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ABSTRACT

By the end of the 1960-61 school year, the National Science Foundation had provided some 75,000 opportunities for secondary mathematics and science teachers to study in its Teacher Training Programs. A study was designed in July 1961, involving questionnaires and interviews, to obtain information on non-applicants for these programs and to compare applicant-rejectees and applicant-attendees. Data were obtained concerning biographical information; professional activities, needs, attitudes, and motivations; training and education; and relevant school and community characteristics. This preliminary report was written when 1,684 questionnaires and 606 interviews (half of the expected totals) were received. The preliminary questionnaire and interview results are summarized, a description of the non-applicant population is given, and experimental and analytical procedures are described. An appendix presents the classification system used to analyze the interview summaries. (Author/BB)

# A Study of Non-Applicants and Other Segments of the Secondary School Science and Mathematics Teacher Population

## PRELIMINARY FINDINGS

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William A. Gorham
John T. Dailey

National Science Foundation
Contract No.: NSF-C222
31 March 1962

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Preliminary Findings

## I. Introduction and Purpose

One of the major concerns of the National Science Foundation (NSF) is raising the level of secondary science and mathematics teaching in the Nation's schools. To this end, the Division of Scientific Personnel and Education (SPE) has developed several programs providing opportunities for such teachers to increase their subject matter background and general scientific competence. Although some 75,000 opportunities for study had been provided for secondary mathematics and science teachers by the end of the 1960-61 school year, NSF personnel felt that its teacher training programs were not attracting a sizeable group who might well profit from them.

In July 1961, the American Institute for Research (AIR) began a study designed to develop information about the non-applicant for these programs as contrasted to applicant-rejectees and applicant-attendees. Data were sought concerning biographical information; training and education; professional activities, attitudes, needs and motivations; and relevant school and community characteristics. Analyses were designed to provide information about non-applicants which might be significant for program improvements and possible modifications.

The purpose of this report is to present preliminary findings and conclusions based upon the data available to date (approximately one-half of the total anticipated returns).

## II. Resume of Experimental Procedure

A. Developmental Procedures. The teachers questionnaire and the interview schedule were both developed from materials gathered through study of prior reports, available data, and intensive interviewing of Summer and Inservice Institute participants and directors. The preliminary interviewing and related materials were described fully in a report entitled "Summary Report of Preliminary Interviewing" submitted as an attachment to Quarterly Report No. 1.

Based upon the information gathered in the above step, the staff developed draft teacher questionnaires and interview schedules. These documents received further tryout and revision when members of the staff took them into the field for personal tryout. The field tryouts were done at McConnellsburg, Pa., Joint Junior-Senior High; Anacostia High, Washington, D.C.; Robert E. Lee Junior High, Baltimore, Md., and Ryken (Parochial) High, Leonardtown, Md.

Based upon the field use of the questionnaire and interview schedule, further revisions were made and the revised forms discussed in detail with the Monitor. The final form of the questionnaire was then reproduced and the interview schedule was incorporated into a detailed manual of procedures prepared for the use of the field staff. Copies of these two documents were included with Quarterly Report No. 2.

B. Sampling. The basic document for the sampling was the U. S. Office of Education Directory of Public Secondary Day Schools, 1958-59 (published 1961). This list was supplemented by sampling state and federally supported secondary day schools from state directories. Private and parochial schools were drawn from lists supplied by the Office of Education and cross-checked against the latest available directories.

Public senior high schools were stratified according to four size categories. Within each category schools were placed in a contiguous state order reflecting the nine U. S. Office of Education Regions, and divided into "batches" of uniform size from each of which one school was selected randomly. This procedure insured regional representation. Junior high schools, private schools, and parochial schools were similarly ordered and schools drawn at random from each "batch". Overage was provided in anticipation of rejections and nonexistent schools. Table 1 shows the number of schools drawn in each category.

In order to preserve the regional representativeness, these samples were divided into interview and non-interview subsamples by consecutive pairing of each sample and use of a table of random numbers to assign one member of each pair to the interview subsample.

Several criteria were used to decide whether a selected school should remain in the sample:

a) If the school designated itself as "elementary", it was dropped.
b) If the school was no longer in existence, it was dropped.
c) If a school had undergone a major organizational change, it was dropped on the grounds that it no longer fit the definition of the category from which it was drawn and thus would distort the projection to the population in that category.
d) If it had undergone a minor change, such as a name change, it was kept.
e) If a school had split into two similar schools composed largely of both the same students, both schools were taken.
f) No substitutions were made, since doing so would in effect give some schools a double chance of selection.

Table 2 shows the extent of school participation, number of teachers, etc., by category of school.

The sample of teachers consisted of all secondary mathematics or science teachers in the schools drawn.

C. Selection of Regional Representatives. Concurrently with the selection of the sample, a field organization of Regional Representatives was being formed. Many of these persons had carried out the field duties for Project TALENT. Others were recruited especially for this study. In all cases only men and women of high caliber and professional standing in psychology or education were chosen to carry out the interviewing and other field duties. A list of the 61 Regional Representatives was attached to Quarterly Report No. 2.

In all cases, Regional Representatives were required to carry out some of the initial interviewing personally. Afterwards they had the option of obtaining and supervising a capable assistant, subject to the limitation that they must make all initial contacts with the schools and that they review and be responsible for the work of any assistant.

Table 1

Number of Schools Drawn by Category

| | Batch Size | No. of Schools |
|---|---|---|
| Public Senior High Schools | | 315 |
| Category 1 (0-24 seniors) | 105 | 62 |
| Category 2 (25-99 seniors) | 80 | 110 |
| Category 3 (100-399 seniors) | 40 | 86 |
| Category 4 (400+ seniors) | 13 | 45 |
| Special* | * | 12 |
| Junior High Schools | 45 | 112 |
| Parochial Schools | 70 | 37 |
| Private Schools | 45 | 27 |
| Total | | 491 |

*A few state-supported and otherwise unlisted public secondary schools were discovered. These were divided into groups by type and two drawn from each. (None of these was included in this preliminary analysis.)

Table 2

Status of School and Teacher Participation
Sample Frequencies as of 19 February 1962

| Type of School | Public 1 | | Public 2 | | Public 3 | | Public 4 | | Junior | | Parochial | | Private | | Special | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Schools | I | NI | I | NI | I | NI | I | NI | I | NI | I | NI | I | NI | I | NI | |
| # Participating | 23 | 22 | 46 | 52 | 41 | 40 | 22 | 23 | 46 | 48 | 17 | 17 | 11 | 11 | 3 | 3 | 425 |
| # Not responding | 4 | 3 | 5 | 1 | | 3 | | | 6 | 4 | | 1 | | 1 | 1 | 2 | 31 |
| # Refusals | | | 1 | 1 | 2 | | | | 1 | 1 | 1 | | 1 | | 1 | | 9 |
| # Ineligible | 5 | 5 | 3 | 1 | | | | | 4 | 2 | 1 | | 1 | 2 | 1 | 1 | 26 |
| Total in Sample | 32 | 30 | 55 | 55 | 43 | 43 | 22 | 23 | 57 | 55 | 19 | 18 | 13 | 14 | 6 | 6 | 491 |
| Teacher Questionnaires | | | | | | | | | | | | | | | | | |
| # Questionnaires in | 29 | 32 | 83 | 166 | 179 | 266 | 128 | 285 | 157 | 237 | 44 | 39 | 4 | 27 | 1** | 7** | 1684 |
| # Teachers reported | 62 | 63 | 213 | 281 | 503 | 402 | 391 | 482 | 451 | 429 | 69 | 65 | 46 | 43 | 12 | 13 | 3525 |
| Interviews | | | | | | | | | | | | | | | | | |
| # Interviews in | 27 | | 93 | | 157 | | 158 | | 132 | | 34 | | 2** | | 3** | | 606 |
| # Interviews expected*** | 62 | | 208 | | 347 | | 285 | | 337 | | 61 | | 44 | | 12 | | 1356 |

* I = Interview NI = Non-interview
**Not included in this analysis due to low percentage of returns to date. This reduces questionnaire N to 1676 and interview N to 601
***Approximate number of interviews scheduled for completion

This system appears to have worked very well, with a majority of Regional Representatives doing most of their own interviewing.

D. Data Collection.

1. School Contacts. Each school in the sample received a letter on NSF stationery signed by Dr. Bowen Dees. The letter outlined the project and provided a stamped return envelope with a form on which the principal was asked to list those teachers teaching one or more secondary level courses in mathematics or science or regularly teaching such courses even though presently assigned to other duties. These lists formed the basic sample of teachers.

At intervals of several weeks, two follow-up letters were sent to each non-responding school. The extent of response, rejection, and non-response is shown in Table 2.

2. Non-Interview Sample. Each teacher on the lists supplied by school principals in the non-interview (NI) sample was mailed a teacher questionnaire. Follow-up mailings were done periodically. Rate of response through 19 February is shown in Table 2. It is difficult to evaluate rate of response from these data, however, as the mailings were not done all at once, but as the schools accepted. Response rate on the earliest group suggests that 75-80% of the data will be obtained eventually.

3. Interview Sample. Each teacher on the lists supplied by the school principals in the interview (I) sample was scheduled to be interviewed. Regional Representatives were instructed to call the schools and set up interview appointments.

As returns began to come in, it soon became apparent that the number of interviews would prove substantially larger than estimated. Thus the number of interviews in the largest schools was randomly cut to a maximum of 15, and the next largest and junior high schools to a maximum of 10. It was felt that these figures would provide sound samples of teachers from these schools without a budget increase.

The exact reasons for the underestimate are still not clear. Certainly increased enrollments and exceptionally good school cooperation played a part. However, it would appear that the average number of pupils per science and mathematics teacher is considerably lower than average in moderate and large public high schools and in junior high schools. Since a straight 1-to-140 ratio was used (based on a National Education Association Study), no account of differential ratios was included in the estimate. Thus the inclusion of these schools in disproportionately large numbers in order to get an adequate sample of them led to a larger sample of teachers than estimated.

As each teacher was interviewed, he was also left a stamped copy of the teacher questionnaire to fill out and return to the AIR office.

Regional Representatives were instructed to write up summaries of each interview (to be 1-2 typewritten single-spaced pages) covering each of the 16 questions on the interview schedule. They were advised to retain their notes, and

interview summaries adjudged incomplete were returned for additional information. Representatives were instructed to report rather than interpret the subjects' responses.

After study of the preliminary materials, a school questionnaire to be filled out by the principal was developed. This was discussed in detail with the Monitor, revised, and reproduced after some delay in securing necessary approvals. These questionnaires were mailed to all principals of schools in the sample. However, returns did not begin to come in in time to be analyzed for this report. About 65-70% of those mailed have been returned to date. Follow-ups are planned.

III. Resume of Analysis Procedures

In planning the analysis for this report, a number of conditions were set up. The purpose of the analysis and report were seen as providing NSF personnel with information, based on preliminary analysis and partial data, which might aid them in immediate decisions regarding program planning and/or modifications. It was neither feasible nor desirable to perform complicated statistical analysis in the time available. The findings described are based primarily upon content analysis and item distributions. A cut-off date of 19 February was established for the receipt of data for this report in order to allow time for analysis and the preparation of a report.

A. Weighting. Since the distribution of results in the sample is of little concern, it was necessary to weight each distribution in such a way that the resulting distributions would provide estimates of the national population of secondary mathematics and science teachers.

