THE TALENT-SEARCH CONCEPT: AN IDENTIFICATION STRATEGY FOR THE INTELLECTUALLY GIFTED

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Using the empirically based evidence that has resulted from the previous five Talent Searches of the Study of Mathematically Precocious Youth, the article develops the rationale and success behind the talent-search concept as a useful strategy for identifying the intellectually gifted. Its practicality as a model is further demonstrated through the systematic curricular programming that has resulted at school-district levels after students have been identified as talented in a specific aptitude area. The identification issue is discussed as it pertains to efficiency and effectiveness related to cost, predictive validity, and feasibility.

If the goal of education is to maximize the learning potential of each individual, then why do we neglect identification *and* facilitation of the gifted student? Parents, educators, and legislatures have given time, energy, and large sums of money to special education in an effort to meet the needs of the mentally and/or physically handicapped and the educationally disadvantaged. The courts have ruled that these students are entitled to an appropriate education. However, the point often forgotten is that the educationally disadvantaged also include the gifted and talented; indeed, far too often such students are grossly retarded in educational development relative to their potentialities. Educational systems that fail to provide students with the appropriate experiences are shirking their responsibility.

The cry of elitism is often raised when talking about funds or programs for the gifted and talented. The stereotype seems to be as follows: Bright students will get along well without the schools having to do anything extra. Another argument advanced is that identification and facilitation programs are too costly (Gallagher, 1975). In reality, this society and these points of view propose *reverse* discrimination. The gifted are being penalized for trying to maximize the effective use of their gifts and talents, supposedly a goal of the educational establishment. Isn't this a waste of what is probably our country's most valuable resource?

RATIONALE

The purpose of this article is to put into perspective the need for a flexible model that is inexpensive but highly accurate in identifying the gifted student, especially in the areas of mathematical and verbal reasoning ability. The intent

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is to demonstrate that the talent-search concept is a highly effective, efficient (Pegnato & Birch, 1959) method of identifying academically gifted students in the areas of mathematical and verbal reasoning ability. It is a method that has been pioneered and refined by the Study of Mathematically Precocious Youth (SMPY) at the Johns Hopkins University from 1971 to 1978; the 1976 Talent Search of that program is of especial relevance to this paper.[1] Further proof is based on earlier talent searches and the resulting school-system replication efforts. The approach is not an attempt to denigrate other identification strategies; rather, it is to show the strengths and efficiencies of the suggested method. Nor is it an attempt to replace early preschool or elementary school identification procedures; rather, it is to supplement them with accurate identification of specific aptitudes around the time that formal cognitive operations of the mind develop.

The rationale behind the talent-search approach is fourfold. First, it is important to show that there exists a systematic and valid approach for identifying mathematical and verbal reasoning ability. In other words, that there are techniques which will predict educability well over a period of several years. Does this approach effectively differentiate degrees of ability? How many false positives and negatives result from such a procedure?

The second goal is educational facilitation. Put differently, are students easily assigned to appropriately difficult programs as a result of the identification procedure? This may depend on the student's ability level relative to the school and its administrative flexibility.

The third issue is whether the talent-search model can be replicated easily in a number of different situations. Will it work in a small, medium, or large school district? Is such a concept applicable within a state or across a region of states?

The fourth and final consideration of such a search is its economical manageability and feasibility. Are the identification procedures used to identify mathematical and/or verbal reasoning talent cost-effective? What type of monetary allotment is needed to conduct a search?

A GENERAL-INTELLIGENCE OR MULTIPLE-APTITUDE APPROACH

In developing the talent-search concept, SMPY was forced to look closely at the two main approaches used to identify academically gifted youths over the last 50 years: global-intelligence testing and multiple-aptitude testing (Guilford, 1967; McNemar, 1964; Spearman, 1923; Thurstone, 1935). As educators know, the global-intelligence tests may be handled by either group or individual administration. Typically, this method has compared a person's MA with his/her CA. The final product is known as the IQ (Terman, 1916), an overall

[1]Three private philanthropic organizations are responsible for the funding of this endeavor: the Spencer Foundation, The Educational Foundation of America, and the Robert Sterling Clark Foundation. The 1976 Talent Search was specifically funded by The Educational Foundation of America.

intellectual measure that is especially indicative of learning rate. The individual IQ score, while more valid than the group IQ score, especially for young children, is more costly, since it requires a one-to-one interaction over a period of several hours. The multiple-aptitude approach, on the other hand, identifies strengths and weaknesses in specific academic abilities, such as mathematical reasoning, verbal skills, mechanical comprehension, space relations, and nonverbal reasoning. This technique allows for large-group administration and uses standardized aptitude test batteries.

