2 *Adolescence of the Mathematically Precocious: A Five-Year Longitudinal Study*

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Abstract

SMPY's first set of longitudinal findings are strong indicators that SMPY's identification measure is effective in selecting students in the seventh grade who achieve at a superior level in high school, especially in mathematics and science. Questionnaire data obtained from 1,996 students who as seventh- or eighth-graders had scored better on the SAT than a random sample of eleventh- and twelfth-grade females were analyzed. Relative to the comparison groups SMPY students were superior in both ability and achievement, expressed stronger interest in mathematics and sciences, were accelerated more frequently, and were more highly motivated educationally, as indicated by their desire for advanced degrees from difficult schools. Sex differences were found in participation in mathematics and science, performance on the SAT-M, and the taking of and performance on mathematics and science achievement tests. The majority of the students felt that SMPY had helped them educationally while not detracting from their social and emotional development. The SAT-M score of an intellectually talented seventh- or eighth-grader has much predictive validity.

The Study of Mathematically Precocious Youth officially began with hopes of finding youths who at an early age were able to reason extremely well with simple mathematical concepts, "students who even before taking or completing the first year of algebra would reason mathematically much better than the average male twelfth grader does" (Stanley 1977). SMPY then studied these youths further, helped to

facilitate their educational progress, and disseminated its findings, e.g. in Keating and Stanley (1972), Stanley (1973), Stanley, Keating, and Fox (1974), Keating (1976b), and Stanley, George, and Solano (1977). In order to identify mathematically talented students, the concept of a talent search was devised (George & Solano 1976b). Six separate talent searches have been conducted by SMPY (Benbow & Stanley 1980). This paper focuses on longitudinal findings and evaluations of the first three, which were held in March, 1972, January–February, 1973, and January, 1974. The purpose of the paper is to characterize at high-school graduation those students who scored highly enough in these talent searches and trace their educational development.[1] Some of the special findings from this study are presented by Michael in chapter 3 (manifestation of creativity), by Benbow, Perkins, and Stanley in chapter 4 (longitudinal evaluation of accelerated mathematics classes), and by Fox, Benbow, and Perkins in chapter 7 (sex differences) in this volume.

Talent-Search Results

In the first three talent searches seventh- and eighth-grade[2] students in Maryland were eligible to participate if they scored in the upper 5 percent (March, 1972) or the upper 2 percent (January–February, 1973, or January, 1974) nationwide in mathematical ability on a standardized achievement test. As part of the talent search they took the College Board's Scholastic Aptitude Test-Mathematics and also, in 1973, the Scholastic Aptitude Test-Verbal (SAT-V) (Angoff 1971). Results have been discussed by Keating (1974, 1976a). In general, the average participant, who tended to come from a home where the parents had been rather highly educated, scored well and at a level better than or equal to that of a random sample of high-school juniors and seniors. Although both sexes scored about the same verbally, boys performed much better mathematically than girls. This sex difference was especially evident in the upper ranges of mathematical ability (Benbow & Stanley 1980, 1981, 1982a). It was particularly significant that this sex difference was observed in the seventh and eighth grades. Up to that time these boys and girls had received similar formal instruction in mathematics (Benbow & Stanley 1982b). Elsewhere Benbow and Stanley (1980) have shown that differential course-taking cannot account for the observed sex difference in mathematical ability.

Longitudinal Follow-Up Procedure

The students selected to be followed up by SMPY after high-school graduation had to have scored at least 390 on SAT-M *or* 370 on SAT-V

during the talent search. If in 1972 the student had met the score criterion on a test of scientific information (i.e., 75 points or better out of 150 possible points on the sum of Form A and B scores on the Sequential Test of Educational Progress [STEP] General Science Information Test, Series II, Level 1a [first year of college]), he or she was also included in this study. This level of performance selects for a group of students who as seventh-or eighth-graders scored as well on the SAT as the average eleventh- or twelfth-grader does.

Selected through the use of these criteria, 2,188 talent-search participants received through the mail an eight-page follow-up questionnaire (see Appendix 2.1) along with an offer of monetary compensation ($5 or, in some cases, $6) as an incentive to complete the questionnaire. The questionnaires were mailed to students at a time when they would have been graduated from high school if they had not accelerated in their education since their participation in a talent search. The questionnaire reached the students and was usually completed by them while they were freshmen in college. Because the students were sampled from three talent searches held in 1972, 1973, and 1974 and because both seventh- and eighth-graders were eligible to participate in the talent searches, the follow-up questionnaires had to be sent out in four different waves: in December, 1976 (N = 214, Cohn 1980),[3] 1977 (N = 594), 1978 (N = 881), and 1979 (N = 499). After six weeks had passed, the students who still had not completed the questionnaires were sent a reminder letter including an additional questionnaire. Six weeks later a postal card reminder was sent. Finally, to bring the response rate up, each unresponsive subject was telephoned (sometimes several times).

The response rates for each wave of the follow-up were 94 (Cohn 1980), 90, 93, and 90 percent, respectively, of the total sample. Omitting persons we were unable to locate the response rates become 98 (Cohn 1980), 94, 96, and 93 percent, respectively. Combining the waves, the overall response rate exceeded 91 percent of the total sample of 2,188 students. In the analyses, there were 1,996 students, 38 percent of whom were females.

DATA ANALYSIS

The data were coded, keypunched, and verified. For the first and second waves of the follow-up they were entered onto the computer by means of the SOS computer package (Shesko 1975). For the third and fourth waves the data were entered through the use of the Filgen and Qgen computer system (The Johns Hopkins University Computing Center). The statistical analyses, performed by using the SPSS program (Nie et al. 1975), were done separately for the first wave, the second wave, and the combined third and fourth waves of the follow-up.

