Special Schools. Hollingworth (1936) described a newly opened, unique elementary school designed for children with a tested Stanford-Binet IQ of at least 130. Speyer School was based on the principle that intellectually superior children could master regular curricula in half the time it takes average-ability students. However, in contrast to the special Terman classes reported elsewhere (Lamson 1930, Hollingworth 1929), Speyer School was designed for nonaccelerative enrichment during the time saved by acceleration in the regular course material. In other words, students at Speyer School worked through the ordinary curricular materials at a faster pace, then participated in courses which they otherwise would not have found in New York schools. The course enrichment areas included French, art, nutrition, music appreciation, elementary science, and the history of civilization (Hollingworth 1936, p. 87).

Over the years New York City was foremost in the establishment of special schools for intellectually precocious students. Since the 1940s Hunter College Elementary School had provided special education for students of superior ability (Braumbaugh 1944, Hildreth 1952). Meister and Odell (1951) noted that four New York secondary schools were designed specially for high-level ability: Brooklyn Technical High School, High School of Music and Art, Bronx High School of Science, and Stuyvesant High School. Since all of the above schools employed curricula appropriate to the superior ability of their students, presum-

ably progress through such schools could be accelerated. Instead, these schools endorsed qualitative enrichment while preserving the chronological age-in-grade lock step.

Special Within-School Programs. Two well-known examples of special within-school enrichment programs for intellectually superior students are the Cleveland Major Work Classes (e.g., Goddard 1928) and the Colfax Plan in Pittsburgh (Pregler 1954). One evaluation of the former project matched equally bright graduates of the Regular Work Classes with Major Work Classes alumni (Sumption 1941). Based on results from a questionnaire, Sumption reported significant differences in favor of the Major Work graduates in areas of leadership, reading activities, sense of social responsibility, and development of individual attitudes.

Barbe's (1954, 1955) evaluation of the Cleveland project reported a 77 percent return from a questionnaire sent to persons who had been graduated from the program between 1938 and 1952. Among those responding, slightly under one-half voiced approval of the program, while a little over one-third approved with hesitancy. In contrast to Sumption (1941), Barbe had not matched Major Work alumni with equally bright graduates of the regular course program. Therefore, there remained some question about the overall efficacy of the Cleveland Major Work Classes. Since the evaluation of a similar program, the Detroit Major Works Project (Fine 1953), likewise failed to include a control group, conclusions about such projects remain incomplete.

Parker (1956) reported a relevant academic enrichment program for bright (IQ above 125) elementary school children in Iowa. Both experimental *and* control groups were in the same classroom. Parker concluded the following:

- (1) Normal achievement of mentally advanced pupils was not disturbed adversely by the provision of curricular enrichment, and in many cases significant favorable differences in achievement were shown.
- (2) According to the measuring instruments used, the provision of curricular enrichment caused no detrimental effect on pupil adjustment and personality. . . .
- (3) The data indicate that in the majority of cases curricular enrichment, when offered to mentally advanced pupils in the regular classrooms, proved to be beneficial to the average students in the classroom. (Parker 1956, p. 24)

Parker's first two conclusions supported notions of the efficacy of the Iowa program. However, the third point indicated that what may have been designed initially as enrichment appropriate only for intellectually able students might, in fact, have been interpreted too closely to mean general intellectual ability. If that was the case, then the Iowa intervention for gifted children was in reality another instance of lateral enrichment poorly suited to the specific needs and abilities of the intellectually able.

Fast-Paced Classes. The third type of relevant academic enrichment, fast-paced classes, also could be described as subject matter enrichment that

might or might not be accelerative. During the past thirty years a number of investigations have been conducted on the problem of subject matter enrichment (e.g., Briggs 1947), especially in mathematics (Albers and Seagoe 1947, Fox 1974, George 1976, George and Denham 1976, Stanley 1976b, Wilson 1959). Depending on the use made of time gained through such fast-paced classes, studies of this type were either "terminal (one-course) enrichment" projects or useful enrichment-acceleration combinations.

Wilson (1959) provided an example of nonaccelerative relevant enrichment in which algebra was taught three days per week to gifted junior high school students. During the remaining two days students engaged in activities previously discussed as lateral enrichment, for example, "preparation and presentation of individual research reports, visits to and note-taking at college lecture series [and] field trips to local industries" (p. 157).

In comparison, Briggs (1947) reported a World War II attempt at the Ohio State University in which educational psychology students participated in a fast-paced seminar course. Briggs stated that "When paired with others of equal ability in regular classes, the 'seminar' students scored somewhat higher on objective tests" (p. 214). Presumably the time saved by taking the fast-paced seminar permitted students to graduate early since they were able to take more course work and complete each course in a shorter period of time.

Those conducting SMPY, the Johns Hopkins Study of Mathematically Precocious Youth, have reported outstanding success with fast-paced mathematics instruction for extremely able students of mathematics (Fox 1974; George 1976; George and Denham 1976; and Stanley 1976b, 1977, 1978a, 1978b, 1979). For example, Stanley and colleagues have demonstrated that for very superior students, as few as 100 to 120 hours are sufficient to teach as much as four and one-half years of precalculus mathematics (Fox 1974). If intellectually precocious students avail themselves of the time saved through enrolling in fast-paced courses to study their area of expertise further, then such fast-paced courses stand in marked and obvious contrast to nonaccelerative enrichment (e.g., Wilson 1959). Moreover, a sustained effort, which is possible only through acceleration at some point in an academic career, is less likely to "wash out" over time (see Meeker 1968).

Some additional references are: Glennon (1957), Saslaw (1961), and Williams (1958).

ACCELERATION

Pressey's definition of acceleration presented in the introduction to his classic monograph on that subject is most succinct yet pragmatically objective. According to him, acceleration is "progress through an educational program at rates faster or ages younger than conventional" (Pressey 1949, p. 2). It is important to note, however, that entrance into an educational program—for example,

college—at an unusually young age usually implies progression through an earlier phase of the educational “lock step” at a rate faster than conventional. That is, matriculation in college at a younger than conventional age usually means that the individual “skipped a grade” or participated in an accelerated program. For example, a student might complete junior high school in two years, rather than in the standard three years (e.g., Woolf 1957). On the other hand, accelerants who complete a program in less time than usual may *not* necessarily be *younger* than the more conventional graduates. At the time Pressey wrote his monograph there were many World War II veterans either enrolled or planning to enroll in college in order to resume educational programs that the war had interrupted. If, for instance, these veterans were involved in military service for at least two years and in an accelerated college program for three instead of the usual four years, this still would leave the veterans at least one year older than the usual age of persons receiving their baccalaureates.

A second point concerning Pressey’s definition is that the specific type of acceleration that qualifies a student for the category “younger-aged accelerant” usually is not specified in the research literature. For example, a student who begins college at age 16 undoubtedly is younger than most college entrants; consequently, he or she is included in an experimental group of younger-aged college entrants. Yet there is usually no mention made concerning *how* this student qualified for college when he or she was one to two years younger than the norm. There are *at least* five possibilities: early admission to primary school at age 5 instead of 6; “grade skipping” in elementary school; “grade skipping” in secondary school; participation in a special accelerative or enrichment program that may have shortened the elementary program by one year; or entering college as a full-time student without completing the twelfth grade. (See Stanley 1979 for a more extensive list.)

Moreover, if one considers younger-aged college *graduates* instead of *entrants*, at least five additional alternatives arise: entrance with sophomore standing based on advanced placement credit; early completion of college with credits earned through examinations and/or heavier-than-average course loads; attendance throughout an extended four-quarter academic calendar; studying for two degrees concurrently (e.g., B.A. and M.A., done fairly often at The Johns Hopkins University); or skipping the baccalaureate and working directly for the doctorate.

Most research on early or younger-aged college entrants fails to distinguish among the *types* of acceleration that enabled students to achieve early entrance status. Such literature does, however, attend very closely to the academic and socioemotional adjustment presumed commensurate with early entrance (e.g., Fund for the Advancement of Education 1957, Keys 1938). Other researchers studying college-level acceleration disregard age at entrance and evaluate, instead, programs of acceleration that enable part of the initial cohort to graduate earlier than is usual (e.g., Flesher 1946). Research concerning elementary and secondary school-aged youths generally reports the effects of moving children at

rates faster than conventional, for example, “grade skipping” or “double promotion,” as it used to be termed (e.g., Klausmeier 1963). In contrast, at the youngest age of participation in the educational process, considerable research has been undertaken to evaluate the effects of early entrance to school (e.g., Worcester 1956, Hobson 1963).

Finally, research on educational acceleration for the most part reports *retrospective* methodology, usually case studies or group comparisons of accelerants versus nonaccelerants matched on any number of variables from one to many. Two notable *prospective* exceptions involved an experiment at the University of Chicago in the 1930s and 1940s (Bloom and Ward 1952), and an early-entrance program conducted by twelve colleges and universities during the 1950s (Fund for the Advancement of Education 1957). Both types of analyses of acceleration indeed warrant our attention. Moreover, the evidence compiled from successful case histories of acceleration is impressive; several instances will be reported.

In order to look at acceleration more carefully, the following topics are discussed: (1) caution concerning socioemotional adjustment; (2) studies of early entrance to college; (3) research on rapid completion of the bachelor’s degree; (4) acceleration at the elementary and secondary school levels; and (5) research on early admission to elementary school.