Overall weights were determined for each of the eight categories of schools (special schools, representing a very small fraction of the population, were later dropped due to poor returns at this time). Each of the seven weights when multiplied by the sample results in the seven categories respectively produced an estimate of the number of teachers in that category. These estimates were then combined over all seven categories to give national distributions.

Table 3 shows the estimated number of schools and teachers in the Nation in each of the seven categories of schools. These figures agree well with estimates derived from other sources (Project TALENT and NSF personnel) and suggest that the sample is a very good one.

There appeared to be little difference in questionnaire returns between interview and non-interview groups. Therefore, it was decided to combine the interview and non-interview returns to stabilize the results. Questionnaire weights were then computed for each category to adjust for school non-response, sampling ratio, and teacher non-response as follows:

a) The percentage of response within each category of schools was determined.
b) Step a) was combined with the sampling ratio by multiplying 1 over the percentage of response times 1 over the sampling ratio.
c) All the responses within the category were added and the sum divided by the total number of teachers in the category. Multiplying 1 over this figure times the result in b) provided the weight.

Table 3

Weighted Estimates of the Number of Schools and Secondary Science and Mathematics Teachers in the Nation

| School Category | No. of Schools | No. of Teachers |
|---|---|---|
| Public Senior | | |
| Category 1 (0-24 seniors) | 6292 | 15,125 |
| Category 2 (25-99 seniors) | 9116 | 42,484 |
| Category 3 (100-399 seniors) | 3612 | 38,010 |
| Category 4 (400+ seniors) | 585 | 4,349 |
| Junior High Schools | 5406 | 44,880 |
| Parochial | 2664 | 9,916 |
| Private | 1176 | 4,361 |
| Totals | 28,851 | 166,125 |

d) Each frequency in a category was then multiplied by the results in c) to estimate the population in that category.

Interview weights were computed in exactly the same way to pro-rate the interview material to the entire national population of secondary science and mathematics teachers.

B. Questionnaire Analysis. The first step was to code all questionnaires on hand through 19 February and to have these punched. Write-ins were studied and it was decided that it would not be feasible to analyze these at this time. All other information on the 1676 questionnaires was coded, and four IBM cards each were punched. All information available suggested that these 1676 were not unlike those questionnaires yet to be received though this cannot be proved.

It was decided that the distributions should be run separately for each of three criterion groups: the non-applicants (NA's), the applicant-rejectees (AR's) and the applicant-attendees (AA's). Since this breakdown requires 21 sorts for each item (seven school categories multiplied by three groups), it was necessary to postpone the analysis of some of the items in the questionnaire in order to meet the report deadline. Therefore a few items judged overlapping with others or of lesser importance were dropped from this analysis. Table 4 shows the items analyzed.

A further problem arose in considering the interpretations of the results. It soon became clear that a substantial number of teachers teach math or science only a small fraction of the time and may be considered to be primarily identified with another field such as English, Physical Education, and the like. These persons constitute a largely non-applicant group, almost certainly because of their lack of identification with the field. It was felt that the information presented would be considerably "watered down" by the inclusion of this group. Therefore all those teachers devoting less than 40% of their time to teaching mathematics or science were sorted out and set aside from the main analysis so that reasons for non-application in the main analysis would be more easily identified for a group closer to the NSF target population and more likely to respond to its programs. It was not feasible to make this division for the interview material, however. Table 5 shows the number of teachers in the under 40% group by category of school.

Table 6 shows the few items which were analyzed for this low-identification group (N = 237) as a sort of verification of their status. It was not possible to repeat the entire analysis for this group.

Table 6

Items Analyzed for the Group Teaching Mathematics and Science Less than 40% Time

| Item Number | Description |
|---|---|
| 6a | Primary Position |
| 7 | Age (Date of Birth) |
| 10a | Undergraduate Major |
| 10b | Graduate Major |
| 15 | Certification Deficiency |
| 27 | Intent to Continue Teaching Mathematics or Science |

Table 4

Questionnaire Items Analyzed

| Item # | Description |
|---|---|
| 1 | Sex |
| 4 | Full or part time |
| 5 | Marital status |
| 6 | Primary position |
| 7 | Year of birth |
| 8 | Number of dependent children |
| | Age of youngest dependent child |
| 9 | Total number of dependents |
| 10a | Undergraduate major |
| | Undergraduate degree |
| 10b | Graduate major |
| | Graduate degree |
| 11 | Number of undergraduate semester hours - Biological Science |
| | " " " " " - Chemistry |
| | " " " " " - Physics |
| | " " " " " - Mathematics |
| | " " " " " - Earth Science |
| | " " " " " - Education |
| | Undergraduate grades - Biological Science |
| | " " - Chemistry |
| | " " - Physics |
| | " " - Mathematics |
| | " " - Earth Science |
| | " " - Education |
| 12 | Now working on degree |
| 14 | Certified status |
| 15 | Certified deficiency |
| 16 | Tenure |
| 17 | Years teaching experience |
| 18 | Years teaching science and math |
| 21 | Number of hours outside activity |
| 22 | Percent time teaching math and science |
| | " " " other subjects |
| 23 | 1961 summer activities |
| | 1960 " " |
| | 1959 " " |
| 24 | Extra job? |
| 25 | Type of extra job |
| 27 | Career intention |
| 28 | Applied for summer institute |
| | " " inservice institute |
| | " " academic year institute |
| | " " research participation program |
| | " " summer fellowship |

(Table continued on next page.)

(Table 4 continued)

| Item # | Description |
|---|---|
| 28 | Attended summer institute 1961 |
| | " " " 1960 |
| | " " " 1959 |
| | Attended inservice institute 1961-62 |
| | " " " 1960-61 |
| | " " " 1959-60 |
| 29 | Number of professional organizations |
| | Number of science and/or math organizations |
| | NEA membership |
| 30 | Number of offices held |
| 31 | Number of journals read |
| | Number of science and math journals |
| 33 | Other professional activity |
| 34 | Salary |
| 35 | Other income |
| 36 | Spouse's income |

Table 5

Number of Teachers Teaching Mathematics
Less than 40% Time
by School Category and Criterion Group

| School Category | Group AR Sample N | AR Weighted N | NA Sample N | NA Weighted N | AA Sample N | AA Weighted N |
|---|---|---|---|---|---|---|
| Public | | | | | | |
| 1 (0-24 seniors) | 4/ | 996 | 15 | 3735 | 2 | 498 |
| 2 (25-99 seniors) | 4 | 688 | 41 | 7052 | 7 | 1204 |
| 3 (100-399 seniors) | 4 | 344 | 36 | 3096 | 5 | 430 |
| 4 (400+ seniors) | 2 | 54 | 29 | 783 | 7 | 189 |
| Junior Highs | 6 | 678 | 49 | 5537 | 10 | 1130 |
| Parochial | – | – | 11 | 1320 | 1 | 120 |
| Private | – | – | 4 | 564 | – | – |
| Totals | 20 | 2760 | 185 | 22087 | 32 | 3571 |

C. Interview Analysis. Work began on the development of a content classification scheme for the interview summaries as soon as a sufficient number had been received to study. A classification system was developed independently by two professionals based on a thorough study of 60-70 protocols. These two systems were then reconciled by the two professionals, with the Project Director and the Research Assistant chiefly responsible for reading the protocols taking part. Another 40-50 protocols were then read into the integrated system and further revisions made. By this time the system seemed very stable and was finalized. The chief orientation of the classification system, which is presented as an appendix to the report, is toward factual answers to the questions contained in the Interview Schedule; opinion was minimized.

In the beginning, it was decided that rather than direct the course of the interviews to the coverage of a number of specific topics, the interviews would focus on broad topics and let themes emerge. This means that if the subject reported that a given reason (such as money) kept him from applying, it showed up in the analysis, if not then it is not mentioned. The advantage here is that the information collected represents the subjects' viewpoints and not the interviewer's biases. Thus, the fact that a given factor did not emerge is just as significant as if it had.

Once the category system was set up, summaries were coded by two Research Assistants as rapidly as possible. Even so, it was not possible to finish all 729 of those received through 19 February, and the analysis reported below was based on 601. The number of returns available from "special" schools and private schools was too small (See Table 2) to warrant their inclusion in the analysis. However, it is felt that there is little chance of any important selection biases in this 601 as a sample from the total interview sample. Conclusions drawn now should not change markedly in most cases, although additional significant findings may emerge when all protocols are finally analyzed.

## IV. Preliminary Questionnaire Results

This section presents findings derived from the teachers questionnaire. Criterion Groups are referred to by the abbreviations AR (Applicant-Rejection), NA (Non-applicant), and AA (Applicant-Attendee).

It was not considered desirable to present the mass of findings gathered. Therefore this section summarizes the findings, presenting medians and summary percentages instead of full distributions. In addition, only differences considered significant between groups are reported.

Normal tests of statistical significance are not appropriate for differentially weighted data. In order to estimate statistical significance, weighted distributions were pro-rated to sample size N's and an approximate test of the significance of the difference in two proportions set up. This procedure shows that a difference in proportion of 5-8% (AR vs NA and AR vs AA) and 3-6% (NA vs AA) is significant at the 5% two-tailed level. The values differ due to different N's in the groups and due to differences in population proportions for various items.

A. Background. Men predominate in teaching mathematics and science, but there do appear to be relatively more women who do not apply to NSF Programs than who do. About 3/4 of all the teachers are married, and this does not appear to be related to attendance.

Table 7 shows the percentage distribution of age for each of the three groups. One of the findings here is that the NA group has a significantly higher percentage of teachers in the youngest age category; this group also appears to have a few more teachers in the older age ranges. The other two groups have more teachers in the age ranges of about 32-40.

With respect to employment, 96-98% of these groups are employed on a full-time basis, and approximately 92% of them are primarily teachers. There appear to be no differences among the three groups with respect to these two factors.

One might hypothesize that teachers with dependents might apply for Programs less frequently. A significantly higher percentage of the NA group have one or no children than the other two groups (52.1%, 66.9% and 53.1%, for the AR, NA, and AA groups respectively). Of course this fact must be interpreted in the light of the large number of young teachers in the NA group. On the other hand, it must also be remembered that among the three groups there is little difference in the percentage that are married. In any case, since the lowest percentage of the three groups of teachers having no children occurs in the AA group, it would appear that number of children is not a deterring factor in applying for institutes.

Age of youngest child was also examined. For those teachers who had children, the median ages of the youngest child were 2.8, 4.3, and 4.0 for the AR, NA, and AA groups respectively. It appears, then, that since the NA group has a higher median age of youngest child than either of the other two groups, this factor is not associated with non-application.

Table 7

Percentage Age Distribution By Criterion Group

| Years old in 1962 | Criterion Group | | |
|---|---|---|---|
| | AR | NA | AA |
| 62 up | 1.2 | 5.4 | 5.0 |
| 57-61 | 5.3 | 5.7 | 5.5 |
| 52-56 | 6.8 | 8.7 | 8.5 |
| 47-51 | 7.0 | 10.2 | 9.6 |
| 42-46 | 8.4 | 6.1 | 10.9 |
| 37-41 | 14.3 | 9.3 | 14.7 |
| 32-36 | 18.6 | 10.8 | 21.9 |
| 27-31 | 22.1 | 19.0 | 16.9 |
| 22-26 | 12.8 | 21.3 | 8.3 |

As a final check, the total number of dependents, excluding the teacher himself, was examined. Of the NA group 56.5% had one or no dependents as compared to 50.8% and 43.2% for the AR and AA groups respectively. Table 8 summarizes the data on dependents. Thus it appears that the AA group rather than the NA group has more of a problem with support of dependents. On the other hand dependents might well provide a motivating factor resulting in increased achievement motivation.