SAT Scores at Time of Talent Search

Mean SAT scores of the follow-up groups at the time of the talent search can be seen in table 2.1. As expected, mean scores are much higher than the average from SMPY's six talent searches due to the additional selection criteria. The group's mean SAT-M scores were also far superior to the means of a national sample of college-bound seniors (ATP 1979a). On SAT-M, boys in each wave scored significantly higher than the girls (by at least twenty-eight points), whereas girls scored higher on SAT-V—significantly so for the second wave.[4] The effect size for the sex difference on SAT-M in the talent search was medium, while for the difference on

TABLE 2.1. Mean SAT Scores of Talent-Search Participants and College-Bound Seniors

	First Wave[a]		Second Wave		Third and Fourth Waves		National Sample of College-Bound Seniors	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
	Talent Search							
SAT-M								
Males	567	91	549	74	526	76		
Females	505	58	510	58	498	61		
t of mean difference	5.1		6.7		6.9			
	$p < .001$		$p < .001$		$p < .001$			
SAT-V[b]								
Males	—		443	86	400	65		
Females	—		468	86	411	74		
t of mean difference			−3.1		not significant			
			$p < .01$					
	High School							
SAT-M								
Males	691	75	693	72	695	67	493	121
Females	652	72	643	68	650	75	443	109
t of mean difference	3.5		7.9		10.6			
	$p < .001$		$p < .001$		$p < .001$			
SAT-V								
Males	596	100	602	82	590	88	431	110
Females	594	115	612	83	592	91	423	110
t of mean difference	not significant		not significant		not significant			

SOURCE: Edmund C. Short, "Knowledge Production and Utilization in Curriculum: A Special Case of the General Phenomenon," *Review of Educational Research* (Summer 1979): 237–301. Copyright 1979, American Educational Research Association, Washington, D.C.

[a] Taken from S. J. Cohn, "Two Components of the Study of Mathematically Precocious Youth's Invervention Studies of Educational Facilitation and Longitudinal Follow-Up," Ph.D. diss., Johns Hopkins University, 1980.

[b] SAT-V was administered only in the 1973 talent search. Thus SAT-V scores were available for the 1973 talent-search eighth-graders, all in the second wave of the follow-up, and for the 1973 talent search seventh-graders, all in the third wave of the follow-up.

SAT-V it was only small. Thus the sex difference on SAT-M was considered important, but the difference on SAT-V was not.

SAT Scores in High School

From their reports, by the end of high school the boys' and girls' mean scores on SAT-M had been raised an average of 155 and 145 points, respectively, from the time of talent-search participation (see table 2.1). Thus the sex difference found on SAT-M at the time of talent-search participation increased during the high-school years by about 10 points. (For further discussion see Benbow & Stanley 1982a.) Both boys and girls in the follow-up scored approximately 200 points better than their respective sex norm group of college-bound seniors (see the lower half of table 2.1). This indicates that the students maintained their superior mathematical ability.

On SAT-V males improved by 159 points and females by 144 points in the second wave of the follow-up. For the third wave males increased by 190 points and females by 181 points (see table 2.1). Thus the initial sex difference on SAT-V favoring girls diminished, and for the second wave it was no longer statistically significant. Both on SAT-M and SAT-V the boys improved significantly more than the girls (see Benbow & Stanley 1982a), unlike in some other studies (e.g., Shaycoft 1967) where it had been found that members of the sex with the initial advantage improved their scores most through high school.

Because the students were selected initially on the basis of their high mathematical ability, it was expected that they would score less well on SAT-V than on SAT-M because of statistical regression toward the mean. This was true both for the talent-search and for high-school results (see table 2.1). In high school the students' mean scores on SAT-V were approximately 170 points above the mean for a national sample of college-bound seniors, compared to the 200-point superiority on SAT-M. This difference held up when percentile ranks were compared. Again, on SAT-V the students maintained their initial superior ability.

MATHEMATICS COURSE-TAKING

The mean number of semesters of mathematics taken in grades eight through twelve is shown by group in table 2.2. Boys reported taking approximately 9.2 semesters, while girls reported approximately 8.4, significantly different beyond the .001 level. The effect size, *d,* equalled approximately .33. Thus the effect was considered small and not important (see Benbow & Stanley 1982a). Boys and girls received mainly *A*s and *B*s, with the girls obtaining slightly better grades (see Benbow & Stanley 1982a).

Approximately 66 percent of the boys took at least one calculus course, compared to 40 percent of the girls (see table 2.2). Furthermore, many

TABLE 2.2. Reported Mathematics and Science Course-Taking in Grades 8–12 (by Wave and Sex)

	First Wave		Second Wave		Third and Fourth Waves	
	Males (N = 133)	Females (N = 69)	Males (N = 310)	Females (N = 221)	Males (N = 785)	Females (N = 478)
Total mathematics						
Mean number of semesters	9.4	9.0	9.3	8.1	9.2	8.5
Standard deviation	2.3	1.8	2.5	2.6	2.6	2.4
Mean course grade	3.6	3.7	3.5	3.6	3.5	3.6
Standard deviation	0.7	0.5	0.5	0.5	0.5	0.5
Total Science						
Mean number of semesters	7.0	6.8	7.0	6.0	8.4	7.6
Standard deviation	2.4	2.0	2.4	2.4	2.8	2.4
Mean course grade	3.6	3.7	3.5	3.6	3.6	3.6
Standard deviation	0.3	0.4	0.5	0.5	0.5	0.4
Percentage taking biology	83	97	89	93	89	94
Percentage taking chemistry	89	93	91	86	89	88
Percentage taking physics	78	68	77	58	76	57
Percentage of total taking a science course	98	100	98	97	98	99
Calculus						
Percentage taking calculus	62	42	69	34	66	43

more boys than girls took two courses in calculus. The differences were significant beyond the .001 level, with a medium effect size (h = .53). No significant sex difference was found in grades earned in calculus, which were mostly *A*s and *B*s. For further discussion of the sex difference in mathematical ability and course-taking see Benbow and Stanley (1980, 1982a), where they conclude that socialization theories (differential course-taking, etc.) probably cannot account for all of the sex difference in mathematical ability.

SMPY students studied mathematics much longer than 1979–80 college-bound twelfth-graders in the middle states region of the United States (New York, Pennsylvania, New Jersey, Delaware, Maryland, and the District of Columbia).[5] Those college-bound twelfth-graders took 7.4 semesters of mathematics during high school if male and 6.8 semesters if female (ATP 1980). The difference between the two groups was significant by a t-test beyond the $p < .001$ level. The effect size, d, varied between .50 and 1.22, which is in the medium to large range. Furthermore, in the National Longitudinal Study of the High School Class of 1972, eight semesters of mathematics were taken by only 8.8 percent of the males and 3.4 percent of the females (Wise, Steel, & MacDonald 1979). This was a

decline in mathematics course-taking of almost ¾ for the men and about ⅔ for the women from the 1960 Project Talent data (ibid.). Calculus had been taken by only 4.7 percent of male and 3.1 percent of female 17-year-olds in 1977–78 (NAEP 1979). At least ten times that percentage (for each sex respectively) of the SMPY students took calculus. The difference in proportions between the two groups was significant beyond the $p < .01$ level for both sexes. The effect size equalled 1.45 for the boys and 1.02 for the girls, both of which are considered large. It can thus be concluded that SMPY students take much more mathematics than students in general.

