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ABSTRACT

The Project Talent longitudinal survey of 400,000 students (grades 9-12) identified deficiencies in the nation's schools, particularly in reading comprehension and career planning. The Program for Learning in Accordance with Needs, PLAN, represented one response to Project TALENT findings. PLAN products included a list of educational objectives with accompanying learning guides and test items; materials to assist students in formulating long-term goals, and in taking the responsibility for planning and completing an educational program to achieve these goals; and teacher guides. PLAN focused on mastery of skills such as reading, writing, and arithmetic. A broader program, Planning Career Goals (PGG), focused on life goals. PCG consisted of three parts: (1) a set of instruments for identifying student values, career interests and awareness; and abilities known to discriminate among people in various careers; (2) information on the background, on-the-job activities, and working conditions of people in the most common career fields; and (3) a report form comparing the student with the 12 homogeneous career groups defined by Project TALENT data. Both programs emphasized clear objectives, knowledge of results, and student responsibility. (CP)

JOHN C. FLANAGAN

PROJECT TALENT AND RELATED EFFORTS TO IMPROVE SECONDARY EDUCATION

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A Monograph

by

John C. Flanagan

American Institutes for Research

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PREFACE

Phi Delta Kappa is an *honorary* fraternity for educators. Its *honorary* aspects have evolved in two directions. All the members of Phi Delta Kappa experience the feeling of being honored when elected to membership. That expression of esteem of our colleagues is a powerful force. It contributes part of what motivates many of us to continue our membership and our service toward the accomplishment of Phi Delta Kappa's goals.

The other dimension by which Phi Delta Kappa is an *honorary* fraternity is seen on those occasions when we single out an individual and, in one manner or another, recognize that person's contributions. On those occasions we do something that has a double payoff. First, it communicates our respect and appreciation to an individual whose contributions are exemplary. Second, we spotlight a person and a pattern of work as a standard for the rest of us to emulate.

John C. Flanagan, founder and chairperson of the American Institutes for Research, has demonstrated outstanding leadership, research, and service as he has pursued distinguished successive careers in: (1) building and scaling measuring instruments for the first major testing program for high schools, a program developed by the Cooperative Test Service; (2) designing and administering the crucial aircrew testing for the U.S. Army Air Force in World War II; and (3) directing the work of the American Institutes for Research, in which he developed the critical incident technique for identifying significant educational objectives, designed and continues to conduct Project TALENT, a longitudinal study of high school students originally tested in 1960, designed and guides the use in school of PLAN (Project for Learning in Accordance with Needs), a computer-supported individualized learning program, and designed and directs a study of adult life styles at successive ages.

For these accomplishments John C. Flanagan was selected as the 1977 recipient of the Phi Delta Kappa Award for Meritorious Contributions to Education through Evaluation, Development, and Research. He serves well as a model of outstanding professional leadership and he exemplifies the humanizing fraternal spirit which Phi Delta Kappa believes essential to its purpose: the promotion and improvement of universally available, publicly-supported education.

William J. Gephart
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PROJECT TALENT AND RELATED EFFORTS TO IMPROVE SECONDARY EDUCATION

John C. Flanagan
American Institutes for Research

The launching of Russia's sputnik in 1957 caused people in the United States to reexamine many of their institutions and programs. It was in this atmosphere that the concept of Project TALENT was developed. The basic idea was to conduct the first scientifically planned national inventory of human talents: the aptitudes and abilities of a people. Although the general concept had been discussed for at least two or three decades, several factors combined to make such a national survey timely and practical. First, efficient tests and inventories for collecting information on aptitudes, abilities, interests, plans, and background information had been developed. Second, the importance of assuring an educational system designed to meet the diverse needs of the rapidly increasing proportion of young people seeking appropriate educational programs at the secondary school level was becoming more apparent. Third, the development of new electronic scoring machines at the Measurement Research Center, State University of Iowa (now The University of Iowa), and the new capabilities of electronic computers brought the cost of scoring and data processing for a large national sample within a reasonable range. Fourth, federal funds for research and development programs in education became available for the first time when Congress established the Cooperative Research Program, administered by the United States Office of Education.

Funds were obtained in October 1957 to support a planning study for the proposed large national survey. A few months later, four advisory panels composed of distinguished national experts

were appointed. These included a Guidance and Counseling Panel, a Testing Problems Panel, an Educational Research Panel, and a Manpower and Sociology Panel. These panels met several times over the next two years to discuss major issues regarding purposes, instruments, sampling, and follow-ups.

The major objectives of Project TALENT, as outlined by these panels,[1] included the development of:

1. A comprehensive national inventory of the talents of our young people.

2. A set of standards or benchmarks for use by test authors and publishers to achieve both precision and uniformity with respect to "national norms."

3. A comprehensive career handbook indicating the interests and abilities characteristic of those who enter and continue in various career fields.

4. The essential components of a program to assist students in selecting and planning to prepare themselves for appropriate careers.

5. The bases for evaluating the usefulness of specific educational experiences for students with defined characteristics and life and career plans.