B. Education. Table 9 shows the percentage distribution for each of the three groups by undergraduate majors. The non-applicant group is quite similar to the rejected group with respect to these educational variables. The clear contrast comes against the AA group which has studied much more science and math, and has a sharply lower percentage of other miscellaneous majors. This tends to suggest that the AA group which had started out in science and math and stuck with it, while the other two groups may have a considerable number of "converts" from other disciplines.

Table 10 shows the percentage of the various groups having 15 or more undergraduate credits in each of several major science subjects, mathematics, and education. The AA group clearly has more training in Chemistry, Physics, and Mathematics than the other two groups.

Table 11 shows the percentage of each criterion group reporting average grades of B or better in each of the same subjects. With the possible exception of Biology, the AA group is clearly superior to the other two on all of the rest of the subjects. The NA group seems very similar to the AR group. This tends to suggest that the AA group is a cut above the other two groups in ability. While this does not answer the question as to what differentiates the applicants from the applicant-rejectees, it does suggest that scholastic excellence may be one of the criteria in common use in selecting participants for NSF Programs. An examination of the various degrees awarded on the undergraduate level reveals no differences among the three groups in the percentage earning various degrees. Approximately half of all groups earn a bachelor of science, with about 1/3 earning a bachelor of arts, and the remainder being split up among several other possibilities. Only 2-3% have less than a bachelors degree.

With respect to graduate education, roughly 3/8 of the AR and NA groups but over 50% of the AA group have some graduate degree.

Tables 12 and 13 show distributions of graduate degrees and majors by criterion group. No clear pattern appears to emerge from the material regarding degrees; however, again there is a clear trend for the non-applicant group to be low in Science and Math majors and high in other miscellaneous areas. Roughly the same percentage, a little over half, of all graduate majors are given as education.

It had been hypothesized that one reason that teachers might not apply for NSF Programs would be that they would interfere with a planned program toward a degree at some particular institution. The evidence does not support this conclusion, since 36.4% of those in the AA group report that

Table 8

Dependents By Criterion Group

| Item | Group AR | NA | AA |
|---|---|---|---|
| Percentage having no children | 41.2 | 50.6 | 36.0 |
| Percentage having one or no children | 52.1 | 66.9 | 53.1 |
| Median age of youngest child (for those having children) | 2.8 | 4.3 | 4.0 |
| Percentage having no dependents other than self | 42.4 | 38.2 | 28.2 |
| Percentage having one or no dependents other than self | 50.8 | 56.5 | 43.2 |

Table 9

Undergraduate Majors By Criterion Group

| Major | Percentage by Group AR | NA | AA |
|---|---|---|---|
| None | 0.9 | 0.3 | 0.4 |
| Education | 4.4 | 9.4 | 8.9 |
| Science and related | 34.6 | 32.4 | 40.2 |
| Mathematics and related | 24.2 | 23.9 | 30.3 |
| Other | 35.1 | 31.2 | 19.1 |
| Omit | 0.8 | 2.8 | 1.1 |

Table 10

Percentage of Criterion Groups

Having 15 or More Undergraduate Credits* in Each of Several Subjects

| Subject | Group | | |
|---|---|---|---|
| | AR | NA | AA |
| Biology | 40.3 | 34.3 | 37.2 |
| Chemistry | 17.3 | 19.8 | 29.9 |
| Physics | 11.0 | 9.5 | 16.2 |
| Mathematics | 52.8 | 48.5 | 56.1 |
| Earth Sciences | 3.7 | 3.7 | 1.5 |
| Education | 75.3 | 70.5 | 73.8 |

* Semester-hours or equivalents.

Table 11

Percentage of Criterion Groups

Reporting Average Grades of B or Better in Each of Several Subjects

| Subject | Group | | |
|---|---|---|---|
| | AR | NA | AA |
| Biology | 57.7 | 47.9 | 56.1 |
| Chemistry | 34.1 | 34.4 | 45.4 |
| Physics | 32.1 | 31.2 | 43.3 |
| Mathematics | 49.5 | 49.5 | 58.3 |
| Earth Sciences | 25.8 | 23.0 | 33.0 |
| Education | 68.7 | 69.9 | 77.2 |

Table 12

Graduate Degrees by Criterion Group

| Degree | Percentage* by Group | | |
|---|---|---|---|
| | AR | NA | AA |
| Master of Education | 34.1 | 25.1 | 31.5 |
| Master of Science | 17.1 | 27.3 | 23.0 |
| Master of Arts | 47.5 | 40.3 | 39.7 |
| Other | 1.3 | 7.3 | 5.8 |

* Based on the 37.5%, 36.2%, and 51.7% of the groups, respectively, reporting graduate degrees.

Table 13

Graduate Majors by Criterion Group

| Major | Percentage* by Group | | |
|---|---|---|---|
| | AR | NA | AA |
| Education | 55.6 | 53.3 | 50.6 |
| Science; Science Related | 20.9 | 14.0 | 21.9 |
| Mathematics; Mathematics Related | 4.8 | 7.7 | 15.3 |
| Other | 18.7 | 25.0 | 12.2 |

* Based on the 37.4%, 37.9%, and 53.0% of the groups, respectively, reporting graduate degrees

they are currently working toward a degree, while only 22.0 and 20.4 percent in the AR and NA groups respectively are currently working toward a degree. One fact does seem to stand out however, and that is that the AA group as compared to the NA, and also to some extent to the AR group, is a high motivation group strongly interested in self-improvement via education. More than half of the AA group have reported having a graduate degree, and over 36% of them are currently working toward some additional degree. Again, the AR and NA groups appear very much alike.

Full permanent certification was reported by 81.1%, 78.2% and 85.5% for the AR, NA, and AA groups respectively. A full 10.5% of the NA group reported being on temporary or emergency certification status. However, certification deficiencies for the NA group seem to be more in education than in Math or Science as compared to the other two groups. About 5.5% of the NA group reported certification deficiency in education as compared to 1.1% and 2.0% for the AR and AA groups respectively. About 7-8% of the three groups reported deficiencies in Science or Math, and 4-5% in other areas.

C. Work Experience. The non-applicant group has significantly less full-time teaching experience both in Math and Science, and in general. About 35%, 43% and 27% of the AR, NA, and AA groups respectively reported having less than five years full-time teaching experience. The corresponding percentages for years teaching Math or Science are 37%, 46% and 41%. This lack of experience must be evaluated, however, in light of the fact that about a fifth of the NA group is in the age range of 22-26 years old, and thus could not be expected to have accumulated much in the way of teaching experience. The age factor may also account at least partially for the fact that the NA group has a somewhat lower percentage of teachers placed on tenure. About 39.3%, 37.5% and 47.6% of the three groups respectively have been placed on tenure. This does not account for the difference, however, between the AR and AA groups; nor do differences in opportunity, since approximately the same percentage, about 2/3 of each group, report that there is a tenure plan available.

Even though all teachers teaching Math and Science less than 40% time were eliminated from this analysis, those remaining spend some time teaching other subjects, particularly in the NA group. Table 14 presents the results. About 11.5%, 17.9%, and 6.7% of the AR, NA, and AA groups respectively spend more than 20% of their time teaching other subjects. Thus, it would appear, that even within this group, the NA teachers are dividing their loyalties, as it were, between Math and Science and some other subjects. This would appear to be an important reason for their non-application. There is even a differential here between the AA and AR groups, and it is seen that the AA group appears to be a much more specialized group, limiting itself specifically to teaching Math and Science.

Another hypothesis, particularly applicable for in-service Programs was that those teachers spending a large portion of time outside of class grading papers, preparing lessons, etc., would not be institute applicants. The median number of hours per week spent at such activities is 11.3, 11.5, and 12.1, for AR, NA, and AA groups respectively. There would appear to be no difference here, and it seems as though, if anything, the applicant group spends more outside time than the others.

Table 14

Total Percent of Time Spent Teaching Math or Science by Criterion Group

| Percent of Time | Group AR | NA | AA |
|---|---|---|---|
| 00 - 09 | 0.8 | 3.1 | 0.0 |
| 10 - 19 | 1.1 | 3.7 | 0.8 |
| 20 - 29 | 4.6 | 4.2 | 2.0 |
| 30 - 39 | 2.6 | 3.9 | 1.3 |
| 40 - 49 | 4.2 | 4.5 | 4.3 |
| 50 - 59 | 7.8 | 5.9 | 5.5 |
| 60 - 69 | 7.5 | 8.0 | 8.3 |
| 70 - 79 | 12.9 | 10.3 | 13.1 |
| 80 - 89 | 24.5 | 21.1 | 23.2 |
| 90 - + | 30.8 | 24.4 | 39.4 |
| Omit | 3.2 | 10.9 | 2.1 |
| Total | 100.0 | 100.0 | 100.0 |

Non-applicant teachers appear to have somewhat less strong career motivation than the other two groups. In response to the question, "Do you intend to remain in secondary teaching as a career?", 87.9%, 78.3%, and 87.9% of the AR, NA, and AA groups responded, "Yes". Corresponding percentages for "continue teaching science or math" were 90.4%, 82.2%, and 94.9%. However, in each case the NA group had more than twice the percentage of "No's" in the other groups. The higher percentage of "Yes's" for continuing teaching Math or Science as compared to continuing teaching secondary school is perhaps explained by hypothesizing that about 4% or 5% of these teachers expect to move into college teaching. In any case, it would appear that the career motivation of the NA group is somewhat lower on the average than for the other two groups.

D. Outside Activities. Table 15 summarizes the summer activities of these teachers by criterion group. It may be seen that the AR group has consistently held a non-school job during the summer with higher frequency than the other two groups, particularly the AA group. The most outstanding point for the NA group is their comparatively higher percentage of none of the four activities listed. One wonders what these people do during the summer. The most outstanding characteristic of the AA group appears to be again its very high emphasis on education. In each of the 3 years in question, about half or more of this group attended summer school. It is quite likely, however, that they counted attendance at summer institutes as attendance at summer school for the purpose of this question.

Inquiries were also made as to the holding down of an extra job during the regular school year over the past several years. Table 16 shows the results. Here we found that the AR group has the highest percentage of extra work, the NA group the smallest of the three. This suggests that whatever the reason for non-application, it is probably not that the people involved are working an extra job during regular school years.

For those that held extra jobs, the character of the job was determined. About 68.5%, 53.9%, and 50.2% of those holding extra jobs in groups AR, NA, and AA respectively held jobs that would be classified as unskilled or semi-skilled and unrelated to education.

E. Institute Attendance. Of those applying for Institutes about 85% applied for summer Institutes sometime during the past five years. About 2-4% applied for Research Participation, grants, and about 8-10% for Summer Fellowships. The AA group applied much more strongly for In-service Institutes, about 37.6% as opposed to 11.7% for the AR group. They also applied somewhat more strongly for the Academic Year Institutes, about 19.1% as compared to 10.4%.