The general-intelligence approach to identifying intellectually brilliant youths was first used by Terman. He identified 1,528 persons who had IQs of 135 or more, most of them at least 140 and averaging 151 (Terman, 1925). They were approximately the top 1 in 200 children from the general population. This approach is still the most frequently used method for selecting the academically gifted in the 1970s. States such as California, Florida, and Pennsylvania require minimum IQs of 130 or 132 on an individual test such as the WISC or the Stanford-Binet.[2] Being identified as gifted by this method, however, may create the wrong impression, because parents and teachers are apt to assume that the individual is equally good in all academic skills. High IQ implies high overall ability but not necessarily specific mathematical ability, scientific knowledge, or history skills. To be truly effective, intelligence testing must be preceded or followed by specific aptitude testing.

Keeping in mind these concerns about intelligence tests and SMPY's goal of identifying highly able mathematical reasoners (Keating, 1976b; Stanley, 1977; Stanley, Keating, & Fox, 1974) the multiple-aptitude approach to testing is more realistic and feasible than the global-intelligence approach (Fox, 1976a). SMPY's three previous talent searches (George & Solano, 1976; Keating, 1974; Keating, 1976a) demonstrated that a large amount of talent in various aptitude areas (especially mathematical, scientific, and verbal) could be found by using standardized aptitude and achievement measures.

A two-step procedure

The identification procedure involves two-steps. The first is the initial screen, which is based primarily on age-grade achievement-test results in the selected aptitude area. Those persons scoring in the top 2%–5% (5% in 1972, 2% in 1973 and 1974, 3% in 1976 and 1978) are invited to participate in the talent search. On occasion, teacher or peer nominations are accepted when no test scores are available, but this approach is considerably less valid (Terman, 1925; Stanley, 1976b). Students selected by teachers tend to be those conforming to teacher guidelines and achieving well as a result. Only with proper guidelines or checklists do teachers begin to be even partially accurate in their selection procedures (Gallagher, 1975). Similar problems occur with peer nominations. Here, popularity and peer interaction play a role in who is chosen.

The administration of an appropriately difficult test that is not easily coached is the next step. The measuring device must have enough ceiling (Fox, 1976a;

[2]An IQ of 132 would place an individual approximately 2 standard deviations above the mean, or in about the upper 2% of the general population.

Keating, 1976a; Solano, in press; Stanley, 1976c) to separate the ability levels of the screened group effctively. The typical age-grade tests used by schools will not succeed in differentiating an already seemingly homogeneous upper 1%–5% group. Schools assume, and often falsely, that these students should perform equally well in the same subject-matter area because they all score quite high on the in-grade tests that are too easy for them. Previous experience with three radical accelerants and SMPY's work with the College Entrance Examination Board (Keating & Stanley, 1972; Stanley, 1974, 1976a) led the SMPY staff to believe that the Scholastic Aptitude Test (SAT) — Mathematics (M) and/or Verbal (V) — would have an appropriate test range and ceiling for highly able seventh and eighth graders. Another positive feature of the SAT is that it is restricted and therefore not easily taught or coached. The SAT requires skills seldom taught in the middle- or junior-high-school years. In order to score high on the M or V sections, the individual must have a keen mind that has picked up a great deal extra beyond what has been taught in school to date.

Since this first 1972 hypothesis of needing tests that are appropriately difficult (such as the SAT) SMPY has identified over 4,500 junior high-school-age seventh and eighth graders who reason better mathematically than the average high-school senior. These students have come from Delaware, the District of Columbia, Maryland, Pennsylvania, Virginia, and West Virginia. In addition, 30% of the boys and 15% of the girls have earned scores at least as high on SAT-M as those of the average college-bound male senior. Two boys, one a seventh grader and the other an eighth grader, have earned raw scores of 58 and 59 out of 60 on the M portion of the SAT, indicating that even this test does not always have enough ceiling for the ablest seventh and eighth graders. In the 1974 Maryland Mathematics Talent Search (George & Solano, 1976), 111 of the 1,519 participants scored higher on SAT-M than did all but 5% of a random sample of male high-school seniors. In fact, only five persons in the entire contest earned a score considered to be at the chance level in this area of the SAT. Similar results were found for the 1976 and 1978 Talent Searches as well.

