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 IDENTIFIERS Study of Mathematically Precocious Youth

ABSTRACT

A followup study involving 2,021 students identified as academically gifted by the Study of Mathematically Precocious Youth (SMPY) was conducted to determine the effectiveness of college courses for facilitating the education of intellectually talented junior and senior high school students. Advantages of a college course over acceleration, student requirements for participation in the college course program, and college enrollment procedures were considered when advising a student eligible for college courses. Of the 1,510 students returning the College Information Questionnaire, 83 students had taken college courses. Among findings were that students' grade-point average (GPA) for the college courses taken was 3.57 (on a four-point scale) and that SMPY students rarely encountered social difficulties in the college classroom. (SB)

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Colleges Courses: One Method of  
Facilitating the Intellectually Talented

by Cecilia H. Solano and William C. George<sup>1</sup>

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One of the goals of the Study of Mathematically Precocious Youth (SMPY) has been to help intellectually able students find challenging and worthwhile learning experiences. The importance of identifying and facilitating highly able students has been documented by Terman (1925), Stanley, Keating, and Fox (1974), and many others. SMPY feels that each talented individual needs to be stimulated to his or her fullest learning potential. With this objective in mind, SMPY has identified over 2000 mathematically talented youngsters when they were in junior high school. This was accomplished through three talent searches. The last of these, conducted in January of 1974, included the entire State of Maryland. Although the range of abilities is diverse, all students scored at least 420 or better on the Scholastic Aptitude Test-Mathematical (SAT-M). This is the 56th percentile of a random sample of male eleventh and twelfth graders. Most of the 2021 participants in the search who earned such a score were still under 14 years of age.

Various methods of facilitation have been studied (Fox, 1974; Stanley, 1975; George and Denham, 1975; Keating and Stanley, 1972; Stanley, 1973) and were available to SMPY. Some of these which have been used successfully are subject matter acceleration, fast-paced mathematics classes, grade skipping, Advanced Placement Program examinations, entering college early (up to four years), and taking college courses for credit while still in junior or senior high school. It is

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important to remember that the particular combination of special educational procedures chosen for each student must suit his particular abilities, interests, and other academic opportunities.

### Taking a College Course

There are several important considerations to be taken into account when advising a highly talented student capable of taking a college course. The first is, why choose a college course rather than some other more traditional form of acceleration? One advantage is that college courses can be taken during the summer and at night, avoiding the scheduling problems that special classes and subject matter acceleration entail. The credits earned from these college courses can be kept in escrow until the person attends college full-time. Furthermore, these college credits may also serve a double function by being counted toward high school graduation credit. The Maryland State Board of Education recently endorsed this method of earning diploma credits. Taking a college course is particularly advantageous when the highly able individual is in an area where there are few other such students; this problem can be acute if the student lives in a rural area. By enrolling in a local college or registering for a correspondence course, the person can still obtain the individualized acceleration that he requires. Precocious youth who are in college classes also benefit by being able to interact with their intellectual peers without disturbing their social relationships with their age-mates in school. For students who are planning to enter college, having sampled the atmosphere of a college campus helps the transition into the new academic format.

The next consideration is, who should be allowed to take a college course before finishing high school? Even within SMPY's highly talented pool of mathematical reasoners, there must be some restrictions. The general rule of thumb which SMPY has used successfully is that the student in question should exceed in already developed ability most of the students in the course he will be taking. By being abler than most of his classmates, the younger pupil can offset his lack of specific academic skills in certain areas of the curriculum. The younger the student, then, the more able he must appear on aptitude tests such as the SAT-M or the Preliminary Scholastic Aptitude Test (PSAT). The criterion used by SMPY has been that seventh and eighth graders should score at least 640 on the SAT-M and ninth and tenth graders earn at least 600. In addition, a verbal score on such tests as SAT-V or PSAT-V is highly desirable. While the test results are crucial, it is important that only those students who are truly interested and willing to work hard for a good grade be encouraged to take a course.

After the student is judged to be capable of taking a college course, how does he go about it? Those persons sponsored by SMPY register with the regular student body for the course work; they receive no special attention or consideration. The SMPY staff believes that the only way a highly able student should take a college course is for graded credit, not for an audit or for pass-fail. In this way the individual receives full benefit from his college experience and still is able to transfer the credits later when he starts college full-time. In this light, it should be remembered that standard academic courses taken at a four-year institution may be more easily transferred than ones from a two-year junior college.

In regard to when to take a college course, the summer seems to be the overwhelming favorite time with SMPY's group. There is also a definite bias in favor of taking courses at night, even during the summer. These two preferences not only solve various scheduling problems within the junior and senior high schools, but also allow the student to devote his full energies to what can be a demanding but exciting experience.