SCIENCE COURSE-TAKING

Essentially all SMPY students took science in grades eight through twelve (see table 2.2). Biology and chemistry courses were most frequently taken. Fewer students—more boys than girls—took physics, whereas more girls took biology. This agrees with Kelly's (1979) findings. The mean number of semesters of science taken by the students was 7.6; the grades received in those classes were mostly *A*s and *B*s.

The participation in science of this group compares favorably with the participation in science of the 1978–79 college-bound seniors in the middle states. The mean number of semesters of studying biological science was 2.8 for such boys and girls (ATP 1980). For the physical sciences the mean was 4.2 for boys and 3.4 for girls (ibid.). Although the total number of semesters spent studying science was somewhat lower for college-bound seniors than for SMPY's students, the difference was not significant.

Benbow (1981) found that a comparison between the number of semesters of mathematics and science taken in high school revealed that SMPY students were significantly more likely to have taken a mathematics course than a science course. It is possible that this difference reflects a greater access to mathematics courses than to science courses.

ACHIEVEMENT TEST SCORES

The students were asked to report their performance on the College Board's achievement tests. Table 2.3 is a breakdown of the performances by sex for those tests that at least 8 percent of the students indicated they had taken at any time in high school. It can be seen in table 2.3 that for every one of these tests, SMPY students' mean scores were superior to the means of college-bound high-school students. SMPY males scored on the average 107 points better, and the SMPY females, 97. Boys were superior to girls on the science and mathematics tests, while girls were superior on the English composition and French examinations.

To test for significant differences in performance on the achievement tests between the SMPY group and college-bound high-school students, a sign test was utilized. The resulting chi-square equalled 5.2, which was significant beyond the $p < .05$ level. The effect size, *g*, equalled .5, which is

TABLE 2.3. Reported Performance on the College Board's High-School-Level Achievement Tests Taken by at Least 8 Percent of the Students in a Group (by Wave and Sex)

	First Wave (N = 202)		Second Wave (N = 531)		Third and Fourth Waves (N = 1,263)		National Sample of 1978 College-Bound High-School Students[a]
	Males	Females	Males	Females	Males	Females	
Math Level I							
Mean score	692	664	698	656	695	644	541
Standard deviation	81	99	74	70	65	76	99
N	34	19	60	58	149	100	146,426
Math Level II							
Mean score	742	676	751	724	748	705	665
Standard deviation	67	93	60	57	59	71	95
N	46	7	91	29	281	99	32,743
English Composition							
Mean score	653	667	634	656	624	638	512
Standard deviation	85	55	85	66	84	80	109
N	61	25	145	94	363	199	195,173
Biology							
Mean score	689	605	667	644	652	613	544
Standard deviation	86	134	78	68	71	93	111
N	11	2	27	23	58	43	47,291
Chemistry							
Mean score	670	619	675	634	678	651	577
Standard deviation	78	66	66	72	85	78	102
N	25	10	50	16	146	50	35,007
Physics							
Mean score	684	530	683	618	672	607	591
Standard deviation	74	—	71	84	81	86	106
N	23	1	42	8	100	15	15,408
French							
Mean score	595	591	616	642	632	646	552
Standard deviation	121	103	84	93	74	95	109
N	12	8	26	41	45	68	25,673

NOTE: SMPY students scored significantly higher than college-bound high-school seniors on all the achievement tests ($X^2 = 5.2$, $p < .05$, $g = .5$ [large effect size], and the power of the test was greater than .43).

[a] Taken from Admissions Testing Program of the College Board, *National Report: College-Bound Seniors, 1979* (Princeton, N.J.: Educational Testing Service, 1979).

considered large and thus important. Interestingly, SMPY students did not score higher on the mathematics achievement test relative to the other tests.

More males took the more difficult Math Level II than the easier Math Level I test (see table 2.3). In contrast, slightly more females took Math Level I than Math Level II. The SMPY males' mean scores on the Math Level II approximated the maximum reported score, 800. Finally, SMPY males scored better than SMPY females on both mathematics tests. The

sex difference was statistically significant except on Math Level I in the first wave of the follow-up.

In science the boys also took significantly more of these achievement tests than girls, especially the ones in chemistry and physics (see table 2.3). Scores were high and above the national mean for both boys and girls. Boys scored better than girls – significantly so, except in biology in the first and second waves of the follow-up and chemistry in the first wave (see Benbow 1981; Benbow & Stanley in press).

FAVORITE COURSES IN HIGH SCHOOL

When asked what their favorite course in high school was, respondents named mathematics most frequently (36 percent of the males and 31 percent of the females). The second favorite was science (34 percent of the males and 25 percent of the females). In a national survey of 17-year-olds, NAEP (1979) also found that the most frequently mentioned favorite course was mathematics (18 percent named it as their favorite). This was followed by English (16 percent), social studies (13 percent), and then science (12 percent). The SMPY group tends to follow this pattern, but mathematics and science are significantly more strongly preferred ($p < .01$). The effect size was medium (.70). Thus the difference between the groups was judged as important.

RATED LIKING FOR MATHEMATICS AND SCIENCE

These findings were further affirmed when the students were asked to rate their liking for biology, chemistry, mathematics, and physics on a five-point scale ranging from strong dislike to strong like. For all of these subjects the students had, on the average, a moderate liking. Mathematics was most preferred by males and females. Boys appeared to like the sciences about equally well, while for girls the ranking of preference was biology (most), chemistry, and then physics.

PARTICIPATION IN SCIENCE FAIRS AND MATHEMATICS CONTESTS

Approximately 23 percent of the boys and 12 percent of the girls had participated in at least one mathematics contest. This was significantly different at the $p < .001$ level. With regard to science fairs, 17 percent of boys and girls participated in at least one. Michael (see chapter 3 of this volume) discusses the relationship between science fair and mathematics contest participation and ability on the SAT and family variables. He concludes that "a modest *negative* relationship exists between SAT-M scores and extent of participation in science fairs for girls (but not for boys) and that a

modest *positive* relationship occurs between SAT-M scores and amount of involvement in mathematics contests for boys (but not for girls)."

Summarizing, it appears from the preceding three sections that mathematically talented high-school students, boys more so than girls, are interested in mathematics and the related field of science.