Table 17 shows the percentage of the AA group attending In-service and Summer Institutes during the last three years. It may be seen that of those who have attended some Institute during the last five years (the criterion for inclusion in the AA group), the percentage of those who attended Summer Institutes in 1959, 1960, and 1961, has remained fairly constant, although perhaps showing a small growth, at about a third. The percentage attending In-service Institutes has, however, grown fairly markedly from 8.6% in 1959-60 to 19.8% in 1961-62.

Table 15

Summer Activities 1959-1961 by Criterion Group

| Year & Group | Percentage * | | | | |
|---|---|---|---|---|---|
| | Taught Summer School | Non-school Job | Traveled Extensively | Attended School | None of these |
| 1959 | | | | | |
| AR | 8.9 | 42.7 | 9.1 | 27.4 | 19.5 |
| NA | 7.7 | 36.9 | 11.3 | 22.1 | 29.3 |
| AA | 6.5 | 27.2 | 5.7 | 49.5 | 16.6 |
| 1960 | | | | | |
| AR | 8.5 | 36.2 | 14.7 | 31.2 | 22.0 |
| NA | 7.8 | 34.2 | 9.9 | 24.8 | 30.0 |
| AA | 6.0 | 22.1 | 10.0 | 52.4 | 16.5 |
| 1961 | | | | | |
| AR | 13.0 | 38.1 | 9.5 | 29.7 | 16.5 |
| NA | 10.2 | 34.7 | 14.4 | 23.1 | 26.9 |
| AA | 10.5 | 18.8 | 7.7 | 53.3 | 16.4 |

* Do not total to 100% due to multiple responses.

Table 16

Percentage Holding an Extra Job
Over the Last Four Regular School Years by Criterion Group

| Years | Group AR | NA | AA |
|---|---|---|---|
| None of the last four years | 52.5 | 68.2 | 62.5 |
| One of the last four years | 8.5 | 7.5 | 10.8 |
| Two of the last four years | 14.2 | 3.9 | 7.6 |
| Three of the last four years | 5.8 | 3.5 | 5.2 |
| Four of the last four years | 19.0 | 16.9 | 13.9 |

Table 17

Percentage of AA Group Attending
In-Service and Summer Institutes, 1959-1961

| Institute | Percentage |
|---|---|
| 1959 Summer | 31.3 |
| 1960 Summer | 32.1 |
| 1961 Summer | 33.4 |
| 1959-60 In-Service | 8.6 |
| 1960-61 In-Service | 13.3 |
| 1961-62 In-Service | 19.8 |

F. Professional Activities. One of the points which might differentiate applicants from non-applicants was hypothesized to be the degree of teachers' identification with professional organizations. The median number of professional organizations belonged to by these teachers was 2.7, 2.6, and 3.2 for the AR, NA, and AA groups respectively. It would appear that there is a slight tendency for the successful applicant group to be affiliated with a somewhat larger number of professional organizations. It is in affiliation with organizations in the field of Science and Mathematics, however, that the sharp differentiation occurs. About 36.9%, 31.4%, and 67.5% of the three groups respectively affiliated with one or more scientific or mathematic organizations. It was further desired to check membership in the various NEA sponsored divisions. Table 18 shows the percentage of each group holding membership in the relevant NEA organizations. Again, it can be seen that the AA group stands out in holding membership in both the Science and the Mathematics divisions of NEA. While the AR and AA groups are quite similar, it is interesting to note that more than half of these two groups do not belong to either NEA, or any of the relevant affiliates.

A further index of professional identification is given by the number of offices in professional organizations (including committee chairmanships), which a teacher may have held. About 35.5%, 30.1%, and 43.1% of the AR, NA, and AA groups respectively have held one or more offices. These data seem to place these three groups in rank order of professional identification and participation.

A similar impression is gotten from the number of professional journals read. The median number for the three groups is 2.5, 2.2, and 2.9 respectively. Again, the NA group is the lowest, with the AR and AA groups in that order. The number of Science and Math journals read confirm this impression. Median figures are 0.8, 0.5, and 1.5 respectively. It is interesting to note that 50.3% of the non-applicant group read no Science and Math journals, followed by 42.7% of the AR group, while only 19.9% of the AA group reported reading no Math and Science journals.

Further evidence of professional interest and competence is gotten from the fact that 18.2% of the AA group reports engaging in some writing, consulting, or research activities, as compared to approximately 10% for each of the other two groups.

G. Financial Data. As might be expected, the salaries of the three groups are in the same order. The median income for the regular academic school year for the AA group is $5846, followed by $5555 for the AR group, and $5255 for the NA group. Of course, it must again be remembered that being a somewhat younger group, with large proportion of beginning teachers, the NA group is not likely to have reached very high on the salary schedule in most school systems.

Contrary to what might be expected, there is virtually no difference in the three groups regarding outside income. About 32.5% of the AR group, 31.5% of the NA group, and 33.6% of the AA group earn $500 or more a year from outside sources. With respect to spouse's income, 25.8% of the AR group, 34.7% of the NA group, and 26.4% of the AA group have spouses who earn $1000 or more of extra income per year.

Table 18

Membership in NEA Organizations by Criterion Group

| Organizations | Group AR | NA | AA |
|---|---|---|---|
| NEA | 30.6 | 35.2 | 24.5 |
| NEA-NSTA | 8.9 | 5.0 | 19.4 |
| NEA-NCTM | 9.4 | 9.2 | 22.9 |
| All three of the above | 0.0 | 0.0 | 0.7 |
| None of the above | 51.1 | 50.6 | 32.5 |

The significantly higher percentage of more than $1000 income for the NA group may perhaps be partially accounted for by the fact that this is a somewhat younger group, and their spouses may very well be holding down a job prior to raising a family. In any case, however, it would appear that the NA group is certainly no worse off than either of the other two groups, and it would appear that financial reasons should not be a very strong factor in the their lack of application.

H. Contrasts with the Group Teaching Mathematics and Science Less than 40% Time. As noted earlier, several questions were analyzed for the group of teachers teaching mathematics and science less than 40% time. Table 19 shows the percentage distributions of weighted numbers of teachers for the under 40% time group, over 40% time group and both combined, by criterion group and school type. It can be seen that by far the biggest source of non-applicants in the over 40% time group (and in the total group) is the junior high school. As might be expected, the small public high schools produce a large percentage of non-applicants in the under 40% group. On the other hand, the biggest sources of successful applicants tend to come from the moderately small and moderately large public schools in the over 40% group and from moderately small and junior high schools in the under 40% group.

TABLE 19

PERCENTAGE DISTRIBUTION OF WEIGHTED NUMBERS OF TEACHERS TEACHING MATHEMATICS AND SCIENCE LESS THAN 40% TIME AND MORE THAN 40% TIME, BY CRITERION GROUP AND SCHOOL TYPE

| School | Group | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | AR | | | NA | | | AA | | |
| | 0-39% | 40-100% | 0-100% | 0-39% | 40-100% | 0-100% | 0-39% | 40-100% | 0-100% |
| Public - 1 | 36.1 | 7.5 | 11.0 | 16.9 | 9.0 | 11.1 | 13.9 | 5.0 | 5.6 |
| Public - 2 | 24.9 | 30.3 | 29.6 | 31.9 | 20.4 | 23.4 | 33.7 | 27.4 | 27.8 |
| Public - 3 | 12.5 | 22.1 | 20.9 | 14.0 | 21.6 | 19.6 | 12.0 | 29.9 | 28.8 |
| Public - 4 | 2.0 | 6.7 | 6.1 | 3.5 | 6.0 | 5.3 | 5.4 | 9.2 | 9.0 |
| Junior High | 24.5 | 29.0 | 28.4 | 25.1 | 33.5 | 31.3 | 31.6 | 18.6 | 19.4 |
| Parochial | -- | 2.4 | 2.1 | 6.0 | 6.8 | 6.6 | 3.4 | 6.8 | 6.6 |
| Private | -- | 2.0 | 1.9 | 2.6 | 2.7 | 2.7 | -- | 3.1 | 2.9 |
| Weighted N | 2,760 | 19,889 | 22,649 | 22,087 | 63,337 | 85,424 | 3,571 | 54,647 | 58,218 |

These results suggest the conclusion that percentage of time spent teaching mathematics and science is importantly related to application and non-application and probably more so than school type.

First of these was "What is your primary position?". The over 40% group had showed no difference in the percentage of teachers who called themselves primarily teachers (92%). In the under 40% group, however, the AR, NA, and AA groups show a percentage of 76.9%, 85.2%, and 76.0% respectively. Both the AR and AA groups show a somewhat higher percentage of principals in their groups, 13.1% and 13.0% as compared to 0.9% and 1.4% in the over 40% group. It should be noted, however, that the NA group, while showing 7.1% of the group as principals, as compared to 1.5% in the over 40% group, is somewhat less than the NA and AR groups with respect to the percentage of principals. The AR group has nine percent listing themselves as counselors, as compared to 0.6% in the over 40% group.

In summary, it appears that the under 40% teaching mathematics and science group contains a significantly higher percentage of principals, and for the AR group, counselors. But the non-applicant group contains significantly the highest percentage of teachers, and thus it would appear comparatively that non-application is not a function of split loyalties in this group. In any case, a higher percentage of them are teachers primarily and unaffiliated with other areas.

The age picture in the under 40% group is quite similar to that in the over 40% group. Again we find that the non-applicant group has a high percentage (29.9) in the youngest age range, 22-26 years. Again the non-applicant group seems to have a higher percentage among the older age ranges. About the only differences that appear to show up are the fact that the AR group has a much higher percentage in the youngest age range than it did before (29.7 as compared to 12.8). This may reflect the use of age as a selection criterion in this group. Overall it would appear that the average age of the under 40% group for each of the three criterion groups is somewhat younger than for the over 40% group.

In examining undergraduate majors, the most striking aspect in comparing the under and over 40% teaching groups shows up in the much higher percentages of degrees other than education, science or math for the under 40% group. Where the three criterion groups showed percentages of 35.1, 31.2, and 19.1 for the AR, NA, and AA groups respectively, the percentages in the under 40% group are 50.8, 49.2, and 49.3 respectively. This suggests very strongly that those teachers under 40% have primary affiliations and primary training in fields other than science and math, and supports the hypothesis under which the under 40% group was deleted from the main part of the current analysis.

Table 20 presents the comparisons of undergraduate majors, and it is further evidenced that the under 40% group shows much smaller percentages with mathematics degrees and with the exception of the AR group, a much smaller percentage with science degrees.

The percentage of education degrees, on the other hand, is somewhat higher across the board.

Table 20

Contrasts with the Group Teaching Mathematics and Science Less than 40% Time on Undergraduate Majors

| Major | Percentage by Group: Under 40% AR | NA | AA | Over 40% AR | NA | AA |
|---|---|---|---|---|---|---|
| None | -- | 2.7 | -- | 0.9 | 0.3 | 0.4 |
| Education | 13.1 | 11.5 | 18.4 | 4.4 | 4 | 8.9 |
| Science and Related | 32.0 | 21.3 | 19.7 | 34.6 | 32.4 | 40.2 |
| Mathematics and Related | 4.1 | 14.5 | 12.6 | 24.2 | 23.9 | 30.3 |
| Other | 50.8 | 49.2 | 49.3 | 35.1 | 31.2 | 19.1 |
| Omit | -- | 0.8 | -- | 0.8 | 2.8 | 1.1 |

The percentage of the under 40% group having graduate majors is somewhat lower for each of the criterion groups as compared to the over 40% group, particularly for the NA group. The percentages are 33.4, 26.2, and 47.8 for the AR, NA, and AA groups respectively as compared to 37.4, 37.9, and 53.0 for the over 40% groups respectively. Among those having graduate majors, however, the percentage distributions of field are much the same as before, with the AR and NA groups showing more than half of their majors in education and, in this case, virtually none in science or mathematics, and the AA group showing somewhat less than half in education - about 25% in science and about 10% or so in math.

