

Radical Acceleration of Highly Gifted Children

An annotated bibliography of international research on highly gifted young people who graduate from high school three or more years early.

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FOREWORD

Educational acceleration of highly intellectually boys and girls is frequently misunderstood as only skipping school grades. Although it is crucial that very bright youth be moved ahead at appropriate rates in the areas of greatest intellectual ability and interest, there are at least twenty different ways in which this can be done well. For example, one of the two mathematically ablest students I have known among the millions tested in our annual talent searches since 1972 (top possible score on a college test of mathematical reasoning twice at age 10) graduated from Harvard University *summa cum laude* in mathematics at age 19, only about two years ahead of his age mates. How [did] this brilliant Chinese-American young man do so? He skipped a year in elementary school and completed his baccalaureate at Harvard in three years instead of the usual four, beginning there with graduate-level math courses because he had taken much math and physics at a local university on a part-time basis while still a high-school student. He could have completed his degree near home in a year after high-school graduation, but chose instead to get a “normal” college experience far away, at Harvard, without slowing down his mathematical development. Thus, he had the best of two “worlds.” (Now he has a Ph.D. degree, with further honors, and is a faculty member in mathematics at a top university).

Furthermore, he competed vigorously and enthusiastically in many math contests from the seventh grade through his time at Harvard, breaking a number of long-standing records while meeting in those contests his true intellectual peers who were also approximately his age mates. Too few unusually capable youth realize that various local, regional and national contests, not just in mathematics, have suitably high ability “ceilings” and provide the intellectual and social stimulation that many of the boys and girls crave. As the great poet Robert Browning wrote in the language of his day, “...a man’s (or a woman’s) reach should exceed his (or her) grasp, or what’s a heaven for?”

In recent years, news media in the United States have featured kids as young as age eight who entered universities, far younger than we think wise. Some have graduated at age 10, 11, or 12, and quite a few at age 15. Some of those have been moderately or even highly successful thereafter (news media seldom follow up to see what resulted). A few have paid a costly price in social and emotional underdevelopment. It seems to us in the Center for Talented Youth (CTY) at Johns Hopkins University that excellent parenting is especially crucial for such “radical accelerants.”

The main literature on educational acceleration is tucked away in specialist journals and therefore not readily accessible to the typical parent or gifted student. Professor Gross, an internationally renowned specialist in this area of intellectual talent, and her co-author has done a great service to a wider audience by abstracting some of the most useful studies.

The abstracts, from quite varied sources, are preceded by an excellent chapter overview of the topic. Abstracts are clearly written and readily comprehensible to the “intelligent layman.”

This is a remarkably useful volume, of great value to gifted-child specialists, other educators and administrators, parents, journalists, educational policy makers, and even the gifted children themselves. It helps dispel some of the myths that encumber the facilitation of educational talent, such as the incorrect notion that gifted students will be able to shift well for themselves wholly within the context of the regular age-in-grade curriculum or, as noted above, that educational acceleration means only grade-skipping.

The gifted-child field is greatly indebted to Professor Gross and her co-workers for their intelligently diligent preparation of this book. It opens the way to conferences and further deliberations and publications that are already planned to examine educational acceleration even more fully.

- Julian C. Stanley

Dr. Julian Stanley is Professor Emeritus of Psychology and the Director of the Study of Mathematically Precocious Youth (SMPY), which he founded at Johns Hopkins University in 1971. His research and service on behalf of mathematically and/or verbally gifted students has sparked the creation of talent searches and residential academic summer programs which have profoundly influenced the lives of thousands of boys and girls throughout the world. Dr. Stanley is a former president of the American Educational Research Association and the National Council on Measurement in Education. In 2000, the Mensa Education and Research Foundation selected Dr. Stanley as the winner of its first Lifetime Achievement Award.

INTRODUCTION

This annotated bibliography summarises and critiques a range of academic articles concerning the incidence and effects of radical educational acceleration. They comprise research papers, descriptive articles, personal accounts, literature reviews, conference papers, book chapters, and a guidebook. Research papers outline individual case studies, multiple case studies, cohort studies and biographical accounts of radical acceleration. Some studies are longitudinal in nature, while others are cross-sectional and comparative. Methodologies employed in the studies reported include questionnaires, surveys, interviews, tests of achievement, tests of ability, personality and self-esteem inventories, and measures of social adjustment.

Radical acceleration is said to have occurred when an intellectually gifted young person graduates from school three or more years earlier than the usual age. Radical acceleration is the consequence of one or more procedures being adopted in an effort to meet the needs of highly gifted children. These procedures generally include early school entry, subject acceleration, grade skipping, curriculum compacting and curriculum telescoping. Case studies indicate that it is usual for a student to experience a combination of these procedures and, together, this combination results in radical acceleration. Students who radically accelerate their education often enter college or university three or more years earlier than is customary.

The literature compiled in this reference work has been reviewed for information regarding the following:

- ♦ the incidence of radical acceleration and any patterns of prevalence which appear internationally;
- ♦ the range of acceleration procedures, and the combinations of procedures, which result in successful radical acceleration;
- ♦ variables which appear to predict success of radical acceleration;
- ♦ the incidence of home schooling of exceptionally and profoundly gifted students and its influence as a facilitator of radical acceleration;
- ♦ the use of distance education as a facilitator of radical acceleration;
- ♦ university course entered after radical acceleration and degree of success;
- ♦ cognitive outcomes resulting from radical acceleration;
- ♦ affective outcomes resulting from radical acceleration

The bulk of literature concerning radical acceleration originates in the United States of America. This would suggest that there is a generally higher prevalence of radical acceleration in the United States than in any other country. However it may also reflect other circumstances, such as the decreased opportunities for educational research, and for the publication of such research, in other parts of the world. There are a number of reports outlining case studies of radical acceleration in Australia. More recently, a significant number of publications have documented radical acceleration in The People's Republic of China and Korea, with a smaller number outlining the process as it is practised in Austria, Britain, Poland and Russia.

Provisions for acceleration, including radical acceleration, in countries outside the United States have been, in many instances, informed by the *Talent Search Model* as developed by Dr Julian Stanley at the *Study of Mathematically Precocious Youth* (SMPY), Johns Hopkins University. The literature reveals the important role Dr Julian Stanley and his colleagues at SMPY have played in encouraging and supporting radical acceleration in the United States of America, as well as in other countries across Europe and Asia. SMPY has carried out extensive research concerning the academic and affective outcomes of radical acceleration, procedures that support radical acceleration, and variables that influence the success of radical acceleration. Much of this research is longitudinal and is on going.

Variables Associated with Successful Radical Acceleration

There have been many variables identified that appear to influence the success of radical acceleration. Careful educational planning is crucial, especially as it relates to the timing of acceleration and the degree to which a student accelerates. Planning should focus on a student's individual needs. Programmers need to be flexible, so that each student choosing radical acceleration can proceed through a set of educational experiences that will best meet his or her unique intellectual and affective needs. It appears most important to include the student in the development of any plans relating to radical acceleration and to proceed only if the student is in agreement.

Family support for radical acceleration has a significant bearing on a student's social and emotional well-being. Students appear to benefit most when parents are closely involved in their schooling and advocate on their behalf. Counsellors can provide important social and emotional support and can offer academic and career advice. Mentors can act as role models and can provide invaluable learning experiences. Students who decide to radically accelerate appear to benefit from involvement in Advanced Placement courses and part-time enrolment in college or university. They also benefit from opportunities that allow them to develop the skills necessary for advanced study.

Relatively small numbers of articles address the role of home schooling or distance education as facilitators of radical acceleration. Case studies present the experiences of three radically accelerated students who were home schooled for at least part of their education. All children lived in the United States of America. Two of the studies are based on retrospective data. Four articles briefly discuss the benefits of distance education through correspondence courses and suggest that this might be one strategy to include in an overall educational plan for radical acceleration. It may be too early for the literature to reflect the roles of home schooling or distance education in the process of radical acceleration.

Following is a list of the variables identified in the literature relating to successful radical acceleration:

- ♦ Personal characteristics of the student

Positive outcomes ensue after radical acceleration when students are motivated to achieve, show persistence and are passionate about learning in at least one subject area. It also appears beneficial for students to have acquired advanced study skills and to have attained results on achievement tests that are at least average for the group of students they will join.

- ♦ Involving the student in educational planning

Positive outcomes ensue when students are supportive of the educational strategies that are employed. Students who are considering radically accelerating into college should ensure that the benefits will outweigh any regrets about missed high school opportunities, such as editing the school newspaper, joining musical groups, competing in academic and sporting competitions, going to the prom, being valedictorian at graduation or applying for college and university scholarships. Students who excel in athletics should realise that, after radical acceleration they may no longer be able to participate in competitive sports at school or college.

- ♦ Supportive Family

It appears to be particularly important for students to know that their parents are their partners in the acceleration process. Encouragement and support from significant others has been shown to have important positive effects for students who radically accelerate. Willingness on the part of parents to allow their children increased independence despite their young age appears to be crucial. Parental support appears to be dependent on parents being informed about the process of radical acceleration and educational counselling for parents has been shown to facilitate radical acceleration.

- ♦ Supportive Educators

Successful radical acceleration commonly involves at least one educator who is knowledgeable about the needs of gifted children. Case studies reveal the important role this educator plays as long-term critical planner, monitor and mentor; identifying appropriate interventions for the student, providing information concerning access to these interventions, and supporting the student, their families and their teachers.

- ♦ Individualised Acceleration Planning

Students need to have access to a variety of acceleration options so that they can choose the combination of options most suited to their circumstances. These options should include early school entry, subject acceleration, grade skipping, concurrent enrolment in school and university or college, curriculum compacting, curriculum telescoping, Advanced Placement courses, part-time college courses, summer programs and correspondence courses. It appears important to consider the timing of implementation of such strategies, as appropriateness of timing will differ between students depending on their cognitive and affective needs.

- ♦ A Flexible Approach to Teaching and Learning.

Radical acceleration works best when there is flexible curriculum planning based on individual needs. Educators need to ensure that students are able to access a wide variety of enrichment and acceleration options. Planning needs to allow for regular readjustment of the educational program, as students' needs and circumstances change.

- ♦ Programming to Support the Affective Needs of Students

Program modifications supporting successful radical acceleration should include provisions to address the affective needs of gifted students. It seems important to pay particular attention to the need for interaction with peers sharing similar intellectual ability. Provision for counselling before and during the process of radical acceleration has been shown to support positive academic and affective outcomes.

- ♦ Opportunities to Develop Skills for Advanced Study

Students who decide to radically accelerate appear to benefit from involvement in Advanced Placement courses and part-time enrolment in college or university. Previous experience of subject or grade advancement also seems beneficial. Such experience provides students with the opportunity to develop the skills necessary for effective note-taking, essay writing and time-management.

Cognitive Outcomes

A significant number of articles document educational outcomes for radically accelerated students. The vast majority of these students progress to university and attain outstanding academic results. Many gain awards and scholarships. Most complete university study and attain significantly higher grade point averages than regular-age students. Many of the students identified in the existing literature are gifted in mathematics and/or science and complete postgraduate study in these areas. Some students undertake multiple undergraduate degrees.

Many case studies outline the career paths of students who have chosen radical acceleration. A significant number complete postgraduate studies and accept offers to remain at university to lecture and to complete research. Many go on to become professors and have become world leaders in their fields, making impressive discoveries and truly advancing knowledge. It is not uncommon for students from the United States to accept opportunities to study or work overseas. The majority of radically accelerated students are grateful for the opportunities to extend their academic experience. They appreciate the increased intellectual challenge subsequent to radical acceleration. A small number of students are concerned about specialising in an academic field at too young an age. However, this fear is not significant enough to reverse their decision to radically accelerate.

Affective Outcomes

The literature reports generally positive affective outcomes for radically accelerated students. Many enjoy a larger pool of friends and an active social life. Many students report that they enjoy more supportive and satisfying friendships after radical acceleration. Researchers suggest that this is consequent to students being placed with peers who share similar abilities and interests, in many cases for the first time in their educational careers.

Studies show high levels of self-confidence, independence, maturity and motivation in college students who have radically accelerated compared to regular college students. These students experience healthy levels of general self-esteem and social self-esteem. A small number of students who enter university or college early express regrets about missing social opportunities at school. Some also identify occasions when other students have teased them for their young age, or have been overly protective. However, despite these concerns, the great majority of students report that the social and emotional benefits of radical acceleration far outweigh any negative effects.

The many articles presented in this reference work attest to the growing educational evidence in support of radical educational acceleration. The research refutes many of the myths surrounding this educational provision. For instance, there is now ample evidence to show that highly gifted students who are radically accelerated do not suffer unfavourable social or emotional effects. These students do not 'burn out'; they do not lose interest in their area of talent; and they do not suffer from large gaps in their academic or social knowledge. Rather, radical acceleration appears to offer extraordinary benefits for highly gifted children for both their intellectual development and their social and emotional health. The well-researched provisions for radical acceleration developed by Dr Julian Stanley are being successfully adopted not only in many sites across the United States but in various international centres.

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ABSTRACTS

1

Flexible Curriculum Planning Facilitating Radical Acceleration

Benbow, C. P. and Stanley, J. C. (1983). Opening doors for the gifted. *American Education*, 19(3), 40-43.

Objective: To make a case for providing a flexible curriculum for gifted students.

Design: A review of research literature regarding the Study of Mathematically Precocious Youth (SMPY).

Setting: Study of Mathematically Precocious Youth (SMPY), Johns Hopkins University.

Assessment of Variables: Research articles were reviewed for evidence regarding identification and characteristics of gifted students, educational options for the gifted, and acceleration.

Main Results: The authors begin by outlining a case for a flexible curriculum based on developmental psychology. They ascribe to the beliefs that learning is a sequential and developmental process; there are large differences in learning status among individuals; effective teaching involves assessing students' status in the learning process and posing problems that slightly exceed their level of mastery. These principles are seen to have important implications for teachers of gifted students. It is particularly important to address issues concerning access to an appropriately challenging curriculum. It is argued that it is impossible for highly gifted children to access such a curriculum in the regular classroom.

Before a curriculum can be adapted to better suit gifted children, issues of identification and characterisation should be addressed. Gifted students need to be identified in a systematic manner. Research shows that teacher recommendation is ineffective for identification. SMPY has developed the Talent Search method for identification of students with outstanding mathematical ability. Students in 7th and 8th grades take the College Board *Scholastic Aptitude Test (SAT)*, mathematics and verbal sections. This is a test designed for students in 11th and 12th grades. Younger students who do well on this test have already developed aptitudes in line with students who are up to five years older.

Students identified by SMPY as possessing precocious mathematical ability are invited to take further testing in an effort to identify characteristics needing to be addressed by education programs. These students have been found to be advanced not only in mathematics but also in specific ability areas and in their knowledge of science. They are generally more inter-personally effective and socially mature than their nongifted peers. They tend to prefer investigative careers. These students tend to come from larger than average families with well-educated parents. *SAT* scores have been found to relate positively to parents' educational level and fathers' occupational status, but not to the number of siblings in the family or sibling position.

Once students have been identified and their characteristics noted, an appropriate educational program can be devised. SMPY has found that the best method for doing this is to offer students a large choice of accelerative options from which they can choose. These include grade-skipping, graduating early from high school, entering courses a year or more early, completing two or more years of a subject in one year, being tutored, taking college courses on a part-time basis while still enrolled at school, and earning college credit through examination courses.

The staff at SMPY work with schools to implement the chosen options. There is no attempt to change programming at schools, as this would take too long. If a school is willing to be flexible each student can be catered for within the pre-existing structures. It is suggested that most schools tend not to be flexible enough in their approach to the teaching of exceptionally gifted students. The best scenario would be a school that is flexible about placement, allowing a student of any age to progress to higher grades as their ability develops. The authors illustrate this process by presenting a case of a student for whom options led to radical acceleration and early entry to university.

Researchers at SMPY have found that options allowing for educational acceleration are best for addressing the needs of highly gifted children. The authors quote a number of studies that show no detrimental effect of acceleration on a student's social and emotional development.

Conclusion: Academically advanced students need to be identified in a systematic manner. The Talent Search process developed by SMPY illustrates how identification might take place. Characteristics of each gifted child need to be documented and this requires further assessment. Once this process has been carried out, a plan can be formulated, based on pre-existing school frameworks, to meet the needs of highly gifted children. Schools need to allow for curriculum

flexibility rather than changing standard learning programs. Options that allow for radical educational acceleration work best for exceptionally gifted students.

Commentary: This article documents the process of talent identification and development as undertaken at SMPY. Insight is gained into the theory guiding this process, along with research findings that have informed program change. As such, this article is valuable for the guidance it can offer others who are involved in coordinating education for gifted students.

A Comparison of Eight Early College Entrance Programs

Boothe, D., Beheruz, N. S., Stanley, J. C. and Colgate, S. D. (1999). Special opportunities for exceptionally able high school students: A description of eight residential early-college-entrance programs. *The Journal of Secondary Gifted Education, 10(4)*, 195-202.

Objective: To compare and contrast programs at eight different sites across the United States of America that enable exceptionally able high school students to enter college early.

Design: Literature Review

Setting: Eight tertiary education institutions in the United States of America that have specific programs to enable students to enrol early. Four institutions are private and four are public.

Assessment of Variables: Literature was reviewed for information concerning admissions requirements, costs, curriculum, residential component, enrichment and leadership, and successful integration into university or college.

Main Results: The early-entrance-to-college program at The Advanced Academy of Georgia (AAG) at the State University of West Georgia is the most recent program in this review to be established. The program serves students in 11th or 12th grade and thus offers acceleration of 1 to 2 years. It is open to students from Georgia and from other states. Selected students are enrolled as full time residential students. They begin their college studies while also completing subjects for their high school graduation. They complete high school study at the Academy. At the completion of the program, students have earned enough credit for college sophomore or junior standing.

The program at the Texas Academy of Mathematics and Science (TAMS) is the largest of the programs reviewed and was established in 1988 at the University of North Texas in Denton. This program admits only students from Texas and is partly funded by the state. It was set up to increase the number of students attempting science and math degrees in the State of Texas. At the beginning of junior high school, selected students are offered a place in the program. Students are offered the chance to accelerate their education by 2 years. After completing a two-year schedule, they are awarded a special high school diploma and are classified as college juniors. The Texas Academy of

Leadership in the Humanities (TALH), located at Lamar University in Beaumont, and established in 1991, combines high school study and early college study in the same way as TAMS and AAG. It also receives state funding.

Middle Georgia College in Cochran established an early-entrance program in 1997. That year they admitted 27 students. The program is administered through the Georgia Academy of Math, Engineering and Science (GAMES). Students study a curriculum that emphasises math, science, engineering and pre-med. Students receive high school diplomas from their home high school and an associate degree from Middle Georgia College. Students enter after the 10th or 11th grade and are thus offered 1 or 2 years of acceleration.

Simon's Rock College of Bard College (SRC), is a private institution that offers an early-entrance program. Students in the 11th or 12th grade are able to enter. Students accelerate their education by 1 to 2 years. They complete a two-year program and receive an associate degree. Many remain at Bard College to complete a bachelor's degree in the major of their choice and others transfer to other universities or colleges with junior college standing.

The idea for the Mary Baldwin College Program for Exceptionally Gifted (PEG) was proposed by Dr Virginia Lester, past president of the College. She realised that there was an underserved population of high school-aged gifted females who could benefit from the college experience. The program serves female students who have completed the 8th grade or reached a minimum age of 13. Students are offered the chance to radically accelerate their education, moving ahead 3 or more years. The students study a traditional liberal arts college curriculum.

The Clarkson School is located on the campus of Clarkson University in Potsdam, NY. It was established in 1978 to supply a one-year residential program to students in the 12th grade. This program was developed to offer a transition experience to help students to bridge school and college. The program presently aims to give talented students access to a solid college curriculum in the sciences and engineering.

The Residential Honors Program (RHP) at the University of Southern California, is a one-year residential early-entrance-to-college program. This program is highly selective. Students are actively sought to participate. They are recruited after 11th grade; thus the program offers one year of educational acceleration. Students must have achieved excellent academic results, with a high-school

grade point average of no lower than A-. There must be evidence of completion of honors and AP courses. They must have a combined *SAT* score in their junior high-school year of no lower than 1370.

The admission requirements for each of these programs vary and the authors provide admission details for each program. Generally students need to be highly motivated, academically well qualified, and socially and emotionally capable. Decisions about admission are made on an individual basis and are usually partly based on the recommendations from high school personnel and student/parent interviews. A minimum score on the *Scholastic Aptitude Test (SAT)* or a similar test is required for all programs except at those at the Clarkson School, PEG and SRC. For selection to SRC or PEG, students need to supply one or more samples of writing for assessment.

The cost to participate in each program varies, with exact amounts being quoted by the authors. The amount of funding from public and private sources differs across programs. Some programs offer scholarships and other forms of financial support.

The curriculum in each program is designed to meet the needs of exceptionally bright students. The focus on specific areas differs across programs, with some programs offering curriculum most relevant for students interested in science and maths, and others offering a curriculum that specifically teaches the humanities. Thus, each program is set up to allow students gifted in specific areas to pursue particular interests. Some curricula are designed to allow students to cover work that will allow them to graduate from high school whilst they concurrently study college level courses. Other programs do not permit this, particularly those that permit radical acceleration.

None of the eight programs reviewed allows students to join fraternities or sororities. National Collegiate Athletic Association guidelines dictate that students must have graduated from high school before they can participate in college athletics teams. This does not preclude early-entrance students joining physical education classes on campus and intramural sport programs. All eight programs emphasise participation in cultural events, campus activities, community service, and clubs. Many programs offer social experiences that include dinners, field trips and camps. Programs differ in their residential offerings. Some programs insist that students live off campus for at least a year. Most programs offer accommodation on campus. Some programs insist that students reside at the college or university.

The authors quote a substantial body of research showing positive academic and social outcomes for students who choose to enter college or university early. The research focuses particularly on academic achievements, with many students winning scholarships and academic awards and continuing to study towards PhD degrees.

Conclusion: Research shows that the eight programs for early college or university entry reviewed in this article are highly successful in allowing gifted students to achieve academic success. Programs such as these have also been shown to prevent boredom. Students who appear to benefit most from early entry to college or university are those who are strongly motivated and who possess considerable maturity.

Commentary: The various models presented of early entrance programs for highly gifted students make the reader aware of how different these programs can be. Each program is designed with the needs of highly gifted students in mind yet each is set up to appeal to quite different groups of students. Some programs concentrate on science and math curricula while others teach arts based curricula. Some allow students to reside on campus while others will not allow this. Programs select students using different criteria. They offer various degrees of acceleration and different forms of social support. By supplying a diverse range of offerings these programs are truly making it possible for highly gifted students to choose the educational environment that will best address their needs.

Radical Acceleration and the Talent Search Model

Brody, L. E. (2001). The Talent Search Model for meeting the academic needs of gifted and talented students. *Gifted and Talented International*, 16(2), 99-102.

Objective: To explain how the Talent Search Model can be used to meet the academic needs of gifted students.

Design: Literature review and case studies.

Setting: Research articles and book chapters published in the last decade and one book chapter published in 1979, concerning the Talent Search Model. Case studies of three gifted students who participated in Talent Searches.

Assessment of Variables: Literature was reviewed for information regarding the development of the Talent Search Model, characteristics of the Talent Search Model, and the effects of Talent Search Model on educational programming. Three cases were presented to illustrate how the Talent Search Model can meet the academic needs of gifted children.

Main Results: The Talent Search Model was first adopted by Dr Julian Stanley at Johns Hopkins University in 1971. It was Dr Stanley's aim to devise a method not only to find talented students, but also to offer them ways to develop their talents through appropriate educational opportunities. One of his goals was to create additional educational options for highly talented students that would supplement their regular school program and allow them to accelerate their education.

Talent Searches are now conducted at many sites across the United States of America. Most Talent Search centres offer information about appropriate educational programs for gifted children. Most also offer a counselling service. They supply students and their parents with information about a range of extracurricular opportunities appropriate for gifted students.

The Talent Search Model is based on some fundamental beliefs about education for gifted children. Gifted students will only achieve their potential if they are offered a challenging and differentiated educational program. The more talented the child the greater is the need for a differentiated

program. It is important to use assessment tools that will measure a student's ability accurately. In the case of gifted students, the most appropriate assessment tools are usually those designed for older students, that is, above-level assessment. It is important for educational planning to also take into account a student's specific abilities, content knowledge, interests, motivation, goals, personality characteristics and learning styles. Course work should be presented at a level and pace that is appropriate for a student's abilities. Gifted students should have access to opportunities for learning outside of school that can augment school-based learning. Gifted students benefit from access to intellectual peers and to role models and mentors.

An academic program model offered at some sites, including the Johns Hopkins University, is a 3-week residential summer program. Students are offered rigorous course work that is aligned with their abilities. They may choose content that is relevant to their schoolwork and may be eligible to accelerate in a particular subject when they return to school. They might also choose areas of study that are not typically part of a school curriculum. The residential nature of this type of program allows students to attend who live some way from the site. Students benefit from interacting with peers who share similar abilities and interests. Counsellors are usually available to support students. Social activities are organised in an attempt to provide students with opportunities to relate to each other in non-academic settings.

Talent Searches have led to a great increase in the availability of supplemental academic opportunities for gifted students. Since 1971, gifted students have been able to choose from a growing number of options that allow for academic acceleration. Early entrance to kindergarten, grade skipping and subject acceleration are options available in the elementary school. Early college entrance allows students to accelerate their education from one year to more than three years, depending on the needs of the student and the specific offerings of the program. Many students have been supported to radically accelerate their education after participating in the Talent Search conducted through Johns Hopkins University.

Summer programs are offered by a number of schools, universities, museums, camps, and other institutions. Such programs allow students to pursue their interests, with some enabling students to be involved in research with mentors. Advanced Placement (AP) programs offer gifted students the chance to study college-level courses whilst still attending high school. Some states allow students to enrol in both school and part-time college without paying college tuition. Students are able to experience college study and to accumulate credits whilst finishing high school.

Students can work independently on advanced level work by enrolling in Internet courses or CD-ROM based courses. They can receive tutoring in an area of interest, work on a project and/or explore a career field with a mentor. Mentors can serve as role models and can play a significant role in motivating gifted students to aspire to achieve at high levels. Internships usually involve students spending time in a work place, and can help students become knowledgeable about content area, develop self-confidence and leadership skills, and explore career options. Students can also take advantage of an increasing number of extracurricular activities. They may decide to become involved in academic competitions, musical experiences, sports clubs or community activities.

Proponents of the Talent Search Model are clear that students should be advised about relevant educational experiences on an individual basis. The needs of each student are identified and program offerings are tailored towards these specific needs. The author uses case studies to illustrate how this model has worked for some students.

Sam earned 800 on the mathematics portion and 560 on the verbal portion of the *Scholastic Aptitude Test-I (SAT-I)* at the age of 12 years. His score on the math portion is the highest that is possible and it is very rare even for college student to achieve at this level. His verbal score placed him above average for college-bound students aged 17 and 18 years. Sam was a motivated student who enjoyed school. He was interested in science, sports, and music. He exhibited good social skills and leadership abilities. He aspired to attend a highly selective college.

There was a need to address Sam's extraordinary ability in math. He began to take math courses at the local college, as well as physics courses, while continuing his high school education. He also exhibited talent in the humanities and took honors and AP courses in high school in these subjects. He attended the Centre for Talented Youth's summer program and spent another summer completing an internship. During the internship, he worked on a project that he submitted to a national science competition. He also participated in an international mathematics competition. He also pursued his interests in music and athletics. Sam considered entering university early but decided against this option. He felt adequately challenged by the options he was already pursuing, and wanted a full four years in high school to develop credentials to be accepted into a highly selective university.

The author outlines another two cases of students who have been helped greatly by participating in a Talent Search. One student scored similarly to Sam on the *SAT-I* but took advantage of very different opportunities. The contrasts in these cases illustrate the need to design individual programs for each student, even when abilities are very similar. The third case described a young female student who chose to take advantage of options for both grade and subject acceleration.

Conclusion: The Talent Search Model goes well beyond simply identifying gifted students and outlining their needs. The model truly acts to meet the academic needs of gifted children by providing a large range of options from which they can choose. These options include school and college based programming adaptations as well as extracurricular activities. Educational plans for gifted students need to be individualised if success is to follow for each student, as individual needs vary. Students who participate in talent searches have been shown to be better prepared for college study. They are often more motivated to achieve.

Commentary: The author has made reference to only a very limited number of research studies to support her assertions concerning the Talent Search Model. The case studies presented are brief. While this article presents a good outline of the benefits that can result for students who participate in Talent Searches, it is probably most valuable for teachers, parents and students who are considering involvement in a Talent Search.

Factors Facilitating Successful Early Entrance to College

Brody, L. E. and Stanley, J. C. (1991). Young college students: Assessing factors that contribute to success. In W. T. Southern and E. D. Jones (Eds), *Acceleration of gifted children* (pp 102-32). New York: Teachers College Press.

Objective: To summarise the research on early entrance to college and to identify factors likely to contribute to successful academic and social adjustment for students.

Design: Literature review.

Setting: Research articles and book chapters concerned with case studies and group studies of students who have radically accelerated their education. Sources were published from 1938 to the late 1980s.

Assessment of Variables: Literature was reviewed to identify factors influencing the success of radical acceleration. Particular attention is given to literature concerning early entrance to university and college.

Main Results: The authors begin with a detailed examination of the history of education for gifted students in the United States of America. This provides a context for the discussion that ensues regarding current educational offerings for gifted students, in particular those allowing for radical acceleration. It is interesting to note that radical acceleration has been occurring in the United States of America since formal schooling began. There has been a gradual decline in educational acceleration since the 1920s, when enrichment strategies began to become more popular among teachers for meeting the needs of gifted students.

Many individual case studies of successful radical acceleration are referenced. Despite these successful cases, the authors argue that it is the small number of cases that document academic and/or social decline following radical acceleration that continue to color public opinion, as well as the opinion of many people involved in education. The authors outline the case of William James Sidis as an example. Sidis was home-schooled by his father for most of his childhood and entered Harvard University aged 11 years. He initially made exceptional academic gains but, after graduating

at the age of 16, he failed to complete graduate school and then law school. He was unable to hold down lecturing jobs and appeared to be suffering emotional difficulties. The media scrutinised Sidis' life and this caused him great distress. He eventually decided to isolate himself socially to avoid this unwanted media attention.

The authors argue that, while many people believe that educational acceleration can be blamed for Sidis' academic and social decline, social and emotional factors played a more important role. They suggest that Sidis was exploited by his father. His father encouraged the media to report on his son's progress and did not appear to be concerned about the negative effects this media attention might be having on his son's well-being. They also propose that Sidis was deprived of emotional support during his childhood and was limited to socialising with a very few people. The fact that Sidis was home-schooled meant that he was unable to socialise with children his own age. Sidis never married and remained socially isolated until his death at age 46.

The authors compare William James Sidis' experiences with those of Norbert Wiener, making the point that a similar degree of radical acceleration proved successful for Wiener. They argue that Wiener's success was directly related to positive social and emotional factors that acted to support his academic progress. These social and emotional influences contrasted markedly with those experienced by Sidis. Wiener attended public school, which enabled him access to other children and adults during his childhood. He was thus able to socialise more widely than Sidis. Wiener's father was aware of the possible negative effects of public scrutiny and thus avoided publicity as much as possible. He decided to send his son to Tufts College instead of Harvard because he felt it would make him less conspicuous. Wiener was able to exert his own independence despite being brought up by a domineering father. He credits his wife with helping him to achieve independence from his family.

Many cases of radical acceleration, both historical and current, are outlined to counterbalance the Sidis story. The authors quote examples of such cases from the research literature and evaluate these cases for outcomes. With regard to academic achievement, the authors quote cases of radically accelerated students who became full professors in their early 20s. While the authors also identify a small number of cases of students who dropped out of formal education before completing college study, they conclude that the majority of radically accelerated students enjoy academic achievements worthy of their ability. The authors highlight the great variability among students in their patterns of

academic acceleration. While some were home-schooled, others attended public schools. While some skipped grades at different times during their schooling, others skipped high school completely.

The authors then present research regarding groups of students who have radically accelerated as a cohort. They conclude that groups of radically accelerated students are extremely successful academically and professionally. For instance, such students are more likely to graduate from college, have the best academic records and are more likely to be awarded honors. These students do not appear to experience any significant social or emotional problems. The authors conclude that there is no justification for assuming that academic difficulties or social and emotional adjustment problems are likely to accompany early entrance to college.

The authors identify issues in need of particular attention regarding radical acceleration. One concern is the degree of acceleration that might be appropriate for a student. It appears that there is no increase in risk associated with more radical acceleration. Research supporting this view has shown predictive factors for successful acceleration to include academic variables such as number of Advanced Placement credits and amount of advanced course work taken prior to acceleration, rather than student age. Another issue concerns the process of identifying optimal times for a student to accelerate. The authors suggest that, to help with such decisions, it is important for students to carefully examine their strengths, weaknesses, experiences, interests, personalities, physical and emotional maturity, and circumstances. They suggest that no single path will be appropriate for all young students who decide to radical accelerate their education.

Research concerning early entry to university or college is discussed. The authors suggest that early entry is facilitated by organised early entrance programs that provide transition opportunities, or by students having accelerated in course work, if not in grade placement, so that they have academic experiences similar to other incoming college freshmen. They discuss issues related to being very young and living on campus and suggest that there are many advantages to being one of a group of early entrants. Some early entrance programs offer counselling for students and this too appears to be beneficial.

While research shows that students who enter college early achieve well whether they live on site or commute to the campus, the authors suggest that, in general, it might be best for younger students to consider commuting for a time. The authors suggest that students considering living on campus should take into account their age, physical and emotional maturity, proximity to a local college,

social and academic alternatives in high school, and support for early entrants at the college under consideration.

Students who enter college or university early can graduate three or more years earlier than students who enter at the traditional age. The authors suggest that acceleration thus saves these students time and another issue that needs to be addressed is how students might best use this time. Options include pursuing higher study or career development, or exploring scholarships for study overseas. The authors present the example of one student who graduated from Johns Hopkins University at age 18 with a degree in humanities. He went on to study law at a top law school. He then spent a year studying international law in Sweden as a Fulbright Scholar. After that, he served for a year as a law clerk to a Federal Circuit Court judge. At the end of this time he was still young enough to win a Marshall Scholarship to Oxford University to study whatever he wished for 3 years.

Education options that can act to facilitate early college entry or that can act as alternatives are described. They include Advanced Placement courses (AP), part-time college courses, summer programs, correspondence courses, independent study, academic fairs and competitions, mentorship and internship opportunities, and study abroad opportunities. Suggestions are made as to ways students might utilise these options to meet their individual needs. Case studies are used to illustrate how two students used these options in very different combinations to radically accelerate their education. The authors conclude with a list of points for students to consider when contemplating radical acceleration.

Conclusion: Acceleration in subject matter and/or grade level needs to be available for youths who reason extremely well mathematically and/or verbally. Specifically, radical acceleration in the form of early entry to college or university has been a successful and rewarding experience for the majority of students who have chosen this option. Social and emotional considerations as well as academic factors need to be addressed before any decision about acceleration is made.

Commentary: A thorough and balanced review of the research on acceleration, with particular attention to radical acceleration is presented. The discussion of pertinent issues arising from the review is particularly relevant as many of those issues are ignored by other authors in spite of their relevance for appropriate planning for acceleration. They include optimal time for acceleration, concerns the student may have regarding acceleration, and family factors that appear to significantly influence outcomes.

Long-Term Academic and Social Effects of Radical Acceleration

Charlton, J. C., Marolf, D. M. and Stanley, J. C. (1994). Follow-up insights on rapid educational acceleration. *Roeper Review*, 17(2), 123-130.

Objective: To report long-term academic and social effects of radical acceleration.

Design: Report of a presentation given at the annual meeting of the National Association for Gifted Children, Atlanta, 1993.

Setting: Study of Mathematically Precocious Youth (SMPY).

Participants: Two young adults who were identified by SMPY in their early teenage years and supported to radically accelerate their education.

Assessment of Variables: Self-reports from two youth about experiences of radical acceleration and its long term academic and social effects. Reports by Dr Stanley, Director of SMPY, concerning long term outcomes of radical acceleration for 12 other youth who accelerated their education under the guidance of staff at SMPY.

Main Results: Participants reported an increased zest for learning after acceleration, which effectively reduced boredom in school. They advocated the use of rapid acceleration and the development of flexible pacing to provide a better match between curriculum and students' intellectual readiness. It was suggested that the students received a better educational preparation for study after school than they would have had they continued in age-placement classes. They were prepared, for instance, to take advantage of scholarships and opportunities for early college entrance. Both participants commented on the benefits of extra time for creative pursuits and career development.

Neither participant reported problems with social or emotional development. Rather, they reported positive social and emotional effects of acceleration. They reported a sense of worth and satisfaction. They expressed relief at finding challenging academic work for the first time. Acceleration allowed both participants to enjoy satisfying relationships with students three or more

years their senior at school and college. The participants were involved in numerous social clubs at college.

One participant identified negative consequences of radical acceleration related to sport and physical education. He did relatively poorly in physical education class and was not involved in competitive sport because he was physically underdeveloped compared to the older students. However, he felt that this drawback was insignificant compared to the benefits gained from radical acceleration.

The authors clearly emphasise the importance of parental support to the success of radical acceleration. It is also clear that the advice and support offered by staff at SMPY, in particular Dr Stanley, was critical in facilitating successful academic and social outcomes. One participant said that advice from Dr Stanley concerning choice of university enabled him to make the best decision in his life.

Cases of other students who went on to achieve great success in both their academic and social lives after choosing to radically accelerate their education through SMPY were discussed. Dr Joseph Louis Bates achieved well at university and was, at the time of the presentation, leading a research group at Carnegie Mellon University working in the computer science field of virtual reality. Another SMPY participant had become an outstanding research cardiologist, with interests in heart pacemakers and gene replacement therapy. Female graduates were said to be working at leading universities in the fields of quantum optics and chemical physics. One was working as a patent attorney, while another, an accomplished violinist, was working in children's television.

Conclusion: The experiences presented for two youth reveal convincing evidence for the benefits of radical acceleration when such acceleration is carefully planned and monitored. It appears that guidance from informed educationalists and support from family is important if radical acceleration is to lead to positive academic and social gains.

Commentary: The authors present personal views and give the reader a sense of the experiences of individuals who have chosen to radically accelerate their education. The reader is able to gain an insight into factors identified by students as influencing the outcomes of radical acceleration. These case studies are important because they reveal outcomes of radical acceleration over time, from high school experiences through to decisions about career.

Comparing Academic and Social Outcomes for Accelerated and Non-accelerated Students

Cornell, D. G., Callahan, C. M. and Loyd, B. H. (1991). Personality growth of female early college entrants: A controlled, prospective study. *Gifted Child Quarterly*, 35(3), 135-43.

Objective: To investigate the theory that early college entrance may be too stressful for young adolescents and therefore deleterious to healthy personality development. Specifically, this study aimed to investigate how students who accelerate compare to students who choose not to accelerate; how accelerated students change over the course of their first year; and how changes experienced by accelerated students compare to changes experienced by nonaccelerated students.

Design: Prospective study.

Setting: A small, private liberal arts college in the United States of America.

Participants: Thirty-three female students enrolled in their first year of a residential early college entrance/acceleration program. Sixteen students were aged 14 years, 12 students were younger than 14 years and 5 students were over the age of 16. These students were compared to a group of 18 nonaccelerated students of comparable age and intellectual ability who were enrolled in traditional high school programs.

Students were admitted to the early entrance program based on evidence of academic aptitude (including test results and grades) and strong motivation for high achievement. After admission to the program, students were asked to complete the *Wechsler Intelligence Scale for Children-Revised (WISC-R)*. Full Scale IQs for accelerated students ranged from 110 to 149 (mean 130.5). For nonaccelerated students, IQs ranged from 115-136 (mean 124.8).

Assessment of Variables: The *California Psychological Inventory* was administered at the beginning and end of the first academic year of early entrance to college. This tool consists of 462 true/false items providing scores for 20 personality scales.

Main Results: Students who chose to accelerate their education by entering college early differed on 4 scales from those who did not enter college early. The nonaccelerated students scored higher on the scale for Self-Acceptance, but lower for Responsibility, Self-Control and Good Impression. Nonaccelerated students were somewhat less serious about duties and responsibilities and more willing to express strong feelings. Accelerated students moved closer to results for nonaccelerated students for these characteristics as the year progressed.

Accelerated students changed in important ways over their first year of college on 14 of 20 scales. There were increases in scales measuring Social Presence, Self-Acceptance, Independence, Empathy, Well-Being, Achievement by Independence, Intellectual Efficiency, Psychological Mindedness, and Flexibility. There were decreases in scales of Responsibility, Socialisation, Self-Control, Good Impression, and Femininity. In contrast, for nonaccelerated students, significant changes occurred on only 3 scales. Nonaccelerated students declined in Dominance, Independence, and Communality. Thus accelerated students in the first year after entering college early made consistent gains in personality adjustment. In contrast, nonaccelerated control subjects made relatively few changes.

Early entrance students changed in a number of ways that indicate healthy personality growth and increased maturity. They became more independent, resourceful and self-sufficient over the course of the academic year. They became more self-assured, more self-disciplined, and more strongly oriented towards completing tasks. Their self-image became more positive and they were more optimistic about their lives. They became more empathetic and more interested in understanding the interests and motives of others. For accelerated students, there was a move away from conformity and conventionality towards independence and self-direction. Their scores reflected a more decisive and action-oriented view, with less emphasis on being sympathetic and helpful.