The advisory panel recommended that new instruments be developed to measure all aspects of these students' development. There was an obvious need to make the measures being used as comprehensive and reliable as possible and at the same time to keep the total amount of time required for the tests to a minimum. The experimental tryouts helped by deleting inefficient items and indicating the minimum times required to obtain reliable measures of each student's knowledge, abilities, interests, and activities. The final measures, as approved by the advisory panels, included: 36 information scores, 23 ability scores, 13 Student Activities Inventory Scales, and 17 Interest Inventory Scales. There was also a Student Information Blank

including 396 items requesting information on personal experiences and activities; home and parents; health; and plans for college, military service, marriage, and careers.

An effort was made to collect information on all aspects of the individuals' information, abilities, activities, and personal characteristics that might influence their later development and their ability to function in adult roles. The total program required two full days of school time for each student to answer the various types of questions.

In addition to this information on each student, each school principal completed a *School Characteristics Questionnaire*. This requested information on faculty, curriculum, pupil-teacher ratio, relevant procedures, and policies. Similarly, a *Guidance Program Questionnaire* asked about guidance personnel, procedures, and problems.

To decide how large the sample should be and how its members should be selected, the help of a special committee was obtained. These individuals came from both the federal government and the universities and represented a large amount of practical experience with respect to sampling problems. The sampling plan, developed with their assistance, included more than 400,000 students in grades 9 to 12 in all parts of the United States. This large a sample was believed necessary in order to have enough persons entering each of the various important specialties such as physicist, mathematician, surgeon, etc. To make the project practical, it was decided to include all students in each of the secondary schools selected.

Thus, it was proposed that about one school in 20 throughout the United States be included. However, it was found that 50% of the schools had only about 5% of the students and 5% of the schools had about 50% of the students. To get an adequate number of large schools, one out of every 13 of the very large schools was included and only one of 50 of the small schools

was selected. For the medium-sized schools and all private and parochial schools, one in 20 was selected. To make the sample as representative of all groups as possible, the schools were stratified by state, by the size of the community, and by the school's holding power on its students. The latter was calculated by getting the ratio of the number of students who graduated in 1958 to the number in the 10th grade in 1959.

These procedures produced a sample of about a thousand high schools. One of the recommendations of our sampling experts was that we allow no substitution for the schools initially selected but use weighting procedures to compensate for schools selected but unable to participate in the program. Thus, we actually tested the students in 93% of the schools chosen. The total sample also included the 9th grade students in associated junior high schools for all three-year high schools. The schools participating included an excellent cross section of all of the 9th, 10th, 11th, and 12th grade students in the United States.

To assist with the arrangements for the testing, 90 regional coordinators were appointed. These individuals were selected from a list of outstanding educators and psychologists who could be expected to work well with school people. These coordinators visited the schools to inform the school administrators and staff about the nature and importance of the testing program. Later they assisted in preparing the staff to administer the tests.

Although a comprehensive national survey of a large representative sample of secondary school students was very important in terms of the immediate findings themselves, the unique and probably the most important function of Project TALENT was to collect information regarding the abilities, interests, personal characteristics, and background of students who subsequently entered and were successful in various types of careers. Another important function of the study was the evaluation, on the basis of later experience, of the education received by these young people.

To accomplish these aims, follow-up studies were planned and carried out one, five, and eleven years after each of the four classes graduated from high school. In the first follow-up, the response rate was quite good but, for the later ones, it was necessary to select a sample, usually about 5%, of the non-respondents and make an all-out effort to get replies from as close to all of this sample as possible, generally about 90%. This subsample was used with the initial responses to get an unbiased estimate of the results for the entire group.

The results from more than 400,000 students in the sample were sent to the Measurement Research Center at the State University of Iowa.[2] There the Iowa Electronic Scoring Machine obtained as many as 13 scores from 5,000 answer sheets in an hour using photoelectric scanners. In a similar fashion, the first model of the Iowa Document Reader, which was actually completed after the tests had been administered, scanned the student's responses to questions on the Student Information Blank and punched the replies to 140 items on a single punched card. The tremendously improved speed and accuracy of these new machines made this type of comprehensive national survey economically feasible for the first time.

The Survey Findings

What are the most important findings from this comprehensive national survey? One of the most striking was the low level of reading skills of secondary school students throughout the country. To provide a more meaningful framework for reporting the abilities to read and understand, two tests were developed using typical passages from magazines of various types and from the books of well known novelists.[3]

Ten magazines were selected as differing widely in the complexity, subtlety, and general difficulty of typical articles.

For each magazine, a passage was selected from two different issues. (In the case of the movie magazines, two different magazines were used.) The passages were selected to represent the magazine content by using a paragraph from an article chosen at random. Usually the beginning paragraph of the selected article was used. For each of the 20 passages, five multiple-choice items were written using the following guidelines:

1. An item testing general understanding of the passage -- comprehension of its general idea or intent;
2. An item testing comprehension of one of the simplest points in the passage;
3. An item testing comprehension of a point of average difficulty (relative to the difficulty of the passage);
4. An item testing comprehension of the most difficult point in the passage;
5. An item testing appreciation of the passage, or an application of the ideas in it, or an inference drawn from it.

Using the students in two high schools, the scores on the 48-item Reading Comprehension Test included in Project TALENT were equated to the scores obtained on the items based on the magazine passages. These results indicated that the proportions of the passages understood by the average 12th grade student in the national Project TALENT sample as reflected in the percent of items correctly answered were as follows: *Modern Screen* and *Silver Screen* 79%; *Saturday Evening Post* - 55%; *Look* - 48%; *Reader's Digest* 45%; *Pageant* 41%; *McCalls* 38%; *Time* 36%; *Fortune* - 34%; *Atlantic Monthly* 32%; *Saturday Review* 28%.