Caution Concerning Socioemotional Adjustment

A review of the literature concerning recommendations that gifted youths be accelerated revealed countless references advising educators to exercise *extreme caution* with regard to accelerating intellectually able youths. Apprehension stemmed from a belief in the potential hazards of social and/or emotional maladjustment coincidental with acceleration. Most early objections were based on case studies of quite mentally apt children who were *not* necessarily accelerated or enriched within the schools (Edelston 1950; Regensberg 1926, 1931; Thom and Newell 1945; Wells 1949, 1950; and Zorbaugh 1937). However, results from these cases are inconclusive, for not a single investigation or article reported *base rates* for socioemotional maladjustment in the juvenile population at large. No attempt was made at matching gifted youngsters who had problems with average-ability control children, similarly plagued, to determine whether unusual intellectual precocity accounted for the socioemotional problems.

In contrast to the overwhelmingly cautious sentiment among psychologists and educators, Hollingworth (1931, 1932, 1936, 1939) was quite reasonable and optimistic in her regard for potential social setbacks among the gifted. Rather than cite instances of social maladjustment, she pointed out that early problems for young gifted children often disappear over time and on their own. On the other hand, Hollingworth advised that there would be problems for *educators* whose responsibility it was to forestall social alienation by the students’ less

gifted agemates as well as to minimize gifted students' disenchantment with schooling.

Educators continued their cautious refrain about social maladjustment unless acceleration was approved after very careful consideration of multiple factors (Cutts and Moseley 1953a, 1953b; Morgan 1957). At most, educators would recommend only one year of acceleration (Hall 1958). There was no question when it concerned deciding between social adjustment and mental growth (Taylor 1943). This leaning toward a social adjustment policy occurred despite considerable evidence reported by Terman (1925–1959) and his associates that mental growth and social-emotional adjustment generally went hand in hand. In contrast with Taylor (1943), Bonsall (1955) pointed out that, although very bright accelerated children initially felt some socioemotional handicaps, they evaluated the accelerative experience positively. This issue will be discussed further at a later point in this review.

Recent writers still maintain a cautious regard for acceleration (Bridges 1973; Weinstein, Mitchell, Schwartzstein, and Hirschhorn 1966). For the most part, however, these warnings are based more on intuitive than on empirical grounds. All indications point to the maintenance of professional attitudes of excessive concern over potential socioemotional maladjustment among intellectually precocious young accelerates, and too little concern about the probability of maladjusting effects resulting from inadequate intellectual challenge.

Studies of Early Entrance to College

Biographical Case Histories. Three reviews, written approximately twenty years apart, report abundant evidence of outstanding and extreme precocity throughout history (Hollingworth 1929, Miles 1946, Montour 1977). For the most part, these are prodigies who completed college at unusually young ages and continued their success throughout life. We quote at length from each article in order to underscore the extreme break with conventional age-grade grouping practices exemplified by these individuals. First, Hollingworth cites seven instances:

The following great and long-lived men, as examples representing many others, entered the university as regular students before they were fourteen years old. James Thompson entered at twelve years of age, became a great engineer, and died aged seventy. William Thompson, his brother, who later was made Lord Kelvin, entered at the age of ten years, won fame in the field of physics, and died at eighty-three. The mathematician Gauss went to the university at eleven, won fame in his studies, and lived a long life of intellectual accomplishment. Justice Bennett Van Syckel entered Princeton at thirteen, was graduated at sixteen, and died at ninety-one after a distinguished career, including thirty-five years of service on the bench of the Supreme Court. Judge Lacombe, recently deceased, federal jurist in the United States for

twenty-nine years, was graduated from Columbia College with honors at the age of seventeen. He was so young when he received his degree in law from the same university that he had to wait two years before he could be admitted to practice. He died, aged seventy-nine. Elihu Root was graduated at nineteen from Hamilton College, as valedictorian of his class, and at the age of eighty is actively engaged in such a way to be called "counsel to the world." (Hollingworth 1929, p. 274)

Next, Miles (1946) cites at least eight instances in which a combination of excellent tutors and flexible college admissions policies permitted now-famous individuals to enter college early as well as get a head start on significant careers:

Karl White, Macaulay, and John Stuart Mill were instructed individually at rates of speed far beyond those of even the most superior of private schools or opportunity classes, and the curricula devised for them were designed to cover by the age of 10 or 12 the elements and many of the higher aspects of liberal education, including the languages, literature, history, mathematics, theoretical science, and philosophy. Many other children besides, including Lord Kelvin, physicist, his brother James Thompson, engineer, Grotius, founder of international law, and the philosophers Bentham and Scheiermacher, were prepared by tutors or under flexible school plans which permitted college or university matriculation at the age of 11 or 12, followed by long careers of brilliant and active accomplishment. Men who achieve the distinction of inclusion in *Who's Who* and the notable group of starred men of science have as a rule passed more rapidly through the elementary and college preparatory school years than the average boy. (Miles 1946, p. 1029)

Third, Montour (1977) focuses on the unfortunate outcome of one man whom she termed "the archetypal father-exploited prodigy," versus the celebrated prodigy Norbert Wiener. In direct contrast with Sidis's case, however—and meant to underscore the infrequency of cases like it—Montour (1976, 1977, 1978) reviews many instances of successful completion of college at ages considerably younger than usual. Two "precocious Harvard alumni" exemplify the degree of eminence associated with those cases cited by Montour:

Two less familiar figures than the oft-cited cases of Increase and Cotton Mather were even younger than Sidis when they got their degrees from Harvard. Paul Dudley, who was really the youngest man to graduate from Harvard (not Sidis, as claimed), entered at age 10 (class of 1690) and took his first degree at age 14. Dudley led a full life at the college and became an eminent Massachusetts jurist who was appointed Chief Justice in 1745. Andrew Preston Peabody was another youthful Harvard graduate at age 15. Both an academic and a minister, he served as acting president of Harvard College in 1862 and was its overseer for ten years. . . . (1977, p. 276)

Successful prodigies that are more recent include Merrill Kenneth Wolf, who took his bachelor's degree from Yale at barely 14; John Rader Platt, who took his bachelor's degree from Northwestern in 1936 at age 17; and Charles L. Fefferman, who finished college degree requirements at 17 in 1966 at the University of Maryland. Fefferman currently is Princeton's youngest full professor after having become a full professor of mathematics at the University of Chicago at age 24 (Montour 1978, p. 277). In addition, Harold Brown, United States

Secretary of Defense under President Carter, was graduated from the Bronx High School of Science at age 15, completed his bachelor's degree at Columbia at age 18, and earned his Ph.D. in physics at the age of 21 (Walsh 1977).

Recent preliminary follow-ups from the Study of Mathematically Precocious Youth at The Johns Hopkins University (Stanley, Keating, and Fox 1974; Keating 1976) report successful college experiences among over ninety-five young men and women who entered college at least one, and as much as six, years early (Stanley 1976f, p. 41). To date these youths have been remarkably successful academically, socially, and emotionally. For journalistic reports about the vanguard of this group see *Time* (1977) and Nevin (1977).

Early Studies of Younger Aged College Entrants. Two excellent reports reviewed extensively the research literature prior to the mid-1930s. Pressey (1949) cited eleven studies of younger-aged students who completed college early. Seven of these reported results based on young entrants at the following universities: Harvard (Holmes 1913), Columbia (Jones 1916), Minnesota (Pittenger 1917), Dartmouth (Husband 1923), Northwestern (Lloyd-Jones 1929), Columbia and Barnard (Gray 1930), and the City College of New York (Payne 1930). Pressey also cited four review articles in his monograph (Dwyer 1939, Learned and Wood 1938, Odell 1933, and Silverman and Jones 1932). Summarizing the foregoing review literature he concluded:

Evidence was practically unanimous that younger entrants were more likely to graduate, had the best academic records, won the most honors, and presented the fewest disciplinary difficulties. The evidence is also that the younger entrants are highest in ability; their superior academic record is presumably a product of this attribute. . . . When ability is allowed for, the accelerated students thus still turn out as well as average entrants, or even seem to have profited to some extent by acceleration. (1949, p. 78)

Keys's (1938) review overlooked two studies reported by Pressey (i.e., Pittenger 1917, Lloyd-Jones 1929) but included five additional references. One study, an exception to Pressey's generalization, was reported in a footnote. It noted that at the University of Illinois for the academic year 1909-10 correlations of 0.09 and 0.20 between academic grades and chronological age were reported for samples of men and women, respectively (see Keys 1938, p. 159). Two references reported the success of young entrants to Purdue University (Remmers 1930) and Amherst (Phillips 1934). The remaining two citations (Bear 1926, Whinnery 1926) also reported higher grades among younger entrants when compared with classmates in general (Keys, p. 160).

Keys, an early advocate of the use of controlled investigations in the study of accelerative techniques, cited two studies (Moore 1933, Sarbaugh 1934) as superior examples when compared with previous research because of their inclusion of matched ability comparison results. According to Sarbaugh, fifty-seven University of Buffalo students aged 16 or younger were paired with a control group of equal size on (1) the New York State Regents examinations, (2) approx-

imate class rank, and (3) the American Council Psychological Examination scores. Average freshmen grade point averages and individual subject scores for the two groups were equivalent. Only 5 percent of the young group felt intellectually handicapped in college; however, no comparison data on this point were reported. Moreover, 32 percent of the young group reported some social handicaps because of youth, but again, lack of comparison data renders such percentages difficult to interpret. Undoubtedly, a certain proportion of all college freshmen experience some social and emotional maladjustment. Thus, normative data are essential for valid interpretation of this type of results.