The nonaccelerated students experienced significantly fewer personality changes as the year progressed and those changes that did occur did not necessarily reflect healthy personality growth. They became less confident and assertive, and less independent and self-sufficient. Results suggested that they developed a stronger sense of themselves as different from others.

Although group results were positive, some students experienced depression and other adjustment problems during the year. These students appeared to be less well adjusted at the beginning of the year.

Conclusion: Female students enrolled in the first year of a residential early college entrance program at a small, private liberal arts college exhibited consistent changes in psychological adjustment indicative of healthy personality growth. Although a small number of students experienced adjustment problems, these problems cannot be said to be a product of the acceleration process as such. Other factors may be to blame, for instance family conflict.

Commentary: This study provides evidence for healthy personality development in female students who choose to enrol in a particular early college entrance program. The authors do not attempt to identify specific program characteristics that might account for these results, although the program does provide social support in the form of counselling and encouragement from staff and peers.

The authors argue that the failure of many studies to find evidence of adjustment problems in radically accelerated students may be due to the use of assessment instruments that are either too narrow in scope or are not sensitive to the kinds of difficulties faced by early college entrants. They argue for the use of standard personality assessment measures such as the *California Psychological Inventory*.

This study is one of a very small number that attempt to assess how students fare while in an acceleration program. Most other studies are retrospective in nature or assess students' adjustment at only at one point.

The researchers attempt to address bias related to subject attrition. The study began with 43 participants but 10 completed only the first assessment and their results were not included in the final analysis of data. The researchers found no differences in the profiles of those students who dropped out of the study and those who completed both assessments.

Effects of Acceleration on Social and Emotional Development

Daggett Pollins, L. (1983). The effects of acceleration on the social and emotional development of gifted students. In C. P. Benbow and J. C. Stanley (Eds), *Academic precocity: Aspects of its development* (pp 113-138). Baltimore: Johns Hopkins University Press.

Objective: To investigate the effects of acceleration on the social and emotional development of gifted students.

Design: Literature review and longitudinal comparison study.

Setting: The literature review is based on several major studies of educational acceleration published since 1947.

The longitudinal comparison study was conducted through the Study of Mathematically Precocious Youth (SMPY) at Johns Hopkins University.

Participants: Twenty-one male students who had been radically accelerated and twenty-one non-accelerated male students matched for age and ability. All students were identified by the SMPY talent searches conducted in 1972, 1973 and 1974. Only two female students were found to have radically accelerated at this time and the decision was made to omit them from the study.

Students were included in the radical acceleration group if, at some point, they were at least three years ahead of their age-mates in educational placement, no matter how this was achieved. These students were matched with other talent-search participants who were of approximately the same age, who had scored about as well on the talent search tests for verbal and mathematical abilities, and who had not accelerated their education (or who had accelerated to a minimal extent e.g. had entered college with AP credit).

Assessment of Variables: Literature was reviewed with respect to the differential effects of varying methods of acceleration, the definition of the 'social and emotional development' construct, and the identification of appropriate reference groups in studies of radical acceleration.

The longitudinal study involved comparing the social and emotional development of radically accelerated and non-accelerated students. A first comparison was made at the time the students were involved in the SMPY talent search, prior to acceleration, when the subjects were approximately 13 years old. The students completed the *California Psychological Inventory (CPI)*, the *Strong-Campbell Interest Inventory*, the *Study of Values (SOV)*, and a self-rating scale assessing their liking for school and for mathematics. This comparison allowed for the identification of dissimilarities, that might affect the decision to accelerate, and/or the social and emotional results of acceleration.

The second comparison was made five years later, when the subjects were of high-school graduation age. Subjects were sent a detailed questionnaire to assess their personal views on their educational progress. The questionnaire was aimed primarily at identifying the academic accomplishments and status of former talent-search participants. It included questions about high school and college activities, liking for college, educational aspirations, and self-perceived social and emotional development. It was argued that differences at this stage could be more confidently attributed to the acceleration itself rather than to any prior social/emotional characteristics.

Main Results: Review of the literature showed that, on the whole, studies do not differentiate between methods of acceleration, such as grade-skipping, early part-time college study, and college graduation in fewer than four years. It is argued that this is a problem because the method of acceleration may well influence outcomes. Many studies also neglect to specify the degree of acceleration, and make it impossible for comparisons to be made between acceleration of one to two years and acceleration of three years or more (radical acceleration).

Review of the literature reveals a problem with the definition, and thus measurement, of 'social and emotional development'. While some researchers have documented involvement in extracurricular activities as a measure, others have relied on the degree of interpersonal effectiveness, or the absence of psychopathology. A further problem with research methodology involves identifying a reference group. Many studies have compared accelerated students with their older classmates of more modest ability. It is argued that a more appropriate comparison group might be equally gifted youth who have not accelerated their education.

No study was located that reported permanent or severely harmful effects of acceleration on a student's social and emotional development. Some studies have reported short-lived negative

consequences such as a temporary feeling of inferiority. In general, research shows that students who accelerate their education make excellent academic gains.

This longitudinal study showed that, at age 13, students who would later radically accelerate their education shared a very similar profile with the gifted students who would not accelerate their education. Both groups appeared to be well adjusted, interpersonally effective, mature and academically advanced. The two groups appeared to be investigative in nature; that is, scholarly, independent, introverted and rational. The two groups also shared similar values, with both scoring highest on the theoretical scale, second highest on the political scale and lowest on the scale for religious values within the *SOV*. Both groups reported a strong liking for maths and a fairly strong liking for school.

Overall then, there was no evidence of any dissimilarity in student profiles at the age of approximately thirteen years, favouring either group with respect to age, academic ability and social and emotional development. The authors thus argue that any differences emerging after acceleration could be attributed, with some confidence, to the acceleration itself and not to a priori differences between the two groups.

At age of high school graduation, students who chose to radically accelerate their education and those who did not accelerate were found to differ in a number of respects. In high school non-accelerated students held more jobs than did the radically accelerated students, although this may have been influenced by age, with radically accelerated students being much younger. The non-accelerated students participated in more college activities than did the radically accelerated students. The non-accelerated students reported a slightly greater liking for college. However, the radically accelerated students had higher academic aspirations, planning, on average, to obtain a doctoral degree, while the non-accelerated students, on average, aspired to obtain a master's degree.

The radically accelerated students felt that they had used their educational opportunities rather well compared with the non-accelerated students who thought they had used them "about average". The radically accelerated students felt that SMPY had helped them very much, while the non-accelerated students thought that SMPY had given them very little help. Both groups reported that acceleration had influenced their social and emotional development in a slightly positive way. Some 'non-accelerated' students had experienced minimal acceleration for example, in the form of AP credit courses.

Conclusion: This longitudinal study was designed to take into account the degree of acceleration, the definition of the 'social and emotional development' construct, and the identification of an appropriate reference group for comparison with radically accelerated students. Results were similar to those of many other studies on acceleration, with no negative effects of radical acceleration being identified on social and emotional development. In fact, there was some evidence for positive effects.

Commentary: The literature review discusses major studies on acceleration with respect to issues central to the design of such studies. The longitudinal study employs a research methodology constructed to address such design issues. This is one of a very small number of studies that specifically addresses the social and emotional development of radically accelerated students.

Procedures for Early College Entrance in the United States of America

Fluitt, J. L. and Strickland, S. M. (1984). A survey of early admission policies and procedures. *College and University*, 59(2), 129-35.

Objective: To ascertain the extent of early admissions in higher education, the kinds of institutions practicing these procedures, and the regulatory policies governing them.

Design: Questionnaire.

Setting: Institutions for higher education across the United States of America.

Participants: Of 511 institutions polled, completed questionnaires were returned from 302. This constituted a representative sample of American higher education. Included were at least two institutions from each state, a complete and balanced number of institutions of different enrolment sizes, almost equal representation from public and private sectors, institutions offering a large variety of degree programs traditionally offered in higher education, and all types of academic calendar systems.

Assessment of Variables: The questionnaire was designed to gather information about two general types or categories of early admissions- Traditional or Conventional Early Admissions and Admissions of Precocious or Exceptionally Gifted Children. Questions were included to determine the prevalence and principal characteristics of each type of program. It was also hoped that definitions for each type or category could be refined.

Main Results: Institutions were said to allow for traditional or conventional early admissions if they allowed admission of high school students in their junior or senior year. Of the 302 institutions polled, 263 (87%) allow for this type of early admission. Over 70% of these allow early admissions of students in their junior high school year, while approximately 25% limit such admissions to high school seniors. Virtually every type and size of university and college is involved. In spite of this, there are very few commonalities among programs for early admission.

For admission, the majority of institutions require a minimum high school grade-point average and a minimum composite *American College Test (ACT)* score or *Scholastic Aptitude Test (SAT)* combined score. Minimum grades and scores vary considerably between schools. Most institutions also require recommendations from at least one high school official (the principal or counsellor in most cases). Some schools use diagnostic testing as part of their selection procedure.

There is no standard or conventional limit to the number of credit hours a student may take as an early entry candidate. The majority of schools (95%) do not place a limit on the amount of credit a student may accumulate as an early entry candidate. Thirty-one per cent of institutions restrict the level of courses available to early admission students. It is unclear whether these restrictions are only for early entry students or apply to all freshmen-type enrolments.

Just over half (57%) of the schools do not offer special assistance to early entry students. There is no special advisor or counsellor for these students. Only 40% actively recruit students for early admission. Around 17% have an agreement with selected high schools for the early admission of their students.

Only 49, or 16% of the 302 institutions that responded to the questionnaire allow for admission of precocious or exceptionally gifted students. To fit this category, an institution has to accept students not yet in high school. Approximately 25% of these schools have a minimum grade-level requirement, the lowest being 6th grade, with the remaining 75% having no minimum grade level requirement for early admission of exceptional children. Only 8 of the 49 schools have a minimum age requirement. The lowest is 11 years.

Sixteen schools require minimum *ACT* or *SAT* scores. These vary between schools. Most institutions require recommendations from one or more school officials. Half require recommendations from other sources, including parents, counselling centres, gifted and talented programs, etc. Only two schools require an established minimum IQ score before a very young student is considered for early entry. Only about one-half of the schools offer the services of special advisors or counsellors in an effort to support very young students. Two schools offer financial assistance to these students. An overwhelming majority of schools do not actively recruit very young students for admission.

Conclusion: Early admission is common throughout a variety of higher education institutions. Despite this, there are very few common features regarding early admission programs and practices. Early admission of very young gifted students does not appear to be common across the United States of America.

Commentary: This study was completed in 1982. Since this time there has been an increase in research conducted into early university and college entry, and programs have been implemented at many more sites. Many of these programs specifically cater for the early entry to university and college of very young students. Some of these programs admit individual students, while others cater for the admission of a yearly cohort of students. It would be interesting to compare results from a more current survey into the extent of early admissions in higher education, the kinds of institutions practicing these procedures, and the regulatory policies governing them.

Facilitating the Educational Development of Highly Gifted Students

Fox, L. (1974). Facilitating educational development of mathematically precocious youth. In J. C. Stanley, D. P. Keating and L. H. Fox (Eds), *Mathematical talent: Discovery, description and development* (pp 47-69). Baltimore: The Johns Hopkins University Press.

Objective: To describe education options available to facilitate the educational development of highly precocious youth. To illustrate the process used at the Study of Mathematically Precocious Youth (SMPY) to address the needs of precocious youth.

Design: Discussion of the fundamental principles underlying the work of SMPY and case studies illustrating this work.

Setting: SMPY, Johns Hopkins University.

Assessment of Variables: Education options offered to students at SMPY were evaluated in light of theory and research. Case studies were screened for the options employed to facilitate appropriate education for precocious students and for signs suggesting success of such options in meeting academic and social needs of these students.

Main Results: There are relatively few specific programs for precocious youth. While many schools have programs for students in the upper 10% or 15% of ability, most do not offer specific teaching strategies for students who fall within the top 1% in relation to ability level. These students require curriculum to be telescoped so that they can cover it faster. They also need programs to be individualised to meet their unique needs.

Homogenous grouping strategies are used frequently for gifted youth. However this strategy appears inappropriate for highly gifted youth because it would be impossible to locate a large enough number of such youth at one site to make this option viable. Also these students do not possess like ability profiles and thus would not be matched in ability across all subject areas. This would make teaching such a group very difficult. Another problem would be ensuring that curriculum is pitched high enough to be challenging for these students. Most curricula written for homogenous groups of gifted students are directed at the moderately gifted rather than the highly gifted.

It has been suggested that the needs of highly gifted students might be better met in schools specially set up to cater for them. However this does not appear to be a viable option due to the very small number of these students in geographic proximity.

Enrichment strategies have been used widely in an effort to meet the needs of highly gifted students. However, enrichment options tend to supply 'busy work' rather than work offering appropriate intellectual challenge. They also tend to focus on areas of study that do not relate directly to a student's area of ability, in an attempt to expand the student's range of interests. This does not address the need for challenging work in the specific areas of a student's strengths.

Acceleration options offer ways of addressing the needs of highly gifted students. Students can skip one or more grades as well as advance in particular subjects, depending on their unique needs. Radical acceleration in the form of early admission to college has been shown to be an appropriate option for some gifted students. It allows gifted youth access to challenging curricula and saves time towards earning an advanced degree. Students can find intellectual equals among the older university students. Courses that allow for advanced college study whilst the student is still at high school can allow students to develop habits appropriate for university and college study and allow students to enter college early with advanced standing and credit in some courses.

The author goes on to outline seven cases of students identified by SMPY as being highly gifted in mathematics and/or science. The case studies illustrate how SMPY staff supported the students to choose from acceleration options, in different combinations, to successfully meet their needs. In some cases radical educational acceleration was shown to be most appropriate education option.

Conclusion: Highly gifted students require curriculum to be telescoped so that they can cover it faster, and need individualised programs that can meet their unique needs. Options that should be considered for these students include grade skipping, subject-matter acceleration, taking college courses for credit as part-time students or by correspondence, earning college credits by examination, independent study programs, and any combination of these. The best method for any given student will depend on several considerations, including factors unique to the student and his or her social background.

Commentary: This paper is valuable for the evaluations of the many education options that have been implemented to cater for gifted students. The author presents clear arguments for and against the appropriateness of such options for highly gifted students based on theory and research. The article is valuable for educationalists involved in catering for highly gifted children as it clearly outlines strategies that have proven to be very successful for the implementation of programs for these students. For instance, the author suggests ways to help parents approach school principals and teachers regarding the education of their gifted children. The article is particularly valuable for outlining appropriate strategies for radical acceleration.

Acceleration as an Educational Provision for Very Able Students

Freeman, J. (1998). *Educating the very able: Current international research.* London: The Stationery Office.

Objective: To present a summary of current international research concerning educational provisions for very able students, including grouping strategies, enrichment and acceleration.

Design: Literature Review

Setting: A monograph written as part of a series of research reviews for the Office for Standards in Education (Ofsted), London. The relevant section is entitled: "How to educate the Very Able: Forms of Acceleration".

Assessment of Variables: Information is presented concerning educational interventions adopted by countries across the world to address the needs of very able students. Interventions are described and comment is made regarding evidence for success of such interventions.

Main Results: The author begins by presenting information regarding ability grouping of school students. She suggests this practice can be problematic due to a tendency for students to be retained in a group regardless of development of skills and knowledge that would enable them to move into a different group. The report then moves on to address enrichment and acceleration. The author describes these two strategies as the two main types of provisions used to cater for very able students.

Acceleration is defined as any process that enables a pupil to move faster through school. The main forms of acceleration are listed as early entry into a new phase of education, grade-skipping, subject acceleration, vertical grouping, out-of-school courses, concurrent studies, compacting studies, self-organised study, mentoring, and correspondence courses. It is suggested that educators are strongly resistant to acceleration because it runs counter to notions of healthy social development. She acknowledges the vast research base attesting to positive social and cognitive outcomes following acceleration, the author remains unsupportive of the provision. She speaks about the 'hurried' child who may be neither physically nor emotionally mature enough to fit in socially with older children in

a new class. She suggests that, for language arts, students need life experience to enable the development of conceptual understandings before they can tackle advanced learning material. She expresses particular concern for boys who accelerate at young ages, citing their apparent late physical development as a problem leading to exclusion from participation in many activities.

Information is presented concerning provisions for acceleration in various countries. The author states that acceleration is not allowed in either Spain or Denmark and is rare in Russia, although no references are cited to support this information. Provisions for acceleration in China, the United States of America, and Israel are outlined briefly. A description of the schooling system in Germany reveals acceleration as one means of providing for very able students but there is no mention of provisions for radical acceleration. The author outlines case study reports of radical acceleration in Australia.

In Britain, students can accelerate within school and can study part-time at higher education institutions whilst still at school. The author quotes Associated Examination Board figures to illustrate the fact that a small but significant number of students in Britain are taking advantage of provisions for acceleration. Of 493,069 General Certificate of Education (GCE) candidates in 1988, there were 434 O-level entries from pupils under 15, including 30 from children aged 9-12. There were 170 A-level candidates under 17, of which one was aged 11 and another 9. The results of these young students were as good as or better than those of older candidates. At the O-level, 35% of entrants under 15 received a grade A, compared with 9% overall. At the A-level, 11% of younger than average students received a grade A, compared to 6% overall. In 1995, there were 43 candidates under the age of 15 taking A-level examines but only 7 students under 15 taking GCSE grade (O-level equivalent) examines.

The author laments that there is little information available about these young students as no research has been done to investigate variables associated with their acceleration. For instance, there is the information regarding characteristics of their school or home environment, and no data about personal characteristics. There is no mention as to whether these students were subject or grade accelerated and as such it is impossible to know if any of them were radically accelerated.

After a short review of studies into the emotional effects of acceleration, the author concludes that acceleration can work, particularly for students advanced in mathematics and languages, but only when particular criteria, as identified by Benbow (1991), are met. These criteria include level of

intelligence in the top 2%, positive agreement from receiving teacher, support from parents, emotional stability in the student and an expressed desire to accelerate by student.

Recommendations are made for future research concerning the socio-emotional adjustment of accelerated students. The author suggests that a single measure of self-esteem is inadequate and that multiple measures should be used; studies should not rely on self-reports as students may be defensive or lack awareness; behavioural observations are valuable; comparison groups need to include non-accelerated students matched for ability and achievement; emotional development should be assessed before and after acceleration; and students for whom acceleration does not prove successful should be included in any study.

Conclusion: Associated Examination Board figures (results for tests completed towards the end of high school) confirm that acceleration occurs in Britain. This information reveals that some students, at least, are studying subjects at levels three or more years above what would be expected for their age. From the information supplied, it cannot be determined if grade acceleration is occurring across 3 or more years.

Commentary: This monograph comments on educational provisions for gifted students in countries across the world, including Australia, Britain, China, Germany, Russia and the United States of America. Along with descriptions of provisions, the author notes some research findings regarding the advantages and disadvantages of ability grouping, acceleration and enrichment. Personal comments concerning research findings provide interesting yet partial views of the benefits and drawbacks of these provisions. The paper outlines the different forms of acceleration, factors to take into account when considering acceleration and suggestions for further research on the socio-emotional adjustment of accelerated pupils. Personal comment is also offered concerning the quality of the existing research addressing acceleration, and suggestions are made for future studies.

Early Entrance at the California State University, Los Angeles

Gregory, E. and March, E. (1985). Early entrance program at the California State University, Los Angeles. *Gifted Child Quarterly*, 29(2), 83-86.

Objective: To describe the rationale for and development of, the Early Entrance Program at California State University Los Angeles (CSULA), with a view to encouraging other sites to adopt a similar model.

Design: Descriptive report and case studies.

Assessment of Variables: Information was presented concerning the history of the Early Entrance Program at CSULA. Case studies were presented to illustrate how the program is implemented and the benefits the program can offer for gifted students.

Main Results: The Early Entrance Program at CSULA was set up to meet the needs of highly capable school students aged in their early teens. Students aged between 11 and 16 years have been accepted into the program. These students are ready to attempt college level work despite their young age. Their needs cannot be catered for in an age-graded system of education. The author suggests that it is important to offer these students an alternative to the traditional school curriculum otherwise under-stimulation may so damage them that they might never reach their full potential.

Programs for early college or university entry recognise that age should not be a criterion for selecting students for college or university study. Early this century, and prior to the advent of the age-graded system of education in the United States of America, it was common practice to place students in college as soon as they were academically ready, regardless of their age. More recently, a growing number of universities and colleges are offering admission to selected students based on their academic readiness rather than age, including Johns Hopkins University, the University of Washington and California State University, Los Angeles. Research has been conducted on these students and findings show early college entrance to be a reasonable, fruitful, and cost-effective method for meeting the needs of some adolescents.

CSULA had a program directed at meeting the needs of highly gifted students for some years before the Early Entrance Program was initiated. Called PACE (Pre-Accelerated College Entrance), gifted students were recommended for participation in the program by junior or senior school counsellors. The program ran after school and during summer holidays. The success of this program coupled with positive reports on early college entrance at other sites led the administration at CSULA to consider setting up an early entrance program.

A pilot study commenced in 1981. Talent searches were conducted over a 3-year period among junior high school students nominated for participation by their schools. Students completed the *Washington Pre-College Test (WPCT)*, a 3-hour multiple choice test designed for college-bound high school students. The scores obtained by these students were compared to average scores for a standard group of college-bound high school students. Students who scored above the 50th percentile for the high school standard group on both the quantitative and verbal composites, and above the 80th percentile on at least one composite, were considered for early admission to the University.

At the time this article was written, research was being undertaken to track the progress of the first two cohorts of early entrance students at CSULA. These students numbered 20 and were aged between 11 and 16 years. Five of the students had become full-time university students. Several had made use of remedial classes offered on campus, primarily for minority students, in order to fill knowledge and skills gaps.

In March 1983 a decision was made to implement a permanent program for early entry at CSULA and this program continues to be offered. Students are selected on the basis of academic and social/emotional criteria. Students complete the *WPCT* and/or the *Scholastic Aptitude Test (SAT)* and need scores above the 80th percentile on either the quantitative or verbal composite, and above the 50th percentile on the other composite. They must be 14 years or younger. They must have good secondary school grades, be highly motivated and exhibit social and emotional maturity. Some students are nominated to apply for early entry by their schools. Others find out about the program through the Gifted Children's Association or by word of mouth.

Students who meet program requirements complete a transition program as a way to introduce them to university life. They sample the university curriculum while still attending school. If they find the work too challenging, or are not comfortable on campus, they can withdraw from the program. The

transition program allows these students to accumulate credits towards university study that can be used at a later date. If students decide that full-time university study would suit them, then they are accepted, after permission has been gained from parents, the Early Entrance Program Director and the Director of College Admissions. Each student is required to meet at least once a week with the program director and to attend twice-weekly meetings with other early entry students. A room is supplied as a social meeting place for students as peer support is seen to be important.

Four case studies are presented of students who chose to enter CSULA early. These students all appeared to gain important social benefits from the program. They became involved in many more social activities, with older students as well as with peers of a similar age, including friends who were still attending their home schools. The cases highlighted the need to support early entry students to develop the skills needed to survive university study, including note-taking, reading technical material and interpreting graphs. They also highlighted the need to recognise and address individual differences among early entry students. Each student will require different academic programs and will have unique social and emotional needs.

Conclusion: A strength of the Early Entrance Program at CSULA is the period of transition offered to students, where they can experience university life on a part-time basis while still attending school. Students can take advantage of this opportunity to help them to make a decision about full-time enrolment at university. Students who decide to enter university full-time enjoy intellectual as well as social and emotional benefits. Each student has a unique personality, unique abilities and unique interests. It is therefore important to monitor each student closely and to structure programs that will address each student's individual needs.

Commentary: The reader is presented with an interesting description of the Early Entrance Program at California State University, Los Angeles. Information about the forces that influenced the initiation and then development of the program highlight important changes in fundamental ideas about appropriate educational programming for gifted students. The author draws particular attention to the changing theories regarding age-based education. It is interesting to compare program offerings at CSULA with those at other sites. It is also interesting to note the very different educational paths taken by the early entry students at CSULA, and the different benefits each student appeared to gain from the program.

Supporting Students Who Enter College Early

Gregory, E. H. and Stevens-Long, J. (1986). Coping skills among highly gifted adolescents. *Journal for the Education of the Gifted, 9(2), 147-55.*

Objective: To present strategies employed by students who enter university early to cope with new demands, and to suggest ways that staff might help to support such strategies or recommend alternative strategies.

Design: Case studies.

Setting: California State University, Los Angeles (CSULA).

Participants: Students enrolled in the early entry program at CSULA from 1980 to 1985.

Assessment of Variables: The experiences of students who were admitted as early entry candidates at CSULA were compared and issues associated with coping skills were noted. Suggestions were made regarding support strategies for highly gifted students who choose a course of radical educational acceleration.

Main Results: The authors state that patterns of adjustment of highly gifted children have not yet been generally identified. It has been assumed that those who succeed in special programs for the highly gifted do so because they are bright and well motivated. Students who fail are said to have been ill prepared or not yet ready to participate. However highly gifted children, like all children, show variation in rate of adjustment, and range as well as strength of coping skills. An attempt to document students' coping skills should allow for the development of a wide range of strategies to support and supplement these skills.

In 1980 CSULA began a program of early entry to university. Students were admitted for part-time studies based on results on the *Washington Pre-College Test*. Students were required to score at the 80th percentile or above on either the mathematics or verbal composite, and at the 50th percentile or above on the other. Students were required to maintain contact with the program director and participate in counselling sessions and group meetings on a regular basis. In 1980, 5 students aged

between 10 and 14 were admitted for part-time study. In 1982 there were 10 students attending either full-time or part-time. In 1985, 8 students attended full-time and 6 attended part-time, with the youngest being 11 and the oldest 16.

This early entry program continues to be offered at the University. Students complete a one year probationary part-time entry and remain at high school during this time. All students are offered personal and academic counselling. Each student meets with the program director at least once a fortnight and an assessment is made of his or her psychological adjustment and academic progress. Problems are identified and addressed early, well before resultant poor grades or exit from the program.

Staff who administer the early entry program at CSULA have found that standardised personality tests are not useful in identifying students who do poorly, except in extreme cases of maladjustment. Also, some students who have been considered good risks on personality tests have required substantial support in order to achieve optimally in the program. A study of case histories reveals problems that are commonly faced by students who enter the University early, the strategies students tend to employ to cope with these problems, and strategies staff have used to assist students at stressful times. Some strategies have been more useful than others.

The authors suggest that supportive strategies need to commence before the student enrolls at university. It appears to be particularly beneficial to counsel parents about the advantages of early entry to university for a student's academic and social/emotional development. It is important to speak to parents about supporting their children at university but also allowing them to become more autonomous, despite their young age. Parents are then more supportive and encouraging of their child's decision to enter university early.

Students can learn the skills of note-taking and time management before they embark on a university education. They can be informed about the level of detail and analysis required for successful university study. They will probably become aware that they will need to spend a great deal more time and effort on university work compared to the time and effort they spent on school work.

Once the student has enrolled at university, other problems may arise. Students need to realise that low grades on an exam, or experiencing difficulty talking to professors, are not reasons to drop out but rather should signal times for reassessment. Strategies need to be offered at this time to help

students to adjust to the new environment and the new set of demands. Such strategies may help students cope with new expectations: for example the detail and accuracy required on examinations; the level of detail and comprehensiveness one must achieve when taking lecture notes; effective management of time for study; and the propriety of approaching a college professor in order to clarify expectations or understand grading procedures.

Conclusion: Comparisons of the experiences of students who enter university early reveal difficulties that surface for the majority of these students. These problems include social/emotional as well as academic concerns. Staff can help students deal with these problems. First they need to understand the coping strategies students bring with them to the university setting. They can then suggest methods to complement these strategies or methods that offer better ways to cope with the demands of university life.

Commentary: Five case studies are presented to illustrate how the authors arrived at suggestions for ways to support students who choose to enter university early. The case studies reveal how such strategies have worked for particular students. A strength of this article is its focus on strategies that can be beneficial for a significant number of students. The author insists that each student who enters university early will experience the process differently, but that a number of problems are shared by many and some easy strategies can result in benefits for most.

Gifted Education in Russia

Grigorenko, E. L. (2000). Russian gifted education in technical disciplines: Tradition and transformation. In K. A. Heller, F. J. Monks, R. J. Sternberg and R. F. Subotnik (Eds), *International handbook of giftedness and talent* (pp 735-742). New York: Elsevier.

Objective: To present an historical view of the development of gifted education in Russia and to suggest ways forward.

Design: A recounting of developments in educational provisions for gifted children in Russia over the last fifty years and discussion about the possible future directions gifted education might take.

Assessment of Variables: The goals of gifted education are outlined and compared across time. Opportunities for gifted students are described, including competitions, extra-curricular support, specialised schooling, and opportunities for enrichment and acceleration. Recent developments are compared to older provisions and an argument is made for progress to incorporate the best ideas from the past with ideas for reform.

Main Results: The author identifies three goals that were the focus for traditional education programs for gifted students: education for the good of the whole society; education to promote progress; and education for the personal growth of the individual. Goals related to society and progress were viewed as most important while goals related to personal growth were viewed as of much less importance. Traditionally, provisions for the gifted revolved around contests and competitions, with greatest support being given to those students preparing for international competitions. Special schools were founded to cater for students with exceptional talent. For instance, Math-Physics school #18 was connected to the Department of Math and Mechanics at Moscow State University. Students were taught by University professors and were involved in research at the University. The author lists another three schools with strong connections to universities.

Traditional provisions for gifted children concentrated on the areas of math and science. Programs incorporated opportunities for both enrichment and acceleration. There was no real focus on social and emotional support for students. Parents did not play a significant role in the education of their gifted children and they were rarely consulted. All provisions were supported financially by the state.

The author identifies the years between the late 1980s and the early 1990s as a time of educational change. Educational goals went through a process of reorganisation, with goals related to development of the individual becoming the main priority for educationalists. Since this time schools have diversified, with a number of private schools being founded and lyceums and gymnasias being established to promote education in specific fields. There has been an increasing interest in the promotion of humanities, arts and social sciences. The focus of programs has shifted towards teaching the logic of a given subject through interdisciplinary study and the development of particular thinking skills. Parents are more involved in discussions about appropriate teaching and learning.

A drawback of educational reforms has been the withdrawal of a significant amount of state funding for gifted programs. Initially support was gradually withdrawn from the existing system of specialised schools for highly gifted students and diverted into the development of new programs for the gifted. More recently, government funding for special programs has also been decreasing and schools have been forced to look towards parents and universities for financial and educational support.

The author suggests that the increased focus on the goal of education for the sake of personal growth has encouraged new directions for gifted education. Specifically, educational acceleration has become more widely accepted, as it allows students to move at a pace most suited to their particular learning profile. The author presents an example of a student who covered the school curriculum by the age of 12 and was then accepted to study at Moscow State University. This example demonstrates a case of radical acceleration.

The author concludes by outlining the future challenges for gifted education in Russia. Major issues for consideration include funding of gifted education, the re-education of teachers, the establishment of theory-based instruction and the harnessing of talents. Presently, old traditions and new developments in gifted education coexist in Russia. It is suggested that the ultimate challenge for educators in Russia will be to retain the best of the old provisions and combine them with the newer opportunities that are becoming available for gifted students.

Conclusion: There has been reform of educational provisions for gifted students in Russia in recent times. These reforms are a consequence of changing educational goals linked to 'democratisation' of

the education system. Specifically, traditional goals were directed at supporting and forwarding state agendas. More recently the goal of education has shifted towards supporting and encouraging individuals towards personal growth. The focus for provisions for gifted students has been redirected towards addressing students' individual needs. Acceleration has become more widely utilised as a process that facilitates individual development, as students can move through curricula at a pace most suited to their individual learning styles. An example is presented of a student who, by the age of 12, had covered the school curriculum and enrolled in university study. This example illustrates radical acceleration.

Commentary: The author provides a clear and detailed account of the changes that have taken place in Gifted Education in Russia during the second half of the twentieth century. The changes are presented in light of changes in overall goals for education and can be seen to reflect the move towards an education system that is focussed on meeting the needs of each individual rather than pursuing the goals of the state. This article illustrates the dependent nature of the relationship between the social and political agendas of a country and educational provisions for gifted students. The author makes a clear case for proceeding carefully with any educational reforms concerning gifted education. It is suggested that any reform process must ensure that those traditional provisions that have proven most successful for meeting the needs of gifted students are not discarded in favour of new provisions that have yet to be validated.

Radical Acceleration: A Detailed Case Study from Australia

Gross, M. U. M. (1986). Radical acceleration in Australia. *Gifted Child Today*, 9(4), 2-11.

Objective: To present a detailed case study of a child who has radically accelerated his education.

Design: Case study.

Setting: Australia.

Participants: Terry Tao, a profoundly gifted child from the Australian state of South Australia. Terry was 10 years old when this article was written.

Assessment of Variables: Information was presented concerning early childhood development, elementary and secondary education, tertiary education, home environment, affective development and involvement with the South Australian Association for Gifted and Talented Children (SAAGTC).

Main Results: Terry was born in Adelaide in July 1975 and is the eldest of three boys. Terry's parents met in Hong Kong and emigrated to Australia in 1972. His father is a paediatrician and his mother graduated from the University of Hong Kong with first-class honors in mathematics and physics.

Terry exhibited signs of precocious development from an early age. He taught himself to read by watching *Sesame Street* before the age of 2. His parents became aware of his reading ability when he played with another child's alphabet blocks. Some of the blocks were numbered and Terry could arrange them in numerical order. Shortly afterwards he could do simple addition and subtraction.

A few months after Terry's second birthday his parents found that he had typed a page of a children's book on a portable typewriter. Although his parents did not want to 'push' Terry, they decided that they should support their son's development. They began borrowing and buying books for him and found it almost impossible to keep up with his reading pace. They encouraged Terry to read and explore. They helped him to develop basic literacy and numeracy skills so that he could

learn from books by himself and thus develop at his own rate. By age 3, Terry was exhibiting the skills of a 6-year-old in reading, writing and mathematics.

At the age of 3 years and 6 months Terry entered a private elementary school. However this particular type of acceleration, early entry to school, did not suit Terry. Even though his abilities were far in advance of the 5-year-old children in his class, he was not yet ready to spend extended periods of time with children 2 years older than himself. His parents decided to withdraw him from school and enrolled him in a neighbourhood kindergarten with children of his own chronological age.

Terry spent 18 months at kindergarten. During this time his mother guided his development in mathematics. He completed the elementary school mathematics curriculum before the age of 5. His parents began to read books about educating gifted children and joined the South Australian Association for Gifted and Talented Children (SAAGTC), a group of teachers and parents of gifted children who run seminars and workshops for parents and educators.

Terry's parents approached educators to help them to develop a scholastic program designed to meet Terry's needs. It was decided that Terry would complete work at several class levels at the same time, based on his tested ability in different subjects. Terry was enrolled two months after his fifth birthday at a government school close to his home. He began school by spending most of his time with grade 2 students although he took mathematics classes with grade 5 students. At the age of 6 years and 6 months Terry was spending time in Grades 3, 4, 6, and 7 for different subjects.

At the age of 6 Terry had taught himself BASIC computer language by reading a manual and wrote several computer programs on mathematics problems. At the age of 8 years and 3 months Terry published a BASICS program to calculate perfect numbers.

By the age of 7 Terry was completing grade 10 math. It became obvious that Terry needed the opportunity to work at school at a level that matched his true mathematical ability. Thus it was arranged for Terry to spend some time at a nearby secondary school where he worked on math with grade 12 students, on physics with grade eleven students, and on English and social studies with grade 8 students. He continued to spend time at elementary school with children closer to his chronological age for purposes of socialisation. Terry had no trouble fitting in at high school. The

author suggests that his very young age may have discouraged other students from seeing him as a potential threat.

At the age of 8 years and 3 months Terry informally took the South Australian Matriculation (university entrance) examination in Mathematics 1 and 2 and passed with scores of 90% and 85% respectively. The following year, he began attending high school full time. He was based in grade 8 where he took English, French, general studies, art and physical education. He studied physics with grade 12, chemistry with grade 11 and geography with grade 10. He also began studying university level Mathematics, at first by himself, and then with the help of a professor of Mathematics. Not long after, Terry began to attend first-year physics tutorials at university. A few months before his 10th birthday Terry was spending a third of his time at university studying second year math and first year physics.

At the time this article was published Terry and his parents were making decisions about his future. Two important events were influencing a decision about when Terry should enrol full time in university. Terry had been selected to compete in the Australian Mathematical Olympiad by gaining sixth place in a national mathematics competition. However, when he competed in the Australian Olympiad he lost his sixth place ranking and was not offered a place in the Australian team to compete in the International Mathematical Olympiad. His parents felt that this showed that, while Terry had progressed extraordinarily fast in Mathematics, he had not set down deep roots. This experience influenced Terry's parents' decision to postpone his full time entry to university.

The other event that informed a decision to postpone full time university entry was a visit to the United States of America on an invitation from Dr Julian Stanley of the Johns Hopkins University. Terry and his parents visited many university campuses including Johns Hopkins, Purdue, Columbia, Princeton, Berkeley, and Stanford, and spoke to many experts in Mathematics and gifted education. They finally decided to wait 3 years before considering full time university entry for Terry. He would be 13 years old by then. They felt that it was important for Terry to consolidate his education and to broaden his knowledge base before progressing on. They were also keen for Terry to remain at school with children closer to his age for purposes of socialisation and maturation.

Terry's home environment appears to have played an important supportive role. His parents value intellectual achievement and model a persistent drive towards goals. The children are given

considerable intellectual freedom although there is a definite code of family ethics. Adults and children enjoy each other's company and share a deep affection.

Although there has been concern at all times for Terry's affective development, he has had no trouble with social adjustment. Terry is almost universally liked and admired by teachers and students. He is able to talk frankly and confidently to strangers as well as friends and displays no arrogance or conceit. Unlike many profoundly gifted children, Terry has had no trouble relating to people of lesser ability.

Terry has been lucky to have been offered the opportunities of a flexible educational program. He has enjoyed content acceleration; relevant enrichment; guidance in selecting courses; special instruction with the opportunity to work closely with other gifted youth; and the opportunity to work with mentors who have high level expertise in his areas of giftedness. Terry has at all times been closely involved in the planning of his educational program

Conclusion: Teachers and parents argue against acceleration of gifted children on the grounds that the child's social and emotional development may suffer. This is despite research evidence to the contrary. The academic and social benefits experienced by Terry Tao add to the research evidence supporting acceleration. Terry's radical acceleration was well planned and was supported by programming options that included relevant enrichment, ability grouping and mentoring. He was involved in decision making at all stages. His family was supportive and encouraging.

Commentary: A detailed case study is presented of radical acceleration of a profoundly gifted child. Lengthy quotes are supplied from parents and the participant as well as rich descriptions of each stage of the process. Experts in the field of gifted education supply interesting viewpoints on the case at the end of the article. An appendix supplies sample problems from the *Scholastic Aptitude Test-M*.

Three Profoundly Gifted Australian Students

Gross, M. U. M. (1992). The early development of three profoundly gifted children of IQ 200. In P. S. Klein and A. J. Tannenbaum (Eds), *To be young and gifted* (pp 94-138). Norwood New Jersey: Ablex Publishing Corporation.

Objective: To present case studies of three profoundly gifted students.

Design: Longitudinal case study.

Setting: Australia.

Participants: Three profoundly gifted males, with IQ scores of 200 and higher, aged between 10 and 15 years at the time of publication. The boys are participants in a longitudinal study of 40 Australian children of IQ 160+.

Assessment of Variables: A profile of each participant's school history and scholastic attainments is presented along with a comparative analysis of various aspects of the participant's psychomotor, intellectual, and psychosocial development during the first 8 years of life.

IQ scores were measured using the *Stanford Binet L-M* test. A ceiling effect came into play for the three participants and thus a ratio IQ was calculated.

Main Results: Ian Baker was tested by an educational psychologist at the age of 5¹/₂ years to investigate the emotional swings that he was experiencing at school. Ian was being verbally and physically aggressive towards other children. Ian was found to have an IQ in excess of 169 and a mental age of 9 years and 10 months. He was found to have the reading and comprehension ability of a 12-year-old. The psychologist concluded that Ian's emotional swings were a result of intellectual under-challenge and advised the school to provide him with academic work at sufficiently challenging levels. The psychologist also outlined Ian's need for companionship with other children who shared his abilities and interests, and referred him to weekend programs run by the Gifted Children's Association in his State.

Ian's teacher for Grades 1 and 2 presented Ian with appropriate enrichment and extension material. He spent two happy years at school. In Grade 3 the principal at Ian's school retired and was replaced by a principal who did not support special provisions for gifted students. Ian was required to work with his age-peers on curriculum that was pitched many years below his abilities. He was once again frustrated at school. His physical and verbal aggression returned. He began to experience severe headaches, bouts of nausea, and stomach pains. This situation continued for two years.

At the age of 9 years and 3 months Ian's parents arranged for him to be assessed by an independent psychologist with a special interest in gifted children. Ian was found to be functioning at a mental age of 18 years and 6 months, exactly twice his chronological age. A ratio calculation placed his IQ at 200. Standardised achievement tests in reading and spelling measured Ian's abilities at adult levels. On the *British Ability Scales* math test he scored more than 5 years above his chronological age.