A similar analysis was carried out using passages from two novels of each of ten novelists. These authors were, like the magazines, selected to show a wide range of complexity, subtlety, and general difficulty in their writings. The results obtained were as follows: Louisa May Alcott - 68%; Robert Louis Steven-

son – 59%; Willa Cather – 51%; Jules Verne – 49%; Sinclair Lewis – 47%; Rudyard Kipling – 46%; Fyodor Dostoyevski – 44%; Joseph Conrad – 40%; Jane Austen – 34%; Thomas Mann – 28%.

It is clearly very difficult to quantify the description of how well a person can read and understand a given passage. However, it seems clear from these findings that 12th grade students fail to comprehend much of what is included in such common magazines as the *Reader's Digest*. They have even greater difficulty with the writings in such journals as *Time, Fortune,* the *Atlantic Monthly*, and the *Saturday Review*. Similarly, it is disappointing to find that high school seniors missed many questions even for such novelists as Louisa May Alcott and Robert Louis Stevenson. Their inability to understand and interpret as many as half the ideas expressed by such authors as Rudyard Kipling, Sinclair Lewis, and Jules Verne suggests that the schools' English courses need to be evaluated to see where improvements can be made.

Looking at some of the other aspects of English instruction,[4] it is found that the average 12th grade student can spell correctly more than 92% of the 5,000 most frequently used words in the English langauge. This estimate is arrived at by obtaining equivalent scores for the Project TALENT spelling test and a test consisting of a representative sample of 150 of the 5,000 most frequently used words in the English language according to the *Thorndike-Lorge Teacher's Word Book*. Similarly, in a program TALENT test including examples representing all of the rules for capitalization, the average 12th grade student answered 90% of the items correctly.

In the area of English usage, most high school students did fairly well. There were only six of the 25 items that less than half of the 12th grade group answered correctly. Some of these involved failure to distinguish between singular and plural subjects, such as, "Neither of them (had went, have gone, has

went, have went, *has gone*) there yet." On this item, many students chose "have gone" instead of the correct "has gone." Another type of error was the confusion of the objective and nominative case. One example of this was the item, "Give these books to (they that, those whom, whomever, *whoever*, whomsoever) you think will enjoy them." For this item, many students chose "whomever" instead of "whoever." An additional example appears to involve lack of familiarity with a specific word since nearly all of those getting it wrong selected choices that are not in the dictionary. The item was "It was the (*furthest*, furtherest, fartherest, most far, farrest) anyone had gone."

Another language test asked students to learn the meanings of as many as possible of 24 words in a foreign language in a period of four minutes. The average 12th grade student learned the meanings of 12 words or about three words per minute. Although the learning arrangements were not optimal, the results for the total group suggest that with appropriate learning materials most high school students can learn a second language without great difficulty.

Other skills tested included simple computation. This test included problems in adding, subtracting, multiplying, and dividing integral numbers. The average 12th grade student answered 44.1 items in nine minutes. Included in those answered were 2.9 items answered incorrectly (about one in 15). Although this speed and accuracy is not acceptable for persons doing computation, there is evidence that speed and accuracy can be improved with practice for those who especially need it.

A somewhat comparable skill that is related to proofreading was measured by the Clerical Checking Test. In this test, the student compares pairs of persons' names in two adjacent lists to see if they are identical or if one or more letters are different. The student marks each pair as "same" or "different." The average 12th grader answered about 15 such items per minute with a little

more than one error per minute. The principal finding with respect to this skill is the very great individual differences in both speed and accuracy with the best 5% of the students getting twice as many items answered with almost no errors.

The testing of a national sample, including four grades, 9, 10, 11, and 12, and the retest of a sample of the 9th grade students when they reached the 12th grade made it possible to study some of the relations between individual differences and growth. For all of the many variables included in this survey, a review of the results emphasizes the predominance of widespread individual differences. For some variables this is accentuated because of the relatively small amount of growth during the secondary school years.

On tests in fields such as English usage and expression, reading comprehension, vocabulary, arithmetic reasoning, social studies, and arithmetic computation, between 20% and 30% of students in the 9th grade scored higher than the median student at the 12th grade level. For some of the abilities not directly taught in high school, such as abstract reasoning, visualization in three dimensions, and mechanical reasoning, the overlap was only a little greater with 32% to 36% of the 9th grade students exceeding the median for the 12th grade students.

Retesting the sample of original 9th grade students when they reached 12th grade showed significant learning differences for males and females. The boys made fairly large gains in physical science and introductory mathematics but the girls made only small gains. This is a direct reflection of the fact that many fewer girls than boys in these classes took courses in science and mathematics in grades 10, 11, and 12. Some of the less direct but perhaps more important results of variations in courses taken are seen in the differences in gains for boys and girls on such tests as arithmetic reasoning and arithmetic computation. The boys' gains are respectively 40% and 50% greater than those of the girls for

these generally useful skills. This is doubtless a result of the practice gained through the use of these skills in science and mathematics courses. Clearly, it is essential to use both the knowledge and the skills gained in earlier grades in later school years if they are to be retained and developed into useful adult tools.