ACTIVITIES AND JOBS

The students were asked to list the number of in-school and out-of-school activities engaged in during grades eight through twelve. Activities were grouped into seventeen categories ranging from academic to religious (see Appendix 2.1). The mean of the total number of activities engaged in by participants was twenty-three across all four waves of the follow-up. The total reported numbers ranged from zero to ninety-one activities per student. The three most popular categories of activities for both males and females were, in order of preference, reading and spectator activities, social hobbies, and performing arts.

The number of jobs held by the students were also ascertained. Across all waves of the follow-up approximately 87 percent of the students reported having had at least one job in grades eight through twelve. The mean number of jobs held was 2.2.

We conclude that SMPY students were actively doing many different things throughout high school. There appears to be no evidence that these gifted students have a narrow range of interests.

AWARDS AND HONORS

The students in the follow-up were asked to report any awards or honors won and their degree of participation in the National Merit Scholarship Competition. Performance in the latter is judged on the basis of the students' scores on the Preliminary Scholastic Aptitude Test (PSAT), typically taken in October of the eleventh grade. SMPY students did well on the PSAT. At least 50 percent of them satisfied the criteria for receiving at least a Letter of Commendation (see table 2.4). Any student in the competition who goes further has to satisfy the criterion for the previous level. For example, students who satisfy the criterion for a National Merit Finalist have also satisfied the criterion for Semi-Finalist and Letter of Commendation. Approximately 5 percent of SMPY students received National Merit Scholarships (the highest level of the competition). This finding attests to the fact that SMPY students are extremely able.

With respect to academic awards and honors won in high school, approximately 67 percent reported receiving at least one. The mean number won by the students is 2.5. The mean numbers of other awards won can also be seen in table 2.4. They average 2. These were won by approximately 59 percent of the students. Clearly, the group won a large number of awards and honors.

TABLE 2.4. Reported Performance in the National Merit Scholarship Competition and Number of Awards and Honors Won in High School (by Wave)

	First Wave (N = 202)	Second Wave (N = 531)	Third and Fourth Waves (N = 1,263)
National Merit[a] (%)			
Letter of Commendation only	27	41	38
Semi-Finalist	5	19	17
Finalist	13	15	14
Scholarship winner	4	4	5
Academic awards			
Mean number	2.7	2.4	2.5
Standard deviation	2.4	2.8	3.1
Other Awards			
Mean number	0.7	2.2	2.5
Standard deviation	1.2	3.0	3.2

[a]Except for a Letter of Commendation, every student in successive echelons of the National Merit Competition had satisfied the requirement for the previous level.

USE OF ACCELERATIVE OPTIONS

The various accelerative options available for facilitating a gifted student's education (Stanley 1978; Benbow 1979) and their use by the SMPY students can be seen in table 2.5. The most widely known of these options is grade skipping. Approximately 15 percent of SMPY students skipped at least one grade or entered school early. The most frequently skipped grade was the twelfth. No significant sex difference was found, except for the first wave of the follow-up, in which 30 percent of males vs. 17 percent of females skipped at least one grade ($p < .05$).

AP examinations can secure college credit for advanced course-work completed in high school if the person scores highly enough on them (Benbow 1978; Benbow & Stanley 1978). They are taken mainly by highly able students (Hanson 1980). Approximately 40 percent of SMPY males and 25 percent of SMPY females took at least one AP examination. Since fewer than 5 percent of high-school students take an AP examination (Hanson 1980), this is a high degree of participation by the SMPY group. The mean number of examinations taken was almost 1 for boys and about .5 for girls (see table 2.5). Although there was a significant sex difference in the taking of AP examinations ($p < .001$), there was no difference in the scores received on these examinations except in the first follow-up ($p < .05$, Cohn 1980). The mean was approximately 3.6 on a five-point scale, where a 3, 4, or 5 is considered a good score and makes a student eligible for some college credit at most colleges.

The most popular AP examinations for the boys were the mathematics, which were taken by 29 percent of the boys (12 percent took the Calculus

TABLE 2.5. Reported Use of Accelerative Options by the Beginning of College (by Wave)

	First Wave (N = 202)	
	Males	Females
Grade skipping		
Mean number	0.5	0.2
Standard deviation	0.8	0.5
Percentage skipping at least one grade	30	17
APP exams		
Mean number taken (s.d.)	0.8 (1.2)	0.3 (.6)
Mean score[a] (s.d.)	3.7 (1.0)	3.1 (1.0)
Percentage taking at least one exam	41	19
College courses as high-school student		
Mean number taken	0.8	0.4
Standard deviation	2.0	1.2
Percentage taking at least one course	24	10
Early entrance to college (%)	29	16
Advanced standing in college (%)	48	30
Mean number of credits for those students (s.d.)	11.5 (8.8)	8.0 (5.6)

[a] Scores on the APP exams can range from 1 (the lowest possible) to 5 (the highest possible). Many colleges give credit for a two-semester course for 3s. Most give such credit for 4s and 5s, except that only one semester of credit is usually awarded for 3–5s on the less comprehensive of the mathematics examinations (i.e., Level AB).

AB and 17 percent took the more difficult Calculus BC exam). For girls the English examination was most popular (second most popular for boys); 19 percent of the girls took it. For girls, the mathematics examinations were second most popular; 13 percent of the girls (8 percent took Calculus AB and 5 percent took Calculus BC) took them. The students' scores were not better on the mathematics tests than on the other tests.

Another accelerative option available to students who want to move ahead in their educational careers is the taking of college courses on a part-time basis while still in high school (George & Solano 1976a). Although the numbers varied for each wave, approximately 20 percent of the SMPY students took college courses while they were still in high school (see table 2.5). Significant sex differences were not observed.

Early entrance to college is yet another educationally accelerative option (Eisenberg & George 1978; Benbow & George 1979). Of the 1978–79 college freshmen, only 3.4 percent entered college at least one year early (Astin 1978). Among the SMPY students, 14 percent did so (see table 2.5). This difference in proportions was significant beyond the $p < .01$ level. The effect size equalled .42, which is considered to be almost a medium effect.

Entering college with advanced standing earned through AP examinations or through college course-taking in high school, for example, is one of the favorite accelerative options. Approximately 38 percent of the SMPY students did this, with a mean number of credits ranging from eight to twelve (see table 2.5). Males used this option significantly more than females ($p < .005$ for the four waves).