With respect to certification deficiency, the situation was as might be predicted in that the under 40% group uniformly showed a larger percentage having deficiencies in all three criterion groups as compared to the over 40% group.

With respect to intent to continue teaching mathematics or science, the picture is very clear. For the under 40% group, the percentages ran 81.5%, 62.4%, and 96.1% as compared to 90.4, 82.2, and 94.9, in the AR, NA, and AA groups respectively. It is quite clear that the firmness of intent to continue teaching math or science is substantially less in the under 40% group for both the AR and the NA groups ranging down as low as 62.4% for the NA group in the under 40% group. It would seem, however, that even in the under 40% group, those teachers who have attended institutes have a firm intention to continue teaching mathematics or science.

In summary, it is difficult to see how the inclusion of the under 40% group in the main analysis could have significantly enhanced the analysis done on the over 40% group with respect to revealing further reasons for non-application.

## V. Preliminary Interview Findings

This section deals with the findings from the interview material on hand. It is organized according to the questions on the Interview Schedule. Procedures similar to those used with questionnaire data were used to estimate differences in proportions which might be considered significant. At the two-tailed five per cent level these are 7-12% (AR vs NA); 8-13% (AR vs AA); and 6-9% (NA vs AA). These are rather larger than those for the questionnaire material due to the smaller number of cases available for interview analysis. In addition, they were used primarily as guidelines in discussing the material presented below, rather than as hard and fast rules. It is felt that the points brought out below represent trends which will be borne out in the final, more stable analysis.

### A-1. "How did you get into teaching?" or "How did you decide to be a teacher?"

The purpose of this question was to open up the interview and to get the teacher to talk. In addition, it was presumed that we might obtain some information regarding the circumstances which lead to the decision to go into teaching, and the degree to which a teacher is motivated to teach.

It is of great interest to note that teachers who have applied for NSF Teacher Training Programs more often started working in another field, or first majored in another field in college, or got into teaching fortuitously than did non-applicants. The non-applicants were more inclined to report an early desire to go into teaching, often with no other occupation considered. It would appear that having had the experience of preparing for or working in another field may have helped the applicant groups develop a broader and more serious approach to education and the responsibilities of a teacher (one of which is, presumably, to keep educationally up-to-date). Possibly they are more aware of the application of knowledge to other fields than non-applicants.

Other people apparently play a great role in influencing individuals to go into teaching, but there appear to be no differences between applicants and non-applicants in this.

### A-3. "What do you like about teaching?"

In this question we are trying to determine both the degree of satisfaction with teaching as a vocation and the locus of the satisfiers for the different groups of teachers.

While all teachers report that student-related satisfactions are important to them, the focus of this satisfaction for the non-applicant group seems to be rather vague compared with the applicant group. That is, the non-applicant group reports student satisfactions in terms of "working with people", or "working with children". The focus of the satisfactions in relation to students for the applicant group, however, seems less vague. These applicant groups talk in specific terms such as seeing students develop, progress, learn, and so forth.

The next most important type of satisfactions for teachers are those which are psychological in nature rather than being related directly to the environment. An

item of satisfaction mentioned frequently by the non-applicant group was "personal growth and satisfaction" - a term equally as vague as "working with children." This finding, indicating a somewhat self-centered attitude on the part of non-applicants, is consistent with their lack of specificity in student related satisfactions. This trend toward self-centered satisfactions is substantiated by a slight tendency for the applicant groups to be more interested in contributing to society and to imparting knowledge. Thus the applicant groups would seem to be more interested in others than in self compared to the non-applicant group. This conclusion is further validated from the observation that one of the satisfiers for the applicant groups is professional associations with other teachers, organizations, etc. This is of significantly less interest to the non-applicant group.

A-4. "What do you dislike about teaching?"

The major dislike of all groups appears to be in the matter of working conditions, especially long hours, heavy teaching load, and so forth. The non-applicant group is interesting in that it has a complaint regarding the physical facilities limitations which the applicant groups do not. However, the applicant groups complain more about low salary than does the non-applicant group. Part of this may be due to the fact that the non-applicants, to some degree, consist of younger teachers who are just getting started; perhaps it is not appropriate to complain about a low salary. In addition, these people have not developed the responsibilities that older teachers have.

Paper work is a problem for all groups, of course, and at the present time there appear to be no systematic differences between the three groups. It is very interesting to note here that the non-applicant group reports a great deal more student-related problems than do either of the applicant groups. There is a tendency in the data for the applicant groups to report problems related to other people to a slight degree more than the non-applicant group. It is likely that this difference may sharpen when additional data are gathered.

There is a slight tendency for the non-applicant group to report out-and-out dissatisfactions with the subject matter, but this is a small percent of the total group.

In summary, the non-applicant group appears to have problems in relation to students when compared with the applicant groups. The non-applicant group is relatively content salary-wise when compared to the other groups, but is more inclined to complain about the physical environment.

A-5. "What are your strong points as a teacher?"

This question is intended as a further exploration of the teacher's self concept.

It is of great interest here to note that the group which has attended NSF Programs considers that subject matter strengths (specifically being well prepared in subject matter) is a strong point. The group which has applied and not attended is significantly lower than the attended group; and the non-applicant group is still lower, but not significantly so. It is, however, significantly lower than the

attended group. The fact that the group that has attended feels stronger in subject matter preparation is possibly a partial outcome of having attended an NSF Program. However, it should be cautioned here that this result may be equally an effect of Teacher Training Program selection procedures.

The applicant groups cite effective teaching methods as a strong point more often than the non-applicant groups.

Putting these findings together, the non-applicant pictures himself as less strong than the applicant, both in subject matter skills, and in the ability to get the information across to the students on their level. It is of great interest here to note that those who have applied but have not attended Programs appear to consider that their interpersonal relationships with the students are very important. The direction of the student-teacher relationship is seen as from the student to the teacher. This finding may point up one of the reasons why this group has not been accepted. It is common practice to ask applicants to write a paragraph about why they want to attend an Institute. It is likely that those whose emphasis is on student development rather than self-improvement may select themselves out. Their primary concern with being liked by students and secondarily, being concerned with the subject matter is antithetical to the viewpoint of most institutions offering NSF Programs.

A-6. "What are your weaker points?" "What ways do you think your teaching might be improved?"

There appear to be no clear cut trends differentiating the non-applicant from the two applicant groups in response to this question.

A-7. "What do you expect to be doing five or ten years from now?"

The purpose of this question is to determine the future plans of the teacher in relation to self-improvement as well as his goals and aspirations for upward mobility.

Here the non-applicants seem to be dissatisfied with teaching as compared with the applicants. Evidence of this is the fact that the non-applicant often wants to teach something else, whereas applicants seem to be satisfied with being in mathematics and science. Those who have attended NSF Programs are most likely to intend to stay in teaching math or science; but even those who have applied but not attended are more content in math or science than the non-applicant group. The non-applicant group shows little desire for upward mobility (teach at a higher level, e.g., college, or become a supervisor), while both applicant groups tended to want to move upward. The non-applicants are, in addition, much more undecided about whether they will stay in or get out of education than are the applicant groups. This question served to identify the group which plans to retire, and this is frequently given as a reason for not applying.)

In summary, the responses to this question seem to indicate that the non-applicants are relatively less happy with their lot as teachers, or simply being in education, than are the applicants. They have little upward mobility compared with those who have attended NSF Programs and generally seem to be rather uncertain about their futures compared with those teachers who have applied for Programs.

Those teachers who have attended Institutes appear to be much more content to remain teachers of math and science than those who have applied but not attended, as well as those who have not applied. It is difficult to determine if the Programs are selecting those who like math or science, plan to continue in it, and plan to use it at a more advanced level, or if these attitudes are by-products of attendance. Perhaps both these hypotheses are tenable to some degree.

A-8. "How do you expect to do this?"

This question was asked only of those teachers who indicated some desire for upward mobility. It was asked to determine if there might be group differences in the kinds of plans as well as in their specificity.

At this time there appear to be no systematic differences among the three groups.

A-8a. "Do you find it necessary to devote much time to keeping up with developments in your field? In what way?"

This question was also designed to try to get information on the motivational level of the teacher by documenting the activities of keeping up in the field.

In response to this question, non-applicants are sharply distinguishable from teachers who have attended NSF Programs in that a greater percentage of them express no need to keep up with developments; there is no concern, or there are excuses for not keeping up. Real differences exist also in specific actions which applicants take compared to non-applicants. Both applicant groups report that they take courses, workshops, and so forth. The non-applicant group is significantly lower in terms of the number of teachers who report that they take part in these professional improvement activities. Again, this kind of finding needs to be considered in light of the age group which may be involved. Younger teachers who are just out of college may be less inclined to apply for courses, lectures, workshops, etc., because they are better prepared, have recent training, and see less of a need at the present time for upgrading themselves.

Both applicant groups, however, report being active in professional organizations as a method of keeping up, and the group which has attended NSF Programs is especially high in reporting this. In general, the group which has attended seems to take a great many more specific actions in keeping up than does the group which has not applied, as well as the group which has applied but has not been accepted. Part of this finding is attributable to the fact that the attended group has actually gone to an NSF Program and, in the interview, reports this as a specific action. However, of real significance is that the non-applicant group gives, in general, fewer responses to this question than either of the applicant groups. In effect, the non-applicant group appears to be more content, more self-satisfied, and hence less inclined to apply. One is easily able to see the applicant groups here as less self-satisfied and willing to engage in a great many more activities, not only to keep up, but improve professionally.

* * *

The interview also examined various aspects of the teachers' motivations and attitudes to determine the extent of their knowledge about and interest in the Teacher Training Programs; what the teachers perceive as the benefits of the Programs; the reasons for applying or not applying; and suggestions for modifications which might better suit the Programs to the teacher's needs.

B-1. "Are you familiar with the NSF Teacher Training Programs?"

In this question we were primarily interested in documenting the degree to which the groups which had not attended Teacher Training Programs were familiar with them. Those individuals who have attended were assumed to be familiar with the Institutes.

As might be expected, the group which has applied claims to be familiar and informed about the Institutes in general. The group which has not applied is split up as follows: About 40% of this group was informed about and familiar with the Programs; about 30% had some understanding, or partial information about NSF Programs; and about 30% were not familiar with the Programs.

Thus we see that at least 70% of the non-applicant group is at least aware of the existence of these Programs and has some information or is well informed about the Programs.

B-2. "How did you first hear about them?"

The purpose of this question is to document the original source of information about the Programs and, incidentally, to make certain that the interviewer and the teacher were both talking about NSF Programs. It was hypothesized that the original source of information might bear some relationship to the decision to apply or not apply. For example, if the information came orally through the department head, biases for or against the Programs may have accompanied the communication. If information was secondhand from another teacher, a different decision might have been made than if the teacher had obtained the information from an NSF brochure.