To explore the observed male-female differences in test scores further and to note trends in this respect, the original 1960 survey data were compared with the results from testing the students in 17 of the same schools in 1975.[5] On four of the tests, the mean scores for this group of students were noticeably lower in 1975 than in 1960. These included vocabulary, English, arithmetic reasoning, and arithmetic computation. On two of these tests, vocabulary and arithmetic computation, the males' scores decreased more than those of the females over this period. On the English test, the females dropped more. However, on this test, their mean scores were still quite a bit higher than those of the males. On arithmetic reasoning, the losses were about the same for the two sex groups. Some tests revealed gains over the 15-year period. For example, scores for both males and females increased on tests of creativity and abstract reasoning. On the creativity test, the gain for the females was nearly twice that for the males. On both the mechanical reasoning test and the test of visualization in three dimensions, the females showed distinct gains while the males showed very small losses. Both of these tests have been found to be predictive of success in mechanical work. The female gains appear to reflect the increased interest and activity of secondary school age girls in this area.

In analyzing the findings from the 1960 national survey, an effort was made to determine the characteristics of schools in which achievement was relatively high and low.[6] These findings may be briefly summarized by noting that the students' achievement on the tests was highly correlated with the socioeconomic

status of the community. The financial resources of the community were reflected in such items as teachers' salaries, teaching experience, housing quality, number of books in the library, per-pupil expenditure, absentee rate, amount of homework, and supervised study periods. A few of the factors studied that were found to have only a small relation to amount of student learning in fields like English and social studies were: size of school, size of classes, age of building, rural versus urban location, and dropout rate. One encouraging finding was that although the ability and education of the students' parents was a substantial factor in determining the level of achievement of the students, this level also appeared to be a function of the leadership and commitment of the staff.

In comparing large with small high schools, no substantial differences were found in many subjects such as English and social studies. However, in other areas, such as advanced mathematics, science, and foreign languages, the students in the larger schools had a definite advantage. This appeared to be a direct result of the offering of fewer courses in these subjects in the curricula of the smaller schools.

One of the major findings regarding these high school students was related to their orientation, or more accurately, their lack of orientation. Many of them reported that they expected to enter careers that clearly required a four-year college degree but apparently did not know this since they reported they did not plan to complete a four-year college program. Of those planning to obtain a four-year college degree, many lacked the academic abilities required. Relatively few of the boys planned to enter careers in business, sales, the industrial trades, and the construction trades. But nearly half of them could be expected to find jobs in such fields.

There did appear to be a fairly realistic sorting program in the high school curriculums. Whereas a large number of boys with

high general academic aptitude were not in the college preparatory course in the 9th grade, the results from the higher grades indicated that these high academic aptitude boys tended to switch to the college preparatory course before reaching the 12th grade. However, the lack of realism with respect to career plans was very clearly shown by the fact that 41% of the 12th grade boys who indicated they planned a career in law scored below the 50th percentile for 12th grade boys in general academic aptitude. This lack of realism in career plans was also illustrated by the finding that 33% of the 12th grade boys planning careers as mathematicians scored in the bottom half of 12th grade boys in general academic aptitude.

Findings from the Follow-Up Studies

One of the earliest findings from the follow-up questionnaire sent one year after graduation to students who had been in the 12th grade when tested as participants in Project TALENT concerned who went to college.[7] It was found that about 90% of those whose general academic aptitude score was in the top 10% of the entire group of 12th grade students entered college during the first year after graduation. About 5% more boys than girls in this group entered college. For those students whose general academic aptitude scores fell in the middle 20% with respect to all 12th grade students, 51% of the boys and 35% of the girls entered college during this period. It was interesting to note that even in the bottom 10%, with respect to general academic aptitude, 17% of the boys and 12% of the girls entered college the year following their graduation.

An important set of findings involved the relations between two variables (the student's general academic aptitude and the socioeconomic status of the parents) and college entrance within five years after graduation from high school. General academic

aptitude is a slightly better predictor of college entrance than socioeconomic status for the male 12th grade students. But, socioeconomic status is a little better predictor of college entrance for the females. The male-female differences are very slight for those in the top quarter in both general academic aptitude and sociocconomic status. But, for those in the lowest quarter in socioeconomic status and top quarter in general academic aptitude, there is a fairly large difference, with 81% of the males entering college as compared with only 47% of the females.

Another interesting comparison of college entrants is in terms of the curriculum taken in high school.[8] For 12th grade males, 87% of those taking the college preparatory course in high school had entered college within five years following high school graduation and 51% had graduated from college. Of those 12th grade males in the general course these percentages were 39% and 12% and for those in the business or commercial course the percentages were 43% and 12%. In the vocational course the corresponding figures were 21% and 3% and for the agricultural course 28% and 10%. It is somewhat surprising to note the large proportions of persons going to college after taking something other than a college preparatory course in high school. The results for the girls tend to include smaller proportions, but are generally similar. Of the 12th grade females in the college preparatory course, 78% entered college within five years following high school graduation and 49% had graduated. For those in the general course these percentages were 31% and 12% and for those in the commercial or business courses the percentages were 15% and 4%. In the vocational course the corresponding figures for the females were 13% and 3% and for the agricultural course 20% and 10%. Again, the numbers going on to college after taking the general and agricultural courses appear surprisingly large.