Ian's parents approached many schools in search of one that was willing to provide a differentiated curriculum for Ian. They eventually found empathetic educators at a large and prestigious private (independent) school. Ian was enrolled in Grade 5 (a grade skip of one year) and participated in a pull-out program for mathematically gifted children in Grades 5-7. A mathematics teacher from the senior school became his mentor and assisted Ian to work on the Grade 8 and Grade 9 math curriculum. Ian joined the Grade 10 math class the following year.

The programming modifications made for Ian were somewhat successful. However, while providing some relief from boredom, Ian still found much of the curriculum less than challenging. He continued to experience social rejection from some of his classmates. It was hoped that further modifications might lead to more marked improvements in Ian's academic and social well-being.

Terence Tao is a prodigiously gifted mathematician from South Australia. At the age of 8 years and 10 months he completed the *Scholastic Aptitude Test-M (SAT-M)* and achieved a score of 760 out of 800. Only 1% of college-bound 17 and 18-year-olds in the United States attain a score of 750 or more. At the age of 6 his IQ was measured at between 220 and 230 and he was functioning at the level of a 14-year-old.

Terry's mathematical precocity became apparent at an early age. At the age of 3 he was displaying the reading, writing and mathematical ability of a 6-year-old. Terry's parents decided to enrol him at school at the age of 3¹/₂, 18 months earlier than the norm for South Australian children.

Unfortunately this did not prove successful. Terry was cognitively far in advance of his 5-year-old classmates; however, socially he was in need of support from teaching staff that was not forthcoming. Terry was removed from school and attended a neighbourhood kindergarten with children of a similar chronological age, where he remained for 18 months. During this time his mathematical ability advanced at a remarkable pace.

With the help of educators, Terry's parents devised an education plan for Terry. Although Terry's development was very advanced across most subjects, the degree of advancement differed for each subject. Thus it was decided that it would be best if Terry could participate in a number of school grades depending on his achievement levels in different subject areas. This would allow him to mix with children of all ages and ability levels as he moved through school. Terry's parents approached a number of local schools before finding one that was happy to work with their plan. The program was extremely successful in meeting Terry's intellectual and social needs. By the time Terry was 6 1/2 he was attending Grades 3, 4, 6 and 7 for different subjects. At the age of 7 1/2 Terry began attending math and science classes at the local high school, and studied math with students in Grade 11.

At the age of 8 1/2, having informally passed university entrance mathematics examinations, Terry began first-year university math. For some years he attended school part-time time and university part-time (dual enrolment). At the age of 15 Terry had passed university entrance examinations in mathematics, physics, chemistry, biology and English. He had completed university courses in mathematical physics, linear and abstract algebra, Lebesgue integration, electromagnetic theory, optics, and several areas of computing science. Terry gained his bachelor of science degree shortly after his 15th birthday. At the time of writing he was taking postgraduate studies in math.

Christopher Otway displayed prodigious talents in mathematics and language from his earliest years. He taught himself to read at 2 years of age and, before his 4th birthday he was reading children's encyclopaedias. Christopher entered school at the usual age of 5 with the mathematical ability of a 5th grade student. Christopher's parents were members of the Association for Gifted and Talented Children in their state and were aware of the educational and psychosocial benefits of acceleration for exceptionally gifted children. They approached the school with the suggestion that Chris might benefit from grade skipping or subject acceleration. Chris was advanced into Grade 1 and took math with Grade 5 students.

For the first two years of schooling, radical acceleration in math proved very successful for Chris; however difficulties arose when Chris' mathematical abilities could not be catered for at his elementary school. Half way through Grade 3 Chris began attending a large neighbourhood school that enrolled students from Reception to Grade 12. He was enrolled in Grade 4, an immediate grade-skip of 12 months. The following year Chris entered Grade 5 but attended Grade 9 for math and started Indonesian lessons in Grade 8.

A few days after his 11th birthday Chris was assessed by a psychologist and was found to have an IQ of at least 200. At the age of 12 he was based in Grade 9 with students up to three years older than him, but took physics, chemistry, economics, and English with Grade 11 students. He entered Grade 10 just before his 13th birthday and chose to repeat Grade 11 in different curriculum areas, this time taking humanities and foreign language subjects, rather than moving on to Grade 12.

The author outlines a range of previous research that has identified specific developmental trajectories as they relate to highly gifted children. She compares the development of the three profoundly gifted participants described here with the research findings from previous international studies. Interestingly none of the three boys spoke at an early age, although most other studies document early speech. In contrast, all three achieved mobility at very early ages, and several months earlier than their age peers. Early reading has long been recognised as one of the most powerful indicators of exceptional intellectual giftedness in young children. The three profoundly gifted students described here learned to read at remarkably early ages. This precocious reading development was accompanied by equally precocious development in math.

Highly gifted children tend to have interests that differ markedly from those of their age peers. Terry pursued interests in math and computers both at school and at home. At the age of 12 he translated *The Hitch-Hikers Guide to the Galaxy* into Latin. Christopher's passions have been for music, economics and math. His reading tastes have always been eclectic; at the age of 11 he read Dickens and the Brontes as well as Arthur C. Clarke's science fiction novels. He enjoys reading Australian history, mystery novels and short stories, a wide range of newspapers and journals and, for light relief, *Asterix* and *Garfield* books. From a very young age, Ian was passionate about road maps. At the age of 4 he was able to classify most roads in the city in which he lived using the classification scheme of the Department of Main Roads. He was almost as skilful in his analyses of the road systems of other Australian states. His library included many street directories. Ian can draw detailed

road maps and knows many different routes around the city. He also derives intellectual enjoyment from playing chess, reading widely and playing piano.

Of the three participants described in this article, two were permitted radical acceleration. These participants were able to form friendships with other children who liked, accepted and understood them. Ian was not permitted to radically accelerate and has not had the opportunity to enjoy such supportive peer friendships. The radically accelerated participants display more modest, although still positive, levels of academic self-esteem. These scores contradict the belief that children who are accelerated will become conceited about their academic ability. Children who have been retained with age-peers, and have had little or no chance to interact with children of like ability, display low levels of social self-esteem. These children appear to be very aware of the extent to which they are rejected and disliked by their age-peers. By contrast, radically accelerated children display healthy social self-esteem. These children are confident in their relationships with classmates. They are no longer rejected for being different. They report that the pressure to underachieve to fit in, is diminished.

Conclusion: Conservative accelerative procedures, such as a single grade-skip, are unlikely to be sufficient to meet the intellectual and social needs of highly gifted students, especially those who are profoundly gifted. Individualised programs similar to those offered to Terry and Christopher are more appropriate. They allow for radical acceleration across subjects and grades. This acceleration allows gifted children to work and socialise with others who share common abilities and interests. They experience more supportive relationships with their peers.

Commentary: This is a very detailed report on the early development of three profoundly gifted children of IQ 200 and above. The author relates her study to previous research and discusses precocious development in speech, movement, reading and number as it relates to profoundly gifted children. She also outlines research concerning the special interests of these children, as well as the importance of peer friendship and self-esteem for academic motivation and social/emotional well-being.

The Benefits of Radical Acceleration

Gross, M. U. M. (1992). The use of radical acceleration in cases of extreme intellectual precocity. *Gifted Child Quarterly*, 36(2), 91-99.

Objective: To illustrate the benefits of radical acceleration by presenting school histories of extremely gifted students.

Design: Longitudinal comparative case studies.

Setting: Australia.

Participants: Five exceptionally gifted Australian students with IQ scores in the range 160-200, who have radically accelerated their education. The children ranged in age from 6 to 16 years at the time of writing.

Assessment of Variables: Academic and social indices were measured for each participant. IQ scores were obtained using the *Stanford Binet Intelligence Scale (L-M)*. Results on standardised tests were used as a measure of achievement. These results were used with information regarding schoolwork to ascertain a measure of 'fit' between demonstrated achievement level and the prescribed schoolwork. School reports revealed teachers' perceptions of students' abilities and achievement.

The *Coopersmith Self-Esteem Inventory (SEI)* was used to measure general self-esteem and self-esteem in social relationships, relationships with family, and in academic work.

Reading surveys were completed at 2-year intervals. Surveys were also used to show the nature and extent of television viewing, computer usage, hobbies and play interests, and interest in or participation in sports.

Developmental and demographic data were obtained from many sources including questionnaires, medical records, parent diaries, and family documents. Semi-structured interviews were held at regular intervals with parents and with the participants to follow-up, clarify, and expand on the material gathered through other sources. For instance, the interviews allowed for more sensitive

information to be gathered concerning educational programs, relationships with teachers and classmates, and social and emotional development.

Main Results: Exceptionally gifted students differ from same-age peers in their cognitive and affective development. Although research concerning the psychosocial adjustment of extremely gifted students is limited, the few studies that do exist suggest that these children tend to have greater problems concerning social acceptance. They may become socially isolated and may suffer from decreased motivation if they are retained in the regular classroom with children of similar age.

Exceptionally gifted students have specific academic needs. Enrichment activities do not appear to be sufficient, by themselves, to meet these needs. Exceptionally gifted children appear to benefit from programming adjustments that allow them to spend a significant amount of time learning with other gifted children. They may benefit from spending most of their school day with other gifted children in full-time, self-contained classes. It is also important to offer exceptionally gifted children opportunities to accelerate their education. Many seem to benefit from options that allow for radical educational acceleration.

This article presents information on the intellectual, academic, social, and emotional development of 40 children who scored at IQ 160 or above on the *Stanford Binet Intelligence Scale (L-M)*. The children's development has been followed since the early 1980s. Of the 40 children, nine were recognised by their school as having remarkable intellectual potential and have been offered the opportunity to radically accelerate their education. Of these accelerated children, five are described in the article and the author presents their case histories along with a discussion of the factors that have contributed to their academic success.

The first case concerns Ian Baker. Ian taught himself to read, write and count before the age of 2. At age 4, he was reading stories to other children in his kindergarten. At age 5, on entering school, Ian was reading *Charlotte's Web* by E. B. White and was able to add, subtract, multiply and divide. Despite his advanced abilities, Ian's teacher insisted that he work on a reading readiness program and a number recognition math program with the other students in his class.

Six months after Ian commenced school, his parents were called to an emergency meeting with the vice-principal. Ian's parents were informed that he had become uncontrollable in class and was

physically violent towards other children. It was suggested that Ian should be psychometrically tested with the view to enrolling him in a special school for behaviourally disturbed children.

Ian was assessed by the school psychologist on the *Stanford-Binet Intelligence Scale (L-M)*. His IQ was measured at 170+. On the *Neale Analysis of Reading* a standardised test of reading achievement, Ian was found to have a reading accuracy and comprehension age of 12. He was just over 5 years old at the time. The school psychologist told the principal that Ian's behavioural problems were a direct result of severe intellectual and social frustration rather than a sign of emotional disturbance. He advised the school to develop an educational program adapted to his needs and suggested that Ian should be given access to other intellectually gifted students. Ian was permitted to do grade 7 math in his first grade classroom and a small pull-out program was established. He appeared less frustrated and his behaviour improved.

Shortly after, a new principal was appointed to Ian's school. This principal held egalitarian ideological views and did not support special provisions for gifted students. Ian was no longer allowed to work on a pull-out program and, despite his extraordinary abilities, he was put back into a school class based on his chronological age. There were huge mismatches between Ian's levels of tested achievement and the curriculum prescribed for him.

At the age of 9, and while in grade 4, Ian took the *Scholastic Aptitude Test- Mathematics (SAT-M)*. He achieved a scaled score of 560, 0.6 of a standard deviation above the mean. This test is standardised on 17 and 18-year-old American students planning to enter college. Despite his advanced math ability Ian was required to work on the grade 4 math curriculum. His anti-social behaviours returned, together with psychosomatic disturbances including migraines, bouts of nausea and abdominal cramps. It was becoming increasingly difficult to convince Ian to attend school.

At the age of 9 years and 3 months Ian was again tested on the *Stanford-Binet Intelligence Scale (L-M)*. He achieved a mental age of 18 years and 6 months. A ratio IQ was computed as his results were beyond the ceiling of the test and his ratio IQ was placed at approximately 200.

At the end of grade 4 Ian's parents decided to move him from the state elementary school he was attending to a private school with a principal who had a special interest in gifted and talented education. An individualised program was drawn up for Ian and included radical subject acceleration, grade skipping and appropriate academic enrichment. At age 11 Ian was based in grade

8 with 13-year-olds. He took math and computer science with 11th grade students and science, history and geography with 10th grade students. Ian was much happier. He was accepted by his teachers and classmates and began to realise that his differences did not necessarily have to be a barrier to warm and supportive social relationships. He was able to enjoy appropriately challenging academic work.

The author presents another four cases of students who radically accelerated their education. All of these students suffered similar distress to Ian before they were allowed to accelerate. The majority suffered similar physical symptoms. All experienced peer rejection and social isolation. After acceleration, all students reported a marked improvement in their physical health as well as their social and emotional well-being.

The author identifies factors contributing to the successful acceleration of the five participants. Grade-skips and subject matter acceleration were well-planned and monitored, and addressed concerns related to social and emotional maturity as well as academic achievement. No child skipped more than one grade at a time and each spent at least one year of consolidation between grade-skips. The children were psychometrically assessed before acceleration to establish that they had the intellectual capacity to perform at levels beyond the average level for children in the receiving grades. In each case it was understood that acceleration would be undertaken on a trial basis, and the children knew that they had the option to return to their earlier placement at any time. However no child chose to return to a previous class.

In all cases the parents and children were involved in the planning and monitoring of the acceleration program. In fact, in the majority of cases, a grade-skip was suggested by the parents. In four of the five cases, acceleration was combined with appropriate enrichment work and ability grouping in the form of pull-out programs, mentorships, or tracking in academic subjects.

After radically accelerating, all children gained positive but modest scores on the index of academic self-esteem. It is possible that scores were slightly depressed because students were comparing themselves to classmates several years their senior and, although they still outperformed these classmates, they needed to work harder to achieve their academic success. The author suggests that these results contradict the popular belief that children who are accelerated become conceited about their academic ability.

Only those participants in the larger study who had been allowed to radically accelerate scored more than one standard deviation above the mean on the social self-peers subscale on the *SEI*. Radically accelerated students were confident in their relationships with classmates. The author suggests that this is because they had been given the opportunity to learn and socialise with other children who share their interests, who delight in intellectual enquiry, and who have similar ways of viewing the world.

Radical acceleration can act to reverse underachievement in gifted students. The emotional security that gifted students experience when grouped with intellectual peers appears to alleviate or completely remove the pressure to underachieve for social acceptance.

Conclusion: Every student in this study who radically accelerated their education felt strongly that they were more appropriately placed, both academically and socially. Their parents expressed similar views. The students were more motivated to achieve. They reported significantly less pressure to underachieve. They reported enjoying a more challenging and stimulating academic program. These students also enjoyed closer and more productive social relationships. Students who were radically accelerated were found to have higher levels of social and general self-esteem than children of equal intellectual ability who had been retained with age-peers or grade skipped only a single year.

There is no evidence from this study to suggest that social or emotional problems arise from programs of radical acceleration, if the acceleration is well planned and carefully monitored. The author suggests that concern should be for exceptionally gifted students who are not permitted to accelerate and who suffer prolonged educational misplacement.

Commentary: This article presents clear evidence for the benefits of radical acceleration, when the acceleration is well planned and closely monitored. It presents information regarding exceptionally gifted students, those with scores above IQ 160. The author identifies the academic and social benefits of radical acceleration and addresses common misconceptions. Case histories are presented sensitively and reveal the subjective experiences of exceptionally gifted children who have radically accelerated their education. The children describe strongly positive academic and social gains.

Intellectual and Affective Development of Children of IQ 160 and Above

Gross, M. U. M. (1994). Factors in the social adjustment and social acceptability of extremely gifted children. In N. Colangelo, S. G. Assouline and D. L. Ambrosion (Eds), *Talent development: Proceedings from the 1993 Henry B. and Jocelyn Wallace National Research Symposium on Talent Development* (pp 473-76). Ohio: Psychology Press.

Objective: To present the major findings of a longitudinal study on the intellectual, academic, social and emotional development of children of IQ 160 and above.

Design: Published conference paper, reporting on case study research.

Setting: A presentation given at the 1993 Henry B. and Jocelyn Wallace National Research Symposium on Talent Development, Belin-Blank Center for Gifted Education, The College of Education, The University of Iowa.

Participants: 40 Australian children of IQ 160 and above.

Assessment of Variables: Intellectual, academic, and social and emotional variables were assessed using tests of general ability; off-level standardised testing of achievement in several academic subject areas; the *Coopersmith Self-Esteem Inventory*, the *Defining Issues Test* of moral reasoning; audiotaped interviews conducted with children and parents at regular intervals; several written questionnaires completed by the subjects' parents; official school records; health records; and family diaries.

Main Results: The author proposes that professionals involved in gifted education should approach their field in a similar way to their counterparts in other areas of special education. Specifically, they need to recognise and respond to different 'levels' or degrees of giftedness in a similar fashion to the way special education professionals accept and respond to differing levels of physical or intellectual disability. The further a child with an intellectual disability is from the average, the more readily it is acknowledged that he or she needs a special educational setting. Yet the majority of intellectually gifted children scoring four or more standard deviations above the mean are retained in heterogeneous classrooms.

The author discusses views expressed by researchers as far back as the 1930s in support of the propositions put forward in this paper. Terman conducted a longitudinal study of 1528 gifted children of IQ 135+ and discussed the special problems of loneliness and social isolation experienced by the subgroup with IQs of 170+. Hollingworth identified the IQ range 125-155 as “socially optimal” and claimed that, above the level of IQ 160, the difference between the exceptionally gifted child and his or her age-mates is so great that it leads to special problems of development which are correlated with social isolation. Hollingworth emphasised that this social isolation was a result of the absence of a suitable peer group rather than a sign of emotional disturbance. She noted that when extremely gifted students were removed from an inappropriate grade-placement and were permitted to work and play with intellectual peers, their loneliness and social isolation disappeared.

The study discussed in this paper supplies important data to support the findings of both Terman and Hollingworth. It follows a multiple-case replication logic, and employs a wide range of observation techniques. The combination of qualitative and quantitative measures allows for a considerable degree of triangulation. The study has amassed a great deal of data on highly gifted children’s academic, social, emotional and physical development. Information is presented concerning the social adjustment of the children and the difficulties they experience in forming congenial relationships with age-peers of average ability.

Most of the students in the study, 31 of 40, were retained in age-graded classes or had been allowed to skip only a single school grade. These children were required to work through curriculum set several years below their tested achievement level. In addition many of the 31 students who had not been permitted to accelerate had chosen to underachieve deliberately in an attempt to gain social acceptance by their classmates. This strategy was not altogether successful as the moral development, reading interests, leisure pursuits and play preferences of the gifted children were too different to permit total camouflage. Despite these attempts to fit in with age-peers, the majority of children continued to experience social rejection and were deeply unhappy.

The social and emotional well-being of the students who had been allowed to radically accelerate their education contrasted markedly with the social and emotional well-being of the non-accelerated students. The radically accelerated students, 9 in all, reported that they had stopped, or significantly moderated, their deliberate underachievement, as they no longer had the need to employ this strategy to gain peer acceptance. After acceleration, they were able to work and socialise with students who

were three or more years older but who were their peers in social-emotional and academic development.

An interesting finding of the study was the striking difference in self-esteem between the radically accelerated subjects and the non-accelerated subjects. In general, the radically accelerated students obtained moderately positive scores on the academic subscale of the *Coopersmith Self-Esteem Inventory*. The author suggests that they may not have scored higher because they were now comparing their achievements with those of their older classmates. The subjects who scored more than one standard deviation beyond the mean for their age were, in general, non-accelerated students who were comparing themselves with age-peers of average ability. However radically accelerated subjects had positive and healthy levels of social self-esteem whereas the majority of the non-accelerated subjects had scores of more than one standard deviation below the mean, with a number of children obtaining scores that were disturbingly low.

Scores on the *Defining Issues Test* were related to measures of social acceptability. The majority of children scored several years beyond their age. Those whose moral reasoning was unusually accelerated, but who were retained in the regular classroom, were found to have the most severe difficulties with social acceptance. Children of similar ages and with similar scores on the *Defining Issues Test*, who had been radically accelerated, were much more likely to be accepted and valued by their classmates.

Conclusion: The author concludes that ability grouping with age-peers, or a moderate degree of acceleration, or a combination of these and other interventions, is not the most appropriate way to cater for the needs of exceptionally and profoundly gifted students. Rather, extremely gifted students require a carefully designed and monitored program of radical acceleration, along with ability grouping and individualised instruction. If exceptionally gifted students are not permitted to work and socialise with peers who share their abilities and interests, they are placed at a high risk for suffering social and emotional distress.

Commentary: The author presents data to support the proposition that highly gifted students require opportunities to learn and socialise with peers who share similar abilities and interests. It appears that highly gifted children benefit most from relationships with peers who are matched for both intellectual and social/emotional maturity. The author's longitudinal research is a rare example of a study that addresses social and emotional concerns as they relate to highly gifted children. It is also a

rare example of a study that follows the academic and social development of highly gifted children in current time, rather than providing information based on retrospective data.

The Academic and Social Development of Radically Accelerated Gifted Students

Gross, M. U. M. (1994). Radical acceleration: Responding to academic and social needs of extremely gifted adolescents. *The Journal of Secondary Gifted Education*, 5(4), 27-34.

Objective: To review American and Australian research on the academic and social development of exceptionally and profoundly gifted students who have radically accelerated their education.

Design: Literature review.

Setting: A selection of research articles and books published from as early as 1926 concerned with radical educational acceleration.

Assessment of Variables: Literature was analysed for information about the academic and social development of students who have radically accelerated their education.

Main Results: Research shows that teachers' views about educational acceleration are almost universally negative. Teachers fear that accelerated students could lose their academic advantage in later school years. They fear that these students could experience difficulties in social and emotional development and that they could lack the physical and emotional maturity to handle the stress of acceleration. They also fear that accelerated students could become arrogant or elitist in their attitudes towards others. Concerns expressed most frequently by teachers relate to the possibility of acceleration leading to social or emotional damage. These negative teacher attitudes persist despite research evidence showing positive effects of acceleration.

Researchers over the past 50 years have consistently advised that exceptionally gifted students are best served by a series of carefully planned and monitored grade-skips spaced over the course of the student's school career. There is a considerable body of research concerning early entrance to college. This research shows that students who enter college early achieve academic results superior to those of regular college students and to those of equally gifted students who do not enter college early. This research also shows that there are no negative social or emotional effects for students who enter college early and that their social and emotional health may in fact be enhanced.

Research, as far back as studies by Terman in the 1920s, shows that extremely gifted students require opportunities to work and socialise with peers of like-ability. In mixed ability groups, few children of their own age will take the time, or have the capacity, to engage in activities that are of interest to the extremely gifted child. Gifted children may well choose to hide their abilities and interests in order to fit in with peers and fulfil social needs. This may be a coping strategy employed most successfully by gifted girls and there are examples to be found in the research literature. Gifted boys, on the other hand appear to rebel against conformity. Either way, children who adopt these strategies tend not to be selected for gifted programs and tend not to be offered the chance to accelerate their education. This is ironic because it is usually these children who would most benefit from academic acceleration.

The author presents examples of exceptionally gifted Australian students for whom academic acceleration would most certainly have led to positive changes but for whom this was not an option. The academic boredom, social isolation and lowered self-esteem experienced by these students contrasts with the academic achievements, social well-being and healthy self-esteem of 9 of a total of 45 exceptionally gifted children who were allowed radical acceleration.

The author presents case studies of exceptionally gifted Australian students to illustrate how successful radical acceleration can be. One such case concerns Fred who entered the 11th grade 2 weeks before his 14th birthday. Fred is an exceptionally gifted student with an IQ of 162. He sat the *Scholastic Aptitude Test (SAT)* at the age of 12 years and 1 month and scored 640 on *SAT-Mathematics* and 500 on *SAT-Verbal*. He had taught himself to read before his third birthday and soon after could carry out basis addition and subtraction. By the age of 9, Fred was reading deeply in many fields, including psychology, art history, and adult science fiction. Fred is a talented artist.

Fred was very unhappy during elementary and junior high school. He was taunted and teased by his classmates who were unable to understand his passion for music and mathematics, and his concern for social justice. He became a social outcast at school and was miserable. The school refused to offer Fred any form of differentiated curriculum and suggested that he would be happier if he stopped “trying” to be different to other students, took a healthy interest in sport and worked at the same level as the other children in his class.

Fred was in 5th grade when his parents finally, and out of desperation, approached the local secondary school to ask whether they would consider admitting Fred early. After meeting Fred, becoming familiar with his academic achievements and noting his emotional maturity, the principal

agreed to allow Fred to enrol. At age 10 Fred enrolled in the 7th grade. The year after he was based in the 8th grade but took math and chemistry with 11th grade students. He then skipped the ninth grade while continuing his subject acceleration in math, science and computing. He graduated from high school aged 15 years and entered college to pursue a science degree specialising in math, physics and chemistry.

Conclusion: American and Australian research on the academic and social development of exceptionally and profoundly gifted students has found no evidence that social and emotional problems arise through well-planned and carefully monitored programs of radical acceleration. Radical acceleration is not suited to all gifted students. However, for the extremely gifted, placement with students several years beyond their age has strongly beneficial effects on social adjustment.

Commentary: This article presents valuable information concerning research addressing teacher attitudes about academic acceleration. It also gives a detailed explanation of those academic alternatives that appear to be most appropriate for exceptionally gifted students. The author has discussed research in support of particular options and has included evidence for positive academic and social/emotional gains for gifted students.

The Cognitive Development of Children with IQ 160 and Above

Gross, M. U. M. (2000). Issues in the cognitive development of exceptionally and profoundly gifted individuals. In K. A. Heller, F. J. Monks, R. J. Sternberg and R. F. Subotnik (Eds), *International handbook of giftedness and talent* (pp179-192). New York: Elsevier.

Objective: To present the key research on the cognitive development of children who score at or above IQ 160 on tests of cognitive ability.

Design: Literature review.

Setting: A book chapter to follow on from the chapter written by the author in the first edition of the *International Handbook of Gifted Education*. This chapter builds on the findings introduced in the first edition.

Assessment of Variables: Research articles were reviewed for information concerning differences in cognitive functioning; developmental precocity in extremely gifted children; multiplicity of talents in the extremely gifted; and radical acceleration.

Main Results: Intellectually gifted children can be classified as mildly, moderately, highly, exceptionally, and profoundly gifted depending on their level of intellectual ability. All gifted children require particular adjustments to be made at school in response to their unique cognitive and affective characteristics. Children who are exceptionally and profoundly gifted (IQ 160 or above) require very specific adjustments, however many of these children are forced to work in regular classrooms, at levels several years below their levels of tested achievement. Exceptionally and profoundly gifted students appear very rarely in the school population and this may account, in part, for educators' lack of awareness of their needs.

Research literature on exceptional children over the last century includes many individual case studies. Unfortunately the majority of these studies do not provide specific information on the intellectual status of participants. Several large scale group studies have compared children of IQ 160+ with moderately or highly gifted age-peers but have focussed on psychosocial development and have paid much less attention to cognitive or academic issues.

The most influential study of profoundly gifted children was undertaken by Hollingworth. She presented information concerning 19 children who had been identified by previous researchers, and described the intellectual, academic and social development of a further 12 New York children of IQ 180 and above. She described significant differences in both the cognitive and affective development of moderately and extremely gifted children, concluding that children of IQ 140 waste half their time in the normal elementary classroom, while children of IQ 170 waste practically all of their time.

Comparative studies of the cognitive functioning of intellectually gifted and non-gifted children have identified significant differences in cognitive style, cognitive development and cognitive strategy selection. The author discusses these studies in depth. There have been very few large-scale, comparative studies investigating differences between the cognitive functioning of moderately and extremely gifted children.

Research shows that gifted children prefer to study independently rather than in mixed-ability groups. They appear to function best when presented with both auditory and kinesthetic information. They are intrinsically motivated, and dislike being given responsibility for the learning achievements of classmates. A substantial amount of research supports the proposal that gifted learners differ from their age-peers of average ability in the age and pace at which they traverse the Piagetian stages of cognitive development. Specifically, they progress through the stages at significantly accelerated rates, thus reaching the formal operation stage at much earlier ages. The author outlines the research that supports this proposal, including information from individual case studies and data obtained from cohort studies that have measured specific developmental variables.

Research has outlined ways in which gifted individuals differ from non-gifted individuals in their selection of cognitive strategies to complete structured problem-solving tasks as well as tasks of daily living. Gifted individuals tend to use higher-order information processing strategies more frequently and more effectively. They are quick to generate a series of steps to move effectively towards resolution of a problem; they set priorities and monitor progress and solutions; they spend longer in thoughtful pre-analysis; and they represent information through structures usually employed by experts. Gifted children also appear to differ from non-gifted learners in their capacity for analogical thinking, and in the skills of acquisition, retention and transfer of information. Research concerning young gifted children has noted humor as an indicator of giftedness.

The author points out the rarity of research concerned with the development of exceptionally and profoundly gifted children and the retrospective nature of many of these studies. She identifies isolated case studies and a limited number of group studies that support the proposal that exceptionally and profoundly gifted children experience precocious cognitive and affective development.

One study, the Fullerton Study, is discussed in detail, as it represents a developmental study conducted in real time, with data being collected objectively and systematically. Children, 107 in all, were recruited through birth notifications of hospitals adjacent to California State University, Fullerton. They were full-term babies of normal birth weight who were free of visual and neurological abnormalities. The children were assessed from the age of 1 year to 8 years. At the age of 8 they completed the *Wechsler Intelligence Scale for Children-Revised (WISC-R)*. Twenty children were found to have IQs in the range 130-145, with a mean of 137.6, and they were designated the gifted group. The remaining 87 children, with IQs in the range 84-128, and a mean of 110.9, formed a comparison group.

Data collected over 8 years revealed that the children in the gifted group developed at significantly faster rates and attained significantly superior results for expressive language, comprehension, gross and fine motor skills, memory, and personal-social development. The only area in which the gifted group did not show superiority was on numeracy. However the researchers noted that this was due to a ceiling effect on the numeracy test. The findings of the Fullerton Study lend credibility to retrospective studies that show unusual cognitive precocity in intellectually gifted children. The author presents case studies of exceptionally and profoundly gifted children to illustrate precocious development in speech and language, reading, and fine and gross motor skills.

Extremely gifted individuals appear to possess a multiplicity of talents, and display superior abilities across a wide range of subject fields and domains. The author quotes case studies of children with documented talents in many academic fields, as well as in music, computing and sport.

Research supports the use of radical educational acceleration for exceptionally and profoundly gifted students. Differences between extremely gifted children and their age-peers can far outweigh similarities and can thus hinder the formation of productive social relationships. Extremely gifted children have been shown to suffer social isolation, peer rejection, loneliness and alienation. The author argues strongly that this is not a consequence of exceptional ability itself but should be seen as

a result of society's inappropriate response to children who possess exceptional ability. Social problems become particularly marked when schools refuse to create opportunities for gifted children to work with peers who share common abilities, interests and values.

One particularly appropriate way for schools to meet the academic and social needs of extremely gifted children is through a program of radical acceleration, a series of grade advancements which result in the student graduating from high school three or more years earlier than is customary. Research makes it clear that some form of acceleration is essential for highly gifted children if they are to find like-minded peers with whom they can form healthy and productive social relations. For extremely gifted students, it appears that more conservative accelerative procedures such as a single grade skip are not sufficient to meet their needs. The author quotes research showing that, if these children are not allowed radical acceleration, they tend to suffer from low levels of motivation and social self-esteem, and are more likely to perform in school at levels several years below their tested achievement.

The author presents findings from her own longitudinal research with highly gifted children. She specifically outlines results for children who have been allowed to radically accelerate their education. These children have experienced high levels of academic success and all lead full social lives. None of the children has any regrets concerning their radical acceleration through school.

Conclusion: Research studies conclusively show that exceptionally and profoundly gifted children develop at faster rates than average ability children. This includes both cognitive and social/emotional development. They not only progress at faster rates through the Piagetian stages of cognitive development but also develop significantly different cognitive strategies. Research has documented this differential development in children as young as one year of age. Schools need to address the special cognitive and affective needs of highly gifted students and they can do this by allowing these students to radically accelerate their education.

Commentary: This article specifically addresses issues as they relate to exceptionally and profoundly gifted children. It offers a detailed account of the cognitive and affective development of highly gifted children, and makes specific recommendations for radical educational acceleration. As the author points out, many studies in the area of gifted education have not recognised differing levels of giftedness and have not addressed the concerns of highly gifted students. The author points out that

the majority of research has been in the form of case studies and makes suggestions for future research to build on the findings of these case studies.

Strategies for Teaching Exceptionally Gifted Children

Gross, M. U. M. and Feldhusen, J. F. (1986). The exceptionally gifted child. *Understanding Our Gifted*, 2(5), 1 and 7-10.

Objective: To present issues regarding the education of exceptionally gifted children and to suggest strategies for teaching such children.

Design: Article discussing findings from a collection of case studies of 32 exceptionally gifted children.

Setting: Australia.

Participants: A selection of 32 Australian children with IQs greater than 160.

Assessment of Variables: Commonalities were identified across cases and presented for early development, development of reading, and early school experiences. Suggestions for school programs for the exceptionally gifted are presented.

Main Results: Case studies illustrate that the remarkable abilities of exceptionally gifted children become obvious very early in life. Exceptional intellectual giftedness is usually easy to identify in children before school age because they have not learned to underachieve or conceal their abilities. Research shows that the majority of exceptionally gifted students speak and walk significantly earlier than children of average ability. Children in this study spoke their first meaningful word other than 'Mama' or 'Dada' at 9 months, as compared to 12 months for the general population. Many were able to recite or sing several nursery rhymes without error before the age of 18 months. Fully 97% were reading before the age of 5 years (decoding and comprehending more than 5 words from a printed source without the use of pictures as textual clues). Sixty per cent were reading at or before the age of 2 years.

The early school experiences of exceptionally gifted students appear to mark the beginning of problems. It is at this time that these students begin to interact on a regular basis with other children of a similar chronological age. It appears that, at this stage of development, a young child's view of

ability or achievement tends to be self-referenced- comparing one's achievements with one's own previous achievements. Gifted children, by contrast, have often moved on to a norm-referenced understanding of ability as performance measured against the attainment standards of peers. The case studies support the view that this does not lead to conceit or feelings of superiority in gifted children but rather encourages them to change their behaviour to 'fit in' with peers. Parents of 66% of the exceptionally gifted students reported that their children had spontaneously stopped reading or deliberately decreased the quality and quantity of their reading after only a few weeks at school.

The majority of parents of children who stopped reading on entry to school decided not to approach the teacher about the issue for fear that they would be disbelieved and their child penalised. These children were required to spend much time on 'reading readiness' exercises, curriculum appropriate for students with reading ability 3 or 4 years below the actual reading level of the gifted students. This pattern suggests that it is important for teachers to use standardised tests of achievement to assess a child's level of reading development at school entry. It also appears important for parents of exceptionally gifted children to share with the school the child's developmental history and his or her current level of achievement in reading and mathematics.

The author argues for radical changes to school programs for exceptionally gifted students. Pullout enrichment programs may be of benefit to some gifted students but do not provide adequate challenge for exceptionally gifted students. These students, it is argued, require placement in self-contained classes of intellectually gifted students. They need the freedom to progress at a pace suitable to their abilities. An individualised program with a strong element of acceleration (including radical acceleration) appears to fulfil this need.

The author makes these suggestions in light of experiences of the exceptionally gifted children in her study. She quotes the example of Ian who, at the age of 9, scored 560 on the *Scholastic Aptitude Test-Mathematics (SAT-M)*, almost a whole standard deviation above the mean on a test standardised on college bound high school seniors. The author makes the case for radical acceleration to meet Ian's learning requirements.

Programming changes to allow for exceptionally gifted students to learn with others of like ability also address social concerns. Case studies of the exceptionally gifted young Australians discussed in this paper reveal that many suffered social rejection from peers in the mixed ability classroom setting. A small number of students were given the opportunity to accelerate their education and there was a

marked improvement in social and academic outcomes. Hadley, for instance was allowed to accelerate by two years and this has led to a marked decrease in boredom, an increase in personal happiness and more satisfying interactions with peers.

The author reports positive outcomes for students who were allowed to radically accelerate their education (acceleration by 3 or more years beyond chronological age). These students had significantly higher levels of social and general self esteem than did children of equal intellectual ability who were retained with age peers in regular classrooms or who were permitted a 'token' acceleration of one year. The students who had radically accelerated had higher levels of motivation, were much less likely to underachieve for peer or teacher acceptance and had more positive attitudes towards school than did non-accelerated students. In contrast, non-accelerated students suffered low levels of social self esteem, were more likely to report social rejection by their classmates and admitted that they frequently underachieved in an attempt to reduce teachers' and classmates' dislike of them.

Conclusion: Many exceptionally gifted children never experience the self-fulfilment that comes with full expansion and utilisation of their remarkable abilities. These children are rarely offered learning programs at school that adequately address their intellectual capacity. School programs rarely address the importance of motivation and self esteem to the achievement of intellectual potential. Radical acceleration is a programming option that can address the academic and social/emotional needs of exceptionally gifted children.

Commentary: The author makes reference to many cases throughout the article to illustrate findings from her study on exceptionally gifted students in Australia. Reference to pertinent research with similar aims, such as case studies conducted by Hollingworth, allows for this paper to be interpreted in the context of theory and research in the field of gifted education.

The Academic, Social and Emotional Development of Exceptionally Gifted Children

Gross, M. U. M. and Start, K. B. (1989). "Not waving but drowning": The exceptionally gifted child in Australia. In S. Bailey, E. Braggett and M. Robinson (Eds), *The challenge of excellence: A vision splendid* (pp 25-36). Sydney: Australian Association for the Education of the Gifted and Talented.

Objective: To report on the progress of a longitudinal study of exceptionally gifted Australian children.

Design: Conference paper outlining findings of a set of longitudinal, comparative case studies of the academic, social and emotional development of a group of exceptionally gifted children.

Setting: This paper was presented at the Eighth World Conference on Gifted and Talented Children, Sydney, Australia, 2-7 July, 1989.

Participants: Thirty-one Australian children aged 5 to 13 years who had been identified as exceptionally gifted. All children achieved an IQ score in excess of 160 on the *Stanford-Binet (L-M)* IQ measure.

Assessment of Variables: Significant cognitive and affective characteristics were identified from the case study data, along with factors that appeared to influence cognitive and affective development.

Main Results: The children in this study differed significantly from the norm in almost every aspect of early development. They acquired the ability to speak, on average, just before 9 months of age compared to the general norm of 12 months. Early speech was accompanied by early development of motor skills. The children walked when led at the mean age of 9.5 months and walked unassisted at the mean age of 11.6 months. Average children walk when led at 11 months and walk unaided at 15 months. The precocious development of verbal and motor skills contributed to the heightened capacity of the children to acquire and process information at a very young age.

The study children learned to read at ages significantly younger than the majority of children. Three children were reading before the age of 2 years. The considerable majority of the study children were reading before they commenced formal schooling.

Many of the children underachieved in the school system. Several stopped reading when they entered school in an effort to avoid appearing different to their classmates. Many of the children became aware of their unique characteristics at a young age and were quick to alter their behaviour so that they would not stand out from the group.

In the majority of cases, schools did not undertake to have students assessed using any standardised procedures. Teachers tended to rely on subjective judgement alone. This led to the majority of children being offered work that was not matched to their ability, and was neither challenging nor educationally appropriate.

The play interests of the exceptionally gifted children in this study differed markedly from those of similar aged peers. The majority of children indicated a 'strong dislike' or 'very strong dislike' for games involving mock fights or chasing. They preferred leisure activities that were completely outside the realms of interest or capability of the average child. Leisure activities for children in this study included writing computer programs, translating texts into Latin and studying street directories. The children showed little interest in sports, either as performers or spectators. They nominated reading as their favourite occupation, followed by playing with puzzles and board games, and working with personal computers. Watching television was placed last on a list of 8 activities.

There was evidence that several of the children were facing the dilemma of having too many avenues available to pursue and too many identities to select from. For instance, Anthony, aged 13 years, was a talented mathematician as well as an extremely talented cricketer. He was concerned that, if he pursued national or international cricket to the level of his potential, he would have to postpone his mathematics study and a career in the math field.

Of the 31 children in this study, 9 (29.03%) were of Asian ethnic origin. Of the 62 parents, 15 (24.19%) were ethnically Asian. These parents originated from China, Hong Kong, India, Malaysia and Singapore. At the time (1989), people originating from these countries made up only 1.34% of the total Australian population. Thus parents and children who were ethnically Asian were

significantly over-represented in the cohort. The author identifies factors that may have contributed to selection bias.

The researcher suggested some ways that schools could respond to the unique needs of exceptionally gifted students. Mentoring relationships with older students or adults sharing similar interests were of great benefit to some of the study children. Some children were allowed to accelerate their education and this lessened their intellectual frustration. A small minority of the children were allowed radical acceleration across some subjects and across grades. This curriculum and timetable flexibility allowed these students to find intellectual stimulation at school. These children benefited from the new social environment, making friendships with older, more capable students who shared similar interests.