Criterion for participation

The initial success of the Talent Search in finding gifted persons appears to be outstanding. This is especially true in the area of mathematical reasoning. *Flexibility* and *variability* are key words if this identification design is to be repeated in a variety of other circumstances. Concern about these concepts resulted in SMPY seeking and receiving funding from the Educational Foundation of America for three searches starting with SMPY's 1976 Talent Search held on December 4 and 12. The search region was expanded from Maryland to include Delaware, southern Pennsylvania, northern Virginia, and the District of Columbia. Twelve percent (n = 104) of the 873 contestants participating in the December 1976 Talent Search were from regions other than Maryland. In the following year's search only 32% of the 2,800 participants came from Maryland.

The 873 participants (507 male, 366 female) took both the V and M parts of the SAT.[3] In keeping with the idea that the talent-search design must be adaptable, contestants had to be in the top 3% of their national age-grade group on a test of mathematical ability. Examples of qualifying age-grade tests include the Iowa Test of Basic Skills, the Stanford Achievement Tests, and the Cognitive Abilities Test. No test of general intelligence was permitted as the criterion for participation. Students had to qualify by being in the top 3 out of every 100 students of their school grade nationally in the specific aptitude area of mathematics.

In the 1976 contest the initial qualifying score was lowered slightly from the previous upper limit of 2%. This was done for several reasons. First, only seventh graders or students in higher grades who were of seventh-grade age were permitted to participate in the search. In previous searches seventh and eighth graders had participated. Second, the concepts of test difficulty and standard error of measurement were taken into consideration. In 1972 our initial screening criterion of the upper -5% students was too lax; for the SAT proved too difficult for a sizable minority. The average scores on the SAT-M were lower in the 1972 contest than in any other search. During the next 2 years we used the upper 2% criterion with great success, and there were fewer individuals who scored at the lower end of the test scale. (This does not imply that all students identified by SMPY via SAT-M as being excellent mathematical reasoners will be highly successful in mathematics and related areas. Only longitudinal study will answer this speculation.) By lowering the initial criterion slightly in 1976 we hoped to take into consideration the standard error of measurement that occurs in each test. In addition, we hoped to reduce the number of false negatives. Put differently, the person who scores at the 97th percentile on one day may score at the 98th or 99th percentile on another day, depending on the factors, such as the test conditions, student health, and test environment. Such a student would be missed by a 98th percentile cutoff if he/she had an "off" day. This individual may score very well on the SAT-M and/or SAT-V sections because he/she was included in the search even though he/she only scored at the 97th percentile. An analysis of the relationship between initial screening scores and the SAT-M would be helpful.

It is important to remember that the Talent Search is voluntary. Detailed practice materials are sent to each student well in advance of the search date. Of the 1,076 boys and girls who submitted an application, 18.8% did not show up for the contest. The no-show rate for boys was 16.5% and 22% for girls. An analysis of this relationship compared with students actually taking the SAT-M needs to be done. Probably, after working the practice test, students who do not achieve a recommended minimum corrected score on either section of the SAT generally decide not to participate. Thus, students who are more likely to score more poorly on the SAT tend to screen themselves out.

[3]This was an older version than is currently in use. It contains 90 verbal items and 60 mathematical items. The time limit for the M and V sections is the same (75 minutes for each).

1976 Talent Search results

Figure 1[4] illustrates the distribution of scores earned by the seventh and underage eighth-grade girls and boys who participated in the 1976 Talent Search as compared with a random sample of high-school students. The scores of the 1976 Talent Search participants are higher relative to the random sample of high-school students by sex than are the SAT-V scores relative to the random sample of high-school students. This was expected, since the search was for mathematical talent, and the criterion for entering the contest was based solely on knowledge of mathematics.

The mean score of participants on the SAT-M was 459 for males and 422 for females. For males the average SAT-V was 373, and for females it was 368. The *average* high-school junior or senior scored 402 on M and 368 on V. The median Talent Search scores on M and V were 439 and 364, respectively. This means that well over 50% of the students participating scored above the average national high-school junior or senior on at least one of the SAT subtests (M or V).