Second Wave (N = 531)		Third and Fourth Waves (N = 1,263)	
Males	Females	Males	Females
0.2	0.2	0.2	0.2
0.5	0.5	0.5	0.4
13	15	12	14
0.8 (1.3)	0.4 (.8)	0.9 (1.4)	0.6 (1.0)
3.6 (.9)	3.7 (.9)	3.6 (.9)	3.6 (1.0)
40	25	43	32
0.3	0.2	0.4	0.4
0.8	0.5	1.3	1.1
19	18	19	19
15	17	11	13
35	24	44	37
12.1 (10.6)	9.6 (8.8)	11.4 (10.0)	8.2 (6.4)

It is clear that a fairly high percentage of SMPY students used at least one of the educationally accelerative options for facilitating their education. Furthermore, the students who did accelerate felt that this had affected their social and/or emotional development somewhat positively. Only 5 out of 1,104 (0.5 percent) students in the second, third, and fourth waves of the follow-up who considered themselves to have been accelerated felt that acceleration had affected their social and/or emotional development much to the worse. In contrast, 203 (18 percent) of the students felt the opposite.

COLLEGE ATTENDANCE

Over 90 percent of the SMPY students were attending college at the time they completed the questionnaire (see table 2.6). The colleges attended by these students were rated using the Astin (1965) scale. Each college was given an intellectualism and status score, T-scores having a mean of 50 and a standard deviation of 10. Astin (1965, p. 54) defines a four-year college with a high intellectualism score as having a student body that "would be expected to be high in academic aptitude (especially mathematical aptitude) and to have a high percentage of students pursuing careers in science and planning to go on for Ph.D. degrees." A four-year college with a high status score is defined as having a student body that "would be expected to have a high percentage of students who come from high socioeconomic backgrounds and who themselves aspire to careers in enterprising fields (lawyers, business executives, politicians)" (ibid.). Among the colleges attended by SMPY students the mean intellectualism score was almost 59 and the mean status score 57 (see table 2.6). Thus the SMPY group attended colleges or universities that were rated on the average almost one standard deviation above the mean for four-year colleges and universities

TABLE 2.6. Talent-Search Students' Attitudes toward College and Ratings on Intellectualism and Status of Their Colleges

	First Wave (N = 202)	Second Wave (N = 531)	Third and Fourth Waves (N = 1,263)
Percentage attending college	95	92	92
College intellectualism score			
Mean (s.d.)[a]		58.4 (11.5)	58.8 (11.8)
Mean for colleges, including community colleges (s.d.)[b]		56.1 (14.5)	55.7 (16.0)
College status score			
Mean (s.d.)[a]		57.1 (9.4)	57.3 (9.4)
Mean for colleges, including community colleges (s.d.)[b]		55.1 (13.0)	54.3 (14.1)
Liking for college			
Mean[c]	4.4	4.4	4.4
Standard deviation	0.8	0.9	0.8

[a] College intellectualism and status scores are T-scores, mean 50 and standard deviation of 10. Ratings are from A. W. Astin, *Who Goes Where to College?* (Chicago: Science Research Associates, 1965).
[b] An arbitrary value of 15 was given to a community college.
[c] Liking for college was coded as follows: 5 = strong like, 4 = moderate like, 3 = neutral or mixed feelings, 2 = moderate dislike, 1 = strong dislike.

in academic difficulty, and almost as high in status. The students had a fairly strong liking for their colleges (see table 2.6).

The intended college majors of the SMPY students as college freshmen can be seen in table 2.7. Approximately 61 percent of the males and 50 percent of the females are planning to major in science, mathematics, or engineering. Except in the engineering area, where more boys are majoring, relatively small differences are seen between males and females. Compared to college-bound high-school seniors of whom 45 percent of males and 33 percent of females intend to major in science, mathematics, or engineering (ATP 1979b), this mathematically talented group shows a strong interest in these fields.

EDUCATIONAL ASPIRATIONS

The educational aspirations of the SMPY group were high. Fewer than 4 percent of the students hoped to obtain less than a bachelor's degree. The most frequently aspired to educational level was a doctorate (39 percent). Compared to educational aspirations of high-school students in general, where only 51 percent aspire to obtain a bachelor's degree or more (Charles Kettering Foundation 1980), the SMPY students are highly motivated. The difference between proportions aspiring to at least a bachelor's degree was significant beyond the $p < .01$ level, and the effect size, h, equalled 1.5, which is considered large. Thus the difference is considered important.

TABLE 2.7. Reported Intended College Majors (in Percentages)

Majors	Males	Females	Total
Mathematical sciences/engineering	36	25	32
Science	26	25	26
Social science	10	13	11
Liberal arts	8	11	9
Other	11	12	11
Undecided	10	14	12

USE OF EDUCATIONAL OPPORTUNITIES

Overall, SMPY students felt that their use of all available educational opportunities was a bit above average. Only 2 percent felt that they had made extremely poor use of their opportunities. In contrast, 58 percent felt that they had used their opportunities either rather or extremely well.

SMPY'S INFLUENCE

Although, subsequent to the talent search itself, SMPY had had little contact with most of the students in its talent searches (only through its bulletin, the *ITYB,* for the most part), the students were asked to rate how SMPY had helped them educationally and how SMPY had affected their social and/or emotional development. The results can be seen in table 2.8. Over 60 percent of the students felt that SMPY had helped them educationally at least some. Less than 2 percent felt that SMPY had hurt them educationally. The majority (almost 80 percent) felt that SMPY had not affected their social and/or emotional development at all. Since most felt that SMPY had helped them educationally – a major purpose of SMPY – and few (less than 3 percent) felt SMPY had negatively affected their social and/or emotional development, the main goal of SMPY can be said to have been fulfilled.