Intervention methods such as in-class enrichment or withdrawal programs were not found to be of great benefit for the study children. They appeared to need more radical educational interventions. It was suggested that the optimal intervention might well be to supply a peer group that shared a similar intellectual capacity and similar interests. Such placement, it was argued, would allow the exceptionally gifted child to develop a sense of identity and provide an environment that would allow for social intimacy. Radical educational acceleration was put forward as one option to achieve these aims.

Conclusion: The exceptionally gifted children in this study faced problems of social isolation and rejection. These problems appeared to be directly related to characteristics that set these children apart from their age-peers. These included differences in physical development, intellectual development, interests and play habits.

The children faced difficulties at school. They were quick to develop strategies to mask their differences from other children. Many were not identified by teachers as having specific intellectual and social/emotional needs. Most were not offered adequate learning experiences. Many of the children fell into a cycle of underachievement at school.

Schools need to address the needs of exceptionally gifted students if this underachievement is to be reversed. The most successful strategies appear to be those that allow exceptionally gifted children to work with others who share a similar intellectual capacity as well as similar interests. Radical

educational acceleration is an option that appears to successfully address the needs of exceptionally gifted children.

Commentary: This longitudinal study presents case studies of exceptionally gifted students. This article illustrates the success of the case study technique in highlighting and investigating specific social and emotional concerns. Direct quotes from participants act to draw attention to the true extent of such concerns and allow the reader to empathise with the participants.

Radical Acceleration Supported by the Study of Mathematically Precocious Youth

Hendricks, M. (1997). Yesterday's whiz kids: Where are they today? *Johns Hopkins Magazine*, 49(3), 30-36.

Objective: To report on the historical development of the Study of Mathematically Precocious Youth (SMPY). To report on the course of the lives of gifted students who were identified by SMPY and who radically accelerated their education with the support of SMPY.

Design: Informative article for a college magazine.

Setting: The Study of Mathematically Precocious Youth, Johns Hopkins University.

Participants: Staff and students of SMPY.

Assessment of Variables: Staff and students were interviewed about their experiences at SMPY. The interviews were supplemented with information from research journals concerning outcomes for students from SMPY.

Main Results: The Study of Mathematically Precocious Youth was founded by psychologist Julian Stanley in the early 1970s. Scientifically and mathematically precocious youth were identified. These were 12 and 13-year-olds who had achieved high test scores on the *Scholastic Aptitude Test*, the College Board admissions test normally taken by senior high school students. These students were offered opportunities to accelerate their education. They were able to attend intensive summer and weekend programs at Johns Hopkins University and were supported to radically accelerate their education. Many of these students opted to enter college early. This program continues to offer similar opportunities to gifted youth today.

Research has been conducted since SMPY was established to follow the academic and socio-affective development of students. This research has acted to assuage the concerns and objections of many people to the work of SMPY. Recent findings show that the majority of participants have been successful in both study and career, and have not experienced adverse social outcomes. Nonetheless there are a small number of students who did not fare well and some who do not endorse the

acceleration program. Research findings from SMPY show that 9% of men and 5% of women said that acceleration had a negative or somewhat negative effect on their educational planning.

The author presents examples of students who radically accelerated their education under the guidance of SMPY. Mark Jacobson was one of the first students to be identified by SMPY. At the time this article was written, he was spending weekends as the official scorekeeper for the Baltimore Orioles and was employed during the week with the Defence Department in a high-security role. He started college at age 15. Joseph Louis Bates also enrolled in university early, at the age of 13. By the age of 17 he had earned his baccalaureate and master's degrees and had begun a doctorate in computing at Cornell. At the time of writing he was a professor of computer science at Carnegie Mellon University.

Jonathan Edwards also entered university aged 13. Unlike the others, he did not complete his university studies and did not receive a degree. Instead he left university at the age of 17, disillusioned with academia and suffering problems in his social life. However he does not regret attending university at a young age and recalls very positive memories of university life. Despite a lack of academic success, Jonathan has found great career success. At the time the article was written he was the chief technology officer of a company he founded called Intranet. The company has an annual revenue of 17 million dollars, employs 140 people, and has a partnership with IBM.

Discussion with these men, along with others, who were among the first students to be identified by SMPY, revealed an overall positive picture of radical acceleration. Comments about academic and social gains were encouraging. Some offered suggestions for modifications to the course taken to radically accelerate, in the hope of making radical acceleration even more successful for those following in their footsteps. Dr Julian Stanley offered some insights into personal factors identified by research that appear to contribute to successful radical acceleration. Among these were a true desire on the part of the student to accelerate, a hunger for learning, and the motivation and energy for hard work.

Conclusion: Research conducted at SMPY, along with personal insights gained from ex-students and staff associated with SMPY, reveal that radical acceleration has allowed many people to achieve remarkable academic and career outcomes. There appear to be no overall detrimental effects on social health and many ex-students identify positive social and emotional outcomes. There are a

small number of students for whom radical acceleration has not been successful. SMPY staff make it clear that radical acceleration should be considered only for some exceptionally gifted students.

Commentary: This article presents results from longitudinal research on radical acceleration as well as insights from people who have experienced radical acceleration. As such, it allows the reader to make judgements based on data from various sources. Personal comments from those who have been involved add immediacy to the findings from empirical research and allow for an expanded understanding of the effects of radical acceleration on the lives of students. Comments by Dr Julian Stanley, a respected authority in the field of gifted education, are enlightening. This article describes his courageous and well-informed leadership of SMPY.

Radical Acceleration: A Case Study

Holmes, J. S., Rin, L. H., Tremblay, J. M. and Zeldin, R. K. (1984). Colin Camerer: The early years of a radical educational accelerant. *Gifted Child Today*, 33, 33-35.

Objective: To present an instance of radical educational acceleration.

Design: Case study.

Setting: Study of Mathematically Precocious Youth (SMPY).

Participant: Colin Farrell Camerer

Assessment of Variables: The participant and his mother, Mary Farrell Camerer were interviewed and student records at SMPY were accessed to reveal details about Colin Farrell Camerer. Information was presented on his early life, college and graduate years, and his views on acceleration.

Main Results: Colin was an unusually quiet child but otherwise had a normal childhood. His parents were unaware of any signs of precocity until the age of 5, when he was found to be reading TIME magazine. His parents do not know when he began to read and Colin cannot remember ever learning to read. Colin began school at the usual age. His kindergarten teacher thought him very intelligent and arranged for him to be assessed by the school psychologist. He was found to be unusually bright and the school allowed him to work ahead of his age peers. He was completing fourth and fifth grade work in second grade.

After the second grade, Colin moved with his family to Baltimore. His school referred him to Mr Raymond Trimmer, the educational director of the Maryland Academy of Sciences, in the hope that he could help Colin to access curriculum appropriate for his age and ability. Mr Trimmer, in turn, introduced Colin and his parents to Dr Julian Stanley, a researcher at Johns Hopkins University with a special interest in gifted children. Dr Stanley assessed Colin's capabilities using achievement tests designed for older students as well as tests of ability. At the age of 11 years Colin was found to have a *Stanford-Binet* IQ of 160. At age 13 he scored 750 out of a possible 800 on the *Scholastic Aptitude*

Test-Mathematics (SAT-M) and 610 out of 800 on the *Scholastic Aptitude Test-Verbal (SAT-V)* (corresponding to the 99th and 93rd percentiles, respectively, for college-bound 12th-grade males).

Colin proceeded to accelerate his education, under the guidance of Dr Julian Stanley. He moved from sixth grade in elementary school to the eighth grade in junior high. He finished studies in pre-calculus in 120 hours at Saturday morning 'speeded-math' class. He also took an introductory computer course at Johns Hopkins University. Colin then skipped the last year of junior high and the first year of senior high. He took Advanced Placement (AP) calculus at school, worked through AP physics on his own, and attended Towson University at night. His AP scores were 5 out of 5 for Calculus AB and 4 out of 5 for Physics B. Confident that he could handle the advanced coursework, Colin applied for admission to Johns Hopkins University.

Colin entered university at age 14 with 34 credits and sophomore standing. He graduated at the age of 17 years and 1 month and went on to attend the University of Chicago for its outstanding Ph.D. program. Colin received his M.B.A. from the University of Chicago at age 19 and completed his Ph.D. in Behavioural Decision Theory two years later. While completing his Ph.D., and at the age of 21, Colin accepted a position as an assistant professor of business policy in the Kellogg Graduate School of Management at Northwestern University. During this time he had several articles published in academic journals. At the time this article was written (1984) Colin was involved in numerous research projects and was teaching Master's-level research seminars.

Colin holds positive views of his experiences of educational acceleration. He believes that, without acceleration his life would be vastly different and he would probably be employed in a low-level management position. He has found social adjustment somewhat difficult all his life. He believes this is due to his natural loner/introvert tendencies and does not blame the acceleration process. Colin feels that the options to radically accelerate which were made available to him should be available to many more children, although he concludes that acceleration is not suitable for all students. He suggests that it is particularly important for students to be emotionally stable before acceleration is considered. He contributes the success of his acceleration to the support offered him by Dr Julian Stanley and others at SMPY, as well as encouragement from his parents.

Conclusion: A case is presented of a highly successful, radically accelerated protégé. Colin's case is a strong argument in favour of educational acceleration. The authors name another three males who share similar success stories and make the point that Colin's acceleration program is not an isolated

instance. They suggest the need to follow up and report on other individuals who have radically accelerated their education.

Commentary: This detailed study of a single case of radical educational acceleration tracks one possible path for acceleration whilst revealing that there are many acceleration options available. It allows for a realisation of the huge scope of accelerative options, and blend of options from which students might be able to choose to accelerate their education. This case reveals factors that were obviously crucial for successful radical acceleration. These factors include the personal characteristics of the student, including a desire to accelerate and succeed. Also important is the support of crucial others, in this case educationalists knowledgeable about acceleration options and parents who provide steady encouragement.

Characteristics of Successful Acceleration Programs

Howley, A. (1989). The progress of gifted students in a rural district that emphasised acceleration strategies. *Roeper Review*, 11(4), 205-207.

Objective: To document one school district's experiences with the use of various acceleration strategies in elementary schools, and to identify program characteristics related to success.

Design: Case study. Comparative surveys of achievement.

Setting: Jackson County School System, West Virginia.

Participants: Gifted students enrolled at elementary schools in Jackson County. There were a total of 8 elementary schools in the county at the time of this study and gifted students from all these schools took part. Two of the elementary schools catered for children in grades K-8, 4 schools served children from grades K-5, one school enrolled students from grades K-2, while the last school enrolled students from grades 3-5.

Assessment of Variables: School programs were assessed for provisions for educational acceleration. The Board of Education policy documents were assessed for guiding principles concerning provisions for educational acceleration.

The achievement of students who participated in acceleration programs at each elementary school was assessed at the time of acceleration and a year after acceleration in an attempt to measure the academic benefits of different acceleration programs. The *Woodcock-Johnson Psychoeducational Battery: Tests of Achievement* were used to assess students' reading ability, math ability, and written language. Results for the groups of students at each school were compared.

Main Results: Rural schools may have difficulty establishing and maintaining programs for gifted students. There may be too few gifted students to warrant the establishment of special classes for the gifted. Options such as pullout enrichment programs can be too expensive to run. Options for educational acceleration provide good alternatives. Recent research suggests that programs focussing on acceleration may be more beneficial for meeting the needs of gifted students than programs

stressing enrichment. Also, programs for acceleration are usually not costly to implement or maintain because they can take place within pre-existing frameworks for curriculum delivery.

Educational acceleration however is not widely accepted. Many teachers and school administrators have concerns regarding students' emotional development, disruption to orderly curriculum development, parental expectations, and scheduling problems. Despite these concerns, the Board of Education decided to officially sanction programs for acceleration in schools in Jackson County. The Board suggested that the programs should provide systematic procedures through which administrators, teachers, parents and students could plan for acceleration, implement acceleration and monitor its success. The program also needed to outline other options for students for whom acceleration was unsuccessful.

Schools in Jackson County have offered specific educational intervention for gifted children for 11 years. In the early stages a single teacher attempted to serve all the gifted children in the 15 schools across the county. This teacher began by educating the educators about the needs of gifted students. Many more students began to be identified as being gifted. Eleven years on, 12 teachers now work to serve a total of 260 gifted students in Jackson County.

There has been a shift away from programs for enrichment since the Board of Education decided to support acceleration strategies for gifted students. Options for acceleration were first introduced in the middle and high schools in the form of Honors and Advanced Placement classes. Gifted students were encouraged to move through curriculum at a pace most suited to their abilities.

It took longer for programming for gifted children in elementary schools to focus on acceleration strategies. Teachers were reluctant to proceed too quickly because they wanted to take time to explore issues related to differences among gifted students and differences between schools. Discussion about these issues resulted in each school developing its own program. These programs differed markedly. Some schools allowed for subject acceleration, while others focussed on grade acceleration. Some programs made provision for students to radically accelerate their education while others actively discouraged this.

It was decided to compare the success of each elementary school program for meeting the academic needs of gifted students. Assessments of student achievement were made using the *Woodcock-Johnson Tests of Achievement*. The gains students made in reading, math and written language were found to be

remarkably similar across programs for the school year 1987-1988. On average, students gained 1.8 years in reading, 1.9 years in math and 2.0 years in language.

A comparison of achievement gains across programs revealed only two significant discrepancies, both relating to math achievement. In one instance, a program's gain exceeded gains achieved by other programs by a significant margin. The author suggests that this might be related to the training of the math teacher involved in administering this program. This teacher had trained as a high school business teacher and as such had a more extensive background in math than most elementary teachers responsible for math instruction in the other programs. In the second instance a program's gains failed to equal those of other programs. Again the author argues that this is a reflection of teacher characteristics. The teacher for math in this particular program was opposed to acceleration and was reluctant to allow students to progress rapidly through advanced material. Opportunities for these students to achieve significant gains in math were limited.

Conclusion: Evaluation of different programs for acceleration in elementary schools in one school district showed that these programs were equally effective in producing achievement gains among gifted students in reading and written language. Most programs were also equally effective in producing achievement gains among gifted students in math. However one program led to significantly higher gains in math and another led to significantly lower gains. Characteristics of the math teachers in both cases were said to be responsible for these discrepancies. Some programs allowed for radical educational acceleration and these programs appeared to be just as effective as the more conservative programs in relation to student achievement.

It appears practicable for schools in a district to develop individual programs for educational acceleration. In this way schools ensure that their program suits the needs of their gifted students as well as pre-existing frameworks. For such an approach to work, the Board of Education should provide guidelines and specify academic requirements. Importantly, each school program should allow for every gifted child to receive instruction in basic skills at levels that closely approximate his or her instructional levels.

Commentary: The study suggests that programs of educational acceleration for gifted students can lead to significant academic gains irrespective of the acceleration options offered. The reader may have been more convinced of this fact had the options for each program in this study been outlined in greater detail. There is little mention of how each program differed from the others. In particular,

it would have been beneficial to be informed about how many programs allowed for radical acceleration and how many students took advantage of this option. This article would also have benefited from a description of the students involved, particularly in relation to cognitive and affective characteristics related to giftedness and the procedures used by each school to identify gifted students.

The Academic Performance of Early Entrance Students

Janos, P. M. and Robinson, N. M. (1985). The performance of students in a program of radical acceleration at the university level. *Gifted Child Quarterly*, 29(4), 175-79.

Objective: To compare the academic performance of students who have entered university three or more years early with that of two groups of older students matched for academic aptitude. One group consisted of students who had achieved similar scores on the pre-entry assessment and the other was a group of National Merit Scholars.

Design: Longitudinal cohort study.

Setting: University of Washington

Participants: Twenty-four students who entered the University of Washington before the age of 15, three or more years earlier than is customary. Of these students, 17 had completed their undergraduate study and were enrolled in graduate programs. These students were compared to:

- ♦ 24 students who entered the University of Washington at the conventional age and who achieved similar scores to the early entrance students on pre-admission tests (REGs), and
- ♦ 24 National Merit Scholars (NATs) entering university at the usual age. These comparison groups were chosen on the basis of having similar levels of academic aptitude to the accelerated students.

Assessment of Variables: The *Concept Mastery Test (CMT)* was used to provide an estimate of verbal ability. Academic transcripts revealed number of credits earned and cumulative grade point averages.

A questionnaire was devised to assess students' perceptions of their university experience. The students were asked to rate the importance to them of the following aspects of university life: intellectual level of offerings, pace of instruction, content in areas of interest, faculty members' attitudes towards achievement, and time for interaction with faculty. They were then asked to rate their satisfaction with how these aspects were addressed at The University of Washington. Differences in responses in relation to gender were noted.

Main Results: This study assesses data for radically accelerated students who were attending the University of Washington and who were identified and supported by provisions made available through a unique early entrance program at this site. These students were carefully selected on the basis of high academic achievement, high levels of personal commitment and motivation, and appropriate levels of family support. They attended a transition school for a year to ensure that they possessed the skills needed for university study, before commencing full-time study. They benefited from provisions that supported social and emotional health, including mentoring, counselling and organised social activities.

The mean score for females on the *Scholastic Aptitude Test-Verbal (SAT-V)* was significantly higher than that for males. Otherwise no differences were noted between males and females on any variable.

No significant differences appeared among groups in the number of university credits earned. However scores on the *CMT* and grade point averages were substantially lower for REGs than for the other two groups, while NATs received higher scores than the early entrance students on the *CMT*.

The early entrance students were studying a wide range of subjects. Nine were majoring in engineering, computer science or the natural sciences. Eight were majoring in the humanities and social sciences. Seven had not yet declared their majors at the time of this study.

Students who entered university early gave high ratings to the importance of academic characteristics and to their satisfaction with the academic environment provided by the university. This contrasted with low ratings recorded for REGs. The NATs gave ratings similar to those of early entrance students for the importance of academic variables but were significantly less satisfied with the academic environment provided by the university.

Conclusion: The 24 accelerated students in this study have achieved significant academic success. Their progress exceeded that reported for the student body at large at the University of Washington and for a comparison group of normal-entry university students with similar scores on pre-entrance tests. Their academic success is comparable to that of National Merit Scholars. Early entrance students at the University of Washington report satisfaction with their academic environment and rate the importance of academic variables highly.

Commentary: This study demonstrates that a program for radical acceleration at the university level which is carefully undertaken and which supports a student's academic progress, as well as social and emotional well-being, can result in exceptional academic gains for students. This study is important because it compares results for radically accelerated students with those of normal-entry students of similar academic aptitude. Many studies of radical acceleration do not include comparison groups while some compare radical accelerands with older students who are not matched for intellectual or academic ability.

The Social Development of Students who Enter University Early

Janos, P. M., Robinson, N. M., Carter, C., Chapel, A., Cufley, R., Curland, M., Daily, M., Guiland, M., Heinzig, M., Kehl, H., Lu, S., Sherry, D., Stoloff, J. and Wise, A. (1988). A cross-sectional developmental study of the social relations of students who enter college early. *Gifted Child Quarterly*, 32(1), 210-15.

Objective: To study the changes in social adaptation, over time, of students who enter university three or more years early.

Design: Cross-sectional survey.

Setting: The University of Washington.

Participants: 63 students who entered the University of Washington as full-time students between 1977 and 1985 and who were three or more years younger than the typical university entrant. Students were aged 14 years or younger at time of entry to university. All were admitted through the University's Early Entry Program and, as such, needed to achieve high scores on the *Washington Pre-college Test (WPCT)* as well as providing convincing evidence of personal maturity and motivation, and appropriate parental support.

Assessment of Variables: Students were asked to complete a four-part questionnaire. The first part of the questionnaire requested personal information. Students were then asked about the ages of their university friends. Friends within three years of the student's age were identified as agemates and those three or more years older were identified as elders. Students recorded the amount of time per week they spent with agemates and elders. Information was sought regarding the number of times per week students spoke to agemates or elders about sensitive topics. Such topics included relationships with parents, specific values, physical appearance, plans for life, others' perceptions of them, their attraction to another person, relationships with friends, and the sharing of deep feelings.

Students were next asked to rate relationships with agemates and elders. Rating scales assessed the duration of and dedication to a relationship, degree of trust and affection, freedom to communicate

criticism or hostility, ability to synchronise goals and actions, ability to develop unique norms, and the ability to equate the interests of friends with their own.

Students were also asked to give information about dating. They were asked to report on the number of students they had dated who were age-mates and the number who were elders.

Results were analysed for groups according to years spent at university (freshmen, sophomores, juniors/seniors and graduates) and gender. Correlations were sought between relationship variables and age and number of credits.

Main Results: Results pertain to students at the University of Washington, a site that offers a unique program to support students who enter university three or more years earlier than is customary. Students spend a year at a Transition School preparing for full-time university study. During this time there is opportunity for social interaction with others who have chosen to enter university early. Students then begin formal university study with the main student body and can choose to socialise with others who are three or more years older. Throughout their time at university the accelerated students continue to socialise with and support each other and a homeroom is supplied for this purpose.

Ninety two percent of subjects reported having a best friend and the majority identified at least three additional friends whom they considered to be close. The majority of students, 57%, had best friends more than 2 years older. The close friends of females were almost three years older on average, while the close friends of males were only about three-quarters of a year older.

In the early years of their undergraduate study, the radical accelerands sought the company of their age-peers in the acceleration program rather than elders. It was only in the junior and senior years that the company of elders was sought as often as the company of age-peers.

There were no significant differences between groups for communication with age-mates about sensitive issues. However females communicated with elders about sensitive issues far more commonly than males and this was evident from the sophomore year onwards.

Higher proportions of juniors/seniors (56.4%) and graduates (43.9%) than freshmen (0%) and sophomores (0%) dated individuals three or more years older. A considerably higher proportion of females (44.4%) than males (14.4%) reported dating elders.

Conclusion: For freshmen and sophomores, differences in measurements of time spent with friends, communication concerning sensitive issues and intimacy in relationships shows that there is a marked preference to socialise with agetates. For juniors/seniors, there was no significant difference in the amount of time spent with agetates compared with elders, communication concerning sensitive issues with age mates and elders, and intimacy in relationships with agetates and elders. Therefore students at this time appear to spend as much time with agetates as they do with elders and appear to enjoy relationships with both agetates and elders. For graduates there is a marked shift towards relationships with elders. More time is spent with elders, communication about sensitive issues takes place with elders, and relationships with elders appear to be more intimate than relationships with agetates.

The study suggests that, when provisions are made for regular contact with intellectually comparable agetates, students who enter university three or more years early prefer to develop relationships with each other at the beginning of their university career. However after two years at university, these students appear to expand their friendship group to include older students. Female students who choose to enter university three or more years early appear to socialise with older students sooner and more regularly.

Commentary: It is advisable to remember that the results of this study are a reflection of the unique early entrance program operating at the University of Washington. It appears that students who choose to radically accelerate their university education at a site that supports and assists socialisation with agetates and elders enjoy a vital social life.

Academic and Social Outcomes for Students who Enter College Early

Janos, P. M., Robinson, N. M. and Lunneborg, C. E. (1989). Markedly early entrance to college: A multi-year comparative study of academic performance and psychological adjustment. *Journal of Higher Education*, 60(5), 495-518.

Objective: To identify academic and social outcomes of early college entry in the hope of addressing widespread concerns about the hazards of hastening childhood development.

Design: Longitudinal comparative study.

Setting: The University of Washington.

Participants: Twenty males and 23 females aged 12 years or younger who enrolled in the Early Entrance Program (EEP) at The University of Washington between 1977 and 1983 (EEPers). All students achieved scores on the *Washington Pre-college Test (WPCT)* equivalent to *Scholastic Aptitude Test- Verbal (SAT-V)* and *Scholastic Aptitude Test- Math (SAT-M)*, scores that would place them well above the 85th percentile for Washington State college-bound twelfth graders.

The EEPers were compared to three groups of students. The first comparison group consisted of comparably bright agemates: 25 males and 19 females who qualified to enter the EEP but chose instead to attend high school (QUALs). The second comparison group consisted of 43 University of Washington students (25 males and 28 females) who were, on average 4^{1/2} years older than the EEPers and who were considered typical undergraduates (REGs). These students were matched to the EEP group for gender, year of entry to university, high-school catchment area (as a rough control for social class) and for Verbal and Quantitative Composite scores on the *WPCT*. The third comparison group was made up of National Merit finalists (NATs) (29 males and 30 females). These students were chosen for their close match to the EEPers on academic ability. They were also matched to the EEP group on gender and year of matriculation.

Assessment of Variables: Data were collected annually. The 1982 EEP cohort supplied information three times (1982, 1983, 1984), the 1983 cohort twice (1983, 1984), and the 1984 cohort only once

(1984). Certain data were collected only once. Three measures bearing directly on social adjustment and maturity were collected during each year of the subjects' participation.

Data were collected to assess aspects of intellectual functioning. These included college grades and scores on the *Concept Mastery Test (CMT)* to analyse verbal ability. Assessment of students' knowledge about, and attitudes toward, studying was provided by the four scales (Delay Avoidance, Work Methods, Teacher Approval, Education Acceptance) of the *Survey of Study Habits and Attitudes (SSHA)*. Social and personal adjustment and maturity was assessed using the *California Personality Inventory (CPI)*, the *Tennessee Self-Concept Scale (TSC)*, the *Inventory of Parent and Peer Attachment (IPPA)* and the *Defining Issues Test (DIT)*. The *Family Environment Scale (FES)* was used to assess possible differences in family relational patterns. The *Social Maturity Index (SMI)* was used to assess socialisation, responsibility, flexibility and dominance.

Main Results: On the CMT, the EEP, QUAL and NAT groups scored higher than the REG group. EEP students also scored much higher on the CMT than a sample of 117 normal college juniors from a large midwestern university. This shows that the two groups that tested high on college readiness tests at an early age (EEP and QUAL), and the group that entered college already identified as having unusually effective ability (NATs) were psychometrically superior to typical college students. In addition, the NAT group outscored both the EEP and QUAL students.

No significant differences were noted between groups on the *SSHA* scales. Thus EEP students' attitudes towards study and knowledge about study skills were comparable to those of the other students, including the academically oriented National Merit finalists. Females in all groups scored higher than males on the *SSHA* scales.

EEP students earned a mean grade point average comparable to that of the NAT group. This was true for courses in humanities, social sciences, natural sciences and honors courses, and at the freshman, sophomore, junior and senior levels. EEP students' GPA was higher than that for the REG students, as well as being higher than the average GPA for University of Washington students as a whole. There were no differences among the groups in total number of credits earned by June 1984. EEP and NAT students had completed more credits at the freshman level than had the REG students. Patterns of enrolment in subjects reflected similar gender differences among all three groups.

EEP students chose to major in a variety of disciplines. Male EEP students majored in accounting, anthropology, ethnomusicology, history, philosophy, political science, and psychology, as well as chemistry, computer science, engineering, mathematics and physics. Female EEP students took more social science courses (including computer programming). Female EEP students majored in physics, microbiology, mathematics, electrical engineering, chemistry and biology, as well as English, political science, psychology, religious studies and south-east Asian studies.

Results for the *TSC* were comparable across all groups, indicating that all groups were best characterised as normal and healthy in psychological adjustment. On the first administration of the *CPI*, EEP students scored higher than the NAT and QUAL students on the Intellectual Efficiency scale. Otherwise there were no significant differences between scores for the EEP students and those for the NAT and QUAL students. Compared to the REG students, EEP students scored higher on Responsibility, Good Impression, and Impression via Independence. EEP students scored lower than the REGs on Social Presence and Self-Acceptance. These results suggest that EEP students are less assertive than typical college students. Results remained relatively stable at the second testing.

SMI results showed two groups scoring significantly higher than others. These were females in the NAT and QUAL groups. A high score on this tool indicates a student who is dependable and capable and who possesses foresight. EEP students scored on average about as well as other students outside the two highest scoring groups.

All groups indicated that they trusted and communicated well with parents and peers. There was no evidence that EEP students were more alienated from parents or peers than students in comparison groups.

Scores on the *DIT* rose after the second testing but no scores for any group changed more than another group. EEP students scored at almost exactly the same levels as comparably bright agemates. Their scores were also similar to those of NAT students and REG students, suggesting that they were developmentally ready for college. EEP students scored significantly lower than REG students on Achievement Orientation and also scored lower on Moral/Religious Orientation. This may be a reflection of their youth.

Conclusion: Results from the current study are consistent with findings from other studies concerning early entrance to college and university. Students who enter university early make fine academic progress, attaining higher grade point averages than regular students and completing more honors courses. Their progress is in line with very bright, older students who are National Merit finalists. This study found no association between early entrance and psychological or social impairment. There is a suggestion that students who enter college early may be less assertive than average college students. This may derive as much from a tendency towards introversion as from their youthful disposition.

Commentary: Studies concerning academic acceleration are often criticised for their lack of a relevant comparison or control group. Authors of this study have discussed this problem along with other issues concerning methodology. They have attempted to address these problems, and provide detailed explanations for their choice of comparison groups in this particular study.

This article begins with a valuable review of the literature. It gives a detailed outline of the program for early entry at The University of Washington. In concluding, the authors provide an informative yet personal description of their experiences as staff associated with the Early Entry Program. Their personal observations add richness to the discussion of the results from this study.

Early College Entry and Student Underachievement

Janos, P. M., Sanfilippo, S. M. and Robinson, N. M. (1986). “Underachievement” among markedly accelerated college students. *Journal of Youth and Adolescence*, 15(4), 303-311.

Objective: To investigate student underachievement in a college-level program of academic acceleration.

Design: Cross-sectional survey.

Setting: University of Washington, Seattle, Washington.

Participants: Candidates enrolled by the Summer Quarter of 1984 in the early entry program at the University of Washington (25 females and 31 males, all younger than 15 years).

Assessment of Variables: All participants completed the *Washington Pre-college Test (WPCT)*, a test taken by all students entering the university to assess college instructional content. They also completed the *Concept Mastery Test (CMT)*, designed to assess advanced verbal ability. Academic achievement data were retrieved from university transcripts, including cumulative Grade Point Average (GPA), number of course withdrawals and number of incompletes, as well as grades, including credits, in humanities, engineering, natural sciences, social sciences and honors courses. The *Californian Psychological Inventory (CPI)* was used to identify personality variables relevant to achievement.

The *Family Environment Scale (FES)* was used to assess students’ perceptions of their families’ interpersonal relationships, directions for personal growth, and organisation and structure.

The *Survey of Study Habit and Attitudes (SSHA)* was used to assess knowledge and attitudes about studying. Students also rated the importance of, and satisfaction with, nonacademic activities, recreational interaction with peers, time for interaction with peers, and quality of interaction with peers.

The overwhelming majority of Early Entrants at the University of Washington do well in undergraduate study. However, for the purpose of this study “underachieving” students were identified as those with GPAs under 3.0 (4 females and 8 males), a cut-off level more than 1.5 standard deviations below the mean for the total population of early entry students. Results for these students were compared with those for students with a GPA above 3.0 (23 females and 21 males).

Main Results: Thirty-nine of 44 students with GPAs above 3.0 contributed all or part of the information requested. Eleven of 12 students with GPAs below 3.0 contributed all or part of the information.

“Underachieving” and achieving students did not differ in the number of credits earned in any subject areas. They did, however, differ in the number of credits earned in honors courses and on all indices of grades, with students with GPAs below 3.0 scoring fewer credits and making lower grades. Nine of the 12 students with GPAs below 3.0 dropped out of university for at least one quarter, 2 returning to high school. Students with GPAs below 3.0 tended to alternate between successful and highly unsuccessful quarters.

Students with GPAs below 3.0 withdrew from nearly twice as many courses and took incompletes nearly twice as often. Of the 44 students with GPAs above 3.0, 20 (45%) had graduated from the University of Washington by Spring Quarter 1984, 19 going on to enrol in challenging graduate school programs. None of the 12 students with GPAs under 3.0 had graduated, although 42% had been enrolled at the University of Washington for more than four years.

No differences were noted in scores on the *WPCT* and the *CMT*. No significant differences were noted on the *FES* dimensions scale or on the *SSHA* total score. No differences were noted on ratings of importance and satisfaction with the intellectual and nonacademic aspects at the University of Washington. Both groups placed high value on learning and on developing peer relations and extracurricular competencies.

Strong gender differences were noted. Underachievement in males appeared in students caught up in adolescent concerns (fantasy, computer games, struggles for personal autonomy) rather than academic concerns. In contrast, underachieving females tended to be absorbed in extracurricular commitments, including varsity sports, as well as being more prone to ill health.

Conclusion: Underachieving males appeared less psychologically mature and appeared to suffer more internal conflict than achieving males, but underachieving females evidenced greater maturity than achieving females. Such maturity may have contributed to these students becoming absorbed in extracurricular commitments. Admission procedures for early entry into university should probably emphasise readiness for intense and sustained concentration.

Family characteristics did not appear to play a significant role in influencing the academic achievement of the students in this study. Even so, the researchers noted that families of underachievers tended to have deeply rooted nonacademic traditions. Other problems were disorganisation in the home environment and unreasonable demands by parents for control over academic achievement. It is suggested that further research should look into the influence of family variables on academic achievement of gifted children.

Commentary: Most studies on early entrance to university present the overall success of programs and many do not consider the small number of students for whom this option is less successful. This study is important, as it is one of a few that reports on those students who have not found academic success in line with expectations.

Early College Admission in the United States of America

Karnes, F. A. and Chauvin, J. C. (1982). A survey of early admission policies for younger than average students: Implications for gifted youth. *Gifted Child Quarterly*, 26(2), 68-73.

Objective: To ascertain the prevalence of the practice of admitting younger than average gifted students to institutions of higher education, prior to high school graduation, in the United States of America.

Design: Survey.

Setting: Institutions for higher education in the United States of America.

Participants: A total of 282 institutions for higher education in the United States of America were contacted. A response rate of 67% was achieved, with 92 private institutions and 98 public institutions represented.

Institutions were selected to be involved in the study only if they offered four-year degrees and if their enrolments exceeded 100 students. Bible colleges, seminaries, and union colleges were excluded. A maximum of 6 institutions was selected from each state. Of these, no more than 3 could be public institutions and no more than 3 could be private institutions.

Assessment of Variables: Basic criteria used to select students for early admission to university and college were surveyed. Age ranges for young students at colleges and universities were recorded. Institutions offering programs for early entry were surveyed regarding the availability of dormitory facilities for young students, special counselling services and suitable social activities. Finally, data were collected to discover if any financial aid in the form of special scholarships was available.

The survey used in this study was designed by the authors and validated by several admissions officers in several institutions. Data were collected during the school year 1980-1981.

For the purposes of this survey, younger than average students were defined as those with outstanding intellectual abilities who had not completed the requirements for high school graduation but would be capable of accomplishing college level courses.

Main Results: Over two-thirds of the institutions surveyed had policies that allowed the admission of students younger than average, including 80% of private institutions and 77% of public institutions. Of the institutions reporting a policy for early admission, 19% of the private schools indicated that they only accepted early admission students on a full-time basis. Another 11% indicated that they only accepted these students on a part-time basis. Over half (54%) indicated that they accepted students on a part-time or full-time basis. For public institutions, 12% admitted early entry students full-time only, 31% part-time only and 48% indicated that both part-time and full-time admission were possible.

Overall, criteria for admissions varied widely in both public and private institutions. All institutions indicated that they made decisions about early admission on an individual basis. It was possible for the director of admissions or an admissions committee to override specific policy regarding early admission if a case warranted such action. Parental permission for early entry was not required at 60% of private institutions and 62% of public institutions.

Minimum age requirements ranged from 14 to 17 years in those institutions using this criterion for selection. The majority of institutions (75%) did not have a minimum age requirement. The average age for early admission was 16 years. All states had at least one college that admitted students before high school graduation. Minimum score requirements for either the *American College Test (ACT)* or the *Scholastic Aptitude Test (SAT)* did not appear to be very important at public or private institutions. About 70% of all institutions sampled specified a minimum grade point average and required a recommendation from the student's high school. Fewer than 45% of the schools surveyed required students to attend an interview as part of the selection process.

Early entry students were allowed to study for any major they chose at 73% of private institutions and 73% of public institutions. The choice of subjects was limited at other sites. Honors programs were not open to younger than average students at most institutions, with 64% of private institutions and 66% of the public institutions disallowing these students enrolment in Honors study.

Special counselling services for early entry students were offered at only 39% of private institutions and 34% of public institutions. Early entry students were able to take part in all social activities at most sites, with only 8% of private institutions and 10% of public institutions restricting the social activities open to young students. There was a designated person overseeing the early admissions program at 48% of the private institutions and 52% of the public institutions.

Younger than average students were able to apply for scholarships at 62% of private colleges and universities and 49% of public institutions. However, in almost all cases these scholarships were not specifically designated for younger than average students and early entry students competed with other university students for these awards. Dormitory accommodation was available for younger than average students at 69% of private institutions and 59% of public institutions.

During the 1980-1981 school year, 44% of private schools had actually enrolled younger than average students. During the same academic year, 56% of the public schools had enrolled younger than average students. The number of these students enrolled on a part-time basis in private institutions ranged from 1 to 35. Public institutions reported having from 1 to 100 students enrolled part-time. The number of full-time students enrolled at private institutions ranged from 1 to 150, and from 1 to 50 for public institutions.

These enrolment data suggest that only a small number of students are taking advantage of programs at colleges and universities that allow for early entry. The authors suggest that there might be more interest in early entry to college if there was one person directly responsible for program administration. They also suggest that a lack of specialised counselling services at many sites might dissuade both parents and students from considering early entry.

Conclusion: Early entry to college or university for highly gifted students is possible at private and public institutions across all states in the United States of America. Programs for early admission vary widely in relation to their admission procedures and the experiences they offer. Most institutions assess students for early admission on a case-by-case basis. Only about half of the sites have a designated person in charge of younger than average students. Very few sites provide specific counselling services for younger than average students.

Commentary: This study is one of a number that present information regarding the availability of options for early admission to college or university over time. It is interesting to note that early

admission to college was possible at many institutions for higher education even in the early 1980s. Many institutions allowed students to enrol three or more years earlier than was traditionally expected. Even so, there were few colleges and universities with specific programs for students who entered early and no institutions in this survey offered a program that actively recruited a cohort of young students. Also, it appears that there were only relatively small numbers of students taking advantage of such programs. It would be interesting to conduct a similar study of the present day prevalence of early admission to college and university in the United States of America and to compare results. It would also be interesting to compare the prevalence of early admission to college or university in the United States to the prevalence of similar options in other countries.

Options for Early College Entry

Kearney, K. (1989). The highly gifted: The early college option (part 1). *Understanding Our Gifted*, 2(2), 13.

Kearney, K. (1989). The highly gifted: The early college option (part 2). *Understanding Our Gifted*, 2(3), 13.

Objective: To describe options for entering college early, to identify students for whom these options would be appropriate, and to outline beneficial outcomes for students.

Design: Case studies.

Setting: Series of two articles presenting information to educators and parents concerning early college entry.

Participants: Four students who entered college early.

Assessment of Variables: Cases were presented to highlight issues concerned with the variability of options available for early entry to college, reasons why early college entry should be considered, and for whom these options should be considered.

Main Results: The first article in the series introduces the cases of Nicole and James, two students who chose to enter college early. Nicole, a junior in high school, was finding her classes boring. She only needed two additional credits in order to graduate but one of these was senior English, which she could only take in her senior year. The opportunity arose for Nicole to leave school and enrol in college early. She decided to forego graduating from high school to take up the offer to attend college.

James graduated from high school at the age of 14. He had been allowed to accelerate his schooling by 3 years. He took advantage of options available after school and on holidays to complete college courses. On graduation from high school he had completed a significant number of college courses and had accumulated 15 college credits. His outstanding academic record allowed him to enter a highly competitive college 3 years early, with advanced standing.

These cases illustrate two different ways in which gifted students can take advantage of early college entry. Early college entry can allow a student, such as James, who has radically accelerated through school to continue to move through education at a fast pace. It can offer other students, such as Nicole, the chance to accelerate their education for the first time.

The main reason for most students to enter college early is to gain access to curriculum that is better matched to their exceptional abilities. In many cases, students find that the boredom and lack of motivation experienced at school is replaced by challenge and enjoyment. Part-time early college entry can provide an opportunity for students to collect college credit whilst still in high school and to experience college life with the view to deciding if full-time entry would suit them. The author writes that part-time college entry can act as a “bridge” for students, allowing them access to more radical, full-time acceleration.

Nicole and James both used early college entry to meet their desire for a more challenging learning environment. They chose different paths to early college entry based on their individual needs and circumstances.

In the second article in the series the author presents the cases of a further two students who chose this option, with the view to considering additional ways that the early college experience can enhance the education of highly gifted students.

Veronica had successfully completed 9 college credits as part of her home education program before she was 10 years old. Her parents had decided to home-school Veronica despite two grade skips at elementary school, as her academic needs were not being met. Veronica decided to take the placement test to qualify for entry at her local college at age 10. She was able to enrol full-time in a degree program and became one of the youngest full-time college students in the United States of America. Veronica’s parents also continued to encourage her to socialise with children her own age. Church groups and neighbourhood and community groups provided opportunities for Veronica to build relationships with other children.

Sara participated in the Johns Hopkins Talent Search and achieved the highest score for children in her state. As part of her state award, she was offered a one-course scholarship at a local college. She was also offered the opportunity to enrol in some subjects at her local senior high school. Flexibility

on the part of Sara's school district enabled her to concurrently enrol in junior high, high school, and college. Thus, part-time early college entry was one component of a total educational plan to meet Sara's academic needs.