The principal first sources of information for non-applicants are: NSF brochures, local university material (38%); principal, other teachers, supervisors (24%); and while in college (10%).

The responses to this question seem to indicate that attendees also obtain their information primarily through NSF brochures. About half of those who have attended got their information originally through NSF brochures, while about 1/3 of the other teachers received their information in this way. Of significance is the fact that about 10-12% of both applicant groups reported professional journals, periodicals, newspapers, magazines, etc., as the first source of information, while this was rarely reported by non-applicants. Other teachers are a source of initial information for all groups, but there does not appear to be any relationship to application based upon this original source.

Once again, we seem to see the picture of the "reading teacher" in the applicant group, with the "non-reading teacher" as the non-applicant. It must be emphasized that these are not clear cut, all-or-none divisions, but only trends.

B-3. "As you understand them, what do you see as the basic purposes and values of the Programs?"

For those teachers who have never applied for or attended an Institute, the answer to this question is likely to be very important. Whether the information is accurate may have influenced the desire to apply for a Program. For those teachers who have attended a Program, the perception of the purposes and values may be different from those who have not.

The primary purposes and values of the Programs (updating subject matter knowledge and broadening subject matter background) seem to be well understood by all groups regardless of whether or not they have applied. As would be expected, the group which has attended does have a better understanding of these two purposes than both of the non-attending groups. In addition, both the attending group and the applied but not attended group seem able to give more purposes and values than do the non-applicants. This, however, is to be expected, in view of the fact that the non-applicants are generally not as well informed about the Programs.

Correcting for lack of information about the Programs, essentially the three groups differ little, if any, in their perceptions of the basic purposes and values of NSF Programs. This would indicate that the Program purposes are reasonably well understood. There is still a sizeable group of teachers (about 1/5) who have rather vague or abstract ideas about the purposes of the Programs. These ideas are not expressed as secondary reasons either; rather they are primary purposes. These include such things as helping our country, improving our schools, better prepared children, etc. These are, to be sure, long range desirable values but perhaps too vague to serve as specific motivators for these teachers. The matter of improving teacher skills and methods received very little nomination as a primary value of the Programs, although it was mentioned prominently as an important aspect in the preliminary interviewing.

B-10 "Why did you apply?" "Why did you not apply?"

These questions represent the crux of the inquiry of this Project. The distribution of percent responses by non-applicant and applicant groups is shown in Tables 21 and 22. Let us look at the non-applicant group first.

The major general reason for non-applications appears to be that these people claim to have other obligations which they feel they must consider first. The most important of these other obligations is centered around the family, with occasional mention of financial considerations. These people feel they have obligations to be with their families for any number of reasons. Another obligation, but one which is only about half as important as family, is the obligation of working for a degree.

It is of interest to note that only about 8% of the non-applicants report financial considerations preventing them from applying for a Program. But even financial considerations and working toward a degree are minor compared with the attitude that the Programs are not relevant to the current needs of the individual. About 9% of the non-applicants feel that the Programs are not relevant because they are too old, or near retirement; about 6% give as a reason for not applying that they are currently teaching in areas other than math and science; about 5% feel that the Programs are not appropriate in content or level for them - that is, they do not meet their current educational needs. About 7% feel that their own background is so inadequate that they could not keep up with the work, or the requirements would be too high, and they would not be accepted.

One sub-group among these "inadequate background" non-applicants believes that NSF's requirements are so high that the Programs would be too difficult. (This

Table 21

Responses to the question: "Why did you apply?"

| Category | Percent Response* | |
|---|---|---|
| | AR | AA |
| 10. Improvement Concepts | 71.0 | 96.9 |
| 11. Keep up to date in field | 17.1 | 29.3 |
| 12. Financial and/or professional advancement | 2.9 | 1.3 |
| 13. Increase subject matter background and competence | 31.8 | 28.7 |
| 14. Brush up; review subject matter | 2.0 | 5.3 |
| 15. Become better teacher; improve skills and methods | 4.6 | 12.7 |
| 16. Work for advanced degree | 8.0 | 15.5 |
| 19. Other | 3.5 | 4.1 |
| 20. Personal Reasons | 10.1 | 23.8 |
| 21. Honor, prestige, value on record | — | 1.7 |
| 22. Financial assistance | 9.5 | 18.6 |
| 23. Develop new interests | — | 1.0 |
| 29. Other | .6 | 2.5 |
| 30. Interpersonal (social) values | 2.3 | 4.4 |
| 40. Encouraged by principal; chairman, head, etc. | 3.8 | 6.5 |
| 50. Enjoys going to school; subject matter | 1.4 | 3.1 |
| 60. Vacation, travel | — | 1.0 |
| 90. Other | 9.9 | 11.7 |

*Percentages do not total 100% due to multiple responses and a few non-responses.

Table 22

Responses to the question: "Why have you not applied?"

| Category | | Percent Response* |
|---|---|---|
| 10. | Other obligations | 40.7 |
| 11. | Family (non-financial) | 16.6 |
| 12. | Financial needs | 2.9 |
| 13. | Make more money in other summer job | 5.2 |
| 14. | Working for degree | 8.0 |
| 19. | Other | 8.0 |
| 20. | Low drive level | 13.8 |
| 21. | Complacent or indifferent; not seeking promotion | [illegible] |
| 22. | Needs vacation | [illegible] |
| 23. | Wants summers free | 4.2 |
| 24. | Many transcripts, applications | .7 |
| 25. | Other time demands | 4.7 |
| 26. | Other | .9 |
| 30. | Feels non-relevance (need diminished) | 26.0 |
| 31. | Has enough education | 3.1 |
| 32. | Near retirement (too old) | 8.7 |
| 33. | Plans to teach or is teaching in areas other than math or science | 5.7 |
| 34. | Institutes not appropriate in conduct or level | 5.0 |
| 40. | Feels background is inadequate to keep up with work; requirements too high; won't be accepted | 7.0 |
| 50. | Location | 1.2 |
| 60. | Application up to superior | 3.0 |
| 70. | Not familiar with program | 3.4 |
| 80. | Presumes not eligible | 13.9 |
| 81. | because of age | 2.7 |
| 82. | because of experience | 9.2 |
| 89. | other | 2.0 |
| 90. | Other | 4.9 |

*Percentage do not total 100% due to multiple responses and a few non-responses.

is very similar to the group that feel that the Programs are not appropriate in content or level, except that the latter group is concerned more with practical aspects of NSF content for the teachers' situation regardless of background.)

A second sub-group includes those who "know" that they won't be accepted because of their background. The legitimacy of this "knowing" varies; some teachers whose background is in other areas, e.g., social sciences, and who are now teaching physical sciences, probably "know" with valid reason. Others are less clear cut.

A third group does not apply because they "fear" not being accepted. They may use their background, or the high requirements of NSF as justification for this "fear" which is based on several factors (e.g.-- possibility of failure, low grades, possibility of rejection, etc.) which would look bad on their records.

Another group feels that application is futile. This attitude may be based on the number of teachers they know who have not been accepted, remarks they have overheard such as, "There are 100 applicants for every one who is taken," or simply the overall defeatist attitude of the teacher himself. In some cases, it is shown simply by a, "Why bother?" (this often related to a complaint about the complexity of application procedure); in others, a more detailed description of reasons is given, and often the attitude seems quite justifiable. It is usually cases such as these that arouse the ire and sympathy of interviewers who sometimes comment that NSF is turning down teachers that most need the help.

About 9% of the non-applicants presume that they are not eligible because of lack of experience, specifically because they have not been teaching long enough.

One of the more relevant findings here is that about 14% of the non-applicants can probably be termed as "low energy" people. They say they need vacations, they want their summers free, and excuse themselves on the basis that they don't have time for one reason or another. Now some of these excuses are accompanied by legitimate reasons - e.g., summer military duty. However, other types of programs would be available even to these people if they were highly motivated. The fact is, a common finding in studying human behavior is that those people who are busiest seem to find the energy and time to take on more activities.

This again confirms our picture of the non-applicant as an individual who does not want to devote 365 days a year to teaching. He wants to do something else when the teaching day is over - be with his family, take a vacation, or do another job. While teaching may be important to non-applicants, other things in their lives appear to demand equal time.

The expressed purposes for applying for Programs are greatly concentrated in the general area of self-improvement. These people reflect insights into basic purposes and values of the Programs, since many of the responses are concentrated in: keeping up to date, increasing subject matter competence, becoming a better teacher, and "brushing up". Interestingly enough, the applicants do not use as a reason financial and/or professional advancement. This is consistent with the reports of the teachers who have attended. A great many of them wish to remain in teaching at their present level. Financial assistance is, however, given as a reason by a significant percentage of the applicants. An hypothesis here is that those teachers with more dependents are likely to find greater financial benefit from attending a summer institute than from taking a job. For example, if a man

has four dependents, his stipend assistance for a 10 week summer institute would be $1350. Jobs paying an average of $135 per week are not easily available to many teachers in the summer. Financial assistance is not given, however, as important as the self-improvement concept. About 5% of the applicants report that they were encouraged by their principals to apply.

B-5. "Have you ever talked with any other teachers who have attended such Programs? If so, what did they have to say about them?"

It was hypothesized that the experiences and opinions of teachers who have attended Programs may influence their colleagues in applying for NSF Programs. It is of interest to note here that the attitude of both groups which have not attended Programs - that is, those who have applied but have not been accepted, and those who have not applied - appears to reflect a more highly favorable attitude than that of the attending group. That is, the non-attending groups generally report that other teachers feel more favorably about the Programs than does the group which has attended. About 1/4 of the non-applicants have never talked with any other teachers, but it is of interest to note that only a small percentage of the non-applicants report less than a generally positive attitude from other teachers. Non-applicants could easily have used the excuse that the attitude of other teachers was less than all-out for the Programs; but they did not. Neither did they complain about a reaction of other teachers of a heavy workload or of subject matter difficulty. Twice as many teachers in the applicant groups complained about this as did in the non-applicant groups.

One conclusion which might be drawn here is that the teachers who are attending programs apparently exude a positive attitude about the Programs toward those who have not applied. This psychological phenomenon is similar to that of belonging to a fraternity. One is generally inclined to play up the positive values so that the uninitiated will have a good image of the fraternity, while in reality the situation might be somewhat less desirable than the in-group would like to make it out to be.

B-6. "We are interested in reasons why teachers might not apply. What ideas do you have about this?"

This question is strictly an opinion question and was inserted to allow the teacher an opportunity to express a pure opinion about the issue of non-application. However, in asking the question in this way - that is, talking about other teachers, it was hoped that the situation would be less threatening, and that the non-applicant group would be somewhat more frank about non-application.

The non-applicant frequently thinks that other teachers do not apply because of family obligations, because of inadequate background, because of a need to make money in some other way; or because attending would be a financial sacrifice. They sometimes indicate that other teachers might not apply because they are not informed, but this constitutes a relatively minor reason.

The applicant groups, however, see the non-applicants quite differently. From the viewpoint of their own high energy level, they see them as complacent or indifferent, as not seeking promotion. They also see them as lacking in background,

and to a degree significantly greater than the non-applicants do. They do not show as much sympathy with non-applicants for family reasons, but perceive the non-applicants as being in a tighter financial condition than do non-applicants themselves.