Summary

This chapter is an attempt to trace the progress through high school of the intellectually talented students identified by the Study of Mathematically Precocious Youth in its first three talent searches (Keating 1974, 1976a). The students who were followed up had scored as seventh- or eighth-graders better on the College Board's Scholastic Aptitude Test-Mathematics and/or -Verbal sections than a national sample of eleventh- and twelfth-grade females had. Students were asked to complete an eight-page questionnaire about themselves. Of the 2,188 students selected for this study, over 90 percent (1,996) returned the survey form to us. The

TABLE 2.8. Ratings on Degree of Educational Help Received from SMPY and SMPY's Affect on Students' Social and/or Emotional Development

	First Wave (N = 202)	Second Wave (N = 531)	Third and Fourth Waves (N = 1,263)
Educational help[a]			
At least some (%)	61	63	60
None (%)	39	36	38
Unfavorable influence (%)	0	1	2
Mean[b]	2.9	2.8	2.8
Standard deviation	0.9	0.8	0.8
Social and/or emotional development[c]			
Positively (%)	21	18	21
No influence (%)	79	80	77
Negatively (%)	–	2	3
Mean	–	3.2	3.2
Standard deviation	–	0.5	0.5

[a] The perceived degree of educational help received from SMPY was coded as follows: 1 = hurt me; 2 = none; 3 = a little; 4 = considerably; 5 = much.
[b] The distribution of responses was significantly skewed and had a significant amount of kurtosis.
[c] The rated influence of SMPY on students' social and/or emotional development was coded as follows: 1 = much for the worse; 2 = negatively; 3 = no influence; 4 = positively; 5 = much for the better.

general conclusion is that these students did fulfill their potential during high school.

These students maintained their initial superior ability throughout high school. Compared to a national sample of college-bound seniors, SMPY students' mean scores on the SAT-M and SAT-V in high school were approximately 200 and 170 points superior, respectively. The mean scores on the SAT were close to the top possible score on that test, which is designed for above-average students. SMPY boys and girls showed a mean score gain on SAT-M of 155 points and 145 points, respectively, from the time of the talent search until they took the tests again in high school. On the SAT-V males improved by 159 points and females by 144. Thus males improved significantly more than females during high school in both their verbal and mathematical abilities (see Benbow & Stanley 1982a). Furthermore, SAT-V scores were lower than SAT-M scores on the 200- to 800-point scale and in percentile ranks by sex both at the time of talent-search participation and in high school, as would be expected on the basis of regression toward the mean.

To assess the SMPY students' level of achievement, performance on the College Board's achievement tests was studied. Over all tests taken during the high school years by at least 8 percent of the SMPY group, SMPY students' mean score was approximately 100 points above the mean for 1978–79 college-bound seniors (107 points for boys and 97 for girls). The

highest scores were not necessarily found for the mathematics achievement tests. On not one of the tests studied was the SMPY group mean lower than the college-bound seniors' mean. Thus these students are superior not only in ability but also in achievement.

Benbow (1981) showed that SMPY students took significantly more of the college-level AP examinations taken in high school than students in general do. Furthermore, on every single test taken by at least ten persons, SMPY students scored above the mean, as they had done on the achievement tests. Again, scores on the mathematics examinations were not necessarily the highest.

A major purpose of this study was to determine the degree to which mathematical talent of students in grades seven and eight relates to subsequent course-taking, achievements, interests, and attitudes in high school. The results suggest strong relationships.

The degree of participation in high-school mathematics by the mathematically talented students was outstanding. As a group the SMPY students took one year more of mathematics than college-bound seniors and received mainly *A*s and *B*s for their course-work. With respect to calculus, almost 66 percent of the boys took at least one calculus course, compared to 40 percent of the girls. This is ten times the rate (for each sex separately) at which high-school students in general take calculus. Thus for both boys and girls, respectively, it was concluded that students identified as mathematically gifted in grade seven or eight did have a high level of participation in high-school mathematics courses. Participation and achievement in high-school science courses were almost as high as for mathematics and compared favorably to the 1978–79 college-bound seniors' performance.

A high degree of interest was also shown in mathematics and science. Mathematics and science were the favorite courses in high school, with mathematics being the most preferred course. When the students rated their liking for mathematics, biology, chemistry, and physics on a five-point scale, their responses were equated to a moderately strong liking. Again, mathematics was rated most highly. The strong interest in mathematics and science was exhibited not only in the number of courses taken in these fields in high school but also in the high degree of participation in science fairs and mathematics contests.

The use of accelerative options (Stanley 1978; Benbow 1979) was at a level much higher than that of the general population. The students who considered themselves at least somewhat accelerated felt that this acceleration had benefited their social and/or emotional development.

Although these students were highly successful academically and were interested in academics, they pursued a wide variety of extracurricular interests in high school. The mean number of activities was twenty-three; reading, social activities, and performing arts were the most popular. Most

of the students also won some type of award or honor. Although a high percentage of them were academic awards, many other types of honors were also won. It can thus be concluded that SMPY students did not have a narrow range of interests and were not one-sided in their activities.

Over 90 percent of the students were attending college, typically at academically and socially elite universities, and were enjoying it. Over 50 percent of the students were intending to major in mathematics, science, or engineering. This is a high percentage compared to college-bound seniors. Furthermore, the educational aspirations of the whole group were extremely high. Over 96 percent of the students wanted to receive at least a bachelor's degree. A doctorate was the most popular choice.

Sex differences were found throughout this study in participation in mathematics and science, performance on the SAT-M, and the taking of and performance on the mathematics and science achievement tests. No statistically significant differences were found, however, in attitudes toward mathematics and science. For further discussion of sex differences found in this group see Benbow (1981) and Benbow and Stanley (1982a). Some other studies in sex differences are Benbow and Stanley (1980), Fox, Brody, and Tobin (1980), and Fox, Benbow, and Perkins in chapter 7 of this volume.

It is clear that this group of intellectually able students identified by SMPY were in general quite successful in high school. But how much had SMPY to do with that? In many cases a great deal, it appears. It is difficult, however, to reach and help personally 2,000 students. Yet this group of SMPY students did feel that SMPY had given them some help educationally while not detracting from their social and/or emotional development. This was as much as SMPY had aspired to influence the whole group, since the members of its small staff concentrated their efforts on the ablest, best-motivated students among the group.

In conclusion, SMPY has shown that its identification measure is effective in selecting students in the seventh grade who achieve at a superior level in high school, especially in science and mathematics. The SAT-M score of an intellectually talented seventh- or eighth-grader does have predictive validity.

Notes

1. For more complete coverage of this topic see Benbow (1981).
2. Some *accelerated* ninth- and tenth-graders were also eligible.
3. The responsibility for conducting the first wave of the follow-up with 214 students who had met the science criterion and/or had scored at least 420 on

SAT-M was Cohn's. The data collection for the remaining three waves (N = 1,974) was my responsibility.

4. The first wave of the follow-up consisted only of students who had been at least eighth-graders in the talent search, the second wave consisted mainly of ex-eighth-graders but of some ex-seventh-graders in the talent searches, and the combined third and fourth waves consisted mainly of ex-seventh-graders and also of some ex-eighth-graders. The talent-search mean score difference on SAT-M and SAT-V for the waves is probably accounted for by this difference in composition of the groups.