The author concludes by warning that early college entry should only be considered when the student is eager to take up this option. She also recommends that early college entry be considered only for highly gifted students. This option can allow a highly gifted student access to curriculum that is truly challenging, at a very young age. There are now many higher education institutions that allow for students to enter 3 or more years early. At these sites, students can study long university courses such as medicine, law or science as well as completing research or a higher degree with the knowledge that they will still graduate at a relatively young age.

Conclusion: Early entry to college should be considered for highly gifted youth. Appropriately challenging curriculum can be studied and boredom can be alleviated. There are many different pathways through which students can proceed to early college entry. They may decide to enrol part-time whilst they complete high school or they may enter as full-time students 3 or more years earlier than the usual age.

Commentary: Articles in this series are written principally for parents. The author relates four cases of students who have entered college early. She uses these cases to give credence to the suggestions she makes regarding the benefits of early college entry and the characteristics of students for whom she believes this options should be considered. While these cases are interesting, this series would perhaps have benefited from a comparison with earlier research which addresses similar concerns.

The Influence of Important Others On Decisions Regarding Acceleration

Kelly, M. P. (1985). Unique educational acceleration: The dilemma of John Stuart Mill and contemporary gifted youth. *Gifted Child Quarterly*, 29(2), 87-89.

Objective: To explore the dilemma faced by many exceptionally gifted youth of having to choose between pursuing their own intellectual path and accepting outside control.

Design: A collection of biographical and autobiographical sources.

Setting: Biographical sources concerning the life of John Stuart Mill from as early as 1926. John Stuart Mill's autobiography. Personal writings of 20 gifted children as recorded in *On Being Gifted* (American Association for Gifted Children, 1978).

Participants: John Stuart Mill and a group of 20 gifted students with current experience of education in the United States of America.

Assessment of Variables: The experiences of John Stuart Mill are compared to the experiences of a group of 20 gifted students in an attempt to identify similar concerns regarding the influences of important others in shaping the course of their education and career.

Main Results: John Stuart Mill was a prodigy living at the beginning of the twentieth century. His IQ was measured at 190. He was educated solely by his father, James Mill, until he reached the age of 14. His father believed that the mind of a child was a "blank slate" upon which all experiences were recorded. He believed that the ability to imprint experiences on the mind diminished with age and that any single new experience had many others with which to compete. He also believed that one could determine the character and ability of a child by choosing and sequencing appropriate experiences.

Jeremy Bentham was a friend of James Mill and influenced the way he educated his son. He espoused Utilitarian theory, believing that human behaviour was determined by the pursuit of pleasure and the avoidance of pain. He believed that educators should work from this premise when devising learning experiences for students. Along with John's father, Bentham believed that home

schooling would be most appropriate for John as he could then learn in a manner in line with Utilitarian theory and be encouraged to develop his abilities to the full. Such an educational option would allow for John to develop at his own pace, away from environments and people that might have detrimental effects on his academic and social well-being. John made excellent academic progress, surpassing expectations held by educators of his time for children of his age.

Unfortunately home schooling as based on Utilitarian theory meant that, during his childhood, John was isolated from much of the outside world. The author believes that such treatment of a child today could be seen to be abusive. He suggests that such an approach to education could be seen to be denying John the childhood right to healthy development due to his restricted access to worldly experiences.

The author uses the case of John Stuart Mill to highlight the conflict of interests between the rights of the individual to his intellectual freedom, the rights of parents to educate their child as they see fit, and the rights of the state to guarantee some minimal educational standard for every citizen.

A group of gifted adolescents claim that a fourth right should be considered when any decision is to be made regarding students' educational options: the right to an education that will lead to a child's fullest potential being realised. This right is identified by children in a book, *On Being Gifted*, coauthored by 20 exceptionally gifted children in which they detail their educational experiences (American Association for Gifted Children, 1978).

The educational experiences described by the authors of this book are first described in an effort to show that the education of John Stuart Mill could in fact be seen to have been positive in some respects. John, for instance, did not have to suffer the bullying and teasing from peers that many of the young authors experienced in the school setting. Nor did he have to suffer ridicule from teachers who were unable to understand the plight of gifted students. Many of the gifted children recorded feeling the need to underachieve at school so as to become less conspicuous and thus avoid ridicule and humiliation. This would not have been a concern for John Stuart Mill. Ironically, John had only his father to compare himself with and *did* feel inferior to him in relation to intellectual ability. This was despite his father insisting that achievement was a reflection of opportunity and amount of work rather than of any innate ability.

Another beneficial aspect of John Stuart Mill's education was the continual support he received from his father. His father was determined that John should reach his potential and encouraged him daily to extend his knowledge. He believed that John needed to be offered learning experiences that would stretch him beyond his abilities. Thus there were many instances when John attempted very challenging work, and he learned to accept mistakes as important catalysts for moving towards deeper understanding. Such a strategy allowed John academic achievement well beyond that of his same age peers. At age 14, John was functioning at an intellectual level that was more than three years in advance of peers of a similar age.

Despite the remarkable academic achievement of John Stuart Mill, the author notes social and emotional setbacks that he attributes directly to Mill's educational experiences. The author claims that a depression suffered by John at the age of 20 was a result of his father's style of education. As he recovered from this depression John resolved to embrace many styles of thought other than Utilitarianism. He began, for the first time, to integrate into the wider world. So, although James Mill may have helped John to achieve his intellectual potential, he may well have hindered his social development.

The modern day authors of *On Being Gifted* suggest that a good teacher should not only know his or her subject matter well but should also understand and be able to respond to the unique characteristics of gifted children. Rather than seeing talent development as something that a teacher does for a child, teachers need to see achievement as a reflection of innate ability. In this way, gifted children will have the chance not only to develop their intellect but also to achieve social and emotional well-being.

Conclusion: The story of John Stuart Mill has been used to illustrate the importance of addressing the social/emotional needs of exceptionally gifted children as well as their intellectual development. John was fortunate to have been able to learn at a pace most suited to his abilities and was able to take advantage of radical acceleration. His social and emotional needs, on the other hand, were not addressed in a similarly appropriate way and he suffered because of this. The author stresses the need to address the social and emotional needs of gifted children when employing any options for educational acceleration. Acceleration can then be employed and acknowledged for the intellectual benefits it allows rather than being viewed as a source of emotional damage.

Commentary: This article draws attention to the influence of underlying theoretical beliefs on the strategies employed to teach gifted children. The author challenges the reader to think about conflicts between the rights of the individual to his intellectual freedom, the rights of parents to educate their child as they see fit, and the rights of the state to guarantee some minimal educational standard for every citizen. The reader is also challenged to revisit beliefs about the source of achievement, in particular to explore theories about innate ability and the effects of outside influences on talent development. Such beliefs need to be considered by anyone involved in devising and delivering programs to gifted students.

Early Entrance at The University of Science and Technology of China

Liu, J. and Barnhart, R. (1996). Chinese gifted teenage university program. *The Journal of Special Education*, 30, 204-212.

Objective: To describe a university early entrance program for gifted teenagers in China, with particular attention to its development and current structure.

Design: Literature Review.

Setting: Research articles about the gifted education program at The University of Science and Technology of China (UTSC).

Assessment of Variables: Sources were examined for information about the forces that have shaped the program since it began, as well as information about the characteristics of the program as it currently exists, including identification and selection procedures, curriculum development and administration concerns.

Main Results: Since its inception in 1978, the early entry program at UTSC has been examined for its educational philosophy, educational principles, educational administration, pedagogy, and curriculum development. Studies have led to the development of formalised standards for the identification of gifted children and the publication of a special monograph outlining key issues about the developmental potential of gifted children, the need for special provisions for the gifted, and parent identification of gifted children. Research and development at this site has led to international recognition of the program, and has influenced the initiation and character of similar programs at another twelve universities across China. Research has also encouraged closer links between universities and high schools and has led to the development of gifted programs at high school sites.

Students come to the attention of University staff either through teacher or parental referral, through national or city based academic tournaments, or through a self-referral process. They are required to complete a series of examinations given by educational specialists and professors at the university. Students tend to be highly motivated, ambitious and diligent. The program is one of radical

acceleration with students entering university three or more years younger than is usual. The youngest student to have entered was eleven years old.

Students spend the first two or three years studying as a group, with time varying depending on the needs of the student. They complete a general studies curriculum that stresses integration and application of knowledge, thinking skills, hands-on experiments and cross-disciplinary study. A homeroom administrator acts as a counsellor during this time, helping students with personal problems, as well as providing moral education. Students are then integrated into the general student body and specialise in a science, mathematics or technology field.

Studies have revealed that early entry students achieve exceptional results during their time at UTSC. After graduating, many are admitted into graduate programs with a growing number being accepted into overseas universities. One student began his assistant professorship at the age of 19, the youngest university faculty member in China. Such success has encouraged positive public recognition of the program.

It is suggested that future research on this university early entry program should concentrate on documenting the impact it has on students' professional careers and personal life.

Conclusion: The success of an early entry program at The University of Science and Technology of China has led to international interest, as well as encouraging the development of similar programs at twelve other universities in China and programs for gifted students at high schools. Research concerning the program has led to ongoing developments at the site and has influenced gifted education across China. For instance, identification procedures and curriculum frameworks have been refined and published, and teachers are now better informed about the needs of gifted students.

Commentary: A detailed case study of a program for early entry to university is presented. An historical overview of the program provides insights into social and political forces that have shaped the program. The impact this program has had on the development of gifted education across China is impressive.

Comparing the Experiences of Three Radically Accelerated Students

Montour, K. (1976). Three precocious boys: What happened to them? *Gifted Child Quarterly*, 20(2), 173-179.

Objective: To provide case studies of precocious individuals whose stories were reported in the media and who went on to attain academic and social success, in the hope of changing the mistaken assumption that all precocious individuals will suffer a fate similar to that of William James Sidis.

Design: Retrospective case study.

Setting: Individuals who were identified in media reports as being precocious during their childhood.

Participants: Three talented males from the United States of America aged 60 years or older.

Assessment of Variables: Back copies of magazines were searched for mention of gifted children. Individuals thus identified were located and contacted using information from biographical directories. Information was then sought regarding academic and social progress. One participant was interviewed at the Johns Hopkins University, another participant corresponded with the researcher via mail, and information regarding the last participant was gathered from the publication *Who's Who in America*.

The author acknowledges some flaws in this research method. Firstly, it was only possible to trace one female (she was not able to be involved in the study). This was because most females had married since the publication of media reports about their lives and had given up their maiden names. Of the males who were located, only those older than 60 years were willing to take part in the study. This limited the study sample.

Main Results: There is a widely held belief that accelerating children through school will ultimately lead to harm. Many people who hold this view tell of at least one case of a student who was accelerated and who then went on to suffer negative academic and social consequences. One such case, that of William James Sidis, was reported widely in the media.

People hold negative views about acceleration despite research evidence showing exceptional academic achievement and normal social adjustment for individuals who have accelerated. Examples include many of the 300 people studied by Catharine Cox (1926) as well as Paul Dudley who became, at age 10, the youngest person to enter Harvard College. Paul received a baccalaureate degree at age 14 and went on to become a prominent jurist in Massachusetts.

John Trumbull, a famous American lawyer and poet, passed the entrance exam to Yale College at the age of 7 years and 6 months but did not enter until the age of 13. Verrill Kenneth Wolfe graduated from Yale College in 1945 at the age of 14. He went on to become a professor of neuroanatomy at the University of Massachusetts Medical School. Norbert Weiner, father of cybernetics, graduated from Tufts College at the age of 14. A. A. Berle, Secretary of State under Franklin D. Roosevelt, entered Harvard College at age 14 and graduated *cum laude* from Harvard Law School. Robert B. Woodward, Nobel prize-winning chemist, graduated from the Massachusetts Institute of Technology at the age of 19 and was awarded his PhD the following year.

The author presents three cases in detail. All are men who were identified as gifted at a young age on the basis of their precocious verbal abilities. The first case study concerns, L, a physician. At age three, L was fluent in both German and English, could read fluently in either language, and exhibited strong comprehension skills. When L entered school the teacher did not realise that he could already read. It was not until the teacher saw L reading a newspaper in his father's office that she was willing to make adjustments to the curriculum. L was soon promoted to the 4th grade. He entered high school when he was 9 years old. He was 12 years old when he passed the Harvard entrance examinations and 14 years old when he was admitted to the University.

L's ambition from a very young age was to become a professor of classical languages. He began to teach himself Latin in pre-school. By the time he entered the first grade he knew as much Latin as the average college sophomore. He also taught himself Greek and by the time he reached high school could compose Greek poetry.

L always enjoyed solitude. As a young child he would hide in his room and read Latin books rather than play with other children. In high school he got along well with boys but not with girls. This may have been partly due to his relatively young age. Even in high school his preference was to spend much of his time alone studying Latin and Greek. This was despite attempts by his family to encourage social pursuits.

L sat the Harvard exams despite his parents' wish that he sit the College Board exams for the University of Pennsylvania where they wanted him to study medicine. After his freshman year at Harvard, L concentrated on classical languages and literature. He graduated with honors in Classics at age 18 years. He then attended Oxford University where he earned another baccalaureate degree and a Masters degree, as well as completing all requirements for a doctorate, excepting the writing of a thesis. He left Oxford without his PhD, to attend the American Academy in Rome on a fellowship.

On returning to America, L was unable to secure a teaching tenure at any college. He decided to attend Johns Hopkins University Medical School and received his license to practice at the age of 39 years. During World War II he was a lieutenant in the Navy's Medical Corps and served in the Pacific. After the war L again tried to secure a teaching tenure at a college or university without success. He eventually took over his father's medical practice. He also lectured in classics twice a year at Johns Hopkins University.

Another student who studied with L at Harvard University was M, a professor of classics at the University of California at Los Angeles. M was 15 years old when he entered Harvard. He had skipped two school grades and had completed four years of high school in three years. He received a baccalaureate degree at the age of 18 years, a Master's degree the year after, and his PhD at the age of 21 years. M then became a member of the faculty at the University of California at Los Angeles.

M claimed that the support of his family was crucial to his success. He also spoke about the difficulty of making choices between different talents. He chose to pursue an interest in music over the competing interests of his job as an academic. This meant that he did not publish a significant body of work and probably influenced the lateness of his receiving a full professorship.

The third case concerns the life of E, Dean of Chapel of Cambridge University's Jesus College and lecturer in Divinity. E was one of the subjects in Hollingworth's famed longitudinal study of exceptionally gifted children. E enrolled in Columbia University at the age of 12 years. He graduated at age 14 with membership of the Phi Beta Kappa Society. He went on to earn a Master's degree and a PhD degree from Columbia. E then decided to enrol at the Union Theological Seminary where he completed a Master of Sacred Theology. He also received an honorary Doctorate of sacred theology from the General Theological Seminary and a Master's degree from Cambridge University. Like M,

E enjoyed the support of his family. Even though his parents were eager for him to enter Harvard University or New York University they supported his decision to attend Columbia.

Conclusion: The cases of E, L and M illustrate the success that is possible when talented individuals are allowed to radically accelerate their education. These individuals appeared to suffer no ill effects from moving rapidly through their education. Their cases show that gifted people must face trials in life just as others do. Family support appears to be an important factor in influencing the lives of talented people.

Commentary: The author is successful in presenting cases that contrast markedly in their academic and social outcomes with the case of William James Sidis. Certainly the cases of the three precocious individuals presented in the article suggest that early identification of gifted children and appropriate intervention, in these cases radical acceleration, can have very beneficial academic effects. Like William James Sidis, the lives of these three individuals were reported in the media. Although other authors have suggested that media interest affected William James Sidis' life in negative ways, it appears that media interest in a gifted child need not necessarily lead to problems for that child.

The author suggests that family played an important role in influencing the lives of all three of the precocious individuals she describes. Other authors have suggested that such influences are crucial in shaping academic and social outcomes for exceptionally gifted individuals. The effect of family on the lives of exceptionally gifted individuals would seem to be an important research area for further consideration.

Factors Associated with Successful Radical Acceleration

Montour, K. (1977). William James Sidis, the broken twig. *American Psychologist*, 32(4), 265-79.

Objective: To attempt to dissuade the public from its opposition to educational acceleration for precocious children, to which the 'Sidis fallacy' has contributed, by presenting a case of a prodigy who entered college as early as William James Sidis and who benefited greatly from this radical educational acceleration.

Design: Retrospective case study.

Setting: Information sources included newspaper articles, magazine and journal articles, biographies and autobiographies, and university records.

Participants: Two males who were regarded by the general population as prodigies, whose lives were closely followed in the media, and whose experiences of radical educational acceleration led to very different outcomes.

Assessment of Variables: Factors influencing the course of the lives of the participants were identified and compared in an effort to identify those factors that enabled one participant to achieve academic and social success. Factors included personal characteristics, family influences and educational interventions.

Main Results: The life of William James Sidis was reported extensively in the media and his story, as reported, was well known among the general population. The media chose to concentrate on unfortunate events in Sidis' life and did not always report events accurately. His story became mythologised and used to warn against educational acceleration.

William James Sidis was the only child of Russian Jews who migrated to the United States of America towards the end of the nineteenth century. His father and mother were very successful despite their limited knowledge of English. His father earned PhD and MD degrees at Harvard and became an

eminent medical psychologist. His mother earned a medical degree and worked with her husband at the Sidis Institute for Abnormal Psychiatry in New Hampshire.

During Sidis' childhood, it was widely believed that any child could be moulded into a genius if supplied with suitable educational experiences. Sidis' parents, in particular his father, believed that they could cultivate genius in their child. His father employed educational techniques that were described as being exploitive and straining the child-parent relationship. Such techniques were based on the belief that an individual could tap into stored intellectual energy if he could be forced past an initial layer of fatigue. When it became obvious that William was achieving at levels well beyond his age, his parents took credit for this.

William was able to read and spell before the age of three. At age $3\frac{1}{2}$ William could write and began using a typewriter. By age 5 he could predict the day of the week on which a date would fall. He could read English, Russian, French and German. By age 6 he was so familiar with human anatomy and physiology that he was able to pass university level medicine examinations.

When he reached the legal age to attend school, William was sent to public school. He moved through all seven elementary grades in 6 months. William then spent two years being educated at home. During this time he passed the entrance examination for the Massachusetts Institute of Technology, devised a new table of logarithms using a base of 12 instead of 10, and passed the Harvard Medical School's anatomy examination. He was 8 years old. He attended Brookline High School for three months before his parents removed him to study at home for another two years.

When he turned 10, William's parents attempted to enrol him at Harvard College but the faculty was reluctant to admit such a young student. William was finally admitted to Harvard at the age of 11 years. The year after, he delivered his celebrated lecture on the fourth dimension, a theory which he originated, before an audience of 75 men of the Harvard Mathematical Club. At the age of 16, William became the youngest person to receive a baccalaureate at Harvard. He then spent a year in graduate study at Harvard.

William James Sidis then appeared to loose direction. There is a suggestion in the literature that he suffered a breakdown around this time. He moved from graduate study in mathematics to Harvard Law School without completing either course of study. He then took up a teaching position at Rice Institute in Texas but did was not successful in this role. He left Rice Institute and, shortly after, was

arrested at a May Day demonstration and was sentenced to a year and a half in prison. He won an appeal against this conviction and then became a recluse, hiding from the media who were eager to report the downfall of the young Harvard graduate. For the remainder of his life he worked at various low-paying clerical jobs. He constantly changed his job, when his identity was realised, to avoid the scrutiny of the press.

Sidis died in 1944 at the age of 46 years after suffering an intracranial haemorrhage. Rumours were rife that he committed suicide. At the time of his death, William was living alone in a boarding house, apparently destitute and unemployed.

William James Sidis had much in common with Norbert Wiener, a child prodigy attending Harvard at the same time as Sidis. They were both identified in the press as child prodigies and were well known to the general public. Both entered Harvard at very young ages. Their fathers shared similar experiences and held similar views and were both Russian Jews who had migrated to the United States of America. Both believed that appropriate educational experiences were responsible for children becoming prodigies rather than any heritable traits or innate ability. Both pressured their sons to achieve and took credit for their sons' accomplishments.

Striking differences between the lives of these two people began to surface when they were of university age. While Sidis suffered from a breakdown, left formal study and became a recluse, Wiener found great success in academic life and published many books, including two autobiographical volumes. These books provide an insight into the stresses he encountered and allow for suppositions to be made about the causes of Sidis' eventual decline.

The author identifies Sidis' relationship with his father as a crucial factor in shaping his life. His father dominated his life and, while Wiener was able to make the transition from father-dominated infant to self-identifying adult, Sidis did not appear to be able to shed the mantle of his father. This may have led to suppressed feelings of revolt. It is postulated that Sidis may have deliberately ruined his own life to thwart his father's efforts to make him the perfect man.

Both men were pushed by their fathers to excel academically, yet Wiener's childhood differed to Sidis' in important ways. It was probably less severe because he attended public school and was thus exposed to other children and adults. Sidis, on the other hand, was home-schooled for a significant amount of time. Wiener's father made a point of stressing his son's ordinariness whereas Sidis'

father was said to cultivate arrogance in his son. Wiener's father protected his son from too much publicity whereas Sidis' father encouraged the press to take an interest. When Norbert Wiener was in trouble his father would leap to his defence, whereas Sidis' father disowned him for his problems.

Norbert Wiener was a very different character to William James Sidis. He was well liked by teachers whereas Sidis was said to be highly-strung and disagreeable. Wiener married a supportive woman who helped him to attain independence from his family. Sidis seemed unable to sustain a relationship and the author postulates that this may have been due to emotional immaturity consequent on a lack of emotional support in childhood. Wiener noted that, during their Harvard days, Sidis lagged in social development and social adaptability.

Lastly, Sidis was hounded all his life by the media. He found this attention very difficult to cope with, especially when the media chose to concentrate on his misfortune. It is postulated that such attention from the press may well have played as important a part in his downfall as his dysfunctional relationship with his father.

It is suggested that William James Sidis may have achieved further academic success if he had been allowed more academic acceleration. He was forced to spend five years getting his AB degree whereas Wiener was allowed to achieve his baccalaureate in three years. If Sidis had achieved his AB in three years he may have earned a PhD before his emotional troubles began.

Conclusion: William James Sidis was a child prodigy who endured a lack of suitable protection from his father and a lack of understanding or sympathy from the outside world. The Sidis fallacy, 'early ripe-early rot', persists today despite the evidence that his failure was due to factors other than his radical academic acceleration, and despite the fact that many other people have radically accelerated through their education and gone on to live full and rewarding lives.

Commentary: This article gives a very detailed description of the life of William James Sidis. Newspaper, magazine and journal articles are quoted and their information compared to recordings by colleagues and friends. It is a study of the damaging power of the media as much as a story about the experiences of a gifted child who radically accelerated through his education.

Social and Emotional Development Among Early College Entrants

Noble, K. D., Arndt, T., Nicholson, T, Sletten, T and Zamora, A. (1999). Different strokes: Perceptions of social and emotional development among early college entrants. *The Journal of Secondary Gifted Education, 10(2), 77-84.*

Objective: To investigate how students perceive the social and emotional effects of early entrance to college.

Design: Focus group discussions.

Setting: University of Washington.

Participants: Thirty-one students (16 males and 15 females) enrolled in the Early Entrance Program at the University of Washington. Participants ranged in age from 14 to 19 years, were spread evenly across all undergraduate classes and were studying a wide range of academic majors.

Assessment of Variables: Three one-hour focus group discussions were conducted in which participants were asked about their perceptions of social and emotional development as a result of attending the Early Entrance Program at the University of Washington. Discussion was facilitated by the following questions:

- ♦ How has the Early Entrance Program affected you, socially and emotionally?
- ♦ Has it been helpful or harmful?
- ♦ How have you changed? Give examples.
- ♦ Have you grown up too fast?

Discussions were tape-recorded, transcribed, and analysed by the authors, individually and as a group, for content and themes.

Main Results: Each year 16 students are accepted into the University of Washington's Early Entrance Program. The students are aged 14 years or younger. They spend a year on campus attending the Transition School where they learn strategies to help them succeed at university. Typically one or two students decide to return to high school after the transition year. A cohort of 16 students is

accepted so that each student can enjoy the support and social benefits of peers who share similar abilities and interests.

Participants' comments fell into three general categories: social experiences prior to and during Transition School; their affective responses to the intellectual challenges of early college entrance; and their continuing personal growth in the Early Entrance Program.

Students reported better relationships with adults than with age peers prior to entering Transition School. Adult relationships were said to be stimulating whereas relationships with same-age peers led to feelings of frustration and isolation. There was a tendency for same-age peers to bully the participants for their academic achievements and intellectual traits. Once students began Transition School, they had many friends of a similar age whereas previously they had few, or no, same-age friends.

Support provided by peers, faculty, and staff at the Transition School enabled participants to expand their sense of self. They no longer had to conform to the 'smart kid' persona as was expected at school. Nor did they have to hide their talents. They described an environment at university where intellectual ambition and drive were not only expected but were prized and rewarded. They were able to be themselves without fear of being humiliated. They commented that they felt more confident and happier at university.

Students discussed affective responses to intellectual challenges. They found the higher academic demands and expectations humbling. Being among equally bright peers had the immediate effect of challenging many participants' self-esteem. They spoke about realising the need to let go of the compulsion to always be right. Many participants reported that the Transition School experience allowed them to take responsibility for their own learning. At the end of Transition School, most students reported that they felt they had acquired a stronger, more realistic self-concept. Many said that they were able to set higher yet realistic goals for themselves and felt emboldened to involve themselves in research opportunities, volunteer work and extracurricular activities. Many commented on finding independence and assertiveness.

There were no students who felt that early entrance to university had forced them to grow up too fast. Some students said that the comfort they felt being around other gifted students gave them freedom to be boisterous and playful. Others identified specific areas in which they felt they had

developed quickly but not *too* quickly. For instance, they acquired skills that allowed them to develop mature study techniques well before they might have.

Many students felt they would have been less mature socially and emotionally if they had stayed in school. They felt safer to work through adolescent problems with others at the Transition School rather than with school peers who tended to undermine and ridicule them.

Conclusion: All students believed that they were more mature than they would have been had they gone on to high school rather than attend the Early Entrance Program at the University of Washington. All reported enjoying the social environment of university despite their young age. Students identified the importance of acceptance of individual difference, encouragement of excellence and personal responsibility, and solidarity and sense of belonging, as important strengths of the Early Entrance Program.

Commentary: Many studies into the effects of early entrance to college and university report on the academic outcomes of such programs. Research concerning the Early Entrance Program at the University of Washington has documented academic gains for students. This study is valuable because it looks particularly at the social and emotional effects of early entry to college, particularly with reference to this particular program. This research suggests that a program for radical educational acceleration at the university level can be successful for achieving academic as well as social gains. This conclusion needs to be viewed in light of the unique characteristics of the Early Entrance Program at the University of Washington. This program has been modelled to particularly address the social and emotional needs of gifted students as well as to provide appropriate academic challenge.

Students' Perceptions of Early College Entrance

Noble, K. D. and Drummond, J. E. (1992). But what about the prom?: Students' perceptions of early college entrance. *Gifted Child Quarterly*, 36(2), 106-111.

Objective: To examine students' perceptions of early college entrance, focussing on the reasons why students choose this educational option; their experiences with peers, regular-age students, and professors; and the effect of skipping high school on their social, emotional, and intellectual development.

Design: Structured interview.

Thirteen open-ended interview questions were developed by the authors based upon questions most frequently asked of students, faculty and staff about the Early Entrance Program at The University of Washington. Questions were submitted to the Transition School faculty, program staff and several students for their comments before they were drafted into a final form.

Setting: The University of Washington

Participants: Twenty-four students, slightly more than half of all of those who had completed Transition School and were currently enrolled in undergraduate coursework, agreed to be interviewed. Students ranged in age from 14 to 21 years. They were studying a broad spectrum of disciplines, with half enrolled in the social sciences and humanities faculty.

Assessment of Variables: Data were collated and analysed for content and frequency, with frequency representing the number of students who cited similar experiences within the framework of each question.

Main Results: The University of Washington offers an Early Entrance Program (EEP) to students who are aged 14 years or younger and who are highly capable. Each year up to 15 students are admitted to the Transition School, a self-contained, one-year academic program on the university campus. Transition School prepares students for full-time university enrolment the following year. The admission of a relatively large cohort of students each year provides for a diverse peer group that

nevertheless shares some important characteristics. Students are supplied with a homeroom throughout their time at the university and a special advisor acts to monitor the students' personal and social development.

The majority of students reported that they decided to enter the Early Entrance Program because they wanted the challenge and opportunity to accelerate their education. Most (n=17) were bored and unhappy in junior high school. One student was attracted by the degree of respect and independence accorded Transition School students. The social aspects of the program attracted eight students. Both males and females had felt isolated and lonely in school and both genders reported bullying that involved ridicule of intellectual achievement.

Four students entered the program as a way to prove their intelligence to themselves and others. Six students claimed that the possibility of skipping several years was the decisive element, with two of these students having already decided upon a career in medicine and looking to speed up a long educational path. Three other students were attracted by the wide range of interesting courses as well as the extra time they would have to explore interests and career options.

All but one student reported that they themselves made the decision to enrol in the program and that their parents supported this decision. Fourteen reported that their parents were apprehensive at first. Five students reported that their parents did not want to pressure them into making a decision that they might later regret. One student spoke about having to convince his parents to allow him to attend the program as they felt that he had not achieved well in the previous two years at school and would not have the appropriate skills or knowledge to attempt university study. A female student spoke of the anger her relatives directed towards her parents for allowing her the freedom to attend the program.

Students discussed how much they had matured intellectually, emotionally and socially during the year spent at the Transition School. Students were particularly positive about learning the skills to manage time more wisely and to analyse, organise and express ideas. They reported positive social outcomes and many commented on forming close relationships with peers for the first time in their lives.

One student reported that she felt obliged to conform to the expectations of staff at the Transition School. She felt that staff lacked sensitivity about students' emotional needs. Another student

reported that she did not enjoy the Transition School experience because she was no longer allowed to procrastinate over choosing learning options.

Students identified the following characteristics as important for success in the Early Entry Program: intelligence, persistence, independence, curiosity, resilience, ability to organise time well, a willingness to work hard, a willingness to make mistakes and a willingness to accept criticism.

Eleven students reported having no regrets about skipping high school. Three students said that they missed music and arts programs, and extracurricular activities. Four students missed the social interaction with school friends. Another four missed being a part of the debating team, band and orchestra. Other regrets included missing formal dances, sports, math competitions, chess club and language classes. Students also reported missing the ethnically diverse mix of students in the school population. Six students felt that, if they had attended high school they would have been able to apply for more scholarships and would have had opportunities to attend more prestigious universities.

Four students felt that their lives would not have been significantly different if they had not attended the Early Entrance Program. Many felt that they would have been less able to exercise their academic talents. Ten students said that they would not know how to work as diligently and would have been less academically oriented.

Four students reported that they would have been less happy if they hadn't entered college early because they would not have had as many friends. Four felt they would have been shyer and less self-confident. One student said that he would have felt alienated and extremely unhappy, and perhaps even suicidal. Two students felt that they may have had a broader circle of friends in high school. One felt that she would have had more time to decide what she wanted to do with her life and another felt that she could have earned better grades at university had she completed high school.

All students felt that they had been accepted by the regular-age college students, although all reported having been occasionally teased about their age. However two also reported feeling distance and jealousy from some older students and three felt they had at times been overprotected or patronised by older students.

Eight students felt that they were more responsible and mature than peers of a similar age. Seven said that they had a better sense of direction about graduate school and career goals. Nine felt that they were more open-minded, more intellectual, more individualistic, less shallow, and more comfortable with being different.

Ten students reported feeling no different to regular college-age students. Fourteen felt that they were different from regular-age college students for reasons varying from being less experienced socially and sexually to being more prepared for university study.

Students reported the following as being the best things about the Early Entrance Program: interesting courses; challenges; having a head start; the ability to think critically; doing things that others their age could not yet do; and having friends who thought in a similar way. The worst things about the Early Entrance Program were: the academic workload; stress; not being able to drive a car; having to experience dating for the first time in college; confronting stereotypes about gifted people; missing the experience of applying to many different colleges; and having to decide what to do with one's life at a young age.

Conclusion: On the whole students were satisfied with their choice to forego high school and to enter university early. It appears that, while the community generally perceives high school as necessary for most children, there is a certain group of gifted children for whom it is not necessary. In fact early entrance to university appears to provide for a more optimal educational and social environment for these students than does high school.

Commentary: This study is extremely effective in the way it reports personal views of students. Many direct quotes are included that allow the reader to truly empathise with the students. The students express their thoughts clearly and offer many insightful suggestions for others who may be considering early entrance to university, as well as for educationalists who are involved in early entrance programs.

Female Students' Perceptions of Early Entry to College

Noble, K. D. and Smyth, R. K. (1995). Keeping their talents alive: Young women's assessment of radical, post-secondary acceleration. *Roeper Review*, 18(1), 49-55.

Objective: To ask females who were enrolled in a college early entry program about the effect of radical acceleration upon their goals, aspirations, and sense of self, and whether they would recommend it as an option for other highly capable young women.

Design: Questionnaire.

Setting: The University of Washington.

Participants: A total of 30 young women who had enrolled in the University of Washington's Early Entrance Program between 1988 and 1992 were contacted. Twenty-seven students (90%) completed the questionnaire. The Early Entrance Program at the University of Washington admits very young students and all students were 14 years or younger at the time of enrolment. They all decided to radically accelerate their education.

Assessment of Variables: The authors devised a 25-item questionnaire. Participants were asked why they chose early college entrance and whether gender played a role in their decision. They were asked for information about how their attitude towards themselves was affected by their participation in the Early Entrance Program and how the attitudes of others towards them were affected by their participation. They were also asked about their perceptions of sexism in educational and work environments; the values and dreams that guided their educational, professional, and relational decisions; and whether they thought early college entrance had been a help or a hindrance to achieving their goals.

The questionnaire was composed of open-ended questions and Likert-scale response items. It was piloted with several students prior to its administration for this study.

Main Results: At the time of this study, all but 5 respondents were undergraduate students. They were studying in all major fields including the humanities, social sciences, and physical and life

sciences. Three students were completing a double major in science and the humanities or social sciences. Five students had graduated. One was studying physics in graduate school and another was in medical school. Three were working.

Twenty participants (74%) reported that gender played no role in their decision to enrol in the Early Entrance Program. One student reported that she might have been less frightened of high school had she been male and this may have influenced her decision to leave school early. Another student reported that females suffered more in high school from negative sentiments directed towards intelligence.

Twenty-four students (89%) believed they had made the right decision to skip high school and enter university early. Only one student reported that the benefits of early university entry did not outweigh the disadvantages of being so much younger than classmates and missing out on social activities. Sixteen students (59%) felt that staying at school and attempting an easier curriculum would have had a negative effect on their academic development. Only 3 students felt that they would have been as motivated to study had they remained at school.

Overall, students perceived that University faculty favoured male students over female students. This was especially irritating for one student, who believed that the most intelligent students in her classes were female and as such were being ignored. Some students (41%) perceived females in authority to be threatened by bright females.

Participants reported that their parents were very supportive of their decision to radically accelerate. Mothers were perceived as being slightly less supportive than fathers. They all believed that radical acceleration had influenced their relationships with their parents in a positive way. It had allowed their parents to accept that their children, although still very young, could be responsible for making their own decisions. Students appreciated the increased independence they were allowed.

The respondents perceived their parents as having high or very high academic expectations for their children. They were also seen to have high or very high professional expectations. Students did not necessarily link high parental expectations with increased levels of pressure. Only two students felt that their parents' professional expectations were low and these same students thought that their parents' academic expectations were high.

All students reported that early entry to university led to them to perceive themselves as more competent. They also felt more confident socially. They felt that early entry to university enhanced perceptions of them in the eyes of peers and family members.

The most commonly reported advantage of radical acceleration was the experience of being surrounded by intellectual peers for whom education was a high priority. Two students reported an increase in their self-esteem and self-confidence as the most important advantage. Six students identified academic challenge as an important benefit. Other benefits included having extra time to explore a variety of options and interests, and freedom to pursue self-directed education.

Participants also reported disadvantages to radical acceleration. One student was uncomfortable being so much younger than most other students and did not enjoy being treated like a child by others. Two students regretted missing opportunities at high school for recognition of achievement, such as competitions and scholarships. Another two students would have appreciated more time to prepare themselves for university level study in mathematics and science. Two students felt that they would have benefited from more time to generally expand their life experiences before entering university. One student was worried that she was unable to present prospective employers with information regarding prolonged experience in any field, or information regarding any truly relevant life experience.

The most frequently cited problem for participants involved dating men who, though traditional college age, were considerably older than them. Two students felt that the mismatch between themselves and their boyfriends was extreme in relation to both sexual and life experiences.

Conclusion: Although gender was not a factor in most respondents' decision to enrol in the Early Entry Program at the University of Washington, young women derive a number of unique benefits from radical acceleration. These include a rare combination of acceptance and encouragement from peers and adults at a critical age that might help to inoculate them against less supportive environments as they grow older.

While intelligence is essential to the success of early entry to university or college, other factors appear to play a crucial role. To do well, students appear to need to be able to take responsibility for their learning, to be determined and committed, and to be intrinsically motivated.

With the exception of one participant, the students in this study were glad that they had chosen to radically accelerate their education. They believed that their decision had markedly improved their intellectual and academic skills, reinforced their self-confidence, supported their educational goals, and positively influenced their social and emotional development.

Commentary: The authors of this study discuss the appropriateness of the chosen data collection method for this study. Self-report questionnaires allowed the collection of personal information from students intimately involved in radical acceleration. This was the aim of the study. The authors quote lengthy responses that reveal much about the social and emotional experiences of the participants.

The authors tried to encourage the participants to be open and forthright by protecting their anonymity. For instance, students were allocated a random code. Still, the questionnaire asked students to record lengthy answers in their own handwriting. This could have led to some participants choosing to be guarded in their answers.

Gifted Education in Poland

Nowicka, R. (1995). Supporting gifted and talented children within the Polish educational system. *Gifted and Talented International*, 10(1), 36-38.

Objective: To report on changes taking place within the Polish education system pertaining to gifted and talented education.

Design: Literature review.

Setting: Articles concerning research on gifted education conducted and published in Poland during the 1990s.

Assessment of Variables: Literature was reviewed for changes that have taken place over the proceeding decade within the Polish educational system pertaining to gifted and talented students.

Main Results: Poland has undergone social and educational reform during the 1990s in response to a move towards social democratisation. These changes have led to more and varied provisions being available to gifted students, and include options for enrichment and acceleration.

Some schools provide fulltime classes for gifted students. The Creative Schools Association (a coalition of approximately 25 secondary schools) and the School of Talents in Wroclaw offer students individualised, accelerated instruction, including Advanced Placement college courses. Many of the schools in the Creative Schools Association do not follow traditional organisational structures. For instance students are not grouped into static classes. Counselling centres in small towns and city districts cater for the needs of highly able students and their families, offering services to aid in the identification of gifted students as well as educational programs and therapy programs.

Provisions for acceleration include early entry to school, grade skipping through elementary and secondary school and early admission to university. Radical acceleration is offered to selected students and competitions such as the Mathematics Olympiad are used as one means to identify students who might benefit. Provisions for enrichment include training camps, scientific and creative

production workshops and contact with researchers, authors and musicians. Enrichment activities are set up to encourage students to reason creatively and solve problems.

Case studies are presented to illustrate how gifted students might take advantage of special opportunities. One case study highlights how a gifted child radically accelerated. This boy attended a Creative School in Warsaw and won first prize in the Mathematical Olympiad. His outstanding achievement led to him being offered a place at college even though he was still only 12 years old. He continued at school for another 2 years and sat the secondary school exams at the age of 14. He then enrolled at the Technological College in Warsaw. He graduated from college at the age of 19 and commenced independent research.

Although reforms have led to marked developments in gifted education, areas are identified that remain in need of attention. Procedures used to identify gifted students are not sufficiently comprehensive. For instance students are selected for placement in secondary schools for gifted students on the basis of their performance on one standardised test. Observations by elementary school teachers are rarely taken into account. Attempts need to be made to educate parents about the characteristics and needs of gifted children. This may encourage more parents to allow their children to participate in programs for gifted children. Teachers, especially those in secondary schools, require opportunities to learn about the needs of gifted students so that misconceptions about giftedness can be dispelled. Teachers need training to become competent at educating gifted children. Funding needs to be increased so that classrooms can be adequately equipped.

Conclusion: Education reform in Poland over the last decade has led to positive changes for gifted students. Many schools offer opportunities for enrichment and acceleration. Some schools, such as those belonging to the Creative Schools Association actively encourage and support radical acceleration. Attention now needs to focus on improving procedures for identification of gifted students and on educating teachers and parents about the characteristics and needs of gifted students.

Commentary: Case studies of individual students and of programs that cater for gifted students are presented. They invoke a good picture of the provisions available for gifted students in Poland. One case study highlights how a gifted child might radically accelerate. Suggestions for further reform in gifted education may well have application in other countries.

Academic and Social Outcomes for Students who Enter College Early.

Olszewski-Kubilius, P. (1995). A summary of research regarding early entrance to college. *Roeper Review*, 18(2), 121-125.

Objective: To review the research concerning academic and social outcomes for students who enter college early.

Design: Literature review.

Setting: Articles and book chapters discussing research concerning early entry to college or university.