The findings from the 11-year follow-up[9] indicate that many students tended to postpone their college entrance. The 11-year

data indicate that about 60% of the 11th and 12th grade males and 40% of the corresponding females had entered college by the time they were 11 years out of high school. By this time, about one-third of the 11th and 12th grade males and one-fifth of the corresponding females had received a four-year bachelor's degree. Another 5% say they still plan to obtain such a degree.

A striking fact is that many of these young people reported that much of what they learned in high school was of little use to them and that much of their school time was wasted. Yet, large numbers opted for more education. In responding to the 11-year follow-up questionnaire, nearly half of the 11th and 12th grade students chose one of these three options to describe how useful what they learned in high school was in preparing them for other schools or jobs: "It was a complete waste of time," "It proved of very little use," or "Adequate." This strongly suggests that young people want an education but feel they are not getting one.

A primary function of the follow-up studies was to determine what types of individuals entered the various career fields. It was noted above that the career plans for these high school students at all levels tended to be somewhat unrealistic. The follow-ups carried out one year after graduation from high school demonstrated the extreme instability of those career plans. For example, only one year after reporting their career plans, when they were in the 12th grade, only 31% of the young men in this group and 41% of the young women had the same career plan. Four years later, at the time of the five-year follow-up, the percentages having the same career plans that they had when they were in the 12th grade were reduced by half.

In 1975, a special follow-up study was done with a group of 1,000 Project TALENT participants who had been 15 years old in 1960.[10] This group was selected to be representative of all the nation's 15-year-olds. Instead of the mailed questionnaire approach used in the other Project TALENT follow-ups, this study

used a carefully structured thr - to four-hour interview. These interviews explored the individuals' personal and educational development, their occupational experiences, health, economic experiences, family relationships, friends, civic involvement, and leisure activities and interests. In 1960, most of these young people were in grades 9 and 10 but some were in higher grades and others were still in various grades in elementary schools.

The analyses of the data from this group tended to confirm the results from the earlier follow-ups with the added advantage that they referred to a complete age group unaffected by the dropouts that occurred in the higher secondary school grades. The very important new dimension added by this intensive study of the lives of this nationally representative sample of young people was the opportunity to study the personal dynamics involved in the growth and development of each individual. Thus, in this group, instead of dealing with average scores and measures of variability, it was possible to study each person in terms of what he or she was seeking to accomplish and what specific factors helped and hindered personal progress.

Using the individual as the unit in analyzing the results led to the identification of five problem areas. After the study of each case, a judgment was made as to which characteristics of a person's educational experience had a significant effect on both subsequent development and present quality of life. Each such observed effect was classified as large, moderate, or small, and either positive or negative. The five main characteristics of educational experience that were thus judged to be critically affecting the development and present quality of life of these 1,000 individuals were:

Vocational guidance. This was a very important need that was inadequately met for the large majority of these students. Inadequacy in this area was observed to result in much wasted time and effort. In many cases, at age 30, these

young people were still floundering with respect to career plans.

Quality of teaching. This was observed to have had a very important effect on the present lives of these young people. The study of the lives of the females indicated that the number of them positively affected by many helpful teachers clearly was much larger than the number of women negatively affected by their teachers. The study of the males showed positive and negative effects to be about even. Many of the men felt that teachers who were "just doing it for the money" killed their interest in learning and wasted their time.

Individualized instruction. Many young people reported they were deprived of an opportunity to learn because they were given materials to study that they could not read or understand or, at the other extreme, forced to spend time learning things they already knew. It is essential that each student be given materials that will provide him or her with appropriate learning activities.

Curriculum. These young people reported taking many courses in which they learned things that never proved useful to them. They also reported that they did not have an opportunity to learn many things they needed to know. Clearly, there are courses that all students would find useful that are not now being provided. There are also special courses that would be valuable to certain individuals. But such classes are not now available to them or the students don't realize they are going to need them.

Personal support and counseling. A study of the lives of these young people indicates that a number of them had personal, social, and emotional problems while in school. Although they needed help, unfortunately very few obtained appropriate assistance. There appear to be important needs for preparing teachers to understand the nature of such personal problems, and for establishing easy access to competent professional help for those students with emotional problems.

Programs to Improve Education

Although a study such as Project TALENT is very helpful in identifying and defining some of the major deficiencies in the nation's educational programs, the deficiencies documented were generally areas that had been noted as troublesome earlier and for which various solutions had been proposed by teachers, administrators, critics, and committees over many decades. The literature shows clearly that individual teachers have developed effective procedures for dealing with many of these problems. These have been copied by a few other teachers for a while but then disappear with the passage of time. School principals have also developed innovative programs that involved several teachers. These programs were responsive to specific educational problems and in many cases became widely known and copied. However, these too tended to sink into oblivion when the administrator moved on. These observations suggest the need for a new program that can be institutionalized and will not depend so heavily on the attentive supervision of one local person.

Similarly, there have been many isolated efforts to make use of new technological advances to meet some of the learning needs noted. Although these frequently appeared to be effective, they also tended to remain as isolated demonstrations. Lacking strong centralized control and accepted measures of output, individual teachers continued to conduct their classes using standard textbooks in much the same way as their classes had been conducted when they were in school. The basic concepts of teaching machines, programmed learning, and the use of computers offer opportunities to make substantial improvements in instructional efficiency.