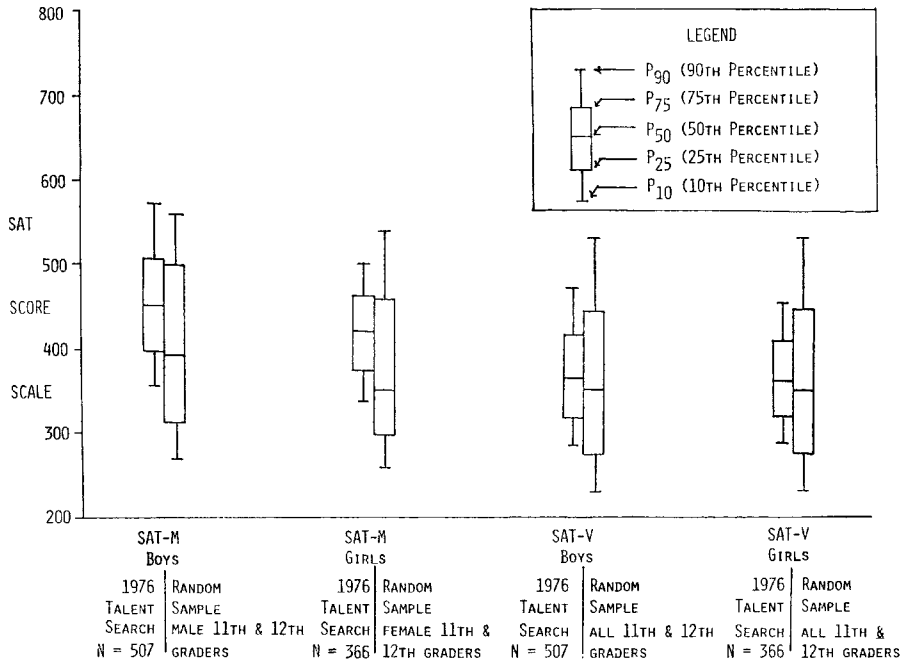

Figure 1. Comparison of scores earned on the SAT exam by 7th-grade boys and girls who participated in the December 1976 Talent Search with those earned by a random sample of 11th- and 12th-grade males for SAT-M and of 11th and 12th graders in general for SAT-V.

[4]Sanford J. Cohn assisted in the construction of Figures 1 and 2. An earlier article giving some results of the 1976 Talent Search appeared in *ITYB (Intellectually Talented Youth Bulletin)* published by SMPY (George & Cohn, 1977).

TABLE 1
FREQUENCIES AND PERCENTILE RANKS OF SAT-M SCORES EARNED IN SMPY's 1976 TALENT SEARCH BY SEX (PERCENTILE RANKS BASED ON A NATIONAL RANDOM SAMPLE OF ELEVENTH AND TWELFTH GRADERS BY SEX)

	Male		Female			Male		Female	
Score	*f*	Percentile rank	*f*	Percentile rank	Score	*f*	Percentile rank	*f*	Percentile rank
780	2	99+	0	99+	490	19	73	11	82
770	0	99+	0	99+	480	17	71	14	80
760	0	99+	0	99+	470	21	68	17	77
750	1	99+	0	99+	460	38	66	36	75
740	0	99	0	99	450	29	64	19	73
730	1	99	0	99	440	24	62	21	71
720	1	99	0	99	430	26	59	22	68
710	2	99	0	99	420	25	57	17	66
700	1	99	0	99	410	14	54	14	63
690	2	98	0	99	400	24	52	22	61
680	0	98	0	99	390	16	49	25	58
670	1	97	0	98	380	14	46	17	55
660	2	97	0	98	370	22	44	12	52
650	2	96	0	98	360	25	41	21	49
640	8	95	0	98	350	9	38	17	46
630	2	94	0	97	340	8	34	7	42
620	3	94	0	97	330	9	31	11	38
610	6	93	2	96	320	6	27	10	33
600	7	92	1	96	310	4	24	4	29
590	4	91	0	95	300	1	20	3	25
580	5	89	4	94	290	0	17	2	21
570	4	88	4	93	280	1	14	1	17
560	8	86	3	92	270	3	10	2	14
550	11	85	3	91	260	0	7	1	10
540	12	83	3	90	250	0	4	0	6
530	14	81	5	88	240	1	3	0	5
520	12	79	6	87	230	0	2	0	4
510	18	77	3	85	220	1	1	0	2
500	21	75	6	84					
					Total	507		366	

The range in scores on the SAT-M were 220–780 for males and 260–610 for females (Table 1). Percentile ranks for the M scores are based on a random sample of eleventh and twelfth graders, separately by sex. The SAT-M scale ranges from 200, the lowest score used, to the highest reported score, 800. A chance score is about 270.

For the V sections of the SAT, participant scores varied in the following manner: 210–710 for males and 220–650 for females. Table 2 presents the entire group of SAT-V scores ranging from the 3rd percentile to the 99th+ percentile of a random sample of eleventh and twelfth graders. No separate sex norms are needed because males and females score similarly on SAT-V. The SAT-V is scored on an arbitrary scale ranging from 200 for no knowledge of

TABLE 2
PERCENTILE RANKS OF SAT-V SCORES EARNED IN SMPY's 1976 TALENT SEARCH (PERCENTILE RANKS BASED ON A NATIONAL RANDOM SAMPLE OF ELEVENTH AND TWELFTH GRADERS)