Assessment of Variables: Sources were reviewed for information concerning the availability of programs allowing for early admission to college or university in the United States of America, their characteristics, and the academic and social outcomes for students who choose this option.

Academic success was assessed using different criteria. Evidence was sought as to whether students lived up to their potential; if their academic performance was hindered by significant gaps in skills and knowledge; if students graduated 'on time'; and if the colleges and universities attended by these students were less selective than they would have been had the students not chosen early entry.

Indicators sought to verify social and emotional success were formation of friendships; adjustment to increased responsibility for oneself; and self-management.

Main Results: At the time this article was published most universities and colleges in the United States (87%) accepted exceptionally promising young students before high school graduation, with some institutions (16%) accepting students before they had reached high school age. However only a few universities had instituted special early entrance programs to attract and support young students.

Most programs for early entry to college or university are set up as special programs within an existing college or university. An exception is the program at the Texas Academy of Mathematics and Science which is structured to allow students to complete the last two years of high school and

the first two years of college concurrently. Another exception is Simons Rock College which is administratively tied to Bard College. Students complete a degree in two years and then decide to either continue at the college or transfer for graduate study.

Some early entry programs admit students to college or university only one or two years early while others allow students to enter three or more years early. One program exclusively admits female students. Some programs are residential while others expect students to live off campus. Many programs have special support services for students but the degree of support varies between programs. Some programs provide special residence halls, counsellors and a designated lounge for early entry students, as well as hosting special social events for younger students. Some programs offer transition programs that allow students to build up the knowledge and skills needed for college and university study. These transition programs can run from a number of months up to a full year. Some universities have a reputation for accepting very young students but do not offer any special support services.

Entrance requirements for programs vary considerably but usually include a minimum score on the *Scholastic Aptitude Test (SAT)* or *American College Test (ACT)*. Most programs use interviews to assess prospective students' maturity, independence, general readiness for the college environment, and family support for the program. Programs for early entry to university or college have been in existence for varying amounts of time. The oldest program featured in this article had been in existence for 26 years. The age of the program affects the degree to which selection procedures have been refined. Early entry programs, especially ones that offer radical acceleration, have continuously refined their selection procedures to ensure that those students selected have the best chance to achieve successful outcomes.

In general, the academic performance of students who enter college or university early is impressive. Research has shown that these students earn higher grade point averages than regular freshmen, typically in the B+ to A- range, and equal to those of a group of National Merit Scholars. Compared to typical college students, they are more likely to complete college, to complete college on time, and to earn general and departmental honors, to make the Dean's list, to have plans to enter graduate school, and to complete concurrent master's degrees. The author makes the point that the majority of these results stem from studies conducted at two sites; a private, selective, academically prestigious university and a large state institution. Both institutions offer a program allowing for radical acceleration. Another early entrance program evaluated academic achievement for female early entry

students at the beginning of their freshman year. These students were all three or more years younger than the typical freshman yet achieved results in line with typically aged freshmen, as assessed by standardised achievement tests.

The author notes that, although research findings show overwhelmingly positive academic success for early entry students, this research does not in general report on students who leave the early entry programs. There is also a tendency to avoid focussing on the range of results attained by students who complete college early. Certainly there is a lack of studies looking specifically at those students who underachieve after entering university or college early.

The author quotes one study that specifically looked at reasons for academic underachievement in students who entered college or university at least three years early. The researchers identified 12 students out of a total of 56 who earned grade point averages that were more than 1.5 standard deviations below those of other early entrance students. Most of the underachieving students had dropped out of college for at least one semester and two students had dropped out of the program altogether and returned to school. Underachievement was attributed to general immaturity. Males in the study were preoccupied with fantasy games while females spent a significant amount of time involved in social activities. It is interesting to note that this particular study took place at the very beginning of this particular early entry program and that the findings informed changes at the site concerning selection procedures and social supports for students. Since this time, the percentage of unsuccessful students is considerably lower.

Another study looked at factors contributing to success for students enrolled in a program allowing two years of educational acceleration. Students were said to be underachieving if their grade point average was below 2.5. The researchers included, in the underachieving group, those students who left the program. In the first three years of the program, 45% of the students admitted were judged unsuccessful. Most students were found to have minor adjustment and behaviour problems and it appeared that these problems were directly related to their underachievement. Success was associated with being from a larger family and with participation in high school extracurricular activities. Involvement in academic activities benefited females and involvement in church and social activities benefited males. As with the previous study, this study was also conducted at the very beginning of an early entry program and informed changes concerning selection procedures and program offerings. At five years after the commencement of this program, and after many changes,

the rate of attrition fell to zero. The percentage of students with academic problems also fell by 50%.

One study attempted to predict indicators of academic performance for early entry students at a private, selective university. The only significant predictor was the number of Advanced Placement (AP) courses the students had completed. The researchers reasoned that, by providing exposure to college level work, AP courses helped students to learn advanced course content, gain confidence in their learning abilities, and develop study skills needed for success in university courses.

A major concern for students and educationalists has been that entering college or university early might preclude students from admission to the most prestigious colleges and universities. One study found that students who had qualified for early entry at a public university after the 7th or 8th grade but did not accept the offer, eventually entered more academically selective institutions than those students who decided to enter the university early. At present, the number of colleges and universities with special early entry programs is small and the majority of these are not selective institutions. Yet most of these programs offer significant social and academic support to students who decide to enter early. The author suggests that students and parents may well have to weigh up the value of attending an academically selective institution against the value of earning a degree at a less selective institution but at a time more appropriate for the student.

Relatively little research exists concerning social and emotional outcomes for students who choose early entry to college and university. One study investigated friendship patterns of 68 students who entered a large state university immediately after the 7th or 8th grade. Almost all the students (92%) reported having at least five good friends. During their first year at university, students tended to spend most of their time with other students who had entered university early. By their second year most students had made friends with older students, female early entry students making older friends more quickly than males.

Another study of the same program reported student comments regarding their experiences of early entry. Students described the benefits of the friendships forged with other early entry students, suggesting advantages with programs that admit a cohort of early entry students. It appeared that, after the first couple of years of university study, issues surrounding physical immaturity were not so marked. Students identified problems related to not being able to reside on campus or drive to

university. Otherwise, they felt generally positive about their peer relationships and social integration into university life.

There are a limited number of studies that have reported on the general adjustment of early entry students. One study found that 44 females enrolled in a liberal arts college were better adjusted than high school students and other college students. Even so, counsellors at this college kept logs that indicated that more than half of the students suffered from symptoms of depression during their first year. Thirty per cent of the students left the program after the first year. Students who made a better adjustment to the program were those who were found to be more responsible, had greater interpersonal interests, had more harmonious family relationships, especially with their mothers, and had structured family environments that emphasised active recreational activities and independence.

Findings from the above study are disturbing but, as the author points out, the researchers did not compare the rates of symptoms of depression for early entry students to rates among the general college population. Also, this study reports findings for students enrolled in the first few years of an early entry program, before selection procedures were well defined. The author points out that many of the students enrolled in the program at the time of this study had low IQs compared to students typically admitted into gifted programs. When selection procedures were refined, attrition rates declined by almost two thirds.

One study found that students who entered college four or five years early were more independent, less conventional and less conforming compared to equally bright students who remained at school and a group of National Merit Scholars. Some early entry students appear to experience an initial decrease in self-esteem although the significance of this is doubtful. The directors of one program that offers a very structured first year for very young students felt that experiences during this year enhanced the students' emotional stability.

From the available evidence, it appears that few students regret their decision to enter college or university early. Two studies report that a small number of students had regrets about missing social events at high school and missing opportunities to enrol in more prestigious universities. However overall, students view the college environment as being more accepting than the high school environment, and more appropriate for meeting their academic needs.

Much of the research about the courses students take after college or university is supplied by studies from the Study of Mathematically Precocious Youth (SMPY). Typically students who enter college or university early go on to graduate school. Many study for doctoral degrees. Others choose to complete more than one undergraduate degree. Many take opportunities to study overseas or take time out for other pursuits.

Conclusion: Research findings suggest that, in general, students who enter college or university early continue to achieve at high levels. Most students make the adjustment to the social environment on campus easily and form friendships with older students. The majority of students who enter college or university early go on to complete graduate study and use the time gained from early college entry to take advantage of further academic opportunities.

The decision about early entry to college or university appears to come down to whether it is a good match between an educational setting and a student's needs and characteristics. It seems beneficial to encourage prospective early entry students to spend some time studying college or university subjects before they make a decision. This will allow them the opportunity to have some experience of college or university study before a decision is made and may even allow them to earn credits towards a college or university degree.

Commentary: The author points out some limitations to the research concerning early entry to college or university. First, there is a general lack of reports on the outcomes for students who leave programs. This may bias results in a positive direction. Also sample sizes are generally small. This is usually because only small numbers of students are admitted for early entry. Still, findings could be biased due to a lack of statistical power. A significant number of the studies employ follow-up surveys. The author suggests that this method may attract responses mainly from students who have had more positive experiences.

It is suggested that further studies concerning early entry to university or college should look specifically at students who have not found success. Further research into the factors associated with underachievement could improve programs and selection procedures, and may assist replication at other sites. Also, research needs to determine whether early entry affects students' motivations, interests, and personalities in significant ways. Long term outcomes of early entry need to be a focus for research and studies need to compare results for early entry students with those for equally bright students who choose to stay at school.

Guidelines to Assist in Making A Decision About Early Entrance to College

Olszewski-Kubilius, P. (1999). *Thinking through early entrance to college*. Retrieved March 26, 2002, from Northwestern University, Centre for Talent Development Web site: <http://www.ctd.northwestern.education/resources>.

Objective: To address key questions about early entry to university and to offer students and parents guidelines to assist in decision making about early entry.

Design: Literature review.

Setting: A selection of research articles published during the last three decades concerning early entry to university.

Assessment of Variables: Literature was reviewed for information on how well students entering university early have fared academically, socially and emotionally.

Main Results: Research shows that in general students who enter university early, the majority choosing to radically accelerate, are academically successful. They attain higher grade point averages than regular freshmen. Early entrants in one study were shown to have grade point averages equal to those of a group of National Merit Scholars. Students who enter university early are more likely to complete tertiary studies, to complete on time and to achieve concurrent master's degrees, compared to typical college students.

One study reported negative academic effects for some students who chose to enter university early. It is suggested that these results should be interpreted with caution and in context; that is, with the knowledge that this research was conducted in the first years of an early entry program, that many changes to the program have taken place since, and that further studies of the same program have reported overwhelmingly positive results.

Research findings regarding the social and emotional adjustment of students who enter university early are positive. These students appear to adjust well and make friends easily. They are accepted

by older college students, and many acquire older friends. Females tend to make friends with the older students sooner than males.

One study reported negative outcomes for some students in one early entry program. Students were found to suffer adjustment problems ranging from mild depression to suicidal ideation. A number of students left the program. Results of this study can be difficult to interpret, as there was no comparison group of students assessed. Even so, the selection procedures for the program were altered on the basis of this study. In particular, students were required to meet more stringent requirements regarding intellectual and academic ability. Subsequent studies of the program have reported a drop in the attrition rate and positive social and emotional outcomes.

Students who enter university early do not appear to have significant regrets about their decision. Rather they report enjoying the stimulating academic environment offered at university. Some students have reported regrets about missing extracurricular activities at high school, as well as opportunities to apply for scholarships or to attend more prestigious universities. Yet, for the overwhelming majority of these students, such regrets are minor when compared to the benefits gained at university.

Evidence suggests that students who choose to enter university early continue studying, many going on to graduate school to pursue doctorates. Most students do not stop or pause in their education, even though they are very young. Many choose to study abroad.

Conclusion: Parents and students can take comfort in the overwhelmingly positive evidence presented on early entry to college. Many colleges and universities in the United States have programs to attract and cater for students who enter early. Some colleges and universities have special program for students who choose to radically accelerate their education.

Commentary: The author pulls a significant amount of research together to generate a list of points for consideration by parents and students who are contemplating early entrance to college and university. She lists sites that have early entrance programs, some catering exclusively for students who choose to radically accelerate. A list of alternatives to early entry to college and university is supplied and ensures that parents and students have knowledge of other opportunities available to them.

Psychosocial Adjustment Following Acceleration

Richardson, T. M. and Benbow, C. P. (1990). Long-term effects of acceleration on the social-emotional adjustment of mathematically precocious youths. *Journal of Educational Psychology, 82(3), 464-70.*

Objective: To investigate the effects of amount and type of educational acceleration (grade skipping and subject matter) on psychosocial indices.

Design: Ten-year longitudinal cohort study.

Setting: The Study of Mathematically Precocious Youth (SMPY).

Participants: The 1,247 students in Cohort 1 of the Study of Mathematically Precocious Youth's (SMPY) longitudinal study. These students took part in one of SMPY's first three talent searches, in 1972, 1973 or 1974, and were either 7th or 8th graders from schools in the Maryland district at the time of the talent searches. They were required to score in the upper 5% (in 1972) or upper 2% (in 1973 and 1974) nationally on a mathematics achievement sub-test to qualify for the talent search. They sat the *Scholastic Aptitude Test-Math (SAT-M)*, and, for students who were identified in 1973, the *Scholastic Aptitude Test-Verbal (SAT-V)*. Their results on the *SAT* tests needed to be at least as high as results for a random sample of high school females.

SMPY introduced students to acceleration options in the hope of creating more appropriate educational experiences, and supported students if they chose to accelerate. Students in this study included those who decided not to accelerate, as well as those who decided to accelerate their education from one year to more than three years.

Assessment of Variables: Data were collected using two questionnaires. The after-high school questionnaire was administered following high school graduation. The after-college questionnaire was the primary source of information and was administered one year after expected college graduation. It consisted of 24 pages of open-ended and multiple choice questions, as well as questions using ratings scales. This questionnaire was made up of items from *Project Talent* questionnaires and *High School and Beyond National Longitudinal Study (NLS)* questionnaires. A draft

was critiqued by experts in the field and was piloted on graduate students at Johns Hopkins University. The after-college questionnaire was then revised accordingly.

Information was sought concerning students' educational and career achievements, decisions and aspirations; employment history; interests and activities; accomplishments; attitudes and lifestyle expectations; family encouragement and characteristics; social and emotional development; and evaluation of SMPY. Two acceleration variables were computed for each student. Grade acceleration was defined as the number of grades in school skipped, which included early entrance to school. Subject matter acceleration was defined as the number of Advanced Placement (AP) and/or college courses students enrolled in while still at high school.

Main Results: Responses to the items included in the self-esteem and locus of control scales indicated that, overall, post-college, students felt good about themselves and felt in control of their lives. There were no significant gender differences. Type and amount of acceleration did not influence results for locus of control. Amount of acceleration appeared to relate negatively to self-esteem but this relationship was not found to be statistically significant.

Gender differences were found for subject-matter acceleration, with a greater number of males choosing this option (50% males and 43% females) but not for grade acceleration (17.2% males and 16.2% females). Responses from accelerated females indicated a slightly negative relationship between acceleration and the psychosocial indices but this relation was not statistically significant.

At the time of graduation from high school, 6.4% of accelerated students reported detrimental effects from acceleration on their social and emotional development. In comparison, only 3.3% of the accelerated students, after college graduation, reported negative effects. This represented a significant reduction, over time, in the number of accelerated students reporting negative effects. Students who reported no effects or positive effects of acceleration after high school graduation were found to have higher self-esteem, higher levels of self-acceptance/identity and higher levels of social interaction after college graduation.

Conclusion: Most students reported high self-esteem and internal locus of control. In general both the accelerated students and the nonaccelerated students appeared to feel good about themselves and to feel that they had control over their lives. Their sense of self-efficacy was strong. The majority of accelerated students reported no negative effects overall from acceleration. In fact, there was

evidence that they felt that their social and emotional adjustments were positively affected. Greater amounts of acceleration, including grade acceleration over three or more years (radical acceleration), were not related to greater amounts of social and emotional difficulties. The effects of acceleration on psychosocial indices did not differ as a function of gender.

Interestingly, accelerated female students reported slightly favourable effects of acceleration on their social interactions. Females were found to accelerate over grades as commonly as males. This finding challenges the belief that gifted female students tend to choose options other than acceleration to improve their educational experiences.

One exception to the otherwise positive findings was that grade acceleration was weakly but negatively related to self-esteem. This finding was not found to be statistically significant. The authors suggest that the relationship might not be due to acceleration as such, but rather, to the changes in the social comparisons being made by accelerated students between themselves and others. Such students would be comparing themselves to older, more advanced students after acceleration.

Commentary: This study has considerable statistical power as it presents data for a large number of students over a relatively long time. It also evaluates acceleration by examining students both during and near the end of their formal education. Such a longitudinal view of the outcomes of acceleration allows for an assessment of the duration of such outcomes. The findings support the belief that disadvantages are usually temporary. Lastly, this study deals with outcomes for both males and females and for the degree and type of acceleration. These variables are not addressed in many other studies.

The study is limited by reliance on self-report data. The authors discuss this methodological concern and give valid reasons for choosing to use self-reporting techniques for this study.

Examples of Two University Programs for Radical Acceleration

Robinson, H. B. (1983). A case for radical acceleration: Programs of the Johns Hopkins University and the University of Washington. In C.P. Benbow and J. C. Stanley (Eds), *Academic precocity: Aspects of its development* (pp 139-59). Baltimore: The Johns Hopkins University Press.

Objective: To present common arguments for and against accelerated pacing. To describe programs that allow for radical acceleration at The Johns Hopkins University and the University of Washington.

Design: Literature Review. Case studies.

Setting: Articles published from 1929 to 1981 concerning the education of intellectually precocious youth.

Assessment of Variables: Articles were reviewed to identify theory and research supporting radical educational acceleration, as well as arguments opposing this educational option. Literature concerning programs for radical acceleration at the Johns Hopkins University and the University of Washington were reviewed for information about selection procedures, educational offerings and outcomes for students. Case studies of students enrolled in these programs were presented to illustrate the benefits that are possible for students who choose to radically accelerate their education.

Main Results: The pace of educational programs must be adapted to the capacities and knowledge of individual children. In a few instances, the appropriate fit of child and program calls for placement several levels above the child's age-mates and is termed radical acceleration. The rationale for this position is grounded in theory within developmental psychology and is based on empirical evidence.

Developmental psychologists have shown that learning is a sequential, developmental process. Research shows that, to be effective, teaching must involve a sensitive assessment of a student's status in the learning process and the presentation of curriculum that slightly exceeds the level already mastered. Research also shows that there are substantial differences in learning status among students of the same age. Despite these findings, schools continue to group children on the basis of

age rather than on the basis of abilities and pre-existing knowledge. Schools also expect all students to advance one grade each year in spite of differences in rates of learning. Individual teachers attempt to cater for differences in ability, knowledge and rate of learning by creating subgroups within a class and providing a program that allows for enrichment opportunities. Schools following the age-grade system of education do not support opportunities for educational acceleration.

The author argues that the age-graded system of education is a modern invention motivated by egalitarian goals. Historically, ability and achievement were used to determine access to curriculum. The author quotes research to show that school classes, before World War II typically contained a mix of students of various ages. Neither is age used as a prerequisite across all domains. The author points to sport and music as being two fields where competence and talent are used in preference to age to determine learning experiences.

Arguments put forward in favour of the age-graded system of education focus primarily on concerns for a student's social and emotional well-being. The author suggests that many people believe that grouping students of different ages should be avoided because it is detrimental for the social development of younger children. He quotes many studies that should allay these fears but makes the point that many people, including teachers, choose to disregard these studies.

A second objection to allowing academically advanced students to progress at their own pace is based on the fear that 'quickening' education can lead to gaps in a student's knowledge. The author states that there is no empirical evidence to support this view but accepts that such an outcome could result if a substantial amount of the *curriculum* is skipped. He suggests that any program for acceleration should be closely monitored to identify and address any knowledge gaps that might emerge. A final objection to allowing academically advanced students to progress at their own pace relates in some ways to the first but identifies missed opportunities for extra-curricular activities rather than gaps in academic experiences. The author suggests that this should not be of great concern because students can be encouraged to relate to others of a similar age in groups after school or during holidays. He quotes one study that found that underage students engaged in more extra-curricular activities than did their older age mates.

The author identifies other concerns regarding educational acceleration. Some people have expressed the view that, while a student may be academically advanced at one stage, it does not follow that this student will be similarly advanced at a later stage. Others assert that children who are

'pushed ahead' will be robbed of a carefree childhood and that they may 'burn out'. There are also fears regarding the development of nongifted age peers. There is a concern that these children will be deprived of valuable role models if gifted students are allowed to progress through school at a faster pace. The author suggests that the available research evidence does not justify any of these concerns. He outlines relevant research findings to support his position.

Arguments are put forward for the benefits of what the author calls a competency-based system of education. He quotes research that has noted the boredom and frustration that gifted children suffer when they are forced to remain with same age peers. He subscribes to the view that a curriculum pitched too low and taught too slowly to gifted students can have the consequence of turning them away from formal education. These children may well underachieve or drop out of school. They may never experience the personal fulfilment of achievement in line with their ability, and society may never benefit from their possible contributions.

The author makes the case for competency-based education for its role in avoiding negative effects on social and emotional development. He quotes research that presents case studies of gifted children who end up isolated, lonely and unhappy due to their ill fit within classes of same age peers. He also outlines the coping mechanisms these children may employ in the hope of achieving peer acceptance. These children tend to underachieve and may decide to take on the role of 'class clown'. These strategies tend to have detrimental effects on a student's academic progress and their social/emotional health. Such risks for students' social and emotional health are not present when competency-based educational strategies are employed.

The author outlines programs for radical acceleration in an effort to illustrate how competency-based education might work and what the outcomes might be. He argues that this option is appropriate for some gifted students and essentially mandatory for extraordinarily precocious students. Case studies of extraordinarily precocious students who chose to radically accelerate their education explain, by example, the importance of competency-based educational decisions for the academic and social development of such students.

Dr Julian Stanley founded the Study of Mathematically Precocious Youth (SMPY) in 1971 at the Johns Hopkins University. Dr Stanley subscribed to the benefits of radical acceleration for highly gifted youths as outlined in the first half of this paper. He set up a program whereby such youths could be identified and then assisted to radically accelerate their education. The author presents

numerous case studies to illustrate how the program works and the benefits of program interventions for highly gifted students. Cases are presented of students who entered college full-time at ages as young as 10 to 13 years. These students were shown to have achieved extraordinary academic gains at university. Many have since entered into graduate study. The author points out that many more male than female students have been identified and assisted by the staff at SMPY and suggests that this outcome needs further investigation.

Shortly after Professor Stanley established SMPY, Dr Halbert Robinson, the author of this paper guided the development of The Child Development Group at the University of Washington. This group was established to conduct extensive research into gifted education, to develop options for gifted preschool and elementary school students, and also to achieve similar goals to SMPY; to identify highly gifted youths and to assist them to radically accelerate their education. The Early Entrance Program at the University of Washington came into existence. Highly gifted students aged 14 years or less were identified and offered early entry to the University of Washington. The program offered substantial assistance in regard to developing habits consistent with college study and supplying social and emotional support.

The author outlines the selection procedures for the Early Entry Program at the University of Washington. These procedures assess social as well as academic variables and include results from ability and achievement tests, as well as lengthy interviews. Offerings of this program are outlined and include special counsellors, a 'home lounge' and specific teaching in the first year to ensure that all students have the requisite knowledge and skills for university study. The author points out that a particular challenge for many students is to develop the responsibility to structure their own lives as many have benefited, up until their early entry to college, from constant guidance and support from parents.

Case studies are presented in an attempt to illustrate how the program works and the overwhelmingly positive academic and social outcomes. One of the first students to enrol in the early entry program at the University of Washington was a female aged 12 years. She enrolled part-time in calculus and astronomy courses while attending a private middle school. She earned an 'A' in both courses and enjoyed attending the university campus. Part-time enrolment allowed her to experience university life and to make a decision regarding full-time enrolment. She enrolled full-time at the age of 13 in an undergraduate honors program and undertook a double major in physics and mathematics. During her undergraduate study, she attained a grade point average of 3.72. She enjoyed the social

atmosphere at university. After graduating, this student wanted to enrich her knowledge and decided to pursue studies in liberal arts.

Conclusion: A radically accelerated approach to education is both appropriate and successful for many highly gifted children. The two programs outlined in this article offer quite different experiences of radical acceleration yet both have led to great gains for many students. This is because, for every student, each program aims to provide the best match between learner and educational environment.

There are many more gifted students for whom radical acceleration may not be ideal but whose needs are being ill served by age-graded practices. If school systems permitted a significantly greater degree of flexibility then children might be allowed to progress on the basis of their competency and ability. Gifted children could then enjoy appropriate academic challenges and would have the opportunity to achieve positive outcomes in relation to school achievement and social/emotional development.

Commentary: This article allows for a thorough understanding of many aspects of radical educational acceleration. The author gives a detailed explanation of theory in support of radical acceleration. He quotes the research regarding radical acceleration and makes a strong case for the empirical support for acceleration options for gifted students. Of particular value is the author's detailed discussion about the changing beliefs about education in the United States and the move from a competency-based school system to an age-based system. He presents detailed arguments in support of both systems, but ultimately expresses a preference for a competency-based system.

Programs for Radical Acceleration in China

Robinson, N. M. (1992). Radical acceleration in the People's Republic of China: Early entrance to university. *Roeper Review*, 14(4), 189-192.

Objective: To report on programs in China that allow for radical acceleration.

Design: Observation and Interview.

Setting: Elementary and middle schools in Beijing, Tianjin and Shanghai, and universities in Hefei and Nanjing.

Participants: Teachers, administrators, psychologists and researchers involved in gifted education.

Assessment of Variables: Subjects were interviewed, and school and university programs examined, for provisions for radical acceleration.

Main Results: In China, programs for acceleration have developed in a system based on a national curriculum that is strictly adhered to. Students tend to accelerate their education by moving through the prescribed curriculum at faster rates, with little emphasis on enrichment. Students are required to cover the prescribed curriculum formally before moving on. This contrasts with provisions for acceleration in the United States where students tend to partake in enrichment activities as well as acceleration, and can move on to college level study without formally covering all of the prescribed school curriculum.

Normally children in China complete twelve years of formal schooling but schooling can be completed in as few as eight years by students who are exceptionally bright. There are schools with special acceleration classes for gifted children called 'experimental classes'. Students who do not attend schools with such classes are still able to accelerate by completing curriculum at a faster rate and then skipping grades. Some students work through the curriculum with a private tutor and then apply to skip grades.

Universities across China cater for students who have been radically accelerated through the school curriculum. Some, like Beijing University, accept radically accelerated students into undergraduate courses without offering a specific program to support them. Other universities, such as The University of Science and Technology of China (USTC) and South East University Nanjing, offer detailed programs for students who have radically accelerated.

The program for radical acceleration at USTC is for students aged fourteen years or younger. These students have successfully completed the school curriculum and have passed the National College Entrance Examinations with distinction. School teachers are asked to supply evidence of high marks, maturity and propensity for hard work. Students spend an intensive week attending classes at the university and completing tests before they are offered a place in the program. During this time they are closely observed by university staff for personal and academic attributes. Once admitted, the students live together on campus and study together for the first three years. They then join the general student body and enrol in the departments of mathematics, science or technology.

The program for radical acceleration at South East University, Nanjing is based on the program at USTC and is thus very similar, but with some important differences. Students tend to be a little older, with a modal age of fifteen years compared to thirteen years at USTC. An annual cohort of about fifteen students is accepted compared to about thirty students at USTC. This has led to the students being integrated with older university students from their first year. Even so, they stay together as a group for the first two years before entering specific departments.

Conclusion: There are excellent programs in universities in China to cater for students who have radically accelerated through school and wish to commence tertiary study early. These programs have been developed to meet the needs of highly intelligent, persevering and hard-working students.

Commentary: Two programs for early entry into university are described in detail, including selection procedures, profile of the student body, curriculum, rate of learning, and paths students take after graduation. Research showing the overwhelming academic success of these programs is discussed. Mention is made of the effects of cultural influences on provisions for gifted children, characteristics of teachers of the gifted, and gender discrepancies (approximately 85% of radically accelerated students are male).

Programs for Early College Entrance in the United States of America

Robinson, N. M. (1996). Acceleration as an option for the highly gifted adolescent. In C. P. Benbow and D. Lubinski (Eds), *Intellectual talent: Psychometric and social issues* (pp169-178). Baltimore: The Johns Hopkins University Press.

Objective: To outline the development of programs for early admission to university and college in the United States and to describe the operation of current programs, in particular the program at the University of Washington.

Design: Literature review.

Setting: Research articles concerned with early admission to college and university, with particular focus on early admission to the University of Washington.

Assessment of Variables: Articles were screened for information concerning the historical development, selection criteria and offerings of early entry programs, with particular focus on the program at the University of Washington. Evidence was also sought concerning the success of early entry programs in meeting students' academic, social and emotional needs.

Main Results: At almost any college or university in the United States there is the possibility for early entrance. However, only a handful of colleges and universities *actively* recruit young students and accept relatively large cohorts.

Although research is limited, studies on cohort acceleration report either no effect or mildly positive effects on personal adjustment but strongly positive effects on academic attainment. Case studies of single students who have entered university or college early support the findings for positive effects on academic attainment and also tend to show positive effects for personal adjustment.

The work of Professor Julian Stanley at Johns Hopkins University, particularly in relation to the Study of Mathematically Precocious Youth (SMPY), has influenced the development of many early entry programs in the United States. The University of Washington program is a direct outgrowth of the experiences at Johns Hopkins University. It is based on the idea of 'optimal match': a profile of

pre-existing skills and knowledge is confirmed for a student through extensive testing and interviews, and an appropriate curriculum is then offered in line with this profile.

The University of Washington's early entrance program offers the benefits of a Transition School, a one-room school on campus where students can acquire skills and knowledge they may need before they radically accelerate into university. There are many provisions in place to support students socially and emotionally. Students must be fourteen years or younger, meaning that all students who participate in this program are radically accelerated. Students need to be living with a family within commuting distance to the university.

A number of studies have been conducted on the program at the University of Washington. The vast majority report positive findings for students' academic gains and their social and emotional adjustment. Early entry to the University of Washington appears to work best when a student is motivated and when parents are supportive, yet willing to accept the need to allow a teenager increased independence.

Conclusion: A program that allows for radical acceleration to college, such as the one offered at the University of Washington, provides a viable alternative to high school study for adolescents with exceptionally high academic capability and the need for academic challenge.

Commentary: A clear case is made, based on significant research, for the benefits of early entry to university and college. Information is supplied regarding the characteristics of students who tend to do well in such programs, and variables that appear to influence success.

Making A Decision About Early Entrance to College

Robinson, N. M. and Harsin, C. (2002). *Considering the options: A guidebook for investigating early college entrance*. Nevada: Davidson Institute for Talent Development.

Objective: To present current information to gifted students and their parents regarding early entrance to college.

Design: Guidebook.

Setting: Davidson Institute for Talent Development.

Assessment of Variables: The guidebook presents information based on research findings regarding the characteristics of students for whom early entry to college tends to be most successful; advantages and disadvantages of early college entrance; alternatives to early college entrance; preparation for early college entrance; and college programs that cater for early entrance students. It includes questionnaires designed for students and parents to help them to identify factors that may influence their decision regarding early college entry, including student characteristics as well as their beliefs and attitudes about early entry to college. Appendices provide a timeline for students who are planning to enter college early and a list of relevant references. A number of resources, including texts and Internet sites are listed at the end of each section.

Main Results: This guide has been written for students who are markedly more intellectually advanced than their age mates, and for their parents. It presents information concerning early college entrance. This is an educational option that allows students to access appropriately challenging curriculum. In most instances this curriculum has been designed for students who are some years older. Most students who choose this option can be said to have radically accelerated their education. The document is presented in the form of a self-study guide, with specific questions for students and parents to complete throughout each section.

The guide begins with a section written specifically for students. The students are led through information regarding particular personal traits that appear, from research, to be important for successful early college entry. Students are encouraged to rate themselves for particular

characteristics. The aim of this section is to assist students to decide whether early entry to college would be an appropriate educational intervention for them.

The next section is specifically directed towards parents. Information is presented regarding personal characteristics of students for whom early college entry has been shown to be successful. Parents are encouraged to rate their child for particular characteristics. Information is also supplied regarding the impact of early college entrance on the family. After reading this section, parents are in a better position to decide whether early entry to college would be an appropriate educational intervention for their child. It is recommended that parents share their thoughts about early entry to college with their child.

Advantages and disadvantages of early college entrance are outlined, based on research findings. The authors present information regarding academic outcomes as well as social and emotional outcomes. These outcomes are written as statements that describe particular scenarios and students are encouraged to decide if they can see themselves in each scenario. For instance, the authors describe a student who has a hunger to explore deeper understandings about the world, and who enjoys communicating ideas by writing and talking. They suggest that college would offer advantages for such a student, beyond those offered in school.

Potential disadvantages are presented in a similar way. The authors suggest that early college entry might not be beneficial for students who are truly looking forward to high school opportunities. Such opportunities might include editing the school newspaper, joining the band, competing in academic or sporting competitions, going to the prom, being valedictorian at graduation or spending a year as a foreign exchange high school student. The authors clearly outline the possible social and emotional disadvantages of early college entrance. They point out issues regarding the relative age difference between early entry students and their classmates. This age difference can cause friendship problems and may preclude students from living on campus and participating in some activities.

Alternatives to early college entrance are presented in some detail. The authors suggest that all students should consider adjusting their present school circumstances before they consider early entry to college. Students can approach their school with suggestions regarding honors courses and educational acceleration at school. They might decide to take advantage of distance learning and correspondence opportunities. Students are directed to relevant Internet sites for information

regarding these options. They can take Advanced Placement (AP) courses at a local college or university or enrol in a high school that offers an International Baccalaureate (IB) curriculum. Participation in Talent Searches and/or summer learning opportunities can open up further opportunities related to part-time college or university study and AP courses. A list of regional talent search centres is supplied. A resource summary provides information concerning on-line classes and opportunities to study abroad as well as other relevant texts and Internet sites.

A very helpful section of the guide outlines ways in which students can prepare for early entry to college, if this is the option they decide to pursue. Research tends to suggest that early entry to college is more successful when students have developed the skills to study productively, write formal reports and tackle college level mathematics. It is suggested that students address these particular areas before commencing college. Students are led through very detailed questions that uncover the exact nature of their pre-existing skills and areas in which they might need to improve. The authors recommend texts that will help students to build up specific strengths.

It is also suggested that students need to think about strategies to manage stress before they enter college. Stress can result from increased academic demands and social anxieties. Many students have spent their time at school being the most competent student in the class. They need to be aware that this will probably not be the case at college.

Detailed information is provided about the different colleges and universities that offer specific programs for early entry students. It is suggested that students visit campuses that are close by and make an appointment to speak with the admissions officer. Students can ask about grants and scholarships but should be aware that most scholarships will not be available to them if they have not graduated from high school. Internet sites and college guides that can provide more information are listed. This section concludes with the message that a student should not expect to find a college or university that is perfect for them. The aim is to find a college or university that can best meet their needs. The guide ends by encouraging students to identify alternatives to early college entrance in case this option does not work for them.

Conclusion: This guidebook encourages students and parents to explore important concerns about early college entrance. It allows students and parents to make a decision about whether early college entrance is appropriate. Alternatives to early college entrance are presented for students who decide against this option. Students are guided to make appropriate choices from these alternatives to best

suit their needs. The aim of the guidebook is to assist students who are academically advanced to find educational options that will best suit them. For some students these options may include early college entrance.

Commentary: This guidebook presents current information about early entry to college in the United States of America. Although it is designed specifically for students and parents, it also provides valuable information for educators. Detailed questionnaires encourage students and parents to explore variables that have been shown by research to influence the success of early college entry. These questionnaires provide a valuable model for educators who may be interested in designing instruments to address selection concerns regarding early entry to college or university. Once they have worked through the guide, students and parents should be able to make an informed decision about early college entry.

Options for Early College Entrance in the United States of America

Robinson, N. M. and Noble, K. D. (1992). Acceleration: Valuable high school to college options. *Gifted Child Today*, 15(2), 20-23.

Objective: To describe options that are available for highly capable children to accelerate their education at the college level. To provide a detailed account of the Early Entrance program at the University of Washington.

Design: Literature review.

Setting: The University of Washington.

Assessment of Variables: Research findings are presented concerning the academic and social/emotional outcomes for students who have entered the University of Washington at or before the age of 14 years.

Main Results: Highly capable students in the United States of America can take advantage of options that allow for part-time or full-time acceleration at colleges or universities.

Part-time options allow students to study subjects at the college level whilst concurrently attending high school. Many universities and colleges offer such programs. Students can enrol in Advanced Placement (AP) courses and be eligible for college or university credit after passing the appropriate examinations. Students can participate in challenging summer programs, community college courses and correspondence courses. Students may be eligible to accumulate credit towards school or college study by completing these courses.

Almost every college and university across the United States of America has some provision for admitting students for full time study one to several years early. However some college personnel express concern that these students will find themselves socially and emotionally out of step with their regular-age classmates. Programs at a number of colleges and universities address this concern by offering social and emotional support in the form of counsellors, advisors, special social events and spaces such as homerooms where these students can gather. Some programs enrol a number of

young students at the same time with the purpose of ensuring that students benefit from the support of peers who share similar experiences, interests and abilities.

The Early Entrance Program at the University of Washington was developed in 1977. The program enables highly capable young people of middle or junior high school age (14 years or younger) to accelerate their education by entering the University without attending high school. Students must possess a high level of intellectual ability and the motivation to begin university study. They are selected on the basis of scores on the *Washington Pre-College Test (WPCT)*, *Stanford-Binet IV*, a 20-minute essay, achievement test records, class grades, teacher recommendations, and extensive interviews.

Each year up to 15 students enter the Early Entry Program at the University of Washington. A sizeable group is admitted to provide students with peers who share common characteristics and interests and to allow for supportive friendships to develop between these students. These students complete a year of Transition School where they learn the knowledge and skills they will need for successful university study. The Transition School curriculum covers English, History, Science and Mathematics. A homeroom is supplied to provide a safe place for socialising with other early entry students. A psychologist acts as a special advisor, monitoring the students' emotional and social development, and offering guidance when it is needed. Students commute to university during their first year at university but are able to move into campus accommodation as sophomores or juniors.

Some 85% of students proceed from Transition School to full-time university enrolment. These students tend to be highly motivated and self-disciplined. Most have a history of earning high grades in school. After Transition School, early entry students become well integrated into the University community. They do not appear to have difficulty making friends with older students. Early entry students perform very well academically. They attain grade point averages that are significantly higher than those for regular students (3.5 to 3.6 compared to 3.0). Ninety-five per cent of early entry students graduate from the University of Washington or a similar institution. About 20% transfer in their sophomore or junior year to another institution, usually a highly selective university or college. However some students are not as successful as the majority. Low achieving males tend to suffer from family and adjustment problems. Low achieving females tend to spend a significant amount of time involved in social activities.

Long term follow-up studies are being conducted into the academic and social/emotional outcomes for early entry students at the University of Washington. Preliminary findings indicate that early entry students are satisfied with their choice to radically accelerate their education. Most have strong circles of friends of varying ages. The majority have entered graduate schools of their choosing and are studying towards doctoral degrees. Others are completing a second degree. Yet others are taking advantage of opportunities to work and study abroad.

Conclusion: Calendar age is only one criterion to consider when seeking an optimal educational and social match for a gifted student who is ill-served by the ordinary high school curriculum. Programs that allow students to enter college or university early provide options to better meet the needs of highly gifted students. Some students require options for radical acceleration, and research conducted at the University of Washington attests to the positive social, emotional and academic outcomes that are possible for students who choose this option.

Commentary: This article provides a brief synopsis of some of the options available for gifted students who might benefit from early entry to college or university. It begins with a discussion of some of these options but does not refer the reader to pertinent research that might support the use of such options. More detail is supplied about the research supporting the benefits of the Early Entry Program at the University of Washington. This program is presented as a model for radical acceleration at the university and college level. It is a well-structured program aiming to address the academic and the social/emotional needs of highly gifted students. Research attests to the success of the program. It appears that a well administered program for early admission to university, that is structured to meet students' individual needs, can provide the best match between learning environment and the needs of a gifted student.

The Early Entrance Program at the University of Washington

Robinson, N. M. and Noble, K. D. (1992). A radical leap from middle school to college: Can it work? In N. Colangelo, S. G. Assouline and D. L. Ambrosion (Eds), *Talent Development: Proceedings from the 1991 Henry B. and Jocelyn Wallace National Research Symposium on Talent Development* (pp 267-77). New York: Trillium Press.

Objective: To describe the Early Entrance Program at the University of Washington and to present research evidence of its success in meeting the academic and social/emotional needs of highly gifted adolescents.

Design: Conference paper, including a description of an early entrance program and a review of research documenting outcomes for students.

Setting: The University of Washington.

Assessment of Variables: A description of the early entrance program was supplied by the authors in their roles as Director of the Halbert Robinson Centre for the Study of Capable Youth, and Assistant Director of the Center for the Early Entrance Program, the University of Washington. Research concerning the program was evaluated for information concerning academic and social/emotional outcomes for students.

Main Results: The Early Entrance Program (EEP) at the University of Washington is founded on the belief that students require access to curricula that closely matches their abilities but supplies enough challenge to encourage intellectual growth. This synthesis of student readiness and educational response is called 'The Optimal Match'. It is argued that highly gifted students are seldom offered such curricula in traditional schools and that early entrance to university is one way to make it available.