At the University of California at Berkeley during the period from 1922 to 1930 there were 238 entrants who were under 16½ years of age (Keys 1938). In order to assess the academic performance and socioemotional adjustment of these young Berkeley students, Keys selected a control group of students aged 17 and over. However, a comparison of the underaged group with conventional-aged entrants revealed discrepancies in the socioeconomic backgrounds of the two cohorts: "The proportion of students with professional fathers is nearly twice as great among the underaged as in the control group" (*ibid.*, p. 177). Despite this finding, Keys made no attempt to control for these outstanding differences in socioeconomic status. In addition, and, quite surprisingly, Keys made no attempt to match underaged entrants with regular-aged comparisons on the basis of intellectual aptitude. Instead, he assumed the comparison students "were probably persons with records better than the average of their group" (*ibid.*, p. 169).

Based on these two methodological problems vis-à-vis the comparison group, results from the underaged Berkeley students' experience, as reported by Keys (1938), ought to be reconsidered. First, Keys reported "the academic achievement among accelerated students was highly superior to that of the average student, for both men and women" (*ibid.*, p. 261). Since these students were able to enter Berkeley younger than the average college entrance age, there must have been *some* degree of acceleration prior to college entrance, and it is quite likely that such acceleration (for example, "double promotion") had been based on superior intellectual ability. Thus, the fact that the underaged students were successful academically indicated that, *in combination with high intellectual aptitude*, acceleration was appropriate for these students. But no conclusions may be drawn about whether entrance at younger-than-typical ages would have been *more* appropriate for the group when compared with a group exhibiting conventional progress through secondary school and college.

Second, Keys noted "more of the younger entrants at the University of California considered their undergraduate social relations as unsatisfactory" (*ibid.*, p. 263). However, a little later he said, "It seems probable that the 'difference' which troubled one-fourth of those entering at fourteen or fifteen was a penalty of their exceptional intelligence rather than their age" (*ibid.*, p. 264). Being unlike their classmates is what Keys means by "difference." It is likely that comparison of social-emotional adjustment using controls matched on intellectual ability would have attenuated these results and revealed the underaged in a better light than Keys reported.

Table 2.1. Pressey's 1936 early entrants to The Ohio State University

Item	Ages of entering college					
	16	17	18	19	20	+20
1. Number of students	78	624	1,266	488	275	308
2. Percentage of age group entering	3	20	42	16	9	10
3. Percentage of total group graduating	52	51	42	16	9	10
Percentage of each age group:						
4. At 90th percentile or above	28	26	20	16	19	18
5. Below 40th percentile	27	20	26	25	38	26
6. Median O.S.P.E. percentile at entrance ^a	72	70	66	64	61	69

^aO.S.P.E. refers to Ohio State Psychological Examination. Table 2.1 is adapted from Pressey (1949, p. 49).

Two Experiments: The Ohio State University and the University of Illinois. Four years after the Second World War ended, Pressey reported results based on a study of 3,021 students who had entered The Ohio State University more than ten years earlier. Table 2.1 is adapted from Pressey's 1949 monograph; the first two rows denote sample sizes and percentages of total group comprising each age cohort. Data concerning the percentage of the total group that graduated (row 3) led him to question "whether or not the greater proportion of younger entrants might simply have been the product of superior ability" (Pressey 1949, p. 60). In addition, percentages of each group scoring above the 90th percentile and below the 40th percentile on ability norms (rows 4 and 5) and median ability percentile ranks (row 6) suggested some relation between intellectual ability and academic achievement.

Pressey divided each age cohort into those scoring at or above the 80th percentile and those scoring below the 40th percentile on ability norms at the time of college entrance. "Seventy-five percent of those entering at sixteen years of age who scored at or above the 80th percentile in ability were graduated. However, only 24 percent of the less-able sixteen-year olds . . . obtained a degree" (ibid.). Therefore, Pressey concluded that "Younger able entrants clearly are more likely to graduate . . . and the academic prognosis for the least able is equally poor, whatever the age" (ibid.).

Results from the Ohio State University underaged accelerants were compared with results for a control group matched for intellectual ability, sex, and educational program. According to Pressey, half of those who entered at 16 or younger graduated within six years after entrance compared with 38 percent of the group two years older on the average at entrance to college. In addition, a larger percentage of younger college students were employed part time while in school, and also took part in extracurricular activities.

During World War II the National Educational Association encouraged colleges to accept intellectually able high school seniors as freshmen. In compliance with this federal request, the University of Illinois initiated a program based upon the following selection criteria: (1) faculty referral, (2) minimum acceptable

course experience, and (3) evidence of intellectual and socioemotional stability. In 1943 thirty-six students meeting these requirements enrolled one to two semesters before having graduated from secondary school (Berg and Larsen 1945).

Overall academic performance of the Illinois early entrants was quite favorable, that is, defined in terms of at least one standard deviation *above* median achievement norms for the college. In addition, the students made satisfactory personal and social adjustments. However, no data from comparison students, matched on intellectual aptitude, were reported. Thus, the Illinois study was consistent with the Berkeley data reported earlier (Keys 1938); likewise, it failed to answer the question whether or not the same sample would have fared as well without having entered the university at an earlier age than usual.

The University of Chicago Program for Early Admission. Approximately six years before the University of Illinois initiated its program of early admission and four years before the United States entered World War II, the University of Chicago began an experimental curriculum in general education (Ward 1950). Five years later the university reached a decision that permitted awarding the bachelor's degree upon completion of a four-year program begun after only the tenth year of schooling (Bloom and Ward 1952). Reported elsewhere (Allison and Bloom 1950; Bloom and Allison 1949; Ward 1950), the program of general education at Chicago emphasized the need to demonstrate competence through successful performance on comprehensive examinations. In addition, Chicago introduced survey courses while eliminating compulsory class attendance after the first two years of the program. In fact, the latter innovation generated more unfavorable criticism than the practice of permitting students to enroll after their sophomore year in high school!

In 1952 the University of Chicago responded to the challenges it received for a demonstration of the worth of its bachelor's degree. One-third of the graduating seniors ($N = 105$) accepted an invitation to take the Graduate Record Examinations (GREs) as part of an "experiment." According to Bloom and Ward (1952), those seniors representing the college did not differ from their classmates in scholastic aptitude, age, comprehensive examinations taken, or number of years of schooling completed prior to graduation. At least 80 percent of the early entrants scored *above median national norms of all GREs taken*. In addition, the University of Chicago seniors' median rank on all eight tests of general education averaged just under the 90th percentile mark, and their median rank on the index of general education was at the 96th percentile. The underaged seniors had demonstrated the unequivocal worth of a Chicago bachelor's degree.

Despite the impressive results reported by Bloom and Ward (1952) the same qualifications concerning the Berkeley (Keys 1938) and Illinois (Berg and Larsen 1945) samples applied for the University of Chicago early entrants. It was reported that the seniors graduating in 1952 averaged two years younger than conventional-aged college graduates that same year. However, the typical Uni-

versity of Chicago undergraduate, who was two years older, scored at the 86th percentile on the Psychological Examination of the American Council of Education. Thus, the norms against which the underaged seniors' GRE performance were compared must have been considerably *below* those appropriate for such an intellectually able group. Nonetheless, the data were consistent to the extent that the 1940s program at the University of Chicago was, indeed, appropriate for highly intellectually able, younger students.

The Ford Foundation Program of Early Entrance to College. World War II made unprecedented demands upon American education to produce well trained, educated, competent personnel. But, following the war, interest in early entrance programs at the college level waned until 1951, when our involvement in the Korean conflict replicated wartime demands of the early 1940s. Against this historical and political context emerged the Fund for the Advancement of Education sponsored by the Ford Foundation.

The project began as a "Pre-Induction Program" involving four universities which were concerned about the problem created for education by the manpower demands of the nation's military services. Under the military draft regulations of early 1951 it appeared that for an indefinite period young men would be drafted at age 18 or shortly thereafter for at least two years of military service, just at the time when they would normally have entered college . . . Discussions of the problem by representatives of four universities—Yale, Chicago, Columbia, and Wisconsin—resulted in a cooperative proposal to the Fund for the establishment of an experimental program of scholarships to enable younger men not older than 16½ to enter college for two years of general education before military service. (Fund for the Advancement of Education 1953, p. 69)

The above rationale differed little from the impetus behind earlier programs of acceleration at, for example, the University of Illinois, The Ohio State University, or the University of Chicago. However, the present investigation contrasted with the earlier studies in two ways. First, the Fund's Program of Early Entrance was designed to attend very carefully to the socioemotional adjustment of the accelerants. Second, the project represented the first *prospective* study of acceleration (with the possible exception of the University of Chicago "experiment"). According to the preliminary report, "Evidence was derived from systematic observation of younger students from the day they entered college" (*ibid.*, p. 70).

Between 1951 and 1954, 1,350 Ford Foundation "Scholars" were awarded scholarships to attend twelve participating colleges and universities. Careful records were kept of a selected group of "Comparison" students who were matched with the Scholars on the basis of academic aptitude (Fund for the Advancement of Education 1957, p. 8). On the average, the accelerants were 16 years old or younger, and only a small minority had completed the conventional twelve years of precollege education.

In general, colleges selected Ford Foundation Scholars on the basis of four criteria: (1) scores above the minimum cutoff for regular entrants; (2) social and emotional adjustment assessed during personal interviews; (3) financial need; and (4) attendance in public schools. For evaluative comparison purposes, the program provided for "carefully selected 'matching' students of comparable aptitude" (ibid., p. 14).¹ Comparison students differed from the Scholars primarily in that they were, on the average, two years older and already had obtained their high school diplomas. In addition, although Comparison students in general were aware of their participation in the project, they were not singled out as distinguished young scholars or "Fordlings" as the group came to be known. Also, the Comparison students may not have been as financially needy as the Ford Scholars (ibid., p. 15).