Score	*f*	Percentile rank	Score	*f*	Percentile rank
710	1	99+	420	44	69
700	0	99+	410	17	66
690	0	99	400	54	64
680	0	99	390	27	61
670	0	99	380	53	58
660	1	99	370	61	55
650	1	99	360	32	52
640	1	99	350	63	49
630	1	98	340	41	46
620	0	98	330	56	43
610	1	97	320	45	39
600	1	97	310	51	36
590	1	96	300	27	33
580	2	95	290	43	30
570	2	95	280	24	27
560	7	94	270	16	23
550	1	93	260	17	20
540	1	92	250	8	17
530	6	90	240	8	14
520	9	89	230	7	10
510	10	87	220	1	7
500	6	86	210	1	3
490	14	84			
480	10	82	Total	873	
470	15	80			
460	12	78			
450	24	76			
440	32	74			
430	18	71			

content to 800 for perfect or near-perfect knowledge, with a chance score being about 230.

The SAT-V scores are important for several reasons. First, they show the wide range in verbal ability among the contestants. Second, V tends to act as an indicator of learning rate similar to the role of an IQ score. Good verbal skills are necessary if one is to learn mathematics more rapidly than the average classroom pace.

Twenty-five percent ($n = 150$) of the boys and a little over 9% ($n = 40$) of the girls scored 500 or more on SAT-M; i.e., at least as high as does the average male college-bound eleventh or twelfth grader. Three-fourths of a national random sample of high-school boys taking SAT-M would score less than 500. (For a discussion of sex differences in the area of mathematics and the sciences see Anastasi, 1974; Astin, 1974; Fox, 1976b.)

Seventy-five percent of high-school students would score less than 430 on the SAT-V. Seventy-two girls and 105 boys among the participants (or 30% of the

total group) scored 430 or more on the SAT-V. This is impressive, since students in the 1976 Talent Search were selected on the basis of mathematical ability. Even within the group of 873, the correlation of SAT-V with SAT-M scores is appreciable: .55 for males and .47 for females.

An even more select group are those who scored at least 500 on M and also 430 or more on V. Eighty-nine students (69 male, 20 female) attained this criterion of being above the means of both highly selective college-bound normative groups. Figure 2 illustrates the relative proportions of Talent Search participants who scored as well as or better than the average college-bound eleventh- or twelfth-grade male on the SAT-M and/or better than the average college-bound eleventh or twelfth grader (of either sex) on the SAT-V. A total of nearly one-third of the 873 students were in this distinguished range on the SAT-V and/or the SAT-M.

Predictive validity of SAT-M

The basic 1976 Talent Search statistics demonstrate that junior-high and middle-school students do well on tests designed for students 4 and 5 years their seniors. The SAT does an effective job of differentiating individuals within the specific areas of mathematics and verbal reasoning ability. For long-range validity of this identification procedure, time alone will tell. Preliminary results indicate that the SAT is highly efficient, effective, and valid in the predictive sense over a 3–5-year time span. Stanley (1976b) found that 3-year-old

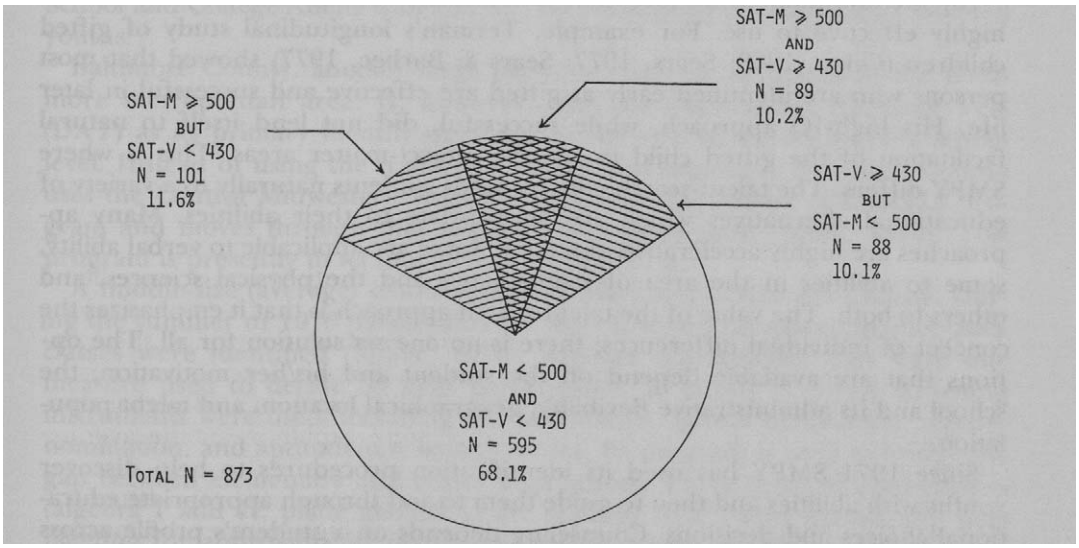

Figure 2. Participants in the 1976 Talent Search who, as 7th graders, scored as well as or better than the average college-bound 11th- and 12th-grade male on SAT-M and 11th and 12th graders in general on SAT-V. (The mean for the boys is used for the SAT-M because it is more stringent than the mean of the two sexes combined.)