5. They were considered to be the appropriate comparison group, since SMPY students resided in that area.

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APPENDIX 2.1: Questionnaire used to Follow Up SMPY Students after High-School Graduation

The Johns Hopkins University - Baltimore, MD 21218 **1979/1980**
Study of Mathematically Precocious Youth (SMPY)

Follow-up survey of SMPY students who are of High School graduate age

Please fill out **ALL** of this questionnaire carefully and completely. Please print or type all answers. For any questions that do not apply, write N/A; if your answer is "None" write None. Please send it as soon as possible in the enclosed envelope to **SMPY,** The Johns Hopkins University, Baltimore, Maryland 21218. All information will be kept **STRICTLY CONFIDENTIAL**; you will not be publicly identified with the information herein in any way. If you have any questions, please feel free to call (301) 338-7086.

I. GENERAL INFORMATION

A. PRINT your full name: _____ (Last / First / Middle / Maiden (if applicable))

Print your parents' names: Father: _____ (Last / First / Middle)

Mother: _____ (Last / First / Middle / Maiden)

Your home address: _____ (Street No / Street)

_____ (City / State / Zip Code) County: _____

Your telephone no: ( ) _____ (Area Code / 7-digit number)

B. Your mailing address, if different from your home address:

_____

IMPORTANT

C. Please print the name and address of a relatively young but stably located adult, not living in your home, who would know your address in case you move. We need this information in order to keep in touch with you in the coming years if you move.

Name: _____ ( ) (Last / First / Middle / Relationship)

Address: _____ (Street No. / Street)

_____ ( ) (City / State / Zip Code / Tel. No. with Area Code)

IMPORTANT

D. Your sex (circle): F M
Your marital status:
- ☐ Single
- ☐ Married
- ☐ Divorced

Your birthdate: _____ (Month/day/year)

Today's date: _____ (Month/day/year)

Spouse's name: _____ (Given name / Former Surname)

E. Social Security No.: ☐☐☐ ☐☐ ☐☐☐☐

F. Driver's license number: _____ State: _____

G. Which, if any, grade(s) have you skipped? _____

H. When did you enter kindergarten? _____ (Month/Year)

I. When did you enter the first grade? _____ (Month/Year)

Go to the next page.

II. GRADES 8 THROUGH 12

A. List all the schools below the college level that you have attended from September of 1974 onward, in order of attendance, with dates of attendance. Indicate with a checkmark (✔) each of the schools from which you were graduated and the dates of your graduation.

School	City, State	Years during which you attended	Graduated?	Year of Graduation

B. Indicate all of the math courses you took in grades 8 through 12. When possible, list the final (overall) grade (e.g., A,B,C,D, or F) you received for the subject, as well as the school grade you were in when you took the course. Also list how long you were in the course (e.g., half year, whole year) and any special comments about the course (such as, no grade received). If you took a college course in lieu of a high school course, list it under "D. College courses while in high school," which is on the next page. (If more room is needed, continue on separate sheet.)

Subject	Final course grade	School grade	Length of course	Special comments
1. Algebra I				
2. Algebra II				
3. Plane geometry				
4. College algebra				
5. Trigonometry				
6. Analytic geometry				
7. Calculus I (Differential)				
8. Calculus II (Integral)				
9. Probability				
10. Statistics				
11. Computer Science				
12. Other (specify)				

13. Unified Math Curriculum (please describe under "Comments" on last page of questionnaire) ☐ yes

C. Indicate all of the science courses you took in grades 8 through 12. When possible, list the final (overall) grade (e.g., A,B,C,D, or F) you received for the subject, as well as the school grade you were in when you took the course. Also list how long you were in the course (e.g., half year, whole year) and any special comments about the course (such as, no grade received). If you took a college course in lieu of a high school course, list it under "D. College courses while in high school," which is on the next page. (If more space is needed, continue on separate sheet.)

Subject	Final course grade	School grade	Length of course	Special comments
1. General science				
2. Biology				
3. Chemistry				
4. Physics				
5. Advanced biology				
6. Advanced chemistry				
7. Advanced physics				
8. Other (specify)				

Go to the next page.

D. List all the courses you took **for credit** at a college **before** becoming a **full-time** college student, as well as the name of the institution, the year you took the course, the grade you were in at the time, the final (overall) grade you received in the course, and the number of credits.

Title of college course	College	Year	School grade	Course grade	Number of credits

E. List in the appropriate spaces below the exact name **and level** (such as, Calculus AB or BC, or Physics C Mechanics) of all Advanced Placement Program (APP) **examinations** you have taken. (Omit those subjects for which you took APP courses but did not take the APP exams.) Show the year(s) you took the exam(s) and the school grade(s) you were in at the time.

Name of APP exam	Score on APP exam	Year exam taken	School grade at the time

F. List your scores on the following standardized examinations, as well as the month and year you took the exam and the grade you were in at that time. If you took the exam more than once, list each score in order of when taken. If you took the exam but cannot locate the scores, so indicate.

Exam	Math	Verbal	TSWE*	Date (Mo./year)	School grade
Scholastic Aptitude Test (SAT)					
Preliminary Scholastic Aptitude Test (PSAT)					

*Test of Standard Written English

	Subject and level	Score	Date (Mo./year)	School grade
College Board Achievement Tests				

	Subject and level	Score	Date (Mo./year)	School grade
College-level Examination Program (CLEP) Test				

	Mathematics	Verbal	Natural Science	Social Science	Total	Date (Mo./year)	School grade
American College Testing Program (ACT)							

Go to the next page.

G. What were your favorite subjects in grades 9 through 12? (Let 1 mean "most preferred.")

1. _____ 2. _____ 3. _____

H. Check the **one** of the five rating-scale categories below that most appropriately describes your attitude toward **each** subject listed. Then in the column entitled "Ranking" rank your preference (1=most preferred, 2=next, 3=next, and 4=least. Please rank all 4 and use **no** ties in ranking.)

Subject	Strong liking	Moderate liking	Neutral or mixed feelings	Slight dislike	Strong dislike	Ranking
Biology						
Chemistry						
Mathematics						
Physics						

I. Have you considered a career in any of the areas listed in item H? ☐ Yes ☐ No

If yes, which one(s)? _____

Why? _____

J. List all of the science fair projects you submitted to science fairs in your school, state, region, or nation. Please indicate the title of the project, science area (e.g., biology, chemistry, physics), year, the school grade you were in at the time, and any prizes you received.