Finally, some thought should be devoted to considering what course in particular would be best for a talented junior high school student entering the college world for the first time. The best procedure appears to be to start the youth off in a course in the area of the student's greatest ability. The course may be either one that accelerates the usual high school curriculum, such as algebra and trigonometry, or one outside it, such as computer science.

#### SMPY College Students

In the preceding section were discussed several important considerations to be taken into account when a highly talented student wishes to register for a college course. The staff of SMPY has encouraged and advised many individuals to take advantage of this opportunity. In particular, the top scorers from each region in the 1974 Maryland Mathematics Talent Search were each awarded one tuition-free college course. These 49 tuition waivers were donated by twelve colleges and universities located throughout the State of Maryland and the District of Columbia which are interested in helping the gifted.

In the fall of 1974, SMPY did a systematic follow-up of all students who might have taken a college course. A College Information

Questionnaire was mailed out to the 2021 students who were considered eligible. Two follow-ups were done on the questionnaire. There was a month's interval between each, yielding a final return rate of 75%. The College Information Questionnaire requested not only information on any course the student might have already taken, but in addition any that they might be considering for the future.

Of the 1510 students returning the College Information Questionnaire, 83 have taken college courses (72 boys and 11 girls). These 83

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 Insert Table A about here  
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students have taken a total of 153 courses, or an average of almost two courses each. Actually, 60% of the students took only one course, while the other 40% took either two or three, and in some cases as many as ten courses. As mentioned previously, summer was the favorite time to take a course, with 70% choosing this session. The age range of these students was from 10 years, 2 months to 16 years, 0 months; the average age was 13 years, 9 months. For the 153 courses taken there were 99 A's, 45 B's, 7 C's, and 2 D's. The overall grade-point average (GPA) for this truly superior group was 3.57. On the standard four-point scale, these young students have achieved an overall average of A-. To be on the dean's list an individual normally needs a 3.50 GPA. Within sex, the girls averaged 3.21 and the boys 3.61. Course grades were also broken down by six month age ranges. Except for some fluctuation in GPA among 10 and

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11 year olds, the GPA is surprisingly stable for those individuals 13-16 years of age. From this it can be seen that a highly selected, well

motivated 13 or 14 year old is as capable of succeeding in a college course as his older counterpart.

The courses were taken at various institutions throughout the State of Maryland and the Washington, D.C. area. The institutions attended ranged from Johns Hopkins and Georgetown University to state and community colleges. The actual courses taken were generally in the mathematics and science areas, but also included courses as diverse as string, chamber music, political science, and intensive Russian. The overwhelming favorite was computer science. Fifty-nine students took this course; 42 of them made A's. All the rest made B's, except for two people who made C's.

These students are outstanding in several other aspects also. The mean SAT-M score in the talent search for those students who have taken a college course is 660, 666 for the boys and 611 for the girls. The SAT-M scores range from 470 to 800. Of the 83 pupils taking college courses, 38 have skipped at least one grade. Among the 38 who skipped, 66 school-grade levels in all have been skipped, or approximately two per individual. Some of the grades skipped came at the end of senior high school and have enabled 15 of these 83 students to enter college early, anywhere from one to four years. This group of students, then, is a highly select and extremely talented one. It is not surprising, therefore, that such a group should be capable of handling college courses well at a very young age. The horrifying thought is that these students might instead have been sitting in junior high school classrooms being taught material greatly below their capabilities.

In comparison with this highly talented group, quite a few of the contestants who have not yet taken a college course are not far behind.

Over a hundred want to know about opportunities for taking college courses in the immediate future, and an even greater number are interested in the possibility when they reach senior high school. At least thirty more of these students are planning to take their first college courses by December 1975. Whereas the percentage of young students interested in taking a college course and able to do so well is small, the actual number of such students in a typical school system may well be appreciable.

The Johns Hopkins High School Scholars Program

SMPY was fortunate to find a comparison group for these talented youths fairly close to home. The Johns Hopkins Evening College and Summer Session supports a program which allows certain senior high school students to take college courses. To be eligible these students must have completed the eleventh grade with a letter-grade average of B. These individuals are, of course, older than those from SMPY, the average age per course being 17 years, 0 months versus 13 years, 9 months.

The following figures are based on courses taken through this program for the academic years of 1973 and 1974. In these two years 64 students (38 boys and 26 girls) took advantage of the opportunity. They

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took 89 courses in all, or approximately 1.4 per student. There are several points of comparison that can be made. On the minor level, these students also preferred taking summer courses (52%) overall. More importantly, the GPA for college courses in this older group was 3.01,





or B on the four-point scale. The boys in this program did better overall than the girls (3.11 versus 2.83), but earned all of the D's and F's given.