The Educational Testing Service at Princeton conducted the first evaluation of the Ford Foundation Early Entrance Program. Academic performance and socioemotional adjustment were assessed on the basis of college records, Scholars' self-reports, a psychiatric evaluation, and Scholars' and Comparisons' essays based on their respective four-year experiences. Concerning the academic performance, three results were reported. First, the Scholars exceeded both the Comparison group and the general college population in grade point average and class rank. According to the 1957 report, "Year after year, a higher proportion of the Scholars than the Comparison students ranked in the top tenth, fifth, and third of their classes" (ibid., p. 24). Second, there was variation in the *extent* of acceleration and in its mode of influence on performance: "Scholars with 11 years of schooling tended to do slightly better than those with only 10, but the latter tended to do slightly better than those with 12" (ibid., p. 26). Third, the 1952 Scholar group exceeded Comparison students on area test scores of the Graduate Record Examinations.

Evaluation of the socioemotional adjustment of the Scholars focused on whether or not they had experienced problems directly related to having been accelerated two years on the average. In other words, this evaluation assumed certain base rates of socioemotional maladjustment exist in the general college population, and proceeded to assess whether acceleration contributed disproportionately beyond what might have been expected. All indications reported problems of social maladjustment were not attributable to early entrance status:

The rate of failure among the first two groups was somewhat higher than that among their Comparison students, but at most of the colleges where comparable data were available it was lower than that among their classmates as a whole. When the reasons for failure were examined, they were found to be no different for the Scholars than for college students in general.

The Scholars encountered more initial difficulties in adjusting to campus life than

¹Note that when one matches, for example, a 16-year-old with an 18-year-old on a College Board Scholastic Aptitude Test score such as SAT-V, the former actually is the brighter because at 18 he or she probably will score higher than the latter did at age 18.

their older Comparison students, but most of the difficulties were minor and were soon overcome. (*ibid.*, pp. 9-10)

In 1966, Pressey followed up 87 Scholars and 111 Comparison students who had participated in the Early Entrance Program at Oberlin College ten years earlier. Pressey reported that more than half of both groups later had obtained advanced professional degrees, but that the Scholars had earned certification, on the average, two years earlier than the Comparisons. In addition, accelerants' retrospective accounts coincided with the data reported in the Fund for the Advancement of Education monograph. That is, the early college entrants reported experiencing "initial social difficulty because of youth at entrance but this soon passed" (Pressey 1967, p. 73). Based on Pressey's follow-up then, the 1957 findings appeared to be reliable, at least for the students who attended one of the twelve participating institutions.

Finally, a related study of young college entrants at Harvard (Kogan 1955) compared favorably with the Ford Foundation Early Entrance Program; however, underaged accelerants at Harvard were not supported by the Ford Foundation. Kogan investigated 90 young Harvard undergraduates who were not quite 17 years old by 1 January of their freshmen year. The Harvard students were comparable to the Ford Scholars in age but differed in certification. Ninety percent of the Harvard accelerants had completed *four years* of high school, whereas 42 percent of the Fordlings left high school after only *two* years of secondary education. According to Kogan, this difference probably was due to the Harvard students' having been accelerated at some point prior to high school or having been admitted to elementary school under age.

Kogan's investigation bore more similarity to earlier studies (Berg and Larsen 1945, Keys 1938, Pressey 1949) than to the Ford Foundation Early Entrance Program. This was due to Kogan's having assessed young entrants' academic performance and socioemotional adjustment relative to *all* matriculated Harvard students. Of course, we might reasonably assume the typical Harvard undergraduate at that time was highly intellectually able compared with the average college student. However, we have no way of interpreting how acceleration might have altered the performance and adjustment of the underaged Harvard sample compared with their *not* having been accelerated.

Kogan's results were consistent with the Ford Foundation findings as well as with results reported in other early college entrance literature. The younger Harvard students were "an over-achieving academically superior group. . . . They did not appear to have more adjustment problems than is characteristic of the college as a whole" (1955, p. 135). Thus, based on numerous *retrospective* accounts of early entrance to college, there appear to be no data reported in the acceleration literature to refute the appropriateness of acceleration for intellectually able students. Furthermore, the single major *prospective* report (Fund for the Advancement of Education 1957) offers considerable positive evidence that acceleration is indeed advantageous for intellectually able and socially mature youths.

Rapid Completion of the Bachelor's Degree

The preceding section reported at length studies of early entrance to college; it should be noted that these types of accelerative strategies generally imply entrance to college at ages younger than conventional. An alternative type of acceleration (cf. Pressey's 1949 definition) appropriate for shortening the time needed to complete bachelor's degree requirements involves academic progress at rates faster than the mode. Both accelerative methods have two points in common: each is designed to shorten time necessary for the baccalaureate; and each is better suited for intellectually precocious youths.

This section reviews the "rates faster" acceleration literature and focuses upon two methods. First, a series of investigations conducted during the 1940s at The Ohio State University (Flesher 1946, Flesher and Pressey 1955, and Pressey 1944a, 1949) described the lengthened school year and heavier course loads as two ways students were able to finish degree requirements rapidly. Second, a few years before the Ohio State University investigations, the University of Chicago initiated a program through which its students could earn credit following successful performance on placement examinations (see Allison and Bloom 1950, Bloom and Allison 1949). In 1953 the Ford Foundation pursued this accelerative method through funding a program for college entrance with advanced placement credit (Fund for the Advancement of Education 1953). In years following, the Educational Testing Service of the College Entrance Examination Board made the Advanced Placement Program a more readily available, viable alternative. More recent experience involves part-time college work for students who are still in high school (see, for example, Solano and George 1976). This approach offers a related accelerative strategy for intellectually talented young adolescents.

World War II Accelerative Strategies at Ohio State University. For over twenty years Sidney Leavitt Pressey (1944a, 1944b, 1944c, 1949, 1955, 1962) has advocated less time-consuming undergraduate, graduate, and professional programs. His 1949 monograph remains a classic in the acceleration literature and provides perhaps the best source for a review of accelerative programs dating back to the mid-nineteenth century in America. According to Pressey (1949), Yale University's Sheffield Scientific School numbered among the earliest prestigious institutions offering a three-year bachelor's program. Prior to 1900, four institutions including Yale had initiated three-year baccalaureate programs: Cornell, Johns Hopkins, and Harvard. In addition, Clark University maintained an accelerated collegiate program from 1902 to 1922. However, these four nineteenth-century three-year programs, like that of Clark University, were relatively short-lived (*ibid.*, p. 10). By the end of the 1930s and the Depression, the University of Chicago apparently was the only major institution to maintain a flexible academic program permitting rapid completion of the bachelor's degree.

The educational lock step with the typical age-grade grouping, even up through the college years, continued to persist until America entered World War

II. At that time, according to Pressey, "The Ohio State University was the only institution anywhere which, upon the outbreak of the war, proceeded systematically to investigate the problem of acceleration and to some extent to direct its practice in the light of its investigation" (ibid., p. 3). Although at least thirty-one professional papers described some aspect of the Ohio State wartime acceleration program, this section focuses upon three major reports (Flesher 1946, Flesher and Pressey 1955, Pressey 1944a).

First, Pressey (1944a) described two Ohio State student groups that were matriculated in 1941-42 and 1942-43. Among the former group ($N = 1,122$) only 5 percent completed the bachelor's degree in less time than conventional, that is in fewer than three years, nine months. The second cohort ($N = 1,030$), however, took advantage of the wartime accelerative options, and 33 percent of this group finished in less than the regular time. Therefore, the above figures, including both men and women, describe what Pressey called the "last pre-acceleration and first accelerated graduating class" (1944a, p. 563).

Two reports subsequently were made concerning the 1942-43 accelerated group: a description of methods used, and an evaluation of success (or failure) of these accelerative methods. First, the accelerants' overwhelming choice for rapid completion of bachelor's degree requirements involved yearlong classes during the extended four-quarter academic year. "Sixty-three percent of the acceleration [was] gained simply by attending a fourth quarter, 4 percent by extra load only, and 1 percent by examination credit alone, while 32 percent of the accelerants used more than one method (ibid., p. 565). These findings led Pressey to term this method "acceleration the hard way."

Pressey was able to assess effects of acceleration in the following way. First, he subdivided the nonaccelerants into two groups: the "regulars" who completed the bachelor's requirements in from three and three-quarters to four years, and the "retardates" who took longer than four years to finish. Then he compared the academic performance and the extracurricular participation of the "accelerates" with each of the nonaccelerated groups. Median ages at time of entrance were comparable for the three groups, but median ages at graduation, although equivalent for the accelerated and regular groups, were reported appreciably higher for the retarded cohort. In addition, the accelerants had an advantage in terms of general ability over the other two groups.

Results were reported as follows: the "accelerants" earned a higher final mean grade point average than either the "regulars" or the "retardates"; and the "accelerants" participated in approximately the same number of nonacademic activities as the "regulars" and the "retardates." In addition, separate analyses of eighteen students completing the program in fewer than three years reported their mean grade point average to be highest among all three groups mentioned above. Moreover, twelve of the eighteen three-year accelerants participated in one or more nonacademic activities (Pressey 1944a, p. 569).