The EEP at the University of Washington enables highly capable young people of middle or junior high school age (14 years or younger) to enter the University without attending high school. All students thus radically accelerate their education. Students need to demonstrate high intellectual ability and the motivation to embark upon university level coursework. Students are selected on the

basis of results on the *Washington Pre-College Test (WPCT)*, *Stanford Binet IV*, a 20-minute essay, achievement test records, school grades, teacher recommendations, and extensive interviews with students and their families. Particular weight is given to test scores. Students need to score at least at the 85th percentile on either the verbal or quantitative composite of the *WPCT* and at least at the 55th percentile on the other. A composite score of at least 135 on the *Stanford Binet IV* is the minimum for consideration for entry into the program.

An essay written by the student is used to assess their ability to organise thoughts and to reach beyond the superficial, and allows for assessment of language skills. School grades reflect a student's stability and willingness to put up with conventional academic demands. Teacher recommendations are sought over the telephone rather than in writing and discussion centres around a student's organisational abilities and study skills, as well as family support and expectations. The school background provides evidence of the degree of self-discipline and application that has been expected of the student. Information is sought regarding students' outside interests, motivation, emotional maturity, emotional adjustment, family support and living situation. Students who live far away are special cases as they may suffer stresses related to travelling long distances, or to residing with relatives or friends whose homes are closer to the University.

Up to 15 students are admitted to the EEP annually. A characteristic unique to the University of Washington EEP is the Transition School. The Transition School is housed in a building on the campus of the University of Washington. Early entrance students spend most, if not all, of their first year together in this building. During this year they are able to build up important friendships in a safe environment. They cover a curriculum that focuses specifically on skills and knowledge essential for college study. As students are ready, they begin to enrol in university subjects and move on to the main campus with older students. Some students wait until the end of their Transition School year before becoming involved in classes on the main campus. Others are ready to participate in classes on the main campus during their first year at the University. These students simultaneously complete the essential parts of the Transition School curriculum as well as the university subjects they have chosen to enrol in.

Research concerning the University of Washington EEP has been ongoing since the program was conceived in 1977. Studies have tended to focus on characteristics of EEP students and academic and social/emotional outcomes for these students. Students who choose to enrol in the program tend to be highly motivated, self-disciplined and successful. Some struggle during their first few

months in the Transition School and find the demands too challenging. One or two students tend to leave the program every year. After transition school, students tend to integrate well into the University community. Most enjoy satisfying relationships with older peers. Female students tend to form relationships with older students sooner and tend to have more friends who are older.

EEP students tend to ask questions less often in class but make good use of opportunities outside of class to consult teachers. They appear to have sound study skills. Undergraduate grade point averages for EEP students are much higher than those for regular students. Ninety-five per cent of EEP students complete undergraduate degrees at the University of Washington or another institution of higher education. They study a wide range of subjects, with about one third majoring in humanities and/or arts, about a third in the biological sciences, and about a third in the physical sciences, mathematics, engineering and/or computer sciences. Many choose to complete double majors or double degrees with the result that the average EEP student takes 2 or 3 extra quarters to graduate.

Research shows that EEP students are as well adjusted as three non-accelerated comparison groups. They appear to be most like National Merit Scholars in their psychological makeup. There have been some adjustment problems for students and factors that appear to be related to such problems include living away from family and difficulties accepting responsibility for their own learning. Students report positive social and emotional outcomes. They feel that the EEP experience allows them to develop emotional maturity, and to become more independent, less conforming, and more academically aggressive.

Follow-up studies of EEP students show that the majority enter graduate schools of their choosing and proceed toward doctoral degrees. Many have made good use of the time acceleration has saved them and have gone on to accept opportunities for study and research overseas. Others have completed more than one undergraduate degree with the hope of synthesising their learning to broaden understanding across diverse fields of knowledge.

Conclusion: The Early Entrance Program at the University of Washington has enabled many highly gifted students to access appropriate learning opportunities in line with their abilities. The majority have achieved benefits related to academic achievement and social/emotional well-being. This program appears to be most successful because students are helped to develop skills necessary for successful college study, and are offered important social and emotional support.

Commentary: The reader is provided with a detailed description of the Early Entry Program at the University of Washington. Most importantly, the theoretical underpinnings of the program are discussed and allow the reader to view the program offerings in light of pertinent theory and research. The results for students concerning academic and social/emotional gains are interpreted with reference to the characteristics of this program. This allows for inferences to be drawn regarding the benefits of particular program offerings such as the Transition School, and elements that support students' social and emotional well-being, including special counsellors, social events and the provision of a homeroom. This article has particular relevance for those involved in program development for highly gifted adolescents, especially if the program addresses radical acceleration in the form of early college entrance.

Gifted Education in Europe

Roland, S. P., Joswig, H. and Balogh, L. (2000). Gifted education in Europe: Programs, practices, and current research. In K. A. Heller, F. J. Monks, R. J. Sternberg and R. F. Subotnik (Eds), *International handbook of giftedness and talent* (pp703-734). New York: Elsevier.

Objective: To convey an overview of the status of gifted education in Europe in terms of existing policies, provisions, relevant practices and specific research.

Design: Questionnaire

Setting: The questionnaire was mailed to national representatives in the 40 nations across Europe. Specifically it was mailed to embassies, Ministries of Education and Science, or similar bodies and agencies, and to national experts known to the authors.

Assessment of Variables: Questions were asked regarding recognition of high ability in the national school system and in legislation; the history of gifted education; the nature of specific provisions offered to the highly able; and the existence of special training in gifted education for teachers. Where there were no provisions for gifted education, national representatives were asked to explain why this was the case, to elaborate on their understanding of gifted education, and to speculate whether provisions for gifted education might eventually develop. Information was also sought regarding current research in gifted education as a way of assessing the status of gifted education in each country. The focus for research also uncovered cultural differences in educational practice and policy.

Main Results: Countries in Eastern Europe and the Balkans, including Bulgaria, Croatia, Hungary, Poland, Romania, Slovakia, Slovenia, and the Ukraine, generally recognise students with high ability through legislation. Provisions for gifted students were in existence before the communist era in most countries and were then supported by communist governments. Many such provisions still remain, including special classes, workshops and courses for high ability students. The authors do not identify provisions for radical acceleration in any of the Eastern European countries.

The development of further provisions for gifted education in Eastern European countries is hampered by a lack of funding. This is reflected in the lack of systematic special training for teachers in gifted education and limited research opportunities.

Countries in Western, Middle and Southern Europe, including Austria, Belgium, France, Germany, Italy, Portugal, Switzerland, Spain and The Netherlands, tend to follow an inclusive model for education. The focus is on mixed ability classes and integration for all children within the national school system. There are provisions for enrichment and acceleration in some countries, including Austria, Belgium and Germany.

The authors suggest that the Austrian education system is flexible both vertically as well as horizontally. It is possible for students to begin school earlier and to skip grades in the 'Grundschule', or elementary school, as well as in middle school and high school. Radical acceleration is possible, with students able to complete school by the age of 15. There is also the opportunity to accelerate in individual subjects and to study university subjects whilst still enrolled in school. Students have access to many enrichment activities, including pull-out programs and Summer camps.

The Scandinavian countries of Denmark, Norway and Sweden share a concern for egalitarian practice in education. Legislation stresses the importance of providing 'equal' experiences for all students. The authors suggest that, in Sweden, providing special opportunities for intellectually gifted students is seen to be undemocratic. The opinion of representatives from Denmark is that gifted students will achieve regardless of their circumstances. While the authors found no evidence for research into gifted education in Sweden and Norway, the Danish Ministry of Education is supporting research conducted by a team of educators and psychologists at the Danish National Institute for Educational Research into problems that appear to be unique to talented students.

Finland differs from other Scandinavian countries in its objectives for the education of high ability students. The focus is on individuality and freedom of choice, with curriculum flexibility allowing for acceleration for the highly able. The authors describe early school entry and 'customisation' of curricula in high school to allow students to move faster through learning experiences, but do not identify provisions for radical acceleration. There is significant research being conducted in Finland regarding high ability, competence, talent and training.

The authors do not identify provisions for radical acceleration in England or Wales. They suggest that there is a concern for egalitarian education, especially in light of historical practices that favoured certain groups of people above others. They identify a strong academic tradition of research on the various aspects of ability, although research focussing specifically on gifted education is rare. Education policy stresses provision for inclusion and there is a focus on strategies to support the education of children with learning difficulties. Despite this focus on inclusion, there is a National Association for Gifted Children in England, which promotes educational provision for gifted students, and there has been a move towards devising national guidelines for gifted education.

Conclusion: The authors point out that there is a great deal of cultural, ideological and economical difference across the 40 nations that make up Europe. National provisions for gifted education appear to reflect these various differences. While some countries strive for differentiation in learning, the main concern for others is equality of experience and integration within mixed ability classes.

There appears to be a divide between countries in Eastern and Western Europe concerning gifted education. Former Communist countries appear to be supportive of provisions for gifted education as they see high ability individuals as essential for promoting the development of a nation's Industry, Science and Economy. The problem for these countries is not controversy regarding provision for gifted students but finding the finance to fund these provisions. In Western parts of Europe, there is generally sufficient funding for national education, however, gifted education is not supported in many countries for ideological reasons. The policies in many Western European countries stress integration and equality. An exception is Austria, where provisions exist for enrichment and acceleration, including radical acceleration.

Commentary: Detailed descriptions are provided of provisions for gifted students, gifted education programs for teachers, and current research into gifted education in many of the 40 European countries. The state of gifted education in each country is presented in the context of the historical, political and cultural influences that have shaped developments in the field.

The Talent Search Model

Rotigel, J. V. and Lupkowski-Shoplik, A. (1999). Using talent searches to identify and meet the educational needs of mathematically talented youngsters. *School Science and Mathematics, 99(6)*, 330-37.

Objective: To examine the role played by talent searches in shaping the education of mathematically gifted students, with special focus on the historical development of the talent search model and the academic and social implications of conducting such searches.

Design: Literature Review.

Setting: Articles and book chapters published over the last two decades.

Assessment of Variables: Literature was reviewed for information concerning the development of the talent search model by researchers at the Johns Hopkins University, the benefits students receive by participating in a talent search, and how schools use information gained from talent searches.

Main Results: Dr Julian Stanley developed the Talent Search model in the early 1970s at the Johns Hopkins University. More than 200,000 students in the United States of America participate in the talent searches each year. Talent searches are now administered by different institutions in most regions. Students complete above-level tests and results are used to identify mathematically talented students, to tailor curricula to match the abilities of the students, and to provide challenging educational opportunities for the students.

It is important to identify students who are exceptionally talented in mathematics and to assess their abilities and achievements appropriately. The more exceptional a student's abilities, the greater is the need to employ assessment tools that test ability far in advance of what might be expected for the student based on his or her age. Also, the more exceptional a student's abilities the greater is the need to make changes to pre-existing curriculum in order to meet the student's educational needs.

The authors outline research that suggests that the mathematics curriculum taught in schools in the United States of America has become significantly less challenging over time. They suggest that it is

important to identify and make adjustments for students gifted in mathematics because they could be suffering seriously at school from an inappropriately simplistic curriculum. The authors suggest that talent searches are helpful because they reveal a student's true ability, allow educators to assess how far this ability might differ from the 'average', and allow learning programs to be designed in line with the student's ability.

The Talent Search process begins with students completing a nationally normed achievement test, such as the *Iowa Tests of Basic Skills*. Students who score at or above the 95th percentile on the composite, or math total, or language total, or on the science sub-tests are recommended for further testing. These students have achieved in the highest ranges of these tests and they may have the ability to achieve beyond the level prescribed by the test questions. They need to attempt more difficult tests that will challenge their abilities further. In this way, their true abilities might be uncovered.

These students go on to complete an above-level test. This is generally a test designed for students who are older. Above-level testing results in a new distribution of marks for students who achieved similar marks on the original, on-level achievement test. These new marks give a better measure of each student's abilities and indicate the amount of acceleration and/or enrichment the student might require. Without above-level testing, students who achieved at similar levels on the normed achievement test might well be offered a similar curriculum, which would be appropriate for some but certainly not for all. Different above level tests can be used. In talent searches in the United States of America, above average 7th graders usually take the *Scholastic Aptitude Test (SAT)* or the *American College Test (ACT)*. Talented elementary school aged students can take the *EXPLORE* test, developed by American College Testing.

Results from above level testing provide a more accurate indication of a student's true level of ability and can be used to determine appropriate educational opportunities. Researchers have developed recommendations for students scoring at particular levels on talent search tests. The recommendations represent a continuum of modifications from enrichment options to radical acceleration. The goal is to match the level and pace of the curriculum to the needs of the student.

The author discusses benefits for talent search participants beyond those already outlined. Students have the chance to access a range of opportunities that otherwise may not have been offered, including summer programs, weekend programs, correspondence courses, and online courses.

Universities sponsor many of these programs. Students are also given the chance to learn more about themselves. Once they have a clearer understanding of their abilities and achievements, they are in a better position to make important choices about courses they may wish to attempt, colleges and universities they may wish to attend and careers they may wish to pursue.

Some talent searches offer honors, awards and scholarships in recognition of students' outstanding results. Some universities that sponsor talent searches offer scholarships that allow students to enrol early. Students are usually offered information regarding educational opportunities for gifted learners. Students and their parents are also made aware of research findings on issues in gifted education. The author suggests that information and support offered to students who participate in talent searches might contribute to their increased involvement in extracurricular educational opportunities. Students who participate in talent searches are also more likely to choose to accelerate their education.

Schools have used the talent search model to identify students who are in need of curriculum modifications. They have developed programs to cater for these students. For example, schools in Southwestern Michigan collaborated with Kalamazoo College to set up The Academically Talented Youth Programs (ATYP). Fifty local school districts are involved in this project. Selected students spend most of their time at school completing special programs. However, one afternoon each week, these students meet on the College campus to complete college level algebra, geometry and trigonometry. The North Hills School District in Pennsylvania offers selected talent search participants a program based on mentoring and accelerated mathematics teaching.

The Appalachia Model Mathematics Program (MMP) is another example of schools making appropriate use of the talent search model. In this case, the talent search model has been combined with a comprehensive mathematics program that employs diagnostic testing followed by prescriptive instruction. Selected students are able to work through a linear mathematics curriculum at their own pace and are able to make dramatic gains.

The authors express some concerns regarding student access to talent searches. They believe that schools may not be informing all students who could benefit from talent searches about opportunities to participate. Many school-based educators believe that a student needs to be an exceptional performer across many domains to be able to attempt a talent search, or that students need to be particularly talented in the language arts area to be able to participate. It is interesting to

note that research has shown that students identified through talent searches as being gifted have not necessarily been identified as gifted at schools.

A problem that can arise for students who participate in talent searches is that schools may not respond appropriately to the talent search results. Schools may not understand the significance of the results. They may acknowledge exceptional performance but then fail to offer appropriate programs or curricula. Many schools may not have staff members who are able to make relevant programming and curricular adjustments for gifted students. Some schools may be willing to make adjustments but implement inappropriate strategies. The author expresses particular concern about subject and grade acceleration and warns that, while acceleration is the most appropriate option for some students, strict guidelines should be followed when considering acceleration for a student and the process should be closely monitored.

Conclusion: Talent searches have been used in the United States of America for over a quarter of a century. They have led to many gifted students being identified and many more such students receiving appropriate educational opportunities. Talent searches have had the added benefit of encouraging research into the characteristics and needs of gifted children.

Commentary: The reader is left with a clear understanding of why the Talent Search model was devised and how it operates. The authors offer a comprehensive explanation of the theory underpinning the model. Research is quoted to show clear benefits of the model for identifying gifted students, detecting their particular needs, and catering for these needs in and out of school. Appendix A lists the University-based Talent Searches in the United States of America. Appendix B presents a guideline that matches performance levels on specific talent search assessments with appropriately challenging learning experiences. This guideline would be particularly helpful for school staff who are involved in programming for gifted students.

Early College Entrance in the United States of America

Sayler, M. F. (1994). Early college entrance: A viable option. In J. B. Hanson and S. M. Hoover (Eds), *Talent development: Theories and practice* (pp 67-79). Iowa: Kendall/Hunt.

Objective: To review the history of early college entrance and to summarise the experiences of students who have chosen this option. To examine the acceptance of early entry by colleges and universities. To describe the advantages and problems associated with entering college early. To offer a set of guidelines for students, parents, and school officials considering early college entrance.

Design: Literature review.

Setting: Literature from 1929 to 1991 concerning early entry to college, including articles from research journals, magazines and newspapers.

Assessment of Variables: Literature was reviewed for information on early entry to college, with particular concern for the historical development of this option, its appropriateness for particular students, special programs, case studies, social and emotional concerns, and potential difficulties. Literature focuses on events in the United States of America.

Main Results: One of the earliest reports of early entry to college was published in 1931 and documented research concerning the top 6% of students at Purdue University (see Remmers 1931). Many top students were found to have been one or more years younger on entrance to university compared to students in a random sample. This study led to a strong acceptance, in the United States, of the benefits of flexible placement of students based on ability. An increased number of students were allowed early entrance to public colleges and universities.

A second period of interest in acceleration occurred in the 1940's and was directly linked to the need to accelerate the education of young people so that they could become military officers at a time of war. Many colleges and technical schools in the United States at this time had some form of early entrance provision.

During the egalitarian years of the 1960s, there was a move away from educational acceleration as this was seen to favour one group of students above others. There was also concern that acceleration would have detrimental effects on the social development of those students who chose this option. This was despite a lack of research data to substantiate these concerns. Recently, this trend has changed and most colleges and universities in the United States allow students to enter early. Many have specific programs to assist very young students to enrol early.

There are many benefits for students who enter college or university early. This option can provide learning experiences that are matched more closely to the abilities of high-aptitude students. They are able to enjoy fast paced learning that requires high levels of intellectual functioning. Other benefits identified by the author relate to time saved because of the acceleration process. Students who choose to radically accelerate often complete multiple or hybrid majors, accept opportunities for study overseas, complete more than one undergraduate degree, have time to be involved in research, and also have time to pursue interests outside of their main areas of study. There are financial advantages related to school fees saved and scholarship opportunities.

Some universities and colleges have organised programs specifically to enable groups of students to enter college early. They provide a peer group of students who have decided to enter early, thereby making the transition to college easier for some students. They also offer provisions to support very young students academically and socially. The author presents as an example the program at the Texas Academy of Mathematics. This program accepts only students who are two years younger than traditional college students and thus does not allow for radical acceleration.

However, case studies are presented of students who have radically accelerated their education and have entered college or university 3 or more years early. Examples include students who entered college early at the turn of the twentieth century as well as some who are currently attending university or college. Overall, the picture is positive with most students achieving well academically and going on to enjoy prestigious careers.

A review of literature concerning social and emotional outcomes for students who enter college early concludes that the benefits far outweigh the disadvantages. Although this review is brief, it quotes studies that show stable personality development for early entry students over the course of their undergraduate degrees. Most studies claim to show that very early entry to college is not related to psychological maladjustment. Studies that rely directly on the experiences of students report that

they express positive feelings towards the experience and positive effects of early entry on their social relationships.

The author draws attention to problems reported by students who enter college early. A small number of students have reported regrets about missed social opportunities (including the high school prom), missed sporting opportunities and missed scholarship opportunities. Others regret missing opportunities to attend more selective universities that require students to graduate from high school before they can enrol.

The author synthesises the information gained from the literature review into guidelines for parents, students and school staff who are considering early entry to college or university. He lists 12 points that cover practical considerations related to admission procedures, issues related to academic abilities, and concerns about social and emotional support. He begins by suggesting that students contact the admission office at the universities they are considering attending as soon as they begin thinking about early entrance. They should explain their circumstances and request information on the university's policies regarding early entrance.

He then suggests that students should take advantage of all opportunities available to them before they enter university, including Advanced Placement courses, honors courses, and advanced-level course work. They should consider attending university summer programs for school students and enrolling in part-time college courses. These experiences will help them to develop important skills, including managing time and energy, taking responsibility for personal hygiene and laundry, and setting appropriate hours for sleeping and studying. Students should assess the extent of their personal organisational skills, keeping in mind that successful college students are good time managers, can analyse tremendous quantities of in-depth materials, and can communicate effectively with teachers and colleagues.

Most importantly, students need to be clear about their decision to enter college early and need to take into account possible negative consequences as well as possible positive outcomes. They should take time to investigate a range of early entrance options and consider carefully the benefits offered by programs which accept an annual cohort of students. They should decide whether it would be best for them to live on campus or whether commuting would be more appropriate.

The author suggests that students should identify their career goals and then attempt to match these goals with opportunities offered at particular universities. For instance, students should choose a university that offers majors or research opportunities in their area of interest. They also need to be sure that they have the abilities to study at the institutions to which they apply. The author suggests that their scores on achievement tests, for instance *Scholastic Aptitude Test-Mathematics*, *Scholastic Aptitude Test-Verbal* and *American College Test-Science*, be at least as high as the average for freshmen at the institutions they are considering.

Once students have selected the universities they believe would best suit their needs the author suggests that they visit the campuses and meet with the admissions personnel. They may be able to meet staff and talk to other early entrance students. Finally the author advises students to avoid excessive publicity. He suggests that an overly public profile may bring unreasonable expectations from others and may lead to the student being placed in uncomfortable situations.

Conclusion: Despite educators' fears of social or emotional problems, most students electing to enter college early can expect to experience achievement, make friends, participate in extracurricular events and organisations, and take part in normal social activities and development. Early entrance to university or college is not an appropriate option for all students. It appears to be most successful for highly gifted students who have well developed study skills.

Commentary: The author presents a review of a modest number of articles concerning early college entrance. This restricts the conclusions that can be reached but is a reflection of the limited amount of research available on this topic. The synthesis of findings into a list of important issues to be considered before a decision is made about early entry is a valuable addition to the literature on this issue.

A Case Study of Radical Acceleration in Canada

Sharkey, O. C. (1987). Tony Lai, age 14, B.Sc., prodigy. *Roeper Review*, 10(2), 94-96.

Objective: To analyse the development of a prodigy.

Design: Case study.

Setting: Charlottetown, Prince Edward Island, Canada.

Participants: Tony Lai, a 14-year-old prodigy.

Assessment of Variables: Information was presented concerning educational achievements, social and emotional development, and variables influencing educational decisions.

Main Results: Tony was born in 1972 in Charlottetown, Prince Edward Island, Canada. He parents are Chinese immigrants. Tony's father is a professor of physics. He has one brother, Jim, who is five years older. Jim is in his fourth year of university. He has achieved excellent academic results and his grade point average is near the top for his cohort. He entered university one year early.

From the time Tony was an infant, he exhibited signs suggestive of intellectual giftedness. He traced letters in his mother's writing, in books, and in printed materials from the age of 18 months. He could write letters and numbers well by the age of 2 years. From the age of 3 years Tony became interested in drawing 2-dimensional views of traffic lights, laundry symbols and Volvos. He would usually spend between one and three months on the same topic before moving on.

He began to count at the age of 3 years and 6 months, and at about this time was able to count 18 pieces of chocolate. By four years of age Tony could add and subtract. At 4 years and 6 months he began to copy calendars. Eventually he could calculate people's birth dates in a few seconds. At 5 years of age Tony's father showed him how to multiply. Before Tony went to school, he could add and subtract fractions with ease. He could also read and write.

Tony commenced school in grade 1 in 1978. The teacher did not acknowledge his abilities. Tony was absent for about a third of grade 1 due to minor illnesses. In grade 2 Tony began to work on a computer at home. He taught himself how to use the computer by making his way through the instructional manual. Since this time he has spent several hours every day working on a computer. His grade 2 teacher acknowledged Tony's abilities and started him on an individual program for mathematics. Tony completed math to half way through 5th grade while in grade 2, reaching grade 8 level in some areas. In grade 3 Tony wrote many poems. He also completed grade 9 math.

Tony skipped grade 4 and entered grade 5 in 1981. During this year he completed math to grade 12 level. In August 1982, at the age of 10 years, Tony was tested at the local university. He was found to be achieving at the 95th percentile in a *School and College Ability Math Test* designed for college entrance students, and at the grade 9.5 level on the *Wide Range Vocabulary Test*. Several Piagetian tests showed that he was functioning at the formal operational stage. He seemed to be a well-adjusted and pleasant child. The school principal and teachers reported that Tony got along well with both students and teachers.

In 1982 Tony entered grade 6 and commenced calculus with some help from his father. In May 1983 he enrolled in a calculus course at the University of Prince Edward Island, topping his class with a score of 92%. He then enrolled in a second calculus course and again topped his class with a mark of 97%.

On the advice of his elementary school, Tony skipped junior high and applied to enrol in a senior high school. The senior high school was hesitant about allowing Tony to enter and was slow to make a decision. Tony finally decided that the best option for him would be to skip senior high school and to apply directly to University. After further testing and assessment, Tony was admitted to the University of Prince Edward Island (UPEI).

Tony performed very well on a series of tests he completed just before and during his university study. He was placed among the top 10 out of 150 in the Prince Edwards Island Mathematics Competition for first year university students. In the *Wide Range Vocabulary Test*, he progressed from an age score of 14.5 years to a score of 20.5 years during his 3 years at Prince Edward Island University. His IQ was measured at 150 on the *WISC-R* test and the *Otis* IQ test.

Tony was required to see a counsellor during his first semester at university to ensure that he was coping with university life. The counsellor noted Tony's excellent sense of humor, good concentration and his sophisticated political and philosophical views. On testing Tony was found to be more serious, shy and trusting than average high school or college students.

Flexible pacing allowed Tony to finish four years of university in three. He received the prize for coming first in science in his initial year and was awarded a full scholarship for the following year. He finished first in second year, which enabled him to continue to receive the scholarship he had won in first year, and to gain another scholarship. He also won the I. P. Sharp Scholarship for Computer Science. Tony completed his third year at university by winning prizes for first place in fourth year and first place in the Science Faculty. He won a prize for Computer Science and was awarded the Governor General's Gold Medal. He received a Natural Science and Engineering Research Council of Canada Scholarship for postgraduate work, and was accepted by the University of Toronto into the M.Sc. program for Computer Science.

Tony delayed his postgraduate studies for a year because it was difficult to make residential arrangements for such a young student. He spent one more semester at the University of Prince Edward Island and then worked through two textbooks for courses that he would be taking in graduate school. At the age of 14 years and 9 months Tony entered graduate school. By July he had taken five courses and had achieved marks in the nineties for all of them. He was coping well with graduate work and was enjoying new social relations.

Many variables seem to have played a part in influencing the direction of Tony's life. His story makes clear the importance of the role of the individual in his own development. Tony has remained motivated and self-directed. He worked on his own at a very young age to figure out the structure of calendars. He taught himself how to use a computer. Persistence played a big role in his development. His story also stresses the important role others can play. His parents played an especially important role. They were supportive of what Tony wanted to do. They were sensitive to his needs and supplied moral support.

Radical acceleration played an important part in Tony's education. It allowed him to enjoy appropriately challenging learning experiences. Tony does not appear to have suffered any adverse social or emotional effects from acceleration. He shows little signs of stress or anxiety. He is

sensitive to the needs of others. He tends to be quiet but evidence points to good personality development and social adjustment.

Conclusion: Tony Lai is an individual who has made exceptional academic progress at school and university. Educational options allowing for radical acceleration made this possible. Such radical acceleration did not affect Tony's development adversely. He is a well-adjusted young man who is motivated to achieve, and enjoys satisfying relationships with peers.

Commentary: This case study presents rich information regarding the radical acceleration of an individual student. It is testimony to the considerable benefits that can accrue to individuals who are allowed to move through school and university at a pace that is most conducive to their learning. Academic rewards can be plentiful, and there are many benefits for social and emotional development.

Gifted and Talented Education in China

Shi, J. and Zixiu, Z. (2000). Psychological research on the education of gifted and talented children in China. In K. A. Heller, F. J. Monks, R. J. Sternberg and R. F. Subotnik (Eds), *International handbook of giftedness and talent* (pp 757-764). New York: Elsevier.

Objective: To outline the development of gifted education in China.

Design: A review of research literature regarding Gifted Education research and practice.

Assessment of Variables: Research articles were reviewed for information regarding identification and characteristics of gifted students, research into gifted education and educational provisions for the gifted.

Main Results: There have been procedures to identify talented children in China since ancient times, when children younger than 10 were said to be prodigies if they could read and understand either 'shi jing' (the Book of Songs) or 'lun yu' (the Analects of Confucius). Widespread and systematic provisions for gifted children, along with research into gifted education, have existed in mainland China since 1978. In Hong Kong, the gifted education movement started later, with the Gifted Education Council being founded in 1988.

Gifted children are identified by their results on a multitude of measures, including: tests of cognitive ability and creativity; analysis of the creative process; tests concerning learning ability and achievement; observation and analysis of the learning process; tests concerning special talent areas; assessment and observation of work products; and questionnaires, observation and interviews to measure personality traits. In Hong Kong, a focus on Gardner's model of multiple intelligences has led to the development of a set of 'multiple intelligences tests' that are used, along with other cognitive tests and peer nominations, to identify gifted students.

Research in China into gifted education has focussed on four main areas: the development of cognition; thinking and reasoning ability of gifted children; the development of creativity in gifted children; and the development of personality traits. Research into cognitive ability has looked

particularly at memory and metamemory in gifted children, as excellent memorisation is identified as one of the main characteristics of gifted students.

Special schools and classes have been established in China to cater for students who are gifted in the arts, including music, painting and dance. Special classes for intellectually gifted adolescents were started in 1978 at the University of Science and Technology of China (USTC). Since then, gifted experimental classes have been set up in many elementary schools, secondary schools and universities. Students in these classes are able to radically accelerate, completing their schooling four years earlier than is conventional. Teaching materials and instruction strategies are modified according to the cognitive and affective traits of gifted children. Students are encouraged to develop abilities of self-regulation, self-education and self-actualisation.

Research has documented positive outcomes for students completing their education in special classes for gifted students. These students complete their studies in a shorter period of time and with excellent results. They pass the university entrance exams with significantly higher scores than their older peers and enrol at prestigious universities. The vast majority attain PhD degrees, a significant number from overseas universities.

The authors outline future directions for gifted education in China. They identify the lack of financial support as a particular problem for both research and educational practice. There is limited research in progress due to the lack of funds, as well as a lack of researchers interested in the field of gifted education. They also identify teacher training in gifted education as an area in need of development. They suggest that future research could focus on implicit learning and creativity; brain function and giftedness; leisure time of eminent individuals; and personality traits and situational problem solving.

Conclusion: Since 1978, gifted education in China has developed at a fast pace. There are many enrichment and acceleration opportunities for gifted students on the mainland, while provisions in Hong Kong focus on enrichment opportunities. Provisions for radical acceleration are available for highly gifted students across mainland China. Students who radically accelerate tend to progress to early university entry. They attain excellent academic results in school and at university.

Commentary: This chapter presents an historical view of the development of gifted education in China. A detailed account of the methods used to recognise giftedness, including an outline of the

theory on which these procedures are based, provides an excellent model for identification of gifted and talented students. Discussion concerning strategies to address affective needs of gifted students provides insights into the changing focus for gifted education in China. Suggestions for future research into gifted education and plans for further developments of provisions for gifted students may well have relevance for educators in other countries.

Options for Radical Acceleration in China

Sisk, D. A. (1992). Reflections and impressions on education in China. *Roeper Review*, 14(4), 181-185.

Objective: To report on the People to People Seminar in Gifted Education in the People's Republic of China, 1991.

Design: Interview and Observation.

Setting: Universities, middle schools, elementary schools and kindergartens in the People's Republic of China with programs designed specifically for gifted and talented children.

Participants: Teachers, administrators, psychologists and researchers involved in gifted education.

Assessment of Variables: Subjects were interviewed and educational sites visited. Provisions for gifted children were described and appraised in light of current knowledge and practice in the United States.

Main Results: Educationalists in the People's Republic of China are encouraged to use a multi-measure diagnostic approach to identify gifted children. The process includes rigorous examinations and interviews. Longitudinal studies have informed the development of this approach. All students are assessed before commencing elementary school. Students identified as gifted tend to enter 'experimental schools', of which there are more than 150. The focus at these schools is on educational acceleration. The elementary grades can be completed in four years instead of six, the middle grades in four years instead of six, and the senior grades in two years instead of three. Most children attend the 'Children's Palace' after school and on Sunday where enrichment is offered in math, science, English, instrumental music, calligraphy, martial arts, ballet, gymnastics, computers, dance and art. Some schools arrange for gifted students to be placed with an expert mentor to encourage growth in a special interest area.

In general, gifted children finish school two to four years earlier than their age-peers. Gifted students can then participate in programs for early entry to university. They need to apply for a position in such programs and the selection process includes interviews and examinations.

Provisions for gifted students in China and the United States are compared and contrasted. Sisk suggests that educators in the United States could learn from some of the teaching methodologies employed in China. These include processes through which children are taught to break down complex problems into manageable parts, skills for time management, and positive reinforcement strategies.

Conclusion: Provisions for gifted students in China emphasise acceleration. Radical acceleration is available to school students who perform well in examinations and interviews and is relatively common. Early entry programs at universities allow students to continue to accelerate their education.

Commentary: This report gives detailed descriptions of practices designed for gifted children at educational sites in Beijing and Nanjing and outlines the philosophical underpinnings of such practices. The philosophy underpinning educational provisions for gifted children in China as well as the provisions themselves, are compared to those in the United States.

Support for an Ability-Based Education System

Stanley, J. C. (1978). Educational non-acceleration: An international tragedy. *Gifted Child Today*, 1(3), 2-5 and 53.

Objective: To present arguments against an age-in-grade lockstep education system, such as exists in the United States of America. To present evidence in support of an ability-based education system, that would allow selected students to accelerate their learning.

Design: Personal response.

Setting: This paper is an updated version of an invited address to the Second World Conference on Gifted and Talented Children held at the University of San Francisco, August 2, 1977.

Assessment of Variables: Arguments in support of an ability-based education system that would allow for academic acceleration have been supported by findings from pertinent research, mainly case studies, concerning appropriate educational interventions for gifted students.

Main Results: Many intellectually gifted students have been prevented from accelerating their education by parents, educators and psychologists. This appears to be due to over-confidence in the benefits attributable to an age-graded education system. Such a system functions in the United States of America as well as in many other countries around the world.

Much evidence has accumulated over more than half a century to show that highly able youth who choose to quicken the pace of their education achieve considerable academic success. Research shows that students who move ahead faster than their agetates are not harmed emotionally or socially. The author believes that disallowing these students to proceed at an appropriate pace can in itself cause academic and emotional harm. However, despite these positive research findings, and although it was once common in the United States of America for students to move at their own pace through the school curriculum, this is not presently a popular choice.

The author quotes research to show that educators are resistant to acceleration because they fear that a student's social and emotional well-being will suffer. Educators also identify difficulties related to

scheduling considerations. Other studies uncover a basic ignorance among educators regarding the research concerning the best educational options for gifted students. The author points out the great number of educators who base their beliefs about educational acceleration on unsubstantiated anecdotal evidence rather than on significant research findings. He does not deny that there are some students for whom acceleration has not proven successful; however he suggests that it is unfair to expect every student who accelerates to achieve outstanding results and he points out that we do not expect perfect outcomes following other educational interventions. He also suggests that educators may harbor fears about teaching precocious students and that this may affect their readiness to adopt acceleration strategies; however he offers no empirical evidence to support this theory.

The author suggests that educators prefer to use teaching strategies that focus on enrichment. He argues that the majority of enrichment activities are unsuited to gifted students. In general they provide work that serves to keep a student 'busy' but do not challenge students' ability nor move their learning forward.

The author suggests that educators hold unreasonable assumptions regarding relationships between chronological age and emotional development. He states that it should not be assumed that a student's social and emotional development is dictated by age, or that age mates will prove to be ideal social and emotional peers. He believes that educators need to accept that individual differences exist within and between students and that age may not be a strong determining factor for intellectual or social development.

The role played by parents in the education of gifted children is a focus of this article. Parents can be supportive or can hinder the development of their gifted child. It is suggested that they need to become informed about appropriate education for gifted students and to advocate for their child. They need to involve the child early in educational decision-making. Parents cannot afford to be authoritarian, aggressive and dominating. Children of such parents tend to become resistant to suggestions parents might make and also to suggestions of other adults. On the other hand, the author suggests, parents cannot afford to be too removed from their child's education. They need to be accepting of their child's abilities, to help their children to make decisions about their education, and to support these decisions. The author quotes research indicating that parental stability and parental encouragement are important factors influencing the outcomes of acceleration. Parents' education and income levels do not seem to correlate with acceleration outcomes.

A model for educational acceleration is outlined, based on theories of individual difference. The author argues that students possess different academic abilities. He suggests that these abilities need to be clearly identified before appropriate curricula can be planned for each student. Assessment will reveal that the abilities of some students are at levels well beyond those of their age peers. These students should be offered options for learning that will allow them to attempt advanced work at a faster pace. Acceleration options are appropriate for these students.

The author then outlines case studies of students for whom acceleration, particularly radical acceleration, has led to extraordinary academic outcomes. Merrill Kenneth Wolf received a baccalaureate degree from Yale University at the age of 14 years as did Norbert Weiner from Tufts University at the same age. Many students in Terman's classic longitudinal study of gifted youth made speedy educational progress and great academic gains.

A short description of the Study of Mathematically Precocious Youth (SMPY) at Johns Hopkins University is presented along with case studies of students who have radically accelerated their education with the help of SMPY. SMPY was established by the author to cater specifically for gifted students who would benefit from educational acceleration. It is the aim of SMPY to organise opportunities for gifted students to accelerate. Students participate in a talent search run by SMPY and, if eligible, are offered counselling and support to access educational opportunities most appropriate for them.

One 7th grade student who participated in the SMPY talent search was the top scorer of all 192 science contestants and ranked third among 396 students who took mathematics tests. He completed college courses in mathematics during summer holidays. He skipped eighth, eleventh, and twelfth grades. He then entered the Johns Hopkins University and completed a Bachelor of Engineering Science degree in electrical engineering. He graduated from university aged 17. He then went on to complete a PhD in computer science at Cornell University. A second student assisted by SMPY also graduated at the age of 17 years from Johns Hopkins. He too won a National Science Foundation 3-year graduate fellowship. He skipped the second, eleventh, and twelfth grades and began taking university courses during eighth grade. A third student skipped the seventh, ninth, tenth, and twelfth grades. He completed college in five semesters and graduated at the age of 17 years. He went on to complete a Master of Business Administration degree and a PhD degree in

economics at the University of Chicago. The educational experiences of three other students who were assisted by SMPY are also described.

All students who were assisted by SMPY reported being glad that they had entered college early. All seemed satisfied with their social development and emotional stability. Educational acceleration, in most cases of more than 3 years, appears to have allowed these students access to appropriately challenging curriculum. Acceleration also allowed them to have more time after graduation from university to pursue further opportunities for study. Research suggests that the success of these students relates to the fact that they were intimately involved in making all decisions about their educational progress. The author suggests that students must be motivated to achieve and must be actively involved in making decisions about their education if acceleration is to work.

The author goes on to outline three further cases of individuals who were able to radically accelerate but without the support of SMPY. All three achieved outstanding results at school and university and went on to successful careers. One became a medical doctor and researcher while the other two became renowned mathematicians.

One of the most important ways in which SMPY supports gifted students is to inform them of the many educational options available to them and to assist them in choosing the most appropriate alternatives to suit their particular circumstances. Students may enter school early, they may skip school grades and they may totally skip senior high school. Many colleges and universities allow students to enrol early and some offer special programs for gifted students. Some students may telescope their learning so that they complete two or more years of school in only one year. A special mentor can act as a role model and support figure. Mentors might introduce students to research opportunities. Students can take college level courses during the holidays, through correspondence, or through part time enrolment on campus or at a community college whilst still enrolled at school. Each student will make a unique choice amongst these offerings.

Conclusion: Among educators, educational psychologists, parents and the general public, personal opinions may prevail over the strong body of research evidence that supports ability-based education, including academic acceleration. An ability-based educational system would be able to cater more appropriately to students' individual differences. Without such a system in place, there is a need for centres such as SMPY to act to identify precocious students, to inform these students and their

parents about appropriate educational opportunities, to help students and parents to make educational choices, and to support these students in their choices.

The author notes that the experiences he shares in this article about educating gifted students have taken place in the educational context of the United States of America. The research he quotes has also taken place in this context. He cautions readers from other countries to view this paper in light of their own circumstances and to realise that any suggestions for change will need to be modified to address national differences in educational contexts.

The author also cautions readers that the case studies and research directly undertaken by SMPY involves participants who are among the top 1% to 3% of their age group and that SMPY specifically works with students who are gifted in mathematics and/or science. Care needs to be taken when extrapolating results to students who are gifted but are not in the top 3% of their age cohort and for students who are gifted in areas other than mathematics and/or science.

Commentary: An interesting element of this article is the theory proposed to account for the resistance many educators express to educational acceleration for gifted students. Factors influencing the success of educational acceleration are discussed in depth. It is interesting to note that more recent research identifies the same influencing factors; namely the opinions and beliefs of educators, the relationship of students and parents, the support offered by parents, and the role of the students in deciding their own educational path.

Case studies lend support to the author's suggestions for appropriate programming for gifted students. They particularly illustrate the academic benefits that can result from radical acceleration. It would have been interesting if similar case studies were presented to explore the author's assumptions regarding negative outcomes consequent to disallowing acceleration.