Science fair project title	Level	Area in science	Year	School grade	Prize

K. List all of the national, regional, or state mathematics contests in which you have competed. Please indicate which contest, your score, and awards you received.

Contest	Year	Score	Award(s)

L. Did you take the PSAT? ☐ Yes ☐ No

Did you receive a National Merit Letter of Commendation? ☐ Yes ☐ No

Were you a National Merit Scholarship semi-finalist? ☐ Yes ☐ No

Were you a National Merit Scholarship finalist? ☐ Yes ☐ No

Did you receive a National Merit Scholarship? ☐ Yes ☐ No

M. List (next to the appropriate categories) all honors or awards you won while in grades 8 through 12. Under the column entitled "Total number" indicate the total number of awards and/or honors you won for each category.

Type of Award	Total number	Name(s) of award(s)	How won	Year	School grade
National scholastic					
Regional scholastic					
School scholastic					
Artistic (music, theatre, art)					
Athletic					
Community, service, religious or political					

Go to the next page.

N. List (next to the appropriate categories) the fairly important in-school activities in which you participated during grades 8 through 12. Under the column entitled "Total number of years" indicate in the appropriate box the total number of school years you participated in each type of activity in this time period. Then name the activities and next to each one list each school grade during which you participated in it.

Type of activity	Total number of years	Activities	School grades
Academic			
Leadership			
Membership (non-academic clubs, committees)			
Performing arts			
Sports			
Technical (stage crew, photography, etc.)			
Writing			

O. List (next to the appropriate categories) your hobbies and out-of-school activities (including summer activities) in which you participated from the summer following your seventh grade through the summer following your twelfth grade. Under the column entitled "Total number of years" indicate in the appropriate box the total number of calendar years you participated in each type of activity. Then name the activities and next to each one list the years during which you participated in it.

Type of activity	Total number of years	Activities	Year(s)
Academic			
Arts & crafts			
Collections (coins, stamps, etc.)			
Community service/ volunteer			
Performing arts			
Political			
Reading & spectator activities (watching sports, listening to music, etc.)			
Religious			
Social hobbies (cards, dating, etc.)			
Technological hobbies			

P. How many different types of summer or part-time jobs did you have during grades 8 through 12? ☐
List your three most recent jobs, along with the employer(s) and dates of employment.

Type of job	Employer (firm)	Dates (from/till)

Go to the next page

III. HIGHER EDUCATION

A. When did you become a **full-time** student or trainee beyond high school?_____
Month/year

At which school or program?_____
Name of school or program

_____
City State

B. Did you enter any college, university, or other school or training program **full-time** earlier than your agemates? ☐ Yes ☐ No

If yes, after which grade? ☐

C. Did you enter with advanced standing? That is, had you earned any applicable credits before entering the post-secondary institution? ☐ Yes ☐ No

If yes, what was the total number of semester, or quarter, hours of advanced-standing credits of all sorts you received?

Semester hour ☐ Quarter hour ☐

D. What college, university, or other school or training program are you now attending? (If none, so state.)

_____
Name of school or program

What is your mailing address at this school or program? _____
Street no. & street

_____ ( ) -
City State Zip Code Tel. no. (including area code)

E. List **all** of the colleges and universities and/or other schools or programs to which you submitted a complete application for admission.

College, school or program	accepted	waiting list	rejected
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐

F. List **all** scholarships or fellowships you were awarded, and for each one list the amount and the sponsor of the award.

Description	Amount	Sponsor

G. As far as you know now, what is your major field of study likely to be? _____

H. List the **titles** of the courses you have taken thus far at college as a full-time student. (If you prefer, enclose a xeroxed copy of the transcript of your college credits.)

_____

_____

_____

_____

Go to the next page.

I. List (next to the appropriate categories) the program activities in which you are participating now either in school or outside of school, or which you plan to join this school year. Under the column entitled "Total number of activities," indicate in the appropriate box the total number of activities within each category shown.

Type of activity	Total number of activities	Name of activities
Academic		
Leadership		
Membership (non-academic clubs or committees)		
Performing		
Sports		
Technical (e.g., stagecrew)		
Writing		
Religion		

J. How well do you like college? (Check **one.**)

- ☐ Strong liking
- ☐ Moderate liking
- ☐ Neutral/mixed feelings
- ☐ Moderate dislike
- ☐ Strong dislike

K. What is the highest level of education you hope to obtain? (Check **one**.)

- ☐ Less than high school
- ☐ High school diploma
- ☐ Less than two years of college
- ☐ Two or more years of college, but not a bachelor's degree
- ☐ R.N. (Registered Nurse, but not a bachelor's degree)
- ☐ Bachelor's degree
- ☐ Master's degree
- ☐ Doctorate (e.g., Ph.D., Ed.D., M.D., D.D.S., LL.B., J.D., D.V.M.)
- ☐ Post-doctoral study

In what field(s) of study? _____

IV. ATTITUDES

A. How well, to date, do you feel that you have used all available educational opportunities? (Check **one**.)

- ☐ Extremely well
- ☐ Rather well
- ☐ About average
- ☐ Rather poorly
- ☐ Extremely poorly

Go to the next page.

B. To what extent do you feel that your association with the Study of Mathematically Precocious Youth (SMPY) has helped you educationally via its talent searches, various mailouts, letters, personal contacts, articles, local and national publicity, and special opportunities? (Check **one**.)

- ☐ Much
- ☐ Considerably
- ☐ A little
- ☐ None
- ☐ It has hurt me educationally.

Please explain your answer: _____

_____

C. How does your social and/or emotional development seem to have been influenced by your association with SMPY? (Check **one**.)

- ☐ Much for the better
- ☐ Positively
- ☐ No influence
- ☐ Negatively
- ☐ Much for the worse

Comments: _____

_____

D. Have you been accelerated in subject matter placement? ☐ Yes ☐ No

Have you been accelerated in grade placement? ☐ Yes ☐ No

If yes to either of the above, how do you feel your social and/or emotional development has been affected by this acceleration? (Check **one**.)

- ☐ Much for the better
- ☐ Positively
- ☐ No influence
- ☐ Negatively
- ☐ Much for the worse

Comments: _____

_____

E. How might SMPY have been of more value to you, especially if its resources had been greater?

_____

_____

_____

_____

F. Any other comments you care to make:

G. I hereby certify that I have read over my responses carefully and thoroughly. They are as complete and accurate as I can make them.

_____
Signature