In a second and related study Flesher (1946) reported on seventy-six women in the Ohio State classes of 1944 and 1945 ($N = 570$) who had been graduated in

three years or less. According to Flesher, the seventy-six female accelerants did not differ in age at entrance from their female classmates; however, their group mean for intellectual aptitude exceeded that of the regular students. Flesher reportedly paired each accelerant with a female control matched on ability and age at entrance to college and time of graduation. The accelerants outperformed the paired comparison group (and the class in general) academically. In the extracurricular areas the accelerants were more active than were the regular students but less active compared with the control group. In general, however, (Flesher 1946), these accelerants were matched with 145 graduates of the same erated group.

The third study reported a ten-year follow-up of 145 accelerants who had been graduated from The Ohio State University in three years or fewer between 1941 and 1945 (Flesher and Pressey 1955). As noted in the previous study (Flesher 1946), these accelerants were matched with 145 graduates of the same sex who were of comparable general ability and age at the time of entrance to college and who had taken similar courses of study. Results were based on 81 percent and 71 percent return rates of questionnaires from the accelerated and regular alumnae, respectively. Different response rates were not considered to be due to anything other than chance. Accelerative methods were reported as follows: "Ninety-two percent of the accelerate group, at least once, went four quarters in school; over half took extra heavy schedules; twenty-nine percent got some credit by examination; and over half used two or more methods" (Flesher and Pressey 1955, pp. 321-32). In general, then, the accelerative methods used reflected heavy academic course loads during an extended four-quarter program.

Results of the follow-up of female accelerants may be summarized in five points. First, rates of employment in college for both groups were approximately equal. Second, very few accelerants considered their experiences as having contributed disproportionately to their physical, social, or academic well-being. Third, extracurricular participation in war-related activities was about equal for the two groups; and, given the political and economic conditions generated by participation in the war, Flesher and Pressey considered the accelerants' nonacademic participation quite favorably. Fourth, 24 percent of the accelerants but only 12 percent of the regulars earned degrees above the bachelor's. Fifth, 29 percent of the married accelerants and 16 percent of the regular married alumnae were employed at the time of the survey.

It should be noted that the accelerants studied during the war were not of considerably higher intellectual aptitude than were students who completed the bachelor's at the conventional rate. Flesher and Pressey (1955) reported approximately 10 percentile points were all that differentiated the accelerants from the general, nonaccelerated college students. Therefore, it seems reasonable to conclude that "acceleration the hard way" is perhaps the one method that is least restricted to students of unusually high intellectual aptitude. Hard work and determination would seem equally important for yearlong academic performance. The remaining studies reviewed in this section will consider accelerative methods best suited to the most intellectually able.

Advanced Credit through Examination. In the preceding section we noted that wartime accelerants at The Ohio State University sometimes received college credit through examination, thereby helping to facilitate completion of the bachelor's degree requirements. One study indicated that only 1 percent of the men and women who were accelerated had taken advantage of earning course credit based on examination performance (Pressey 1944a). A second study (Flesher 1946) reported 29 percent of the female accelerants between 1941 and 1946 had gained credit this way. Despite the relatively low incidence of educational advancement through credit by examination, Pressey was indeed well aware of the method's potential. "Credit by examination has the double merit of placing the student according to ability rather than academic time served (thus preventing able students from learning what they already know) and advancing such students more rapidly toward their educational goals. This method should be more widely used than at present" (1949, p. 132). The phrase "academic time served," in addition to the notion of "acceleration in the hard way" (Pressey 1944a), underscores the idea that wartime accelerative methods might have been better suited to individuals of unusual stamina and/or perseverance rather than to those of unusual intellectual aptitude. Acceleration based on credit by examination, however, denoted a return to the mainstream of accelerative methods, namely, methods appropriate as education individualized for students of unusually high intellectual ability.

Credit by examination was mentioned previously in this report (see "Biographical Case Histories") concerning historical prodigies' early entrance to college. The preindustrialized era was not marked by chronological age-grade segregation at all educational levels, and heterogeneously age-grouped colleges, for example, were not uncommon. The entrance examination indicated the measure of one's intellectual ability, and consequently, assessed one's readiness for college. In most cases readiness for college was considered independent of chronological age. According to Bloom and Allison (1949), in the 1930s the University of Chicago program for general education resumed a long tradition of academic award based on students' having passed comprehensive examinations. The requirement for graduation in the college at the University of Chicago included passing up to fourteen comprehensive examinations. "The principle here places emphasis on the level of achievement rather than on the means of developing such achievement" (ibid., p. 212). Thus, Chicago's program marked the inception of the more recent acceptance of credit through examination.

It is indeed interesting to note that even among underaged University of Chicago scholars who had been admitted after only ten years of schooling (Bloom and Ward 1952), exemption from prerequisite courses by examination did not hinder the students' subsequent course work in the same field. "In 1945, 115 students who had entered at the end of ten years of school were excused from Humanities 1 or Social Sciences 1 comprehensive examinations. On the second year comprehensive examination requirement, Humanities 2 and Social Sciences 2, 35 percent of those students made grades of A or B, while 22 percent made grades of D or F. The corresponding figures for all students taking the com-

prehensives are 29 percent A or B and 21 percent D or F” (Allison and Bloom 1950, p. 231). According to this account, underaged University of Chicago students were not handicapped through advanced placement, even though initially they were two years accelerated.

In the early 1950s, the Ford Foundation funded a related project, the “Program for Admission to College with Advanced Standing” (see Fund for the Advancement of Education 1953, chapter 4). According to the preliminary report, the program was begun in order “to enable and challenge the student to proceed at his own best pace . . . here the burden [was] placed on both the high school and college” (ibid., pp. 56–57). The practice of entering college with advanced standing rather than leaving high school without the diploma obviously contrasted with the mechanics of two otherwise quite similar projects, the Program for Early Entrance to College (Fund for the Advancement of Education 1957) and the University of Chicago “practice of general education” (Ward 1950). However, the objectives of all three programs were practically identical: to permit intellectually able students to complete bachelor’s degree requirements as rapidly as possible.

In the mid-1950s, the Ford Foundation program for college admission with advanced standing evolved into the College Board’s Advanced Placement Program (CEEB 1973, Newland 1976). The procedure for entering college with sophomore standing had been standardized. A student’s successful performance on an Advanced Placement Examination (scores of 3 to 5 with a maximum score of 5) could earn him or her up to one full year of college credit, depending on the participating institution. Thus, according to the College Board, the Advanced Placement Program established “an active consortium to which the nation’s high schools [could] relate their local programs for thousands of young people demonstrably able to complete a year’s worth of college-level studies before progressing from their twelfth to their thirteenth year of formal education” (CEEB 1973, p. v). A more recent report (CEEB 1974) cites 136 academic institutions that are prepared “to award immediate Sophomore Standing or its local equivalent to students gaining full Advanced Placement credits.”

The following account aptly describes the accelerative potential of the Advanced Placement Program. The student to which the report applies was a participant in the Johns Hopkins Study of Mathematically Precocious Youth (Stanley, Keating, and Fox 1974; Keating 1976):

The SMPY contestant who in January of 1973 as a 12-year-old public school seventh grader scored 800 on SAT-M managed to earn credit for two semesters of college calculus while still 13 years old and two semesters each of biology, chemistry, and physics while still 15 by making the highest possible grade (5) on each of four APP examinations. Also, while 14 he earned an “A” from a major university by correspondence study in a third-semester college course. And he still has another year in which to take several more APP courses before going off to MIT or Harvard a year early, having skipped the eighth grade. (Stanley 1979, p. 178)

Scoring 800 on the Scholastic Aptitude Test (SAT-M) at age 12 is a remarkable intellectual accomplishment, one of rare occurrence. However, slightly less ex-

ceptional aptitude appears more often in the general secondary schools; for such intellectually able groups the Advanced Placement Program provides a realistic opportunity to shorten the bachelor's program by one year.

Finally, the Study of Mathematically Precocious Youth reported that over a five-year period 131 intellectually precocious junior high school youths have taken 277 college courses (Solano and George 1976). The overall grade point average for these courses was 3.59, where $A = 4$ and $B = 3$. Recommendations for part-time college level work for 12- and 13-year-olds were based upon their having demonstrated unusually precocious intellectual aptitude as assessed by appropriately difficult tests (Stanley 1976a). For example, College Board Scholastic Aptitude Test scores of at least 550 and 400 on the mathematical and verbal portions, respectively, were guidelines SMPY had established to insure that the young candidates were suited for college work.

SMPY's program for endorsing part-time college courses for intellectually precocious young 12- and 13-year-olds seems appropriate for the unusually high ability of this young group. Yet superior intellectual ability at this young age might be facilitated better through more radical acceleration (for example, see Stanley 1976f, pp. 40-41) some time prior to completion of a conventional four-year secondary school program. It is likely that the usual Advanced Placement Program courses in modern high schools, while appropriate for the needs of bright high school seniors, might very well already be below the level necessary to challenge such intellectually talented youths.

Acceleration Prior to College Entrance

The preceding two sections of this report have focused on accelerative methods designed to bridge the transitional gap between secondary level education and college (cf. Fund for the Advancement of Education 1953). Substantial significant research over the past fifty years has focused upon the evaluation of accelerative methods prior to college matriculation, strategies introduced at various points during the conventional twelve years of elementary and secondary education. In addition, at least four studies reported evaluative research pertinent to the question of the age at which intellectually able students should be admitted to elementary school (e.g., Baer 1958; Birch 1954; Hobson 1948, 1963; and Worcester 1956).