It is interesting to note again that the group which has attended Programs can give a great many more reasons why teachers might not apply than can either of the non-attending groups.

In summary, while the applicant groups show some sympathy for the reasons of other teachers not applying, they generally perceive this group as indifferent and lacking in drive as well as not well enough prepared in subject matter to apply for or attend Programs. While these perceptions may have much objective basis, it should also be remembered that high-drive, high-energy people see others in terms of themselves. What might objectively be a desire on the part of non-applicants to do something else with outside school time, is easily perceived differently from a high-energy, "devoted" group.

B-7. "In what ways might these Programs, as you now understand them, be modified to meet your particular needs better?"

The distribution of responses to this question is shown as Appendix B. In this question we were after specific changes which might be made so as to improve the Programs and meet the needs of the largest number of teachers.

The major suggestions for improvement had to do with the conduct of the Program itself. These constituted a great number of the suggestions, even for the group which had applied but not attended. The main suggestions have to do with placing more emphasis on methods of teaching, more emphasis on a practical application of the knowledge acquired. In addition, suggestions were made about adjusting the level of work. While this adjustment might occur both ways, adjusting it downward was more often suggested. This, incidentally, was frequently suggested by the non-applicant group, too. However, of equal importance to the non-applicant group was obtaining Programs which were more convenient - that is, carried out locally. Only a small percentage (about 5%) complained about the lack of explicit information in announcements. In short, while communications should be improved, say the teachers, this is far down on the list of suggested improvements. In fact, it is last. This would seem to indicate that present communications, while they might be improved to some degree, seem to be reasonably adequate at the present time.

The two applicant groups, of course, have a great many suggestions about the application and selection procedure. While these are of lesser importance to the non-applicant group, since they have never gone through the process, there is some evidence that the non-applicant group may recognize that the requirements for acceptance are quite high. This is a complaint of both applicant groups, too. The group which has not been accepted is somewhat more concerned about simplifying application procedures, evening out acceptances so that some teachers do not get accepted in three or four places and others in none. This would seem to be a reflection of their past application experience.

The attended group, having had the experience of a Program, is more concerned with evening out the backgrounds of the individuals who do attend than other aspects of the application and selection process. Both of the applicant groups express a need for more Programs.

Interestingly enough, only about 2% of the teachers suggested increased stipends as an improvement, and less than that suggested increased travel allowances.

C-1. "How do the parents and community feel toward education and science?"

In this question we are trying to determine the degree to which the different groups perceive the community, and whether this has any influence on application or non-application.

The non-applicant group seems to feel that the community and parents take stands either for or against science and education and that there is less of an indifferent or middle ground than the other two groups perceive. The positive attitude is somewhat less in the non-applicant group, and the out-and-out negative attitude is somewhat greater. The negative attitude in the non-applicant group is expressed by about a quarter of the teachers. However, more than 50% of the teachers in all groups report favorable community attitudes. It would seem logical that if a teacher perceives a somewhat negative attitude on the part of the parents and the community, that he would be less inclined to apply.

C-2. (Teachers)

In regard to the perception of the three groups toward other teachers' attitudes towards education and science, there appear to be no systematic differences at this time. The group which has attended Programs may tend to feel that the other teachers have a slightly more positive attitude.

C-3. (Students)

In regard to the way the three groups perceive students' attitudes, there is some evidence that the non-applicant group perceives the students' attitudes as less positive toward science and education. These attitudes, of course, may be a reflection of the true state of affairs, in which case the motivation not to apply can be more easily understood. It may also be, however, that this perception is a reflection of the teacher's own inability in the classroom which provokes a rather negative attitude on the part of the students. Several such explanations are obviously possible.

## VI. Summary Description of Non-Applicant Population

Let us take a look at the non-applicant population. It would appear that there are three major sub-groups in this population. The first of these might be termed an "extreme age group". The extreme age group consists of those teachers who are very young (of whom there is a considerable percentage in the non-applicant population), and those teachers who are quite old. The former are non-applicants primarily because they either lack the background, experience, or specific qualifications required by various programs; or because their background is too recent to need up-dating or enhancement. The data would suggest that they are not hindered from application by a disproportionate number of dependents, or a disproportionate lack of money. The older group is a non-applicant group because it either perceives itself as near retirement, as too old to make use of the information provided by Programs, or as discriminated against (and truthfully so) by many local institutes because of age.

The second major sub-group of the non-applicant population might be termed the "non-identification group". This group contains those who teach math and science only a small percentage of their working day, and thus have primary interests in other fields or other areas. The data suggest that there is a substantial correlation between percentage time teaching math and science and application for Programs. The greater the proportion of time spent teaching math and science, the greater the probability of application for Programs

It probably will be exceedingly difficult to do something effective about motivating these two groups to apply for Teacher Training Programs. Many members of the young age group are potential candidates for the future after having acquired more experience and background, but for the time being they do not look like a very promising group for getting applicants.

The remaining group of the three major sub-groups might be termed the "prime target group". In effect it seems that this group is the group which will have to supply most of the new applicants who may be enticed to apply for NSF Teacher Training Programs. However it was not possible (for this Preliminary Report) to sort this group out and subject it to the kind of concentrated, separate analysis it may deserve. It will be studied closely for the Final Report.

Non-applicants seemed more inclined to report an early desire to go into teaching. It would appear that their choice of vocation was often determined for them by the influence of other people, and that they more or less assumed that they would teach. This may be compared to applicant populations who did considerably more "knocking around" in trial and error before settling on teaching. In spite of this, however, the non-applicant group definitely exceeds the applicant group in proportion of teachers taking majors and degrees in non-science and math areas. Perhaps the tendency to report the early selection of teaching as an occupation was not one which was always implemented, at least until after educational training in other fields had been taken. It should be noted that applicant groups, having considered other vocational areas, may have developed deficiencies in preparation which they need to make up through attendance in Teacher Training Programs.

As compared to applicant groups, non-applicant groups seem to get relatively little satisfaction out of self-improvement via education. A substantially

larger proportion of the applicant group is currently working toward some degree, and a much larger percentage of this group has already attained some graduate degree. It had early been hypothesized that one of the adverse effects on application might be the interference of summer institute attendance with planned degree programs requiring residence at some particular summer graduate school. There appears to be no evidence to support this hypothesis.

Non-applicants report that satisfactions derived from teaching lie in working with students and helping students, expressed in vague, general terms. They emphasize more self-centered types of satisfactions such as personal growth. Their reasons for teaching appear to be less specific, more personal, more emotional, and more self-centered, as compared to the applicant group. The vague, general character of the satisfactions "in working with and helping students" expressed by the non-applicants leads to the possible conclusion that the external focus of these motivations is less real, and perhaps partially only a socially acceptable rationalization of the internal need to be admired, respected and appreciated by other people. Applicants tend to emphasize more outwardly directed satisfactions and motivations revolving around specific points such as imparting knowledge, teaching students chemistry, contributing to the advancement of the community, and other altruistic and professionally oriented motivations.

Further evidence regarding the orientation of applicant and non-applicant groups is found when the groups are ranked on their belief that subject matter is their strongest teaching point: applicants, rejectees, and then non-applicants. This again seems to confirm the subject matter orientation and emphasis of the successful applicant groups as opposed to interests in the interactions of the teaching process.

A second strong point cited by the applicant groups is effective teaching methodology. Here the non-applicant group perceives itself as less well prepared and less effective. This is not surprising, however, since the non-applicant group appears less concerned with (or aware of) the need for keeping up in subject matter areas. They focus their efforts on the classroom interaction. They are more self-satisfied and less aware of their subject matter deficiencies. NSF is just one of the activities that they slight; others include workshops, summer courses, activity in professional organizations, and so forth. This is further borne out by the fact that the non-applicant group tends to have somewhat less full certification, and somewhat less tenure, as compared to the AA group.

The NA group also exhibits a general lack of contentment with mathematics and sciences as a field, illustrated by the fact that about 10% fewer in the non-applicant group than in the applicant group want to remain in teaching in this area, and that the NA group has two-and-a-half times the number of teachers teaching other subjects than does the AA group.

The general lack of identification of non-applicants with the field is shown by the fact that their professional affiliations, the number of offices held, the number of journals read, the number of mathematics and science organizations belonged to, and the number of mathematics and science journals read, all tend to rank the three groups in the order of highest for the successful applicants, next for the applicant-rejectees, and lowest for the non-applicants.

Of course the applicant groups are better informed about NSF Programs than the non-applicant group, but even allowing for this differential there seems to be little difference among the three groups in perception of the purposes of NSF Programs. There is considerable difference, however, in the perception of reasons for non-application. The non-applicant group states that it has not applied primarily because of other obligations, with family heading the list, and desire to work for a degree following along (even though substantially fewer have or are taking a degree as compared to the applicant group). Psychologically, it is likely that such reasons represent, at least partially, intellectualization of a conflict between vocational and personal motives. This reasoning is supported in part by the evidence that interference with degree work seems to be questionable. Financial considerations are mentioned occasionally.

Another big group of reasons for non-application includes various statements as to why the Program is not relevant for an individual's needs. Inappropriate level, background inadequate, lack of experience, conflict in hours or time, or don't have the time are examples.

The non-applicants feel that other teachers do not apply for much the same reasons as the ones they mention for themselves - family obligations, inadequate background, to some extent uninformed, and financial. There is a sharp difference, however, in the reasons proposed by applicant groups as to why other teachers may not apply. Here complacency and indifference head the list, followed by lack of background and financial inability to attend. It is quite likely that the non-applicant groups are talking about themselves in a considerate measure in response to this question, and that they possess a degree of complacency and indifference which is not obvious to themselves. It is probably also likely that the applicant groups have overstated the case for complacency and indifference because of their high motivation and probable quickness to criticize.

Applicant groups gave primarily self-improvement reasons for applying. Although these reasons did not take the form of specific financial or professional advancement, this motive undoubtedly exists to some extent. Financial benefits of the summer's work or the stipend were, however, mentioned as an asset and a reason for application. In many cases it would be supposed that this money is the greatest amount that these people might earn over a similar period of time.

Non-attending groups reported that other teachers presented a favorable report of the Programs which they may have attended. The applicant group, however, did not feel that other teachers reported NSF Programs quite so favorably. This tends to be a sort of an in-group, out-group phenomenon in which those who have not attended are presented with the "everything is peaches and cream" story, whereas those who have attended are in the in-group, and the difficulties and problems are discussed more frankly.

Non-applicant teachers seem to see the community and students as somewhat more negative to science, mathematics, and education in general than do the other groups.

Non-applicants seem to be relatively content salary-wise, fitting in with their general air of complacency and lack of drive. However, they tend to have more student-related problems, such as discipline, slow learners, grouping and motivation problems, which fit in to some extent with their concern regarding the

interpersonal relationships, rather than the subject matter, involved in the teaching situation. On the other hand, the applicant groups tend to have some slight tendency to have problems with outsiders such as school boards, parents, other teachers, and so forth, which fits in in its turn with their emphasis on external as opposed to self-centered relationships.