SAT scores are better predictors of success in a college-level mathematics competition for high-school juniors than are teacher recommendations.

The first mathematically precocious youth identified by the present study took a variety of College Board examinations. He earned scores of 669 and 590 on the SAT-M and SAT-V, respectively, as an eighth grader. He is presently completing his doctoral studies at a major university and expects to receive the Ph.D. degree in computer science in August 1979. Five other gifted youths identified in the 1972 and 1973 Talent Searches also entered college early and graduated from Johns Hopkins University in May 1977. Their SAT-M scores as 12–14-year-old Talent Search participants were as follows: 790, 740, 710, 710, 670, and 670. Three were elected to membership in Phi Beta Kappa. All are going into graduate study 3–5 years early. This is an excellent savings of creative potential, according to Lehman (1953). Another young man as an eighth grader earned a score of 750 on the SAT-V and 700 on SAT-M. Two and one-half years later he earned a $5,000 prize for a science essay contest sponsored by the Smithsonian Institute. In addition, Solano and George (1976) report that in over a 5-year period 131 SMPY youths have taken 277 college courses on a part-time basis and earned an overall grade-point average of 3.59, where 4 = A. They go on to discuss the relationship between SAT score and success.

FACILITATION FOLLOWS IDENTIFICATION

An identification procedure that is technically sound may or may not be highly effective to use. For example, Terman's longitudinal study of gifted children (Oden, 1968; Sears, 1977; Sears & Barbee, 1977) showed that most persons who are identified early as gifted are effective and successful in later life. His high-IQ approach, while successful, did not lend itself to natural facilitation of the gifted child in specific subject-matter areas. This is where SMPY differs. The talent-search concept leads students naturally to a variety of educational alternatives which are appropriate to their abilities. Many approaches are highly accelerative in nature. Some are applicable to verbal ability, some to abilities in the area of mathematics and the physical sciences, and others to both. The value of the talent-search approach is that it emphasizes the concept of individual differences; there is no one set solution for all. The options that are available depend on the student and his/her motivation, the school and its administrative flexibility, geographical location, and talent population.

Since 1971 SMPY has used its identification procedures to help discover youths with abilities and then to guide them to and through appropriate educational choices and decisions. Counseling depends on a student's profile across several ability areas. The techniques evolved have appeared in three books thus far (Keating, 1976b; Stanley et al., 1974; Stanley, George, & Solano, 1977). Among the options available (Fox, 1974b; Stanley, 1978) are subject-matter acceleration, grade skipping, fast math classes (Fox, 1974a, 1976b; George, 1976, George & Denham, 1976; Stanley, 1976a), social science classes (McGinn,

1976), tutor-preceptor techniques (Cohn, 1976), diagnostic testing, advanced-placement courses (Casserly, 1968; Stanley, 1976a), college courses taken while in high school (Solano & George, 1976), early graduation, and early entrance to college (Eisenberg & George, 1979; George & Stanley, 1975). With proper guidance, students who are *eager* to develop their special abilities may use these strategies in order to bridge the gap from the early secondary school years to college more effectively. Early identification can result in educational planning on a longitudinal basis.

SCHOOL SYSTEMS ADAPT TALENT-SEARCH CONCEPT

The crucial third variable is the adaptability of the talent-search approach. Is it feasible for a single school district, or must it be used across a large region? Is the SAT the only acceptable identifyer? Fortunately, there are data to begin to answer these critical questions. Various school systems at both the state and local level have used or are planning to use the SMPY talent-search concept to develop programs for the mathematically gifted. Two Maryland counties (Charles and Montgomery) have had their programs reported on in some depth in an earlier article (George, 1976). Charles County, rural and sparsely populated, has used the Preliminary SAT for the last 5 years as its selection device. Presently, the mathematics coordinator there is setting up his sixth fast-paced mathematics class. Montgomery County, a large metropolitan area bordering the District of Columbia, is talent-rich. Its program has used the School and College Ability Test (SCAT) for identifying mathematically talented youths.