The following section describes important representative acceleration studies conducted during the past fifty years. Our outline divides the research literature into four sections: (1) Terman and Oden's (1947) follow-up of the 1920s California gifted sample; (2) secondary school accelerative methods; (3) elementary school accelerative methods; and (4) studies of early admission to kindergarten or first grade.

The Fulfillment of Promise: Terman and Oden (1947). Terman's longitudinal investigation (1925-59) of more than one thousand gifted children in

California undoubtedly is the most important study of its kind (see Burks, Jensen, and Terman 1930; Cox 1926; Oden 1968; Sears 1977; Terman 1925; Terman and Oden 1947; Terman and Oden 1959). However, Terman did not intend his study to be an experiment on acceleration of the gifted. Indeed, the investigation is quite unique in its comprehensiveness, and since it fails to fit neatly within our classification of acceleration based on level of education at which the intervention occurs, we have included Terman and Oden's follow-up apart from the other research. According to Stanley, "[Terman's] study was descriptive and observational, not intentionally interventional; he did not attempt to improve the education of the gifted except by trying to modify the attitudes of most adults toward extremely bright youths" (1976d, p. 5). Thus, this section focuses upon chapter 20 in volume 4 of the *Genetic Studies of Genius* series (Terman and Oden 1947, pp. 264–81) in which data concerning the effects of acceleration among a portion of the gifted population are reported relative to those who were not accelerated.

Terman and Oden divided the gifted sample into three separate groups based on chronological age at graduation. Group I included those who were 15.5 years or younger, group II included those who finished between 15.5 and 16.5 years of age, and group III comprised that portion graduating over age 16.5 years. If conventional age-grade grouping practices resulted in graduation at 18 years (plus or minus 6 months), then one might consider groups I, II, and III as having been accelerated 2 to 4 years, 1 to 2 years, and 0 to 1 year, respectively. Terman and Oden reported a mean age at graduation of 15.9 years for a combined sample (I and II) here referred to as the "accelerants." The "nonaccelerants" (III) averaged 17.4 years of age at high school graduation. The sample sizes for the groups are reported in table 2.2. Comparisons between accelerants and nonaccelerants were reported for four categories. First, there was a significant positive correlation between childhood IQ and the degree of acceleration. According to Terman and Oden (1947), however, "The correlation between acceleration and IQ [was] very low, for among the nonaccelerates [there were] 50 men and 39 women in the IQ range 150 to 190. In the schools these subjects attended, IQ's played little part in grade placement" (ibid., p. 268). In other words, despite their superior intellectual ability, approximately 9 percent of group III graduated less than one year younger than the age at which the conventional lock step would have predicted.

Second, a comparison among the groups' levels of academic certification after high school graduation indicated two findings: (1) the greater the degree of acceleration, the greater the likelihood of graduating from college and of remaining for one or more years of graduate work (ibid., p. 270); and (2) Terman reported sex differences indicating that male accelerants demonstrated better scholastic achievement than female accelerants.

Third, greater occupational success was reported for the group I accelerants (42.2 percent) than for the group III nonaccelerants (19.4 percent). That is, 42.2 percent of group I accelerants were employed in professional or upper-level

Table 2.2. Sample sizes for three Terman and Oden groups reported by sex^a

Group (by age at graduation)	Males	Females	Total
I. Age 15.5 or younger	36	26	62
II. Ages >15.5 to 16.5	181	151	332
III. Older than age 16.5	568	430	998
Total	785	607	1,392

^aAdapted from Terman and Oden (1947).

business occupations, whereas only 19.4 percent of the group III nonaccelerants were so employed. Moreover, no relation between avocational interests and the degree of acceleration was found.

Fourth, Terman and Oden carefully assessed the socioemotional adjustment differences reported for the accelerated and nonaccelerated groups. Their conclusions substantiated findings of earlier investigations (e.g., Keys 1938). "The influence of school acceleration in causing social maladjustment has been greatly exaggerated. There is no doubt that maladjustment does result in individual cases, but our data indicate that in a majority of subjects the maladjustment consists of a temporary feeling of inferiority which is later overcome" (Terman and Oden 1947, p. 275). In addition, Terman and Oden noted that marital satisfaction was unrelated to acceleration and that no detrimental effects on physical maturation were assessed. On the contrary, "Children most accelerated in school were on the average also accelerated in physical maturation as indicated by age of puberty" (ibid., p. 279). Thus, based on evidence from Terman's gifted sample, acceleration for intellectually able youths, those with an IQ greater than 135, was found to be beneficial academically and vocationally. Only minimal socioemotional maladjustment was reported; moreover, these problems were short-lived.

Accelerative Methods at the Secondary Level. Most research cited in this section reports evaluation of vertical methods for facilitating the education of intellectually able youths. For the most part, these methods include grade-skipping in junior and senior high schools. For organizational purposes, acceleration at the junior and acceleration at the senior high school levels have been combined under the same heading. In addition, despite the possibility that acceleration sometimes is concurrent with relevant academic enrichment, this section reports only data pertinent to secondary school programs in which rapid progress through school is a primary goal.

Coincidental with the inception of widespread use of intelligence testing in schools (cf. Terman 1916), Alltucker (1924) reported evidence of positive academic performance and good social adjustment among senior high school students who had been accelerated approximately two years. Also, the academic performance in senior high school for a sample of Wisconsin junior high school

accelerants who had completed the regular three-year program in two years was reported to be comparable with that of conventional-age high school students (Unzicker 1932). A related study (Houghton and Douglas 1935)² revealed that junior high school students' academic achievement was equivalent to that of same-grade comparison students, though the students in the comparison group were slightly abler intellectually and approximately two-thirds of a year older.

Two 1930s studies at the University of Buffalo (Strabel 1936a, 1936b) reported favorable results both for accelerated three-year high school graduates and for younger high school graduates who had not yet reached 16.5 years of age by commencement. Strabel (1936b) paired fifty-five three-year high school graduates with two equal sized groups of four-year high school graduates matched for sex, psychological test scores, class rank, and either age at high school graduation, or age at high school entrance. Results based on freshman academic performance indicated that the latter control group was slightly better in mathematics, while the accelerants had a slight edge in the social sciences. No significant academic indices differentiated the accelerated from the two nonaccelerated control groups.

Wilkins (1936) reported favorable results for 282 high school students who were accelerated approximately one year. The single criterion for inclusion in Wilkins's study was high school graduation before the age of 17. However, Keys (1938) noted Wilkins's unfortunate omission of a control sample with which to compare the accelerants' performance. Herr (1937) followed up junior high school accelerants who had completed a three-year program in two years. Seventy-nine accelerants were paired with an equal number of nonaccelerants on three variables: age at entrance to junior high school, IQ, and mental age derived from the Stanford Achievement Test. According to Herr, the control group included a large number of students whose parents refused permission for their children to enroll in the program. Results during ninth through twelfth grades reported the accelerants' performance as having equaled or exceeded that of the nonaccelerants. Shouse (1937) reported similar findings for social adjustment among accelerated junior high school students in a related study.

Keys's (1938) study of Oakland high school students carefully divided 112 accelerants into two categories. First, 46 underaged students with IQs ranging from 120 to 140 were matched with an equal-sized sample on the basis of comparable IQ, sex, race, and socioeconomic status; however, the comparison students were an average of nineteen months older when they graduated from high school. Second, two groups of students who were accelerated approximately two to five semesters were subdivided according to IQ: (1) the superior ability group ($N = 24$) had IQs above 136 and (2) the "bright-normal" cohorts ($N = 43$) had IQs below 120. Therefore, Keys's design permitted analysis of variance among accelerants depending on two factors, chronological age and intellectual ability.

Results may be summarized in four points. First, Keys found significant

²Cited in Keys (1938), p. 228.

effects for intelligence that led him to conclude that acceleration of two or more semesters for students below 120 IQ is "seldom advisable" (1938, p. 242). Second, controlling for effects of intelligence among underaged versus regular-rate students, Keys reported the younger group earned more scholarships, had better study habits, participated in a greater number of student activities, and more often held elective offices. Third, according to the Bernreuter Personality Inventory, sociability appeared to be related to differences in intelligence rather than differences in age. Fourth, self-reported estimates of general happiness were highest for the very bright *and* accelerated group.

Following Keys's 1938 report, little evidence of acceleration at the secondary level was reported. Keys had noted previously that most acceleration in California during the 1930s had involved double promotion at the elementary levels. This trend seemed to persist after 1940. In addition, two programs replaced grade-skipping as educational methods for facilitating intellectually able secondary level students. First, programs of "relevant academic enrichment" followed growing sentiment that social maladjustment was due to acceleration (see early discussion on "relevant academic enrichment"). This attitude led to disinterest in high school grade skipping. Second, programs for entrance to college with advanced standing (e.g., Fund for Advancement of Education 1953, CEEB 1973) encouraged development of *potentially* accelerative, relevant academic enrichment programs at the secondary educational level.

Three exceptions during the 1950s contrasted with the enrichment activity schema and provided opportunities for students to save time at the secondary level. Witty (1954) and Woolf (1957) described secondary schools in Baltimore in which one year of acceleration was possible. Jansen (in Havighurst, Stivers, and De Haan 1955) described a related program in New York City in which "some 62 regular junior high schools provide regular progress classes that allow superior students to complete three years' work in two years' time" (p. 70).

More recent research reports successful results for an accelerated high school program in Toronto in which students completed five years' work in four years' time (Adler, Pass, and Wright 1963). However, this kind of intervention is similar to the Advanced Placement Program described earlier in this report in which high school students may earn credit by examination for up to one year's work.