The difference in GPA between the Scholars program and SMPY's (3.01 versus 3.57) might be due to other factors than just ability. Obviously, the SMPY group is far younger, they have been more vigorously selected on objective criteria, and are undoubtedly more able. Also, SMPY students take courses in the area of their competence, chiefly mathematics and science. The range of courses taken by students in the Scholars program, while limited, covers many of the lower division offerings of the Hopkins Evening School. While this range of offerings may be more enticing, it also creates a greater possibility of exceeding one's capabilities. The careful selection and guidance of the young students in SMPY has allowed them to surpass an older accelerated group.

#### Social and Emotional Development

A major concern in placing young people in college courses, besides academic considerations, is that these students may encounter difficulties of a social nature in a college classroom. The individuals might become lost in a group much older than they are--or even worse, be pointed out as freaks. Fortunately, SMPY's experience has been that these things rarely happen. The students' comments on the College Information Questionnaire indicate overwhelmingly that the courses were considered pleasant and stimulating. One of the few complaints noted was that there wasn't enough thermodynamics in a basic physics class. A brief essay appeared in the March 15, 1975 issue of the Intellectually Talented Youth Bulletin (ITYB), the newsletter put out by SMPY, written

by a student who had just completed an introductory course in computer science. The reaction he describes seems to be fairly typical: "My classmates, I think, were a little confused by me; unsure if I was what I looked like or just a somewhat diminutive college student. Finally, one accosted me on the stairs, asking me what grade I was in. He seemed amazed that I was in the eighth grade and taking algebra: 'They didn't do that when I was in school.'"

Other studies done by researchers working with SMPY have pointed out that often the teacher and regular college students cannot even identify these young students (Keating, Wiegand, and Fox, 1974). When told who the students were, they all agreed that these 10-14 year old junior high school students had been well assimilated into the class. The success of these young students may be due to the fact that they are highly self-selected for interest and willingness to work. It has been demonstrated elsewhere (Haier and Denham, 1975) that they are well adjusted and capable of handling adaptations that most of their age-mates would find difficult.

#### Conclusion

Facilitating the academic programs of these highly talented students is crucial. Through college courses these pupils gain a means of developing their intellectual processes by working with their academic peers. Certain gifted individuals this age can perform well academically in a college class without social trauma. But more basically, these students are having the chance to widen their intellectual horizons and expand to their fullest capabilities. The credits they earn will benefit them later when they enter college and accelerate their

pace through higher learning. By finishing their education sooner they will reach the professional and business worlds earlier and have longer use of their talents as independent and creative individuals, instead of remaining passively in an atmosphere of unproductive boredom.

Table A  
College Courses Taken by SMPY Students\*

	A		B		C		D		F	Total Courses	GPA
	4.0	3.5	3.0	2.5	2.0	1.5	1.0	0.5	0.0		
Boys	92 (60%)	1 (1%)	40 (26%)	---	4 (3%)	---	2 (1%)	---	---	139 (91%)	3.61
Girls	6 (4%)	---	5 (3%)	---	3 (2%)	---	---	---	---	14 (9%)	3.21
Total	98 (64%)	1 (1%)	45 (29%)	---	7 (5%)	---	2 (1%)	---	---	153 (100%)	3.57

\* Percentages based on total courses taken; n=153.

Table B

## GPA of SMPY Students by Age

	<u>GPA</u>	<u>No. of Courses</u>	<u>% of Total Courses</u>
<b>10 Years</b>			
0-6 months	2.67	3	2
7-12 months	4.00	1	1
<b>11 Years</b>			
0-6 months	3.00	3	2
7-12 months	--	-	-
<b>12 Years</b>			
0-6 months	3.80	5	3
7-12 months	3.63	8	5
<b>13 Years</b>			
0-6 months	3.62	21	14
7-12 months	3.74	27	18
<b>14 Years</b>			
0-6 months	3.64	50	33
7-12 months	3.27	17	11
<b>15 Years</b>			
0-6 months	3.55	11	7
7-12 months	3.50	6	4
<b>16 Years</b>			
0-6 months	2.0	1	1
			<hr/> 100%

Table C

## College Courses Taken by JHU High School Scholars\*

	A		B		C		D		F	Total Courses	GPA
	4.0	3.5	3.0	2.5	2.0	1.5	1.0	0.5	0.0		
Boys	24 (27%)	1 (1%)	18 (20%)	1 (1%)	8 (9%)	---	2 (2%)	---	2 (2%)	56 (63%)	3.11
Girls	6 (7%)	---	15 (17%)	1 (1%)	11 (12%)	---	---	---	---	33 (37%)	2.83
Total	30 (34%)	1 (1%)	33 (37%)	2 (2%)	19 (21%)	---	2 (2%)	---	2 (2%)	89 (100%)	3.01

\* Percentages are based on total courses taken; n=89.

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## Footnotes

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