Baltimore County, another large talent-rich county, is located in the Baltimore metropolitan area. It, however, uses the Differential Aptitude Test (DAT) as its primary identification tool at the end of the sixth-grade school level. Instead of using the traditional precalculus sequence, Baltimore County uses the Central Midwestern Regional Education Laboratory (CEMREL) program and moves through that sequence at a rapid pace (Smith, 1976). This program is presently in its fourth year (1978–1979).

A middle-size (average) school district in Maryland is Howard County. During the summer of 1976 participants for their first two fast-paced mathematics classes were identified (Miller, 1976). Algebra achievement tests were one measure used to decide on class participation. A variety of initial screening instruments were used, including self-nomination, parent nomination, teacher nomination, and aptitude-test battery scores. Its program is used to bridge the gap between elementary and senior high school. Three years of mathematics (algebra I and II, plane geometry) are covered in a 2-year period, the class meeting for approximately 60 2-hour periods a year. In 1978–1979 the program went into its third year, with some minor revisions (Miller, 1978).

In September 1976 Minnesota contacted SMPY and asked for assistance in replicating its talent-search approach and the fast-paced mathematics-class model. After consultation with SMPY, Minnesota educational personnel, in fall 1976, conducted the first such talent search in the Minneapolis–St. Paul and

Duluth areas, using SCAT. Three classes a year have been established, and the program is active during the 1978–1979 school year. Montgomery County, Pa., started its first mathematics program, replicating SMPY in the fall of 1977 and continuing the program during the 1978–1979 academic year. At the state level, Illinois is conducting its first statewide search for mathematical talent during the 1978–1979 year, after having pilot tested their program in three sites the previous year.

Talent-search flexibility

These preliminary data indicate that the talent-search concept is flexible and variable as long as one keeps in mind several points. The aptitude-test battery used may vary, but it must have enough ceiling to differentiate among the upper 2%–5% of students who have been initially screened. In addition, strict control over the identifying instrument must be maintained to avoid coaching. The more appropriately difficult the test, the greater the validity of the identification procedure. Further testing will eliminate students who are false positives. Screening procedures may vary to include teacher and peer nomination, but to be really effective they must include the standardized aptitude-test batteries.

Verbal programs and classes may be established using the verbal-aptitude scores. Such programs are discussed in Daurio (1974), in the Study of Verbally Gifted Youth's (SVGY) annual report to the Spencer Foundation (Hogan & Garvey, 1975), and in McGinn (1976). During the fall of 1978 classes for the verbally gifted were established in expository writing, German, and Greek and Latin usage by their departments at The Johns Hopkins University. In addition, verbal scores help to indicate readiness to take introductory college courses on a part-time basis, if the student is well motivated and properly counseled.

If a school system is interested in identifying gifted students in specific subject-matter areas, then the talent search is a realistic approach. For example, in a large urban metropolitan area the DAT might be appropriate. With eight different subtests, one can identify a large number of individuals who perform well in specific areas such as clerical speed and accuracy, mechanical reasoning, and language usage. Individual cut-off scores for each ability could be used for placement in specific programs. The criterion might be the top 5% or so on each subtest. In this manner one can collect a larger percentage of talented individuals than is possible by using a single-score IQ test followed by multiple-aptitude tests.

Another important argument in defense of the talent search is its cut-off flexibility. The program can be as large or as small as the school district can handle. The only difference is that expectations will vary according to ability-level cut-offs and groupings.

University participation grows

Another impetus generated by the talent-search concept has been the rapidly growing interest of colleges and universities in gifted students, especially in the

area of mathematics. Seventy one-course tuition waivers were offered by 17 institutions for the top students in SMPY's Talent Search, while 102 were offered the following year. Previously, in 1974, 40 course waivers were given by 12 institutions of higher education. These tuition waivers are to be used over a 2-year period, permitting students flexibility in taking advantage of this opportunity. Awarding institutions have come from Delaware, the District of Columbia, Maryland, Pennsylvania, and Virginia.

A growing number of institutions have college-course programs for high-school juniors and seniors based on test performance and/or scholastic performance. In many colleges and universities the age-grade barrier is being removed somewhat if the student shows the prerequisite achievement. It is hoped that this growing interest will continue and can be meshed with secondary school programs to the advantage of the academically gifted.