Also, recent extensive evidence from the Study of Mathematically Precocious Youth (SMPY) at The Johns Hopkins University describes successful implementation of a smorgasbord of accelerative educational provisions for intellectually talented junior high school youths who are especially talented in mathematics (Keating 1976; Keating and Stanley 1972; Stanley 1973, 1976d, 1976e, 1976f, Stanley 1977; Stanley, Keating, and Fox 1974; Stanley, George, and Solano 1977). Grade-skipping is but one of at least five accelerative methods employed successfully since 1972. Other methods are reported elsewhere in this paper. These include part-time study in college, credit by examination, early entrance to college, and rapid completion of the bachelor's degree.

Julian Stanley, Director of SMPY since its inception, has reported two

necessary conditions for successful acceleration based on his project's experience. First, students must demonstrate unusual intellectual precocity on extremely difficult aptitude and/or achievement tests of the sort usually appropriate for prospective college entrants. Second, students must be willing and eager to progress at rates more rapid than those for which conventional education has been designed. According to Stanley, use of these two criteria have been indeed worthwhile:

Nearly all of our 44 early entrants to college thus far have done splendidly in their studies and social and emotional development. Compared with the academic and personal record of the typical Johns Hopkins student, the early entrants have been truly outstanding. Only one has performed poorly. He was a brilliant but headstrong 14-year-old who signed up for a heavy load of extremely difficult courses and then would not study enough. By age 15, however, he had earned a year of credit and a high school diploma. (1976d, p. 16)

Two points following this account need clarification. First, SMPY's accelerative strategy primarily relies upon grade-skipping at the secondary education level. However, well-planned educational facilitation for these intellectually precocious youths may *incorporate many alternative methods appropriate for students' intellectual needs*. No rules limit acceleration to any single strategy. In contrast with earlier investigations, SMPY's educative methods for the intellectually able comprise a decidedly eclectic approach. Second, Stanley's reported 98 percent success rate, which is based on only one poor performance among forty-four early entrants, is a reflection of the careful forethought and counseling that are important aspects of SMPY's facilitative methods. In addition, five radical accelerants, each of whom has skipped at least one year of secondary education, were graduated from Johns Hopkins in May of 1977. At that time, three were 17 years old, one was 18, and another was barely 19 years of age (*ibid.*).

Accelerative Methods at the Elementary Level. The earliest reported program "permitting rapid advancement of the capable" occurred in Saint Louis's secondary schools in the 1890s (Hollingworth 1929, pp. 276-77). Related programs prior to 1920 also were operational in New Jersey, Massachusetts, Oregon, and New York. For the most part, however, identification of prospective accelerants depended upon teachers' judgments and class marks (*ibid.*). Following widespread intelligence testing in the 1920s, special programs (e.g., Terman classes) for intellectually superior pupils based on tested intelligence scores were begun in New York City schools. Through the effective combination of enriched curricula and moderate acceleration such programs generally permitted educational facilitation appropriate to intellectually able students' needs.

Lamson (1930) reported a follow-up of fifty-six very bright high school students who had participated in special accelerative-enrichment classes in a New York elementary school. The fifty-six gifted students' average Stanford-Binet IQ was reported to be 155 (range 137 to 188); 110 control students were matched for

sex, grade, and school, but not for intellectual ability. Lamson reported, "The rate of achievement on the part of the gifted program was significantly superior to the achievement of the control group . . . in spite of the fact that their chronological age was, on the average, two years less than that of the control group" (ibid., p. 73). In addition, a related study (Engle 1935) reported successful double promotion for twenty-five students who were compared with fifty nonaccelerants for educational, vocational, and social adjustment. However, without controlling for mental age differences between groups in both the Lamson and the Engle studies, it is difficult to separate effects of acceleration from those due to intellectual ability.

Another early investigation (Elder 1927) reported downward shifts in grades for a group of twenty-two "bright" and "very bright" elementary school children who had skipped one grade. Elder assessed academic performance before and after acceleration for the experimental group and for a control group of 696 nonaccelerated agemates. Although he found a general decline in academic grades following acceleration, Elder reported a *greater* drop for those accelerants who had low grades prior to acceleration. According to Elder, "if one were to represent the standings before and after acceleration by two ogive curves drawn from the same origin and combined into a single diagram, the parts of the curve representing the higher percentiles would nearly coincide, while the parts representing the lower percentiles would be far apart" (p. 7). Thus, Elder underscored the importance of *not* accelerating elementary school students unless their academic performance demonstrated the intellectual ability necessary to meet the greater academic demands of a higher grade.

A considerable portion of the 1950s acceleration literature was concerned with underage versus overage grade placement (e.g., Baer 1958, Holmes and Finley 1957, Klausmeier 1958, Worcester 1956). Holmes and Finley (1957) reported individual differences in combined achievement in six areas (reading vocabulary, spelling, mechanics of grammar, reading comprehension, arithmetic reasoning, and fundamentals of arithmetic) as having contributed 25 percent of the variance in grade placement deviations within any one class for pupils in grades five through eight. "Grade placement deviation" (p. 455) here refers to differences between a pupil's actual grade placement and that grade to which he or she would have been assigned according to chronological age. Related investigations have indicated careful attention to results following either grade placement deviations based on birth date alone (e.g., Baer 1958) or deviations following specific educational interventions such as early admission to school based on mental and physical tests (e.g., Hobson 1948, 1963; Worcester 1956). These studies will be reviewed in the next section.

Elwell (1958) reported successful accelerative methods for intellectually able fourth and seventh graders; however, he noted some curricular adjustments were necessary for fourth and seventh graders in arithmetic and for seventh graders in geography and history. Nonetheless, little social maladjustment was cited for children who had been accelerated in groups. A related investigation

(Morgan 1959) presented a five-year follow-up of a combined sex sample of twenty-three very bright youths who had a reported mean Stanford-Binet IQ of 149. Twelve students were accelerated one year on the average; the remaining eleven comprised the comparison group. According to Morgan's report, "The accelerated [group] equaled the nonaccelerates in school achievement, surpassed them in academic distinction and social leadership, and tended to have better emotional adjustment" (1959, p. 653). Therefore, grade-skipping at the elementary level had a decidedly beneficial result for a bright though small sample of accelerants.

A series of important investigations on acceleration at the elementary level was conducted during the early 1960s in the Wisconsin public schools (see Klausmeier 1963; Klausmeier, Goodwin, and Teckla 1968; Klausmeier and Ripple 1962; Ripple 1961). Klausmeier and his colleagues were interested in the effects of acceleration on intellectually able old-in-grade second graders. Fifty-two students who were above the median chronological age of all second graders and who had Kuhlman-Anderson IQs of at least 115 were "ordered in pairs, matched by sex, and then randomly assigned, one from each pair to the accelerated group, the other to the control group of nonaccelerates" (Klausmeier and Ripple, 1962, p. 93). The twenty-six older accelerants then attended a five-week summer session prior to their entrance into fourth grade. Six control groups were reported: "Two groups of 26 nonaccelerated 3rd graders of SLA [superior learning abilities], 1 above and 1 below median CA; 2 groups of 26 nonaccelerated 4th graders of SLA, 1 above and 1 below median CA; and 2 groups of 26 nonaccelerated 4th graders of average learning ability, 1 above and 1 below median CA" (ibid.). This design permitted evaluation of the effects of acceleration while experimentally controlling chronological age and mental ability.

Evaluations of subjects' academic and socioemotional adjustment were reported after one year (Klausmeier and Ripple 1962, Ripple 1961), two years (Klausmeier 1963), and six years (Klausmeier, Goodwin, and Teckla 1968). After two years, no unfavorable socioemotional, academic, or physical correlates of acceleration were found. Klausmeier and co-workers (1968) followed up twenty-two of the initial twenty-three accelerants after six years; in addition, data were pooled from fourteen children accelerated from grades three to five. Four control groups yielded base-rate data permitting evaluation of the effects of chronological age and mental ability.

Results from this Wisconsin research series may be summarized in three points. First, on fourteen of fifteen cognitive tests, neither accelerated group performed significantly differently from a group of twenty-seven comparably bright students who averaged six months older. Second, no differences were reported between the two accelerated groups despite the fact that each had been accelerated at different points in elementary school. Third, the accelerants' participation in school activities and in athletics was comparable to that of older, bright nonaccelerants.

Overall accelerative methods at the elementary level, then, indicate positive academic performance and social adjustment to be no different, on the average,

from that of comparably bright, though somewhat younger-aged students. The next section will set forth results concerning the earliest educational level at which acceleration has been reported, the age at which the educational lock step begins.

Early Admission to Elementary School

At approximately the time the United States entered the "space race" with the Soviet Union, American educators were advocating early entrance to elementary school as an accelerative method analogous to compensatory educational interventions for the disadvantaged (see Klausmeier 1958, McCandless 1957). It was noted previously that approximately three-quarters of elementary grade placement variance was attributable to factors other than achievement performance in six basic cognitive skills areas (Holmes and Finley 1957). Accordingly, most of the variation in elementary grade placement depended upon chronological not mental age at the time the child enrolled into school. Therefore, proponents of early admission advocated provision for the intellectually able, overage student to gain a year's time at the outset of schooling.