The Study of Mathematically Precocious Youth

Stanley, J. C. (1978). Radical acceleration: Recent educational innovation at JHU. *The Gifted Child Quarterly*, 22(1), 62-67.

Objective: To describe the purpose of the Study of Mathematically Precocious Youth (SMPY) and to illustrate ways in which SMPY has assisted gifted students to access appropriate educational opportunities.

Design: Case Studies.

Setting: Presentation at the meeting of alumni of The Johns Hopkins University in Washington DC in September 1977.

Participants: Students who were identified by SMPY and assisted to access educational opportunities best suited to their abilities.

Assessment of Variables: Case studies of students were presented to highlight the different pathways that each chose to progress through education, the radical nature of the educational acceleration chosen by the majority, and outcomes for the students in terms of academic achievement.

Main Results: The first case discussed was a male student who entered Johns Hopkins University aged 13 years in 1969, after completing the eighth grade at a junior high public school. This student graduated with a Master's degree in the Science of Engineering at the age of 17 years. At age 21, he was completing a doctoral degree.

Another student, Jeff, spent a year studying at Johns Hopkins University before transferring to Princeton. He entered university two years earlier than usual. Jeff graduated in mathematics *summa cum laude* and with membership in both *Phi Beta Kappa* and *Sigma Xi*. He won a National Science Foundation 3-year graduate fellowship and completed a Masters degree in two semesters. He enrolled in a doctoral degree in mathematics at the University of California at Berkeley.

Mike enrolled at the Johns Hopkins University at the age of 14, three years earlier than his age mates. He majored in theoretical physics and maintained an almost perfect grade point average. He graduated at the age of 18 years and 6 months and was elected to membership in *Phi Beta Kappa*. Like Jeff, Mike won a National Science Foundation 3-year fellowship and commenced doctoral study at Princeton University.

Colin completed work for an arts degree in quantitative studies within a few days of his 17th birthday. He had skipped seventh, ninth, tenth and twelfth grades at school before entering university. He then completed his undergraduate degree in 2 years and 6 months. At school he was a wrestling champion, represented the school on television as a member of their academic quiz team, tutored other students, played golf, and taught himself college level physics. At university he was a member of the varsity golf team, took advanced course in a variety of areas including political science, economics, astronomy, and mathematics, and wrote feature articles for the student newspaper. Colin also wrote for a weekly newspaper in Ocean City Maryland. He completed a Masters degree and a doctorate in economics at the University of Chicago.

Eugene entered Johns Hopkins aged 15 years and 2 months, with sophomore standing. He had skipped the second, eleventh, and twelfth grades at school. He graduated from university two months before his 18th birthday. At the age of 12, and while still in the eighth grade, Eugene completed a computer course at Johns Hopkins and graduated with an 'A'. During summer holidays and whilst still enrolled at school he completed courses in college algebra, trigonometry, mathematics, and organic and inorganic chemistry. He was able to enter Johns Hopkins with 39 credits. Eugene won a National Science Foundation 3-year graduate fellowship and completed a doctoral degree in electrical engineering at MIT.

Paul received his undergraduate degree from Johns Hopkins University aged 17 years. He entered university three years earlier than his age-peers. He was elected to membership in *Phi Beta Kappa* and won a National Science Foundation 3-year graduate fellowship. He studied for a PhD degree in computer science at Cornell University.

Most of the students described in the article were identified through the College Board's *Scholastic Aptitude Test (SAT)*, taken when they were 9 to 15 years old. These students did exceptionally well on the *SAT* and were offered a diverse selection of educational options geared towards educational acceleration. Most students chose options that allowed them to radically accelerate their education.

Conclusion: The experiences of the students mentioned in this article illustrate the high levels of academic success precocious students can attain if they are allowed to radically accelerate their education. The reader becomes aware of the need to offer a wide range of accelerative strategies, as it appears that each student needs to find options that are best suited to his or her circumstances and abilities.

Commentary: This article in essence describes successful cases of students who radically accelerated their education. The author concentrates on the academic development of the students. There is a suggestion that concerns regarding social and emotional development were discussed in questions that followed the presentation of this talk.

Radical Acceleration at Johns Hopkins University

Stanley, J. C. and Benbow, C. P. (1983). Extremely young college graduates: Evidence of their success. *College and University*, 58(4), 361-71.

Objective: To produce a complete list of the youngest graduates from Johns Hopkins University and to assess their success at university and after graduation.

Design: Retrospective longitudinal cohort study.

Young graduates, specifically those completing university three or more years early, were identified through relevant administration channels. In addition, every living retired faculty member was asked to recall the names of any young graduates while a letter was published in the alumni magazine appealing to current faculty members for names of young graduates. This identification process continued for three years. University records for the young graduates were obtained and studied for evidence of academic success.

Setting: The Johns Hopkins University.

Participants: Students not yet 19 years old receiving a bachelor's degree from the day school of the Johns Hopkins University from its founding in 1876 to 27th May 1982. Such students would have accelerated their education by at least three years.

Assessment of Variables: Academic success was measured by the number and type of degrees obtained, honors and awards conferred at graduation and current job status.

Main Results: Thirty two early graduates were identified who had accelerated their education by at least three years from 1876 to 27th May 1982. The youngest was aged 15 years and 7 months and the oldest 18 years and 11 months. Twelve graduates were younger than 18 years of age.

The early graduates were successful at university. Twenty students (65%) graduated with honors, 11 with membership in *Phi Beta Kappa*, and 4 with National Science Foundation Scholarships. One

female student became a Rhodes scholar and one male student accepted a Churchill scholarship. Other graduates earned membership to various honor societies and won fellowships.

Early graduates have been successful since graduation. One became the dean of the Graduate School of Arts and Sciences at Harvard. Another became a professor of mathematics at Harvard before age 30. Eagle is a prominent biologist and developed the Eagle medium. Dryden was a prominent physicist and Kerrelmeyer had a long career as a professor of physics. Schaffer was well known in paediatrics. Most young graduates have gone on to graduate work at prestigious universities. Several have Ph.D. degrees and academic appointments. The 20 students born between 1955-1965 have made a successful start on their careers.

Twenty of the 32 graduates received their degree at Johns Hopkins University between the years 1973-1982. Only 12 subjects graduated in the preceding 96 years. This increase appears to be due, principally, to the impact of the Johns Hopkins' Study of Mathematically Precocious Youth (SMPY), founded in September 1971. SMPY was established at the Johns Hopkins University to identify and support gifted students. The staff at SMPY have encouraged and supported the acceleration of many of the most recent young graduates.

Of the 32 early graduates, only two were female. Johns Hopkins only started accepting female students in 1969 and at the time of this study males still constituted the larger proportion of the student body, with 68% of freshmen being male. The gender discrepancy may also suggest that gifted female students are less eager to accelerate.

Students have graduated at other institutions at ages even younger than those at Johns Hopkins University and have achieved similar academic success. A male graduated from Brooklyn College *summa cum laude* in mathematics at the age of 15 years and 4 months. A student at the University of Washington graduated at the age of thirteen years, while others at the same site have graduate at the ages of 14 and 15. Case studies of radical accelerands report high levels of success at university and in their careers.

Conclusion: Students who graduate three or more years early from university tend to be very successful in their university study. This success tends to continue, with many early graduates going on to earn Ph.D degrees and accepting faculty positions at prestigious universities. Many early graduates have made important contributions to their chosen fields.

It is argued that larger numbers of students should be permitted to radically accelerate their education. Parents who are hesitant about allowing children to radically accelerate need to be informed of the benefits. Further programs need to be established for radical acceleration at university. These programs need to offer special provisions to support these younger students.

Information concerning early graduation from universities and colleges across the United States needs to be collected and analysed. This appears to be a neglected institutional research area.

Commentary: The methodology used in this study could easily be applied at other college and university sites. A retrospective study such as this works well to illustrate the academic and career success of students who have been radically accelerated.

The Study of Mathematically Precocious Youth

Swiatek, M. A. (1993). A decade of longitudinal research on academic acceleration through the Study of Mathematically Precocious Youth. *Roeper Review*, 15(3), 120-124.

Objective: To discuss the longitudinal studies conducted by the Study of Mathematically Precocious Youth (SMPY). This program was originally developed by Professor Julian Stanley at Johns Hopkins University to provide accelerative academic experiences for students who achieve high scores on the math section of the *Scholastic Aptitude Test (SAT)* while in middle school. The review gives particular attention to exploring two misconceptions: that students who accelerate work too hard and burn out, and that students who accelerate will have gaps in their knowledge as a result of the acceleration.

Design: Review of research literature.

Setting: The Study of Mathematically Precocious Youth (SMPY), Johns Hopkins University

Assessment of Variables: Research-based reports of longitudinal studies dealing with educational acceleration conducted by SMPY over the past decade were located and analysed for characteristics of the participants, methods of acceleration, and types of outcomes.

Main Results: Julian C. Stanley founded SMPY in 1971 at The Johns Hopkins University. With this program, Stanley pioneered the Talent Search model for the identification of gifted young people. Junior high school students are given the opportunity to sit the *Scholastic Aptitude Test (SAT)*, an aptitude test usually taken by students in the final year of high school. These younger students who perform well on this test are informed of opportunities to enrich and extend their education. SMPY offers support for students who choose to take up special academic opportunities. Many students have chosen to radically accelerate their education with the support of SMPY.

In Its first year of operation, SMPY established longitudinal studies of students identified as being highly gifted. At the time of this article's publication, data concerning the first cohort of students identified and assisted by SMPY had been collected for two decades. Data included measurements of students' intellectual and creative capacities, demographic information, information about the enrichment and acceleration strategies students had chosen, and academic and psychosocial

outcomes. *SAT* score requirements for inclusion in the study varied over time, as did the geographical area from which students were selected and the number of sites at which the talent search was conducted. At the time of publication the SMPY longitudinal study was located in the Office of Precollegiate Programs for the Talented and Gifted (OPPTAG) at Iowa State University.

SMPY has conducted a substantial amount of research on educational acceleration. Studies have examined the academic and psychosocial outcomes for specific types of acceleration, including subject acceleration, grade skipping and radical acceleration. In general, SMPY studies show that students who choose to accelerate their education, including radical accelerands, continue to achieve exceptional academic outcomes. They do not appear to 'burn out' and do not appear to suffer from gaps in their knowledge or skills.

Psychosocial outcomes for students who accelerate their education are also very positive. Most students report high levels of satisfaction with the process. Studies designed to identify factors that may hinder the accelerative process have encountered difficulties because accelerated students have been so positive about the process that such factors have not been evident. Interestingly, students who have radically accelerated appear to be somewhat less involved in extracurricular activities than other students. The significance of this trend is questionable and experts have suggested that it may reflect a healthy interest in academic pursuits rather than an unhealthy lack of social interaction. Findings on these students do not suggest that they are personally concerned about their psychosocial adjustment.

Findings regarding self-esteem are less clear-cut. Some studies show self-esteem scores to be slightly lower for accelerated students while others show no difference between accelerated and non-accelerated students. However, all studies report that self-esteem scores of accelerated students, including those who have radically accelerated, are positive. The slight decrease in the self-esteem of accelerated students may reflect a short-lived phenomenon related to the move to a more intellectually challenging environment and the opportunity to compare themselves against a higher ability comparison group.

Conclusion: Acceleration is an educational option that is inexpensive to implement and can be used in most educational settings to meet the learning needs of many gifted students. Results of longitudinal studies conducted by SMPY over the past twenty years show that acceleration does not harm students either academically or psychosocially. Moreover it appears to assist many gifted

students to establish a foundation for advanced learning, maintain interest and involvement in academic activities, and earn extra time that can be used for the development of a career. This last benefit is particularly applicable for students who choose to radically accelerate their education.

Commentary: This article presents a synthesis of research conducted by SMPY over the past twenty years. This substantial body of research has provided a solid foundation on which many subsequent programs for gifted students have been based. As such, this synthesis represents a valuable insight into the evolution of gifted education over the past twenty years and provides sound grounds for program development. Although this article addresses educational acceleration in all its forms, it is particularly valuable for its findings on the academic and psychological outcomes of radical acceleration.

The Academic and Psychosocial Development of Accelerated Students

Swiatek, M. A. and Benbow, C. P. (1991). Ten year longitudinal follow-up of ability-matched accelerated and unaccelerated gifted students. *Journal of Educational Psychology, 83(4), 528-38.*

Objective: To compare the academic and psychosocial development of accelerated students with a group of equally gifted students who did not accelerate their education.

Design: Longitudinal cohort.

Setting: Study of Mathematically Precocious Youth (SMPY).

Participants: Subjects were drawn from Cohorts 1 and 2 of the Study of Mathematically Precocious Youth (SMPY). Members of Cohort 1 participated in a talent search in 1972, 1973 or 1974.

Students were in either 7th or 8th grade at the time of the talent search. Minimum qualifying scores for this cohort were 390 for *Scholastic Aptitude Test-Math* or 370 for *Scholastic Aptitude Test-Verbal*.

Members of Cohort 2 participated in a talent search in 1976, 1978 or 1979. Cohort 2 students were all in 7th grade at the time of the talent search. Minimum qualifying scores varied for this cohort depending on the year they attempted the talent search. For instance, in 1976, the total of twice the *SAT-M* score plus the *SAT-V* score was required to meet or exceed 1330. Nationally, the scores for all Cohort 2 participants placed them in the top 0.5% of students their age with regard to mathematical ability.

At the time of this study, subjects from both cohorts had reached a minimum age of 23 years. They were delegated to one of two groups, accelerates and nonaccelerates. Accelerates were defined as students who enrolled in college at least one year early, and included students who had radically accelerated their education. Nonaccelerates were students who enrolled in college at the usual age. Members of the groups were matched for gender and ability on *SAT* score. There were 107 students in each group, 69 males and 38 females.

Assessment of Variables: A longitudinal questionnaire was mailed to participants. The questionnaire asked about educational history, educational aspirations, undergraduate grade point average, undergraduate awards and honors earned, graduate school attendance, quality of schools (both undergraduate and, if applicable, graduate), academic and creative accomplishment, publications, and research participation. These variables were assessed using multiple choice and free-response questions.

The quality of schools attended was assessed using national rankings of institutional quality. At the undergraduate level, Astin's (1977) rank ordering of United States colleges and universities was used. At the graduate level, departments were ranked according to Gourman's (1983) listing of graduate and professional programs.

The psychological and attitudinal variables of self-esteem and locus of control were assessed using two 6-item scales. Participation in undergraduate extracurricular activities, attitudes towards college, and attitudes towards mathematics and science were also assessed.

Students in the two groups were compared on the academic and psychosocial/attitudinal variables described above. In addition, comparisons were made between males and females and between those students who had entered college only one year early and those students who had entered two or more years early, including those students who had radically accelerated their education.

Main Results: Only one statistically significant difference was found between students who accelerated their education by one year and those who had accelerated their education by between two and five years: responses from all students who accelerated by more than one year reflected a more internal locus of control than did those who entered college one year early. Otherwise, results for accelerates were true for all accelerates, including those who had radically accelerated their education.

Variables that contributed most to the prediction of membership in the acceleration group were educational level, number of mathematics courses taken that were not required for graduation, and undergraduate grade point average. The first two variables favored accelerates, with the last being slightly lower for accelerates.

Level of achievement in college was high for both accelerates and nonaccelerates. The majority of students in each group attended prestigious universities, earned grade point averages of B+ to A-, and aspired to obtain further education. The accelerates reported a higher average level of educational attainment at the time of the survey than did the nonaccelerates.

No significant differences were found between the groups for any psychosocial variable. On average, students in both groups liked college, were active in extracurricular areas, and expressed positive attitudes towards mathematics and science. Locus of control for both groups was internal. Mean self-esteem scores for both groups were high.

Gender differences were found within and between groups. Among the accelerates, more male students reported having taken more college mathematics courses that were not required for graduation than did female students. Among nonaccelerates, males rated science as being more important to their planned careers than did female students. In both groups, *SAT-M* scores were higher among male students than among female students, and male students reported that they felt more confident about solving science problems than did female students. Males in both groups also reported that they found science to be easier than did female students. Overall, for both groups, attitudes toward science were more positive among male students than female students.

Male accelerates reported having obtained a higher level of education at the time of the survey than did male nonaccelerates. No other statistically significant differences between acceleration groups were found for either gender.

Conclusion: Students of similar age who possess similarly high mathematical ability appear to make similar positive academic gains independent of educational acceleration. However accelerated students achieve these gains at younger ages. These students are psychosocially well adjusted and are satisfied with their educational experiences, including those students who choose to accelerate from one to five years. Students who choose to accelerate are able to compete successfully for admission to universities with good reputations and are able to perform as successfully as nonaccelerated students, even though they are from 1 to 5 years younger. It appears that students who desire to accelerate their education by several years are not affected differently by their educational experiences to students who chose to accelerate by only one year.

Commentary: This study compares students' self-reports on both academic and psychosocial/attitudinal variables. This comparison provides direct evidence for the assessment of more global effects of acceleration on gifted students' lives. The researchers have employed an appropriate comparison group of students who are equally gifted but who decided not to accelerate. The final important feature of this study is its longitudinal nature. This study makes it possible to view the effects of acceleration on the lives of students for at least 5 years after their initial acceleration.

Some limitations to this study are identified and discussed by the authors. First, self-reported follow-up data were used. Second, the participants were highly gifted and, therefore, may not be representative of the total population of students identified as gifted in the American school system. (However, the authors note that acceleration is not recommended for all gifted students and highly gifted students may well be the group for which this option is most effective). Third, the groups in this study were matched for ability using the results of only one achievement test, the *SAT*. Finally, there may well be characteristics not investigated in this study (e.g. motivation) that distinguish accelerated students from those who decide not to accelerate their education.

Advantages and Disadvantages of Educational Acceleration

Terman, L. M. and Oden, M. H. (1979). The problem of school acceleration. In W. C. George, S. J. Cohn and J. C. Stanley (Eds), *Educating the gifted: Acceleration and enrichment* (pp 107-121). Baltimore: The Johns Hopkins University Press.

Objective: To examine evidence from case studies on gifted individuals to determine advantages and disadvantages of educational acceleration.

Design: Longitudinal comparison study using case histories.

Setting: This article summarises findings originally published in 1947 in the fourth volume of Terman's *Genetic Studies of Genius*, and includes information collected over a 25 year period. The article focuses specifically on information concerning the effects of educational acceleration on academic and social development.

Participants: 1392 individuals (785 males and 607 females) identified as being intellectually gifted on the *Stanford-Binet Intelligence Scale* and forming part of Terman's 'gifted group'.

Subjects were divided into three groups based on the degree of educational acceleration. Those in group I, 62 in all (36 men and 26 women) were accelerated by 2 - 4 years. Those in group II, 332 in all (181 men and 151 women) were accelerated by 1 - 2 years. Those in group III, 998 in all (568 men and 430 women) were not accelerated or were accelerated by only 1 year. The researchers classified this last group as the 'non-accelerated' comparison group.

Assessment of Variables: The authors investigated subjects' intelligence, educational history, vocational history and avocational interests, social adjustment, marital status, and physical and mental health, in relation to their degree of acceleration.

The *Stanford-Binet Intelligence Scale* was used to measure childhood IQ. *The Concept Mastery Test* (group intelligence test) was used to measure intelligence 25 years after the commencement of the study and immediately preceding the publication of this paper. High school scholastic record, graduation from college, age at college graduation, average grade in college, honors at graduation, and the completion

of one or more years of graduate work were used to build up an educational history for each subject. A self-rating on the extent to which early mental superiority was maintained into adulthood was obtained 25 years into the study.

A vocational history was compiled for each subject using recordings and classifications of occupations. The *General Information Blank*, a list of questions about twelve specific fields of interest, was used to establish avocational interests.

Social adjustment was measured using a social adjustment rating based on information from parents and teachers in 1922, a rating on social adjustment by field workers in 1928 and a third rating on social adjustment in 1928 based on reports from parents. The subjects recorded the ages of their preferred companions when in high school, and reported on extracurricular activities in high school and college.

Marital status was recorded along with age at marriage and history of separation or divorce. Married subjects completed a test of marital happiness.

Physical health was assessed using a health rating based on information secured from medical examinations and from several questions in a survey about the home environment, called the *Home Information Blank*, and a survey about the school environment, called the *School Information Blank*. Age at puberty was recorded as an indication of physical health and development. Subjects were also asked to rate their physical health at 25 years into the study.

Nervous tendencies were assessed using several questions from the *Home Information Blank* and the *School Information Blank*, and from a rating obtained from parents. Indicators of mental health were obtained from a health rating made by parents and a self-rating made by the subjects. A rating of adjustment was arrived at based upon field workers' conferences with subjects, reports by parents or other relatives, and information from letters and conferences.

Main Results: A significant relationship was found between degree of acceleration and intelligence. Men in groups I and II had IQs 6.4 points higher than those in group III and women in groups I and II had IQs 3.5 points higher than those in group III. Results from the *Concept Mastery Test* administered 25 years later, showed similar differences in intelligence, with accelerated groups again scoring higher than the non-accelerated group.

It was revealed that the greater the degree of acceleration, the greater the likelihood of graduation from college and of completing graduate work. Accelerated students were more likely to attain average grades of B or higher and to be awarded graduation honors. High school records revealed higher achievement for accelerated males but not for accelerated females.

Accelerated men were employed more often in higher-ranking business occupations. Of the most highly accelerated men, 42.2 percent were in the 'A' group for vocational success (the highest category) compared with 19.4 percent of non-accelerated men. There was no significant relationship between acceleration and occupational status for women.

There was a marked relationship between degree of acceleration and preference expressed during adolescent years for older companions, the trend being about the same for males and females. Men who graduated from high school before the age of 15 years 6 months reported lower ratings for extracurricular activities at high school. This might reflect a lack of physical maturity due to their young age. Among the highly accelerated group, a large proportion of men reported disadvantages related to acceleration. This was not true for women.

The percentage of individuals married was about the same for men in all groups, with a slightly higher rate of marriage for highly accelerated men. Women who were members of the highly accelerated group were less likely to marry. Separations and divorces occurred less often among the highly accelerated subjects. The mean age at marriage was appreciably lower for the accelerated group. There was no difference between groups on the test of marital happiness.

No reliable difference between groups was reported in 1922 concerning physical health. In 1928, parents of the most accelerated subjects gave the highest rating for physical health. Nervous tendencies were rated lower for the most accelerated group in 1922. In 1928, males in the most accelerated group were rated lowest for nervous tendencies but no trend was noticed for women. Self-reports of physical health in 1940 showed no differences between the groups for men but women in group I reported better health.

A relationship was noted between age at puberty and degree of acceleration, with the most accelerated reaching puberty at younger ages. This may have been a reflection of a tendency for teachers to prefer to accelerate students who are physically mature.

Conclusion: If decisions for acceleration were based purely on a student's intellectual welfare, then school promotion would be based on intellectual age. The risk of social maladjustment in individuals who accelerate their education is less than is commonly believed. Disadvantages reported by accelerated subjects are usually temporary. There can be no universal rule governing the amount of acceleration that is desirable. Some gifted children are less injured by acceleration of three or four years than are others by one or two years.

Commentary: Data are presented clearly in tables. Thorough research methodology and similar concerns make these findings as significant and relevant today as they were when they were first published in 1947.

Acceleration in Australia

Vialle, W., Ashton, T., Carlon, G. and Rankin, F. (2001). Acceleration: A coat of many colours. *Roeper Review*, 24(1), 14-19.

Objective: To synthesise three research projects conducted in New South Wales, Australia, concerning academic acceleration, with the aim to explore the issues at the centre of the acceleration debate.

Design: Research synthesis.

Setting: The first project involved an investigation of the Early Entry policy for gifted young children in one school region in New South Wales (NSW). The second reports on the experiences of students who skipped at least one school grade. The third examines a vertical programming system that allows students to accelerate within subjects at an academically selective secondary school.

Assessment of Variables: The three research projects are outlined and issues relevant to the debate surrounding educational acceleration are highlighted. These issues include teacher beliefs and attitudes about acceleration, concerns regarding social and emotional development, and the relatively small numbers of children being accelerated in areas outside major urban centres.

Main Results: The first research project studies early school entry. Early school entry occurs when a student is allowed to enrol in kindergarten a year earlier than is usual. In the state of NSW this means that a child enters school at the age of 4 years rather than the typical age of 5 years. This procedure was given government approval in 1991. Even so, it is rare for children in NSW to enter school early, mainly because of negative teacher attitudes. Teachers tend to believe that children below 5 years of age are too immature to enter school despite research evidence to the contrary. This study found that school principals also tended to view early school entry negatively. They were fearful that the procedure would be detrimental to students' social and emotional well being.

The second study documents the experiences of students who had accelerated their education. A multiple case study format was adopted and 5 students participated. The students ranged in age from

6 to 16 years. There were three males and two females. Four students had skipped one or two grades and one student had radically accelerated. One student was being home-schooled.

One case study is that of Elijah who was 16 years old and in his second year at university at the time of the study. He commenced his schooling in Fiji, where he was allowed to work through the school curriculum at his own pace. This allowed him to accelerate to 6th grade within 3 years. His family then moved to another part of the state where Elijah was placed back in an age-grade class. After repeated protests from his parents, and advocacy on the part of the NSW Association for Gifted and Talented Children Elijah was eventually permitted to skip a number of grades over the course of his schooling.

Elijah reported that, before he was allowed to accelerate, he found schoolwork boring and unchallenging. He believed that his boredom manifested itself in physical ways, with rashes around his neck and a tendency to cry easily. Once he was allowed to accelerate these symptoms disappeared. Elijah tended to have friends who were older and this did not upset him. He wanted to continue with his acceleration because he felt happier when his schoolwork was challenging.

The authors present outlines of the other case studies and then discuss the general conclusions from the studies. Commonalities between cases were a focus. Three students were identified as being gifted because of the boredom and frustration they expressed. All these students suffered from physical symptoms that they felt were directly related to their boredom and frustration. In all cases these physical symptoms disappeared when the students were accelerated.

Three students underwent formal psychological testing and a decision about acceleration included a consideration of their results on IQ testing. In the case of two students, teachers advocated for them and supported their acceleration. In all cases parents believed they were forced into an advocacy role. In many instances they appeared to have more knowledge about appropriate education for gifted students than teachers. Parents were aware of great differences between teachers in regard to their beliefs about gifted education and the learning experiences they were willing to offer to gifted students. Significantly, the teachers who were identified by parents as being most effective in teaching gifted children were those who had undertaken formal study in gifted education.

In all five cases, the academic needs of the students were not being met before the acceleration. All students reported that they were more challenged by schoolwork after the acceleration, and that they

were happier socially and emotionally. They reported a greater feeling of fulfilment and self-confidence following acceleration.

The last project studied the effects of a program of vertical timetabling. It was undertaken at a selective high school (a state school serving only academically gifted students). Students are selected to attend the school based on results from an entrance test comprising aptitude and achievement testing and recommendations from students' elementary schools. In summary, the vertical timetabling approach at this selective school has enabled accelerated progression within some subject areas for gifted students. The majority of students (80%) welcomed the opportunities the program offered for subject acceleration. This same majority had suggestions for making the program more effective. Many students felt that teachers needed to allow them more choice in regard to what they studied. They also felt that schoolwork needed to be better matched to their abilities and learning preferences.

Conclusion: All three projects concluded with similar findings and suggestions. All found that the attitudes and beliefs of teachers and school principals about acceleration had an enormous influence on the educational opportunities available to gifted students. All researchers stressed the importance of increasing the awareness of teachers and school principals about the needs of gifted students, and the appropriate adaptations that can be made in relation to programs and curricula. Educators who most actively supported acceleration were those individuals who had received some training in gifted education. Those who were most vocal in their opposition admitted to having no such training.

In all studies the attitudes of students towards acceleration were positive both in terms of their academic needs and their social and emotional needs. Students in all three studies reported high levels of satisfaction, academically and emotionally, when the curriculum was challenging and provided them with options, and when they were allowed a voice in its design and execution.

Another factor emerging from all three studies was the important role adults and peers can play in supporting the emotional well-being of accelerated students. Students highlighted the part that teachers, parents and peers played in helping them to accept their own abilities and to make the decision to accelerate. Parents and teachers acted as advocates in seeking appropriate educational options for them. Like-minded peers made them feel less isolated at school.

Finally the studies highlighted the importance of considering individual differences when planning programs for gifted students. Students who accelerate need to have their progress monitored and additional curriculum modifications need to be made as needs arise.

Commentary: It is illuminating to realise that three very different studies concerning academic acceleration led to very similar conclusions. Results from all three studies supported acceleration, including subject acceleration, grade acceleration and radical acceleration. Although participant numbers were small in each study, data revealed very interesting information concerning students' views about acceleration. These views were overwhelmingly positive and appeared to contrast markedly with the negative attitudes and beliefs expressed by teachers and school principals. Results from these studies suggest that it is important for school decision-makers to consider the views of gifted students, and to include them in decisions regarding their education.

Gifted Education in Taiwan, People's Republic of China

Wu, W. (1991). Current trends in gifted and talented education in Taiwan, R.O.C. *Gifted and Talented International*, 7, 85-94.

Objective: To trace the development of gifted and talented education in Taiwan, Republic of China (R.O.C.).

Design: Literature Review.

Setting: Reports and reviews, published since 1979, concerning provisions for gifted and talented students in Taiwan, R.O.C.

Assessment of Variables: Sources were examined for factors that have influenced the development of provisions for gifted and talented students, the goals for gifted education in Taiwan, R.O.C., and the nature of the existing provisions.

Main Results: Gifted education became a focus in Taiwan in 1962. Since this time provisions have grown from special programs in two elementary schools to programs in many elementary and high schools, as well as in universities. Although provisions focus on academic acceleration, schools also provide opportunities for enrichment. Special schools cater for students talented in fine arts, music, dance and athletics. The government encourages gifted education by supporting curriculum design, teacher training, resource acquisition and research.

In 1984 the Special Education Law allowed for greater flexibility in the time taken for students to progress through school and college. It is possible for students to shorten the time they spend at school and college by four years or more. Highly gifted students are able to skip one grade in elementary school, one grade in junior high school and one grade in senior high school. They can also shorten their college education by one year. In recent years more students are taking advantage of acceleration options and are entering university earlier. A significant number of students are radically accelerating their education.

It is suggested that research into gifted education in Taiwan needs to be redirected at issues concerning the personal and social development of gifted students. Also, the trend for gifted programs to encourage the use of resource rooms in preference to full-time, self-contained gifted classes needs to be considered carefully. Numerous studies have supported the use of acceleration, including radical acceleration, as a method of advancement for gifted students. Follow-up studies continue to evaluate such programs.

Conclusion: Provisions for gifted students in Taiwan, R.O.C. focus on academic acceleration. Such provisions have been shown to be effective in meeting the academic needs of gifted students. Gifted education in Taiwan should continue to expand and improve, with continued government support for research into gifted education.

Commentary: Interestingly, policy and provisions for gifted education in Taiwan have developed in light of social and political forces that have favoured educational acceleration. The general support for academic acceleration in Taiwan contrasts markedly to the general resistance that exists in many Western countries. The option to radically accelerate through school and to begin university earlier has been available to gifted students in Taiwan since gifted education became a concern in 1968.

Gifted Education in Asia

Wu, W., Cho, S. and Munandar, U. (2000). Programs and practices for identifying and nurturing giftedness and talent in Asia (outside the mainland of China). In K. A. Heller, F. J. Monks, R. J. Sternberg and R. F. Subotnik (Eds), *International handbook of giftedness and talent* (pp765-777). New York: Elsevier.

Objective: To review the status of gifted and talented education in Asian countries.

Design: Literature review.

Participants: Information was collected for India, Indonesia, Japan, Korea, Philippines, Singapore, Taiwan and Thailand.

Assessment of Variables: Literature was analysed for information concerning identification procedures, educational programs, and problems and perspectives regarding the education of gifted and talented students.

Main Results: The authors begin by outlining the general trends in gifted education in Asia. Important issues for educators are cultural diversity and giftedness, the gifted handicapped, ecological planning, multiple intelligences, differential programs and the role of gifted education in educational reform.

The agenda for education in India is to equalise opportunities and reduce disparities between human beings. A goal is to provide education so that a person belonging to any region, caste, creed, sex or economic stratum can develop to their full potential. Policy reform in 1986 led the way for the establishment of schemes to provide quality education to talented students throughout the country. Students are identified to take part in such schemes through scores on tests of mental ability, arithmetic ability and language ability. They are offered places at schools specifically designed for talented students. Scholarships are provided for socio-economically disadvantaged students. The curriculum focuses on enrichment learning. The school system does not appear to support radical acceleration. A challenge for education in India is to provide appropriate curriculum for gifted students in all state schools.

Educational policy in Indonesia supports special services for students of high intelligence, declaring that all students should have access to educational opportunities in accordance with their gifts, talents, interests and abilities. Enrichment and acceleration opportunities are available, although the authors do not identify opportunities for radical acceleration. Scores on standardised tests of intelligence and creativity are used to identify gifted students. There are government and private high schools specifically for gifted students. Scholarships are offered for overseas study in science and technology. There are also programs in place for gifted pre-school students.

The education of gifted students in Japan is not a specific priority. The prevalent belief is that ability is not inherent but rather a result of practice and hard work. Thus all students are provided with similar learning opportunities and the onus is on them to take advantage of these experiences. There has been a recent move to provide differentiated programs to meet students' individual ability needs, although acceleration is strictly prohibited in elementary and junior school. It is possible for students talented in science and mathematics to enter college early although there is no indication of radical acceleration. There are many after-school opportunities for enrichment, including clubs and classes.

There has been rapid development of gifted education in Korea. There are special high schools for gifted and talented students, after school enrichment programs in elementary and junior high schools, acceleration, and enrichment programs provided by gifted education centres affiliated with schools and universities. Students are permitted to enter elementary school early, skip selected grades and be promoted to the next school level early. Although radical acceleration is not described, these practices suggest that it is possible. However, parents and pupils tend only to take advantage of the opportunity for early school entrance and are not taking up opportunities for further acceleration. The Cyber Gifted Education System was established in 1998 to provide enrichment programs on the web for those students living in remote locations.

The Philippines has had a training program for teachers of gifted students since 1966. There are three high schools for talented students and programs for gifted students at regular schools. Students are identified as gifted on a combination of assessments, including standardised tests, classroom grades, teacher recommendations, and interviews with parents and students. The focus is on enrichment rather than acceleration. There do not appear to be provisions for radical acceleration.

The Gifted Education Unit in the Singaporean Ministry of Education supports the Gifted Education Program (GEP) and the Science Research Program. GEP has been running since 1984 and caters for the needs of intellectually gifted students through the provision of self-contained classes and pull-out programs. GEP runs in 9 primary schools and 6 secondary schools. All grade 3 students are invited to sit a screening test in English Language and Mathematics and 400 students are selected, on the basis of their test scores, to attend a self-contained class for gifted students. Another 100 students are selected at the end of elementary school to join self-contained classes for gifted students, on the basis of scores on the Primary School Leaving Examination. Programs for gifted education in Singapore are essentially based on enrichment opportunities rather than acceleration. There is no mention of provisions for radical acceleration.

Gifted education in Taiwan has been developing since 1973. There are provisions for intellectually gifted students as well as those gifted in music, arts, dancing, drama and sport at all levels of schooling. In addition to special classes and pull-out programs, which emphasise enrichment, there are acceleration programs for highly gifted students. Early entrance, grade-skipping, early graduation from school, telescoping grades, advanced placement, and early entry to university are possible options. Students are able to accelerate their schooling by 3 or more years.

Gifted education in Thailand is a relatively new endeavour. The National Centre for the Gifted and Talented was set up in 1999. Summer programs are provided for gifted students in arts, creative writing and science. A Master of Education program in Gifted Education is offered at Srinakharinwirot University and the government is sponsoring research into gifted education. Scholarships are offered to high ability high school and university students. The authors do not identify opportunities for acceleration, including radical acceleration in Thailand.

Conclusion: Although there are differences in the focus for gifted education in Asian countries, the authors identify general convictions that are driving the development of gifted education across many of these countries. These convictions include: the educational philosophy of emphasising teaching according to individual differences; the societal tendency to value intellectuals and the wise; the principle of governing a nation on the basis of employing the talented; and the needs of economic development. The authors also point out that a focus on gifted education is relatively new to most countries, with developments progressing at a fast pace. Acceleration does not appear to be common in many Asian countries, with Taiwan being the only country identified that provides opportunities for radical acceleration.

Commentary: This chapter presents a comprehensive discussion of the provisions for gifted education in eight countries across Asia, excluding China. Important contextual information is provided regarding the philosophy behind the development of provisions in each country. A section outlining current problems and future directions for developments in gifted education is valuable for highlighting similarities and differences across the different countries.

Gifted Education in China

Yewchuk, C. R. (1992). Gifted education in China. *Roeper Review*, 14(4), 185-188.

Objective: To report on the People to People Seminar in Gifted Education in the People's Republic of China, 1991.

Design: Interview and Observation.

Setting: Universities, middle schools, elementary schools and kindergartens with programs designed specifically for gifted and talented children. Selective schools serving only gifted students.

Participants: Teachers, administrators, psychologists and researchers involved in gifted education.

Assessment of Variables: Subjects were interviewed and educational sites were visited. Provisions for gifted children were identified and described.

Main Results: Educators in China believe that the use of IQ testing is not in itself sufficient to assess a child's abilities, and rely on teacher observation, test results and interviews to identify gifted children. School teachers are trained to identify students who are gifted. They look for high achievers who are motivated and who show evidence of good memory, quick thinking and general intelligence. Children who perform well on state examinations are considered for admission to the most prestigious schools, including those offering 'experimental classes'. These classes are special classes for the gifted and are designed to provide acceleration. Acceleration is practised at elementary school, middle school, high school and university.

In the most prestigious middle schools, teachers are selected to work with gifted students in 'experimental classes'. These teachers are required to be experts in their disciplines as well as master teachers. Many are enrolled in advanced education courses aimed at improving the quality of teaching instruction for gifted students.

The highest achievers in schools for gifted students are offered places in university early entry programs. At one site students take classes together for the first two years under the guidance of an

academic and personal advisor. They are integrated with other University students from their third year onwards. Some of these students have been radically accelerated, and are thus three or more years younger than their classmates. The programs are heavily weighted towards maths and science.

Conclusion: The education system in China supports radical acceleration for gifted students. Acceleration is possible at all school levels and at university, with special programs in place to support gifted students. Teachers for the gifted are specially selected and participate in ongoing training in gifted education.

Commentary: Procedures used to identify gifted students, as well as school programs for these students, are described, along with the underlying educational philosophy guiding these procedures and programs. The path to radical acceleration is clearly outlined. University programs for the gifted are described.

A Student's Perceptions of Early College Entrance in China

Zhao, X. (1996). Reflections of a gifted program in China. *Gifted and Talented International*, 11, 80-83.

Objective: To describe and assess the success of a university early entrance program for gifted students in China in its first years of operation.

Design: Retrospective personal account of radical acceleration.

Setting: Suzhou High School and The University of Science and Technology of China.

Participants: A Chinese student presently studying in the United States who enrolled in a program for early entry to university in China eleven years before this article was published.

Assessment of Variables: Identifying indications of the success of the program in meeting the academic, social and emotional needs of gifted students.

Main Results: Advertisements for the program were published in the *People's Daily*, an official newspaper in China. Students who applied were required to be aged 13 years or younger. A written test was completed at school, covering four subjects, Chinese, English, mathematics, and a combination of physics and chemistry. Students who performed highly on this test were invited to attend an interview at The University of Science and Technology of China. Students who performed well in this interview were accepted to attend either Suzhou High School or Jingshan High School. They completed a 2-year program of advanced level classes at these sites to prepare them for fulltime university admission. The majority of students were then admitted into a special class for radically accelerated students at The University of Science and Technology of China.

The author reports an overall positive experience of radical acceleration. Gains include disciplined and efficient self-study habits, readiness for group-work, logical reasoning abilities, enhanced imaginative powers, and the skills to problem-solve. Negative features include limited family contact, limited contact with non-accelerated students and limited opportunity to leave the school grounds. Suggestions for change include allowing students to study a wider range of subjects, including

History, Geography and Music, and increased concern for the social and emotional needs of students.

Characteristics particular to the program at the time of the author's enrolment are described. The daily routine was rigorous, with students participating in a physical education session for half an hour at 6:30am and a 2¹/₂ hour self-study session at 6:30pm. Subjects to be taught were grouped for importance, with mathematics, physics, chemistry and English being given most teaching time, followed by Chinese and politics, and then biology, history and geography. Curriculum included condensed coverage of standard textbooks, ample supplementation with advanced material and self-initiated enrichment activities. Quizzes and tests were administered frequently and without advance notice.

Conclusion: Despite some concerns regarding academic, social and emotional experiences, the author found this early entry program to be beneficial and memorable. She argues for increased access to such early entry programs for gifted children.

Commentary: The program is described in detail, including selection procedures, curriculum, living arrangements (students reside on site) and social supports. The report is limited to experiences and memories of one student. Yet the personal insights that are included are valuable in providing information about social and emotional issues relative to acceleration.

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OUTSIDE BACK COVER CONTACT INFORMATION

For more information on Gifted Education:

web for GERRIC: www.arts.unsw.edu.au/gerric/

web for Belin-Blank: www.uiowa.edu/~belinctr/

web for JTF: www.templeton.org/