In this environment, it seemed very desirable to develop an educational program that would take full advantage of the findings about schools from Project TALENT to provide the next

generation with a more efficient and relevant educational experience. A review of the total situation suggested the use of four major strategies to provide a comprehensive approach to improving education:

1. *Focus on the development of each individual student.* Such a strategy involves placing the students at the center of the educational program with teachers, textbooks, technology, classrooms, and other aspects in subordinate supporting roles. This means that the school system is to be evaluated not in terms of what teachers do or how confortable classrooms are but primarily on the development and learning of the students. It should be emphasized that this approach involves not just looking at a standard student to see what a typical program and typical outcomes are. It involves looking at each student as an individual and gaining an understanding of this student's long-range life and career plans, their appropriateness, and the effectiveness of current educational experiences in assisting the individual to achieve his or her goals.

2. *Survey the resources available to assist in these students' development.* This study should include methods, materials, and technological aids that might be employed in helping the student to develop the knowledge, insights, abilities, and plans that will enable him or her to progress toward appropriate goals.

3. *Give the responsibility for developing the educational system to a balanced team of professionals.* The experience and judgment of a varied group of classroom teachers is an indispensable resource for the type of developmental program planned. They should be especially helpful in the tentative selection of learning methods and materials for meeting the needs of specific types of students. Scholars from various disciplines and curriculum experts are essential to define the objectives appropriate for students with various life and career plans. School administrators are needed to insure that local needs and problems are consid-

ered. Behavioral scientists who have had experience both in the classroom and with educational technology are needed to insure proper use of both research findings and techniques.

4. *Utilize a management information system to make complete information on each student's progress available to all those involved in both the developmental and operational phases of the system*. Both the evaluation of an educational system and its improvement depend on accurate information on the extent to which the students are making progress with respect to their educational goals. It is not sufficient to inform parents and taxpayers regarding the numbers of students graduated and the student-teacher class hours recorded in the past year. Even reports on average student competencies in the basic skills need to be supplemented with detailed reports on student progress with respect to the goals most relevant to their lives and career plans.

There are *three basic functions* to be performed by an effective educational system. The first of these is to assist each individual to formulate specific goals for his or her educational development. This involves a program of providing individuals with extensive information about themselves and educational, career, and other life opportunities and responsibilities. The students must make their own decisions and choices from the increasing number of alternatives available. This requires not only a great deal of information but some training in decision making.

The second basic function is to assist students in identifying and participating in learning experiences that will enable them to achieve their educational goals. Clearly, this requires the system to provide a great deal of information to the students. Even though the students have been assisted in formulating appropriate and detailed goals, they will need much help in selecting and using appropriate learning experiences.

The third and last basic function of an educational system is to

evaluate the progress of its students toward achieving their goals. This information is essential to the student for checking his or her progress and reevaluating plans and goals. It is also essential for evaluating instructional materials and improving the educational system.

After the American Institutes for Research outlined the nature of a proposed program for improving elementary and secondary education, efforts were made to get support for its development. Many foundations and government agencies were approached. A series of proposals was prepared and submitted over a three-year period. Finally, a consortium consisting of six school districts in the San Francisco Bay Area and six school districts in the northeastern part of the country[11] agreed to participate with the American Institutes for Research in a four-year developmental program. At about this time the Westinghouse Electric Company established a new educational subsidiary. This group, called the Westinghouse Learning Corporation, agreed to provide the major funding for the development of the new program[12] and to take the responsibility for its dissemination. Each of the school districts sent one teacher from each of three grades, 1, 5, and 9, to the American Institutes for Research office in February 1967 to develop the new educational system for use in their 12 schools beginning in September 1967. The new system was called the Program for Learning in Accordance with Needs, to be marketed as the PLAN* educational system.

The schedule covered a four-year developmental cycle with the programs for grades 2, 6, and 10 to be completed in the 1967-68 school year; 3, 7, and 11 in the 1968-69 school year; and 4, 8, and 12 to be completed in 1969-70. During the year following

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The asterisk with PLAN* denotes the Westinghouse Learning Corporation copyrighted program.

development of the materials, the 12 teachers who participated in this work and 12 additional teachers (one in each school) tried out the materials and participated in their revision. The developmental and tryout activities included about 8,000 students, 280 teachers, and 80 professional staff members of the American Institutes for Research. To supplement the teachers and professional staff in planning the program, especially with respect to decisions regarding educational objectives and curriculum, the services were obtained of 16 distinguished leaders in four fields: language arts, social science, science, and mathematics. These persons served both as panelists on four national curriculum advisory panels and as consultants.

The principal products produced during the developmental phase of the program included: lists of educational objectives; learning guides for each objective; test items to verify mastery of each objective; materials to assist each student in formulating long-term goals and in taking the responsibility for planning and completing an educational program to achieve these goals; and materials to be used in preparing teachers and administrators for the specific administrative, classroom, and student responsibilities required by the PLAN* system.