An example of how chronological age-grade grouping adversely affects the education of intellectually precocious youths recently has been reported (Stanley 1976d, pp. 5-6). Suppose an extremely bright child (e.g., of Stanford-Binet IQ 140) planned to enter kindergarten in a school system in which one must become 5 years old before 31 December in the year during which he/she desires to gain admission. The average student would be approximately 5 years, 2 months old and have an IQ of 100. At the same chronological age but with an IQ of 140, a child would have a mental age of 7 years, 3 months. This would place the bright child slightly *above* the average child entering *second* grade. According to Stanley, a child's date of birth either attenuates or aggravates the degree of one's academic "retardation," assuming school admission is based upon some fixed date before which a child must be a certain age in order to enter. If we follow Stanley's example further, then a child born on 31 December and aged 4 years, 8 months at entrance to kindergarten would have a mental age of 6 years, 6 months, while one born on 1 January of the same year would have a mental age *more than two and a half years higher than the average kindergarten pupil!* This discrepancy due to school admission based on chronological and not mental age prompted Stanley to note, "If you expect to have unusually bright children, arrange to have them born late in the year so that they will be somewhat less overqualified than if they are born during the winter" (ibid., p. 6).

The remainder of this section summarizes four studies; three report on early admission to school (Birch 1954, Hobson 1963, Worcester 1956), while the fourth compares underage and overage students' academic performance and social behavior (Baer 1958). Because the most recently published report is based upon the earliest sample of underage entrants, we will consider it first.

Hobson (1963) described a follow-up of underage pupils first admitted to

Brookline, Massachusetts, schools in 1932 (cf. Hobson 1948). His design called for evaluation of two objectives: comparison of the high school scholastic performance and extracurricular activities of students who were admitted to school early based on mental and physical tests with that of their high school classmates; and evaluation of the relative success of college admissions for the two groups. Two samples of underaged students were reported. Group A comprised 550 underaged pupils admitted by tests (ABT) who were compared with 3,891 Brookline public school classmates. Group B included 91 underaged and 274 regular-aged pupils, subjects initially described in the 1948 report.

Academic performance data were available for group A; both academic performance and extracurricular activities data were reported for group B. According to Hobson, group A boys and girls exceeded their older classmates in percentages graduating from high school with honors and by the margin who gained entrance to an honor society. Group B's scholastic performance, based on separate course marks received during four years of high school, was significantly better than that of the conventional-aged pupils during 1946 and 1947. Also, group B's average number of extracurricular activities exceeded that of regular students over the four-year high school period, but the underaged boys seldom achieved outstanding recognition in the so-called contact sports. Group B's college admissions data for the 1946-47 cohort were quite favorable. According to Hobson, "A significantly larger percentage of underaged boys and girls went on to post secondary education" (1963, p. 165). In addition, if only four-year accredited college data were included in the analysis, the test-screened males and females exceeded their regular-age classmates by 22.6 percent and 21.0 percent, respectively.

Hobson's (1963) results may be summarized in four points. First, scholastic performance continued and even increased throughout elementary and secondary education for underage students admitted early to school on the basis of mental and physical tests. Second, underage ABT pupils participated in extracurricular activities more often than conventional-age classmates, although their participation in contact sports was not as great. Third, ABT youths exceeded classmates in the number of honors and awards earned at high school graduation. Fourth, more ABT high school graduates sought and gained admission to accredited four-year colleges.

A second series of early entrance studies in urban and rural regions of Nebraska during the early 1950s was reported by Worcester (1956). Prior to 1955, and according to the law, a mental age of 5 years, 3 months was the criterion for admission to Nebraska public school kindergarten.³ In addition, early admission was contingent upon an examiner's judgment of social and

³According to Worcester (1956), the mental age criterion for admission to kindergarten was changed from 5 years, 3 months to 5 years, 6 months in 1955. Apparently, it was thought that this increase in age required for school admission would bolster chances for a higher success rate with the early entrants compared to older, conventional entrants. From the point of view of acceleration proponents like Worcester, this turned out to be an unfortunate amendment to an otherwise judicious Nebraska law.

physical readiness. Two points concerning Worcester's review of the Nebraska programs are interesting in light of Hobson's Brookline, Massachusetts, findings. First, the amount of acceleration was relatively less for the Nebraska series. However, according to Worcester, given the improbability of midyear promotions within the Nebraska school systems, the underaged pupils actually gained one year compared with what that state's conventional age-grade grouping otherwise would have permitted. Second, IQs of the Massachusetts and Nebraska samples were comparable, although neither state's underaged population demonstrated unusual intellectual precocity. IQs averaged approximately 110 for the underaged who were an average of about 8 months younger than conventional admissions students.

Worcester reported findings that supported early school admission for 381 Lincoln pupils and for smaller samples of underaged students who attended rural Nebraska elementary schools.

There were no statistical differences in physical development. In academic work, the younger did as well or better than their older classmates. Judged by their peers or by teachers' ratings, they are socially and emotionally as well or better adjusted. They have as good or better coordination. They are accepted by their peers. They like school. They do as well or better than those of the same age who were a year later in getting started in school. Indeed, no negative effects have been discerned. As compared with those who took the test and did not pass it, the younger ones had gained a year of school life without loss in social adjustment. (1956, p. 28)

On the basis of this evidence, Worcester concluded that chronologically younger aged pupils who were able to demonstrate academic readiness on mental tests should be admitted early to elementary school. Moreover, if we consider that the mean IQ for underaged students reportedly was 110, then by extrapolation, pupils of greater intellectual ability defined by higher mental age are better qualified for early admission to school.

A third investigation (Birch 1954) afforded a two-year evaluation of forty-three children admitted underage to the first grade in Pittsburgh schools. Based on principals' and teachers' judgments of educational and socioemotional adjustment, thirty students received completely positive evaluations. Only five of the forty-three students received any negative evaluations; yet Birch noted these evaluations were not totally characteristic of the five children. In addition, Birch pointed out that Pittsburgh schools advised early entrance for those with IQs of 135 and above. Therefore, these data not only are consistent with Hobson's and Worcester's findings but also denote the advantages of one year's acceleration for intellectually able 5-year-olds.

The fourth study reported a retrospective experimental design in which seventy-three children with birth dates in January and February were matched with seventy-three children whose birthdates were in November and December of the same year (Baer 1958). The young-in-grade pupils were matched with the old-in-grade students for IQ, sex, and in two-thirds of the cases, the school they had entered. Mean IQs for both groups were approximately 111, and equivalent IQ ranges from 100 to 130 were reported.

It is important to note that neither group in Baer's study was accelerated through early admission to school at ages younger than conventional. In other words, the design specified an eleven-year retrospective comparison between underage and overage groups of pupils. Given the fact that the groups had comparable mean IQs but differed in chronological age from 9 to 12 months, one reasonably might expect the old-in-grade pupils to have higher mental ages and, thus, to outperform the younger pupils. Baer's results indicated this indeed was the case: "During the elementary school years . . . overage students were marked significantly higher than the underage student, but the differences between overage and underage students tended to decrease as higher grade levels were reached" (1958, pp. 17-18).

Two interesting and important findings emerged from Baer's data. First, sex differences were greater than underage versus overage group differences on three of the personal trait ratings: dependability, attitude toward school regulations, and emotional stability. This implies that the underage pupils were no different from the overage students on important indices of personality quite related to socioemotional adjustment. Second, according to Baer, the young-in-grade pupils made *average* school progress, and "as a group, they made average marks in subjects, average scores on achievement tests, received average ratings by their teachers on personal traits, and did not mark significantly more problems on the problem inventory than did the overage students" (*ibid.*, p. 19). If the young-in-grade students made average school progress but were surpassed in performance by the old-in-grade pupils, then the overage students must have made better than average academic progress. If that was the case, then it was quite likely the overage students were, indeed, quite ready for an accelerative intervention of perhaps one year, possibly at the time of admission to elementary school. Moreover, old-in-grade and *very* bright (e.g., IQ = 140) students most likely would excel (even these bright students mentioned by Baer) in achievement and would serve as even more appropriate candidates for *at least* one year's acceleration in school.

Thus, data from four investigations of early admission to either kindergarten or first grade and studies comparing overage with underage students unequivocally favor acceleration through early admission to school. Underage pupils who can demonstrate mental age performance comparable to mean performance of the grade they desire to enter should be permitted to enroll in that grade. Also, bright overage pupils are at a distinct disadvantage in that certainly they are competent to handle more appropriately difficult curricular materials but, nonetheless, they must remain in their "proper" chronological age grade.

SUMMARY

The relative merits of enrichment versus acceleration for gifted students no doubt will continue to be debated and researched in future years. At present, an objective evaluation of the empirical findings leads us to the following conclusions: (1)

Academic enrichment (whether it is “relevant” or “irrelevant”) may be worthwhile for all students, and not specifically for the intellectually gifted. In this way, enrichment programs seem to be more open to accusations of “elitism” than acceleration is, since no “special” curricula need to be established for the accelerated student. (2) No studies have shown enrichment to provide superior results over accelerative methods. Enrichment at best may only defer boredom until a later time. (3) Much resistance to acceleration (or “grade-skipping”) is based on preconceived notions and irrational grounds, rather than on an examination of the evidence. Most resistance stems from concerns about the socioemotional development of the accelerated student. When the facts are studied, however, we find that such adjustment problems generally are minimal and short-lived. (4) Accelerated students are shown to perform at least as well as, and often better than, “normal-aged” control students, on both academic and nonacademic measures.

It seems evident that, according to the findings of most of the studies reported here, acceleration appears to be the more feasible method for meeting the needs of gifted students. We would expect to find a diminishing adherence to the age-grade lock step as more educators, administrators, and parents become aware of the facts as opposed to the myths.

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