COST ANALYSIS OF THE TALENT-SEARCH MODEL

The fourth, and perhaps the most important, consideration is whether the talent-search concept is economically feasible. If it isn't, then it will probably fail. Lack of cost-effectiveness has hurt many programs that might otherwise have been a success. The 1976 Talent Search will be used as an example. At first glance, costs (Table 3) may seem high. Personnel costs alone were $2,664, or over 25% of the total $8,600. This, however, averages out to a little less than $10 per student tested in the 1976 Talent Search. (If one includes the 18.5% (n = 203) who did not actually show up at the Talent Search on December 4 and 12, the cost per student becomes about $8.

What do these figures mean? To take the SAT under a regular administration cost an individual $7.25 during the 1976–1977 academic year. This includes little feedback except for the test scores (which include M, V [total read-

TABLE 3
THE 1976 TALENT-SEARCH COSTS

Item	Cost
Personnel (general)	$2664.09
Test booklets ($1.00 each)	873.00
Answer sheets (15¢ each)	130.95
Duplication	1710.65
Proctors and campus guides	354.00
Main testers	300.00
Coffee room for parents	72.40
General supplies	195.00
Postage	929.58
Scoring costs	178.50
Phone calls	30.00
Scholarship luncheon and seminar	52.75
Math supervisory seminar	110.00
Total cost	$8,600.92[a]

[a]This breaks down to a cost of $9.85 per person.

ing comprehension, vocabulary], and Test of Standard Written English) and the service of having one's scores reported to three colleges. With SMPY, the scores are evaluated for the student and translated into possible educational alternatives. The results are then reported, with suggestions, to the individual's home school. In addition, complete reports are sent to the various school-system coordinators regarding instruction in mathematics. Further prescriptive testing has been offered to the top 10%–30% of the contestants. This additional information, when analyzed, is then relayed back to the examinees and their schools.

Earlier in this article an attempt was made to demonstrate the predictive validity of the SAT-M scores over a period of 3 or more years. For a school system, this stability would result in real savings. For certain systems in the United States, there is *X* amount of dollars allotted for identification programs (Kearney & Brockie, 1978). Suppose the amount is $40 per child. By SMPY's method the identification program would cost the system approximately $10 per child, or one-fourth of the amount allotted to identify gifted students. The rest of the money (a savings of $30 per individual) could be used for further descriptive testing and some program facilitation. In the following years the system could claim the $40 without going through this procedure again, since the aptitude measures tend to be valid over a number of years. The savings to the school system, if the child is identified in the seventh grade, is $30 + $40 (5 times), or $230 per child. For several hundred children, the savings build up.

For many school districts, the cost of such an identification process would be considerably less. Reusable test booklets are a one-time expense until they wear out. There would be a more systematic screening and identification procedure, probably in terms of a greater number of students to work with. Multiple copies of reports and other duplicating needs become cheaper as quantity increases. The cost per child would probably be less than SMPY's if a school system handles its own talent-search technique.

Postage costs and duplication costs would be reduced from SMPY's by at least several hundred dollars. For instance, SMPY must send letters to mathematics chairpersons, guidance counselors, and principals of every public, private, and parochial junior-high or middle school in its search region. Only one communication would be needed per school for a district search. SMPY uses multiple mailings, since it operates independent of the school system. A further savings would result if the school system has machines to score test answer sheets. It was found to be cheaper for the SMPY staff to hand-score SAT answer sheets in the 1974 and 1976 Talent Searches, rather than pay $2 per test. In 1978 this problem was resolved because the students took the SAT under a regularly scheduled national administration. Results were reported directly to the student and to SMPY. Administrator costs for schools would be reduced if the testing is handled during the school day by school personnel.

The 1976 Talent Search costs will vary somewhat from a school system's. This, however, is not the point. For $8,600, the Talent Search is cost-effective. The public-relations expenses involving a luncheon for college administrators cost $52.75, resulting in a pledge of 70 one-course tuition waivers for the 1976

Talent Search. A conservative estimate of the value of these scholarships is $100 per course. The total value of the 70 courses is thus at least $7,000. Furthermore, colleges and universities in the expanded 1976 Talent Search region are cooperating even more with secondary schools, attempting to provide better educational alternatives for the gifted and talented.

SUMMARY

In summary, the talent-search concept is a useful strategy for identifying the gifted in academic areas, especially in the area of mathematics. It is flexible; efficient; and, as demonstrated by the various school systems using it, highly effective. From the standpoint of economics, costs per child are reasonable. In the long run, identification costs can become further funds for curriculum facilitation. When dealing in the area of mathematics and the physical sciences, educational facilitation naturally follows as a result of identification. For the verbal areas, the strategies may not be as clear-cut or sequential, but they are accessible. SMPY has witnessed the powerful positive effects of the talent-search method since 1972. It is hoped that continued refinement of this technique will lead to more widespread use by school systems at the state and local levels.

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