The central operating procedure of the PLAN* system is the student's Program of Studies (POS). On the basis of results on PLAN* Placement/Achievement Tests, the teacher identifies the learning objectives in a particular subject field such as mathematics. Based on the student's long-range plans, past educational history, and special knowledge that the teacher may have about personal characteristics, the objectives in this field that should be learned next are agreed to by the teacher, student, and parent. These objectives are then recorded in the student's POS in the order that they should be studied. In the usual operation of the system, the POS for each subject is recorded in the central computer. This computer scores the tests as objectives are learned

and keeps the records on the units mastered and those yet to be learned. Usually test-item responses and other information collected during the day are sent over the local terminal to the computer and the information is processed. Results and the current status of each student are returned over the wires and printed during the night. The computer also prepares a monthly administrative report giving the progress made by students in each class and for the school as a whole.

In the past few years a large number of evaluative studies have been carried out by the school districts using PLAN* and also by several impartial outside organizations. The results from these studies uniformly have found that parents, teachers, and students like the PLAN* program. Students show an improvement in positive self-concept. This is especially marked for minority students. Also, students show a more favorable attitude toward school. The improvement in academic achievement as compared with more conventional control groups tends to be slight during the first year but becomes quite noticeable after the second and third year in the PLAN* system. Minority and disadvantaged students showed greater gains under the system when compared with conventional control groups than did students from schools in the suburbs.

Helping the Students Take Responsibility for Their Life Planning

The previous section discussed a program for assisting students to take responsibility for their own education. Many children come to school eager to learn but gradually find out from their teachers that they are in school to do what the teachers want them to do rather than to learn what they want to learn. For learning the basic skills the PLAN* system provides the appropriate framework to keep the students motivated and responsible

for their own learning. As the students reach the intermediate and upper grades, mastery of skills such as reading, writing, and arithmetic is not enough. Students need life goals and an orientation that helps them understand themselves and begin to see how they fit into life and career opportunities. Using the Project TALENT five-year follow-up data, a program to accomplish this was developed as part of PLAN*.

When the eleven-year follow-up data from Project TALENT became available, it was strongly promoted as a basis for helping students get the necessary understanding of themselves and available opportunities. However, it was found too difficult for teachers, counselors, and students to integrate these data into their current programs and make effective use of them. Therefore, a new program for 8th through 12th graders was developed to assist students in obtaining information about themselves and life activities. These types of information were necessary for them to plan life and career goals.

This program, called *Planning Career Goals* (PCG),[13] consists of three parts:

1. A set of instruments and procedures for obtaining a comprehensive description of the student. These include information on the nature of the specific values each student felt were important to achieving a good quality of life; an inventory of interests in relation to possible career fields; a check on information regarding career fields; and a profile of abilities in terms of those 10 ability measures found to discriminate best among people in various careers.

2. Information in the same four areas about persons in the most common career fields and also the educational and training requirements, typical on-the-job activities, and working conditions of persons in these careers.

3. An easy-to-interpret student report form comparing the student with the 12 homogeneous career groups defined on the basis of Project TALENT data.

To help the students understand themselves, they are first asked to indicate the importance to them of each of a list of 15 needs and activities related to a person's quality of life. They respond by indicating whether each item on the list is "of greatest importance to me," "moderately important to me," or "not very important to me." The 15 items defining quality of life were obtained on an empirical basis by asking persons of varying types and in widely different regions of the country to indicate an experience that made their quality of life significantly better or worse. Using the 6,500 critical incidents thus gathered, the 15 categories were inductively formulated to include all of the experiences reported.

The list of needs and activities includes the following: (1) Material well-being, standard of living, financial security; (2) Health, health care, and personal safety; (3) Personal relationships with husband or wife; (4) Having and raising children; (5) Personal relationships with parents, brothers and sisters, and other relatives; (6) Personal relationships with close friends; (7) Helping others (not including relatives and friends); church, club, and volunteer activities; (8) Political and civic activities; (9) Learning; increasing knowledge and ability; (10) Personal understanding and planning, maturity, insight, and inspiration; (11) Occupation or job; (12) Expressing self, using creativity; (13) Socializing, communicating, entertaining others; (14) Participation in active recreation (sports, travel, hobbies, etc.); (15) Participation in observational and passive recreation (reading, TV, movies, etc.).

Going through this list and thinking about how important various types of experience are to them provides an excellent orientation for the individual when thinking about life and career plans.

The second step in helping the students understand themselves relates to their interests. In life and career planning, the types of

activities a person is interested in are of great importance in making decisions and choices. Interests are complex and depend a great deal on experience and knowledge. Young people have great difficulty in making valid expressions of liking or disliking activities and roles that they know very little about and have had no experience with. Thus, it is desirable to use a variety of approaches and a substantial number of questions to help students organize their experiences so that they have new insights into their interests and they can see the significance of these interests for aiding in the choice of a career. The Planning Career Goals Interest Inventory uses several types of questions to help students determine their interests in each of the 12 career groups.

These 12 career groups were derived by placing occupations together that required similar education and training, ability profiles, and general types of activity. The 12 career groups include six usually requiring college training: (1) Engineering, physical sciences, mathematics, architecture; (2) Medical, biological science; (3) Business administration; (4) General teaching, social service; (5) Humanities; law; social, behavioral sciences; (6) Fine arts, performing arts; and six not usually requiring a college education: (7) Technical jobs; (8) Proprietors, sales workers; (9) Mechanics, industrial trades; (10) Construction trades; (11) Secretarial-clerical, office workers; (12) General labor; public, community service.

The three types of questions about these career groups asked of the students by the Interest Inventory include the following. First, they are asked how well they like activities and roles that students their age have opportunities to participate in. The 100 questions of this type are about equally divided among activities reflecting each of the 12 career groups. Another 100 questions sample the students' liking for specific occupational activities that are typical of the occupations in the 12 career groups. Finally, there are 100 questions that ask the students directly how much

they would like a career in specific occupations included in each of the 12 career groups. It is believed that having as many as 25 questions for each of the 12 career groups will provide a fairly stable and valid indication of the students' interests even though they are recognized to be in a somewhat formative stage. By using many of the same questions used in Project TALENT, it is also possible to compare the students' responses with the responses made by groups of persons in each of the 12 career areas when they were in high school.

The third part of the program relating to student self-understanding involves measuring the extent of the students' information about occupations, activities, or other facts related to career group jobs. This use of a 20-item information quiz on each of the career groups tends to reveal that some persons express a liking for specific types of occupations because a friend, relative, or teacher likes it. But, they really do not know a thing about the occupation. Also, it is sometimes found that a student has taken advantage of every opportunity to learn things related to the occupations in a career group and thus has a high information score but was not aware of a basic interest in the field. Thus, Information scores can provide a useful check on Interest scores for many students.

The fourth and last part of the program to gain self-understanding includes the Ability Measures. These 10 measures were selected from a much larger number of such measures included in Project TALENT because they included the major contributors to the multiple correlation coefficients predicting membership in the specific occupational groups. There are three verbal measures -- Vocabulary, Reading Comprehension, and English. These measures have much in common but each has its unique aspects that aid in distinguishing between career groups. The Vocabulary score is especially sensitive to the total amount of reading done by the student and the English score is, to a greater extent than the

others, an indication of conscientious learning of assignments. There are also three quantitative measures – Quantitative Reasoning, Mathematics, and Computation. These measure rather similar abilities but each of them also has special characteristics. The Computation score, for example, is a special indicator of conscientious learning of assignments. The Mathematics score, especially at the higher grade levels, is somewhat more dependent on the number of mathematics and science courses taken. The other four tests measure non-academic abilities including Creativity, Mechanical Reasoning, Visualization, and Abstract Reasoning. These are valuable in identifying special talents and in identifying persons having good learning potential who have had special difficulties in the verbal or quantitative areas. The Project TALENT follow-ups have shown that such academic deficiencies are remediable even as late as the high school years if properly identified and if appropriate learning opportunities are provided.

The procedures just described relate primarily to things that will help the students understand themselves. The next part of the program is concerned with informing them about possible career opportunities. In the Planning Career Goals program, there are two principal products for student use. The first of these is a student guide entitled *Planning Your Career*. In an illustrated and informal style, this booklet provides the student with an orientation toward the importance of life and career planning. It includes brief descriptions of the 12 career groups and short paragraphs giving thumbnail sketches of the job activities for 151 specific occupations.

The student is also referred to the PCG *Career Handbook* that contains a page for each of the 151 jobs. Each one-page description includes sections on job activities, education and training requirements, expected salary, typical interests, abilities of those now in the jobs, reports on satisfaction with various aspects of a career in this field, and expected future job

opportunities in this occupation. Profiles indicate the typical interest patterns in terms of 12 career group scores and the performance on the 10 Ability Measures during high school of persons now in each of these jobs.

The remaining feature of the program is an easy-to-interpret student report form showing comparisons between the students' responses and those of former students now in each of the 12 career groups. This report form is prepared and printed by a computer. It provides profiles that may be compared directly with those for the 151 jobs in the *Career Handbook*. The students, parents, teachers, and counselors are also provided with 12 career group scores for Interests, Information, and Abilities and 12 descriptive reports such as "very much alike" or "not at all alike" based on the comparison of the students' responses to the items in the Values, Interests, Information, and Abilities measures with the responses made when they were in high school by persons now in careers in these fields.

This program, based on the important longitudinal work in Project TALENT, makes full use of the capabilities of electronic computers to score, transform, and make comparisons with student responses in seconds. This work would require several hours per student if done by hand. Although the program covers only one part of the educational activities necessary to enable students to take responsibility for their own life and career planning, this is the part that local personnel find most difficult to provide. It is hoped that the availability of this program will enable teachers, counselors, and parents to perform this function effectively for today's students.

Summary

The Project TALENT survey and follow-ups identified a number of serious deficiencies in the educational program in the

nation's schools. Although some improvements have been made in recent years, it is clear that much remains to be done. The Program for Learning in Accordance with Needs, called the PLAN* system, was developed in the late 60s and represents one effort to correct many of the problems. More recently, the Planning Career Goals program provided tne basis for assisting students at the secondary school level with their life and career planning to provide them with the motivation and direction to take responsibility for their educational program.

Experience with and observation of education in American schools during the past 50 years strongly suggest that improvements in educational practices require clear objectives and knowledge of results. The other principal requirement is to make the student rather than the teacher the focus of attention. The two programs described here are attempting to move education in that direction. Many more efforts are needed.

FOOTNOTES

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