A Conceptualization

It would appear to be useful to consider at this point some psychological conceptualizations which might fit and describe some of the behaviors and behavioral implications regarding the applicant group. First, in summary, it will be recalled that the non-applicant group (the "prime target" non-applicant group) tends to be a group which perceives itself as less well prepared subject-matter-wise, and less skillful in getting across the subject matter material. They perceive themselves as deriving their satisfactions in teaching from interactions with students which result in their own "personal growth" and which provide satisfactions to themselves, as opposed to interactions with students and others which provide satisfactions through the mechanism of seeing desirable results happen to the others. They tend to be more emotional and less reasoning about the teaching profession and teaching situation, and are substantially less well identified with the subject matter per se. Their concern is centered around the "self"; it is parochial rather than worldly. Further corroborative evidence includes their lack of professional identification, their lower level of training in mathematics and science, their apparent lack of interest in further education, their apparent lack of awareness as to the necessity and need for up-grading subject matter deficiency.

A further characteristic of these non-applicants appears to be their relatively low drive level. They tend to have fewer summer activities, fewer extra jobs, and to exceed the other groups in reporting that they want their summers free, they need a vacation, they are too busy for attendance at Teacher Training Programs.

Psychologically, the non-applicant appears to be a personality type which is dependent upon others for motivational impetus. He does not impose his needs on others, but rather accepts the pressures of his environment quite passively, preferring to gain his satisfactions from his interactions rather than aggressively setting out to "make the world his oyster". One of the supporting bits of evidence for this hypothesis is the relatively higher percentage of women among the non-applicants. The cultural role of women has always been that of passive interaction with the demands impinging upon them.

The NA group tends more often to report problems with students in the area of discipline, motivation, and so forth. For such a group, the competition and demands of Teacher Training Programs might well prove to be extremely uncomfortable. The major reason stated for their lack of application is other obligations, primarily family, and degree requirements. It has already been shown objectively that they are much less concerned and less active in obtaining additional education, and it is likely that the "obligations" are at least partially conveniences to make an uncomfortable situation (an Institute, Teacher Training Program attendance) unnecessary. Certainly it seems that the non-applicant has objectively no more to worry about than do the other groups, and to some extent perhaps fewer.

The psychological implications of the personality pattern which has been described to the non-applicant teacher are important. First, subject matter becomes primarily a vehicle through which the teacher contacts the student, and obtains the self-gratifications required by his personality pattern. Should any conflict of desires appear, it is the emotional satisfactions involved in teaching which will prevail over the intellectual aspects and the intellectual stimulation and satisfaction which may be gotten by other groups. This type of pattern will often result in discipline problems (because the teacher will not wish to lose the students' respect and affection by being hard on them), dislike of student criticism and grading, and poor presentation of subject matter to the extent that its presentation requires confidence in his own preparation and ability to put across the material.

Secondly, since the teacher perceives his own inadequacies, and relegates them to a second position in his vocational scheme of things, he is likely to be uncomfortable in a situation requiring subject matter competence. It is quite likely that attendance at Programs would threaten to reveal his inadequacies in subject matter preparation, and possibly his lack of confidence in his own basic ability to meet the requirements and standards of the Programs.

Virtually the opposite is true of the applicant, particularly the successful applicant. The evidence suggests that these individuals are subject matter oriented and find their satisfactions in the teaching situations, not so much from gratification at student contacts, student interactions, but from the intellectual stimulation and the satisfaction of imparting the subject matter and watching students assimilate the subject matter and become proficient in it. It is only natural that such teachers would find the prospect of Teacher Training Programs stimulating, and an intellectual challenge, and it is only natural (as they do) that such teachers would be interested in further intellectual self-improvement via education, workshops, courses, programs, etc. Having this interest they do not experience as much conflict between professional and family obligations, and they will be more secure personally in the classroom and study situation.

A further point should be made regarding what appears to be the energy level of the non-applicant group. Even were they so inclined, the evidence appears to suggest that this group is generally a low drive level, low motivation group, and thus will be content to proceed more or less at status quo rather than to develop a strong drive for self-improvement or change of any sort. It would be predicted that this group would resist, or at best drift, with radical changes.

A word might be said about the applicant-rejectee group. It appears that the pattern of this group is a high drive level at which there are many and various activities, without the channelized and specific interest in the subject matter that characterizes the AA group. Thus, this group sees Programs as a desirable thing, is willing to try, but failing to receive one is capable, apparently, of shaking his head, saying, "too bad", and trying again or letting it go without particular worry. Selection procedures have probably tended to separate this group from the AA group on ability as well.

It should also be mentioned that in terms of academic background and ability, the AR group tends to be very much like the NA group. This suggests that, to

the extent that such items form the basis for selection, even if the NA group could be induced to apply, they would probably be rejected. This could be detrimental to some people of this general personality pattern as it constitutes a rebuff to their efforts at self-improvement. Some interviewers have reported cases where their applications were rejected which resulted in a total disillusionment with Programs and further education in general.

Suggestions and Recommendations

The following suggestions are derived from the above analysis and are not evaluated in terms of practicability.

With respect to the prime target population, a fairly drastic change in the structure of NSF Programs will probably be necessary if they are to attract a substantial number of this group. As the persons in this area do not derive their satisfactions from the subject matter aspects of the teaching situation, and as NSF Programs are almost unanimously and uniformly presented with heavy subject matter emphasis, it would appear that the necessary Program changes lie in the direction of presenting Programs regarding teacher interactions and the teaching process and Programs emphasizing interactions and helping of students in the subject matter area. It is likely, however, that such Programs will not act to raise the level of competency of these teachers to a very great degree, particularly as they would seem to have some real subject matter deficiencies in addition to their general passive attitude and approach in the teaching of mathematics and science.

One point that comes to mind is a logical outgrowth of the general personality pattern of the NA group. Since the non-applicant is likely to be a low motivation, rather passive person dependent upon external motivations, he might be approachable via his supervisors, superintendents and principals. It should be noted that only about 5% of the applicants reported being encouraged by their principals to apply.

On the other hand, it must be remembered that in attending, the non-applicant is entering a situation which he perceives as almost certainly uncomfortable in terms of the competition and effort required. This sets up an avoidance-avoidance conflict in which he desires to avoid both the pressure of his supervisor to apply, and the rigors of attendance. In this situation it will be necessary to do something to ease the perceived difficulties of Program attendance if it is desired to get many of these people to apply.

Since such teachers may perceive themselves as being ill prepared, downgrading the level of the Programs in terms of the subject matter requirements might well attract some of these teachers, alleviating some of their personal doubts in applying. Programs cannot consistently skim off the best teachers and expect all teachers to apply. Further steps along this line might be the elimination of grading, and the reduction of standards to the point where there would not be a high degree of threat in either applying for or attending Teacher Training Programs. Non-graded Programs with product goals such as producing syllabi, lesson plans, etc., might be effective. To such a teacher it should be remembered, that just the mere fact of applying represents staking his emotional well being on being accepted, particularly in the case of teachers who come from small towns

or small schools where they are known by the rest of the faculty, the town and student body. (As Table 19 suggests, there are considerable differences in application from school type to school type.) In such situations the fact that a person has applied and been rejected quickly becomes known and constitutes a source of embarassment and disgrace to the teacher regardless of what the objective level of preparation required for acceptance may have been. Many of the teachers in the non-applicant group are likely to perceive the application situation this way, whether it is this way in truth or not. Perhaps some reduction of the detail, particularly the recommendation by superiors and the obtaining of transcripts, and so forth and so on, in connection with the application might be successful in reducing some of the trauma associated with application. In effect, if some of these people were able to make applications in secret without becoming the laughing stock of their school if they failed, perhaps more would try.

Other approaches in making the Programs more attractive to the non-applicant personality type might include various Programs designed especially for particular, more homogeneous groups, e.g., women, teachers from small towns (or smaller schools), etc. In this way the teachers will perceive themselves as associating with others of their own kind, rather than competing and "being out of their depth".

Recommendation regarding possible Program modifications is drawn from the fact that a high proportion of non-applicants is derived from the junior high school group (see Table 19). It is suggested that further study be undertaken to determine what the characteristics of the junior high school situation are which predisposes to non-application. This may possibly be accomplished by analysis of the school questionnaire information being coded and analyzed later in this study. Once this is determined, new Programs may be directed to the junior high school situation.

A hypothesis which might be offered is that junior high teachers see Programs as offering study much beyond their competencies and needs. Probably many Programs designated as suitable for junior high teachers are really not.

As indicated earlier, the very young and very old segments of the non-applicant population are probably lost to the Programs, although the very young may be considered as potential future applicants. Similarly, the non-identification groups are probably lost to the Programs unless efforts are made to develop a series of Programs designed especially for teachers of mathematics and science who spend only a small portion of their time teaching in this field. Such Programs would have to concentrate on locating teachers of this type who might enjoy becoming more informed and devoting a greater portion of their time to teaching math and science. Then special Programs could be designed to raise their level of competence. Even if this is done, it is likely that it will only be partially successful since such people have obviously committed themselves and have established their primary interest in other fields.

One possible approach to such a special series of Programs would make use of the techniques of programmed learning. Past work of the American Institute for Research has shown the generality and effectiveness of such techniques when based on careful research and development. Such techniques are made to order for the general personality pattern of the non-applicant. By allowing him to learn in private, as it were, the necessity of competitive drive and effort is obviated. In addition, such Programs might be set up for central NSF administration, thereby reducing the serious problems of variable selection standards, competitive application, and multiple application.

Points for Further Study

Within the context of the present study several factors should be studied carefully for the Final Report. The correlation of application vs. non-application and percentage time spent teaching mathematics and science will be run. This should confirm the current conclusion that this is one of the most important variables associated with non-application. Correlation of age and application - non-application will also be run, and partial correlations computed among these three variables.

It is anticipated that these studies will confirm the advisability of defining a "prime target group" of teachers who are non-applicants for reasons other than the above. It is felt that it is from such a group that most additional applicants will be gained and the concentrated analysis should focus on this group. A few variables will be run on the entire group for confirmation, but the results of the Preliminary Analysis suggest strongly that such concentration is desirable.

In the Final Analysis it will be possible to sub-sort by more categories and thus control for sex and school differences, both of which appear relatively important. It must be remembered, however, that only a limited number of such runs can be made due to the limitations inherent in the sample size.

The sample, however, has all the indications of being an excellent sample both of schools and teachers. The information derived from it may well present as complete a picture of our mathematics and science teachers as ever assembled.

One of the least controlled factors in the study is the matter of the selection criteria employed by various Programs. These, undoubtedly vary markedly, and thus must differentially affect not only the composition of the AA and AR groups, but reasons for application and non-application as well. No real definition of non-application is possible until this variable is controlled.

APPENDIX A

## INTERVIEW CLASSIFICATION SYSTEM

This Appendix presents the classification system used to analyze the interview summaries. The system was developed through content analysis of a sample of the protocols. Themes included in the system are those which emerged unbidden from the interview material, as interviewers were instructed not to ask questions about specific themes but simply to probe those which the interviewee spontaneously produced.

The coding system is given at the left followed by a description of the category and illustrative examples of subjects' responses.

## APPENDIX A

## INTERVIEW CLASSIFICATION SYSTEM

QUESTION A-1. How did you get into teaching? (two responses coded)

| Code | Category | Examples |
|---|---|---|
| 0 0 | No response | |
| | 1. Influence of other people | |
| 1 1 | a. Teachers | -- in paying attention to the ways of his own teachers. The good ones inspired him .... |
| | | -- a professor of chemistry ... talked to him from time to time about the values and importance of high school teaching .. |
| 1 2 | b. Family (includes support of own family) | -- my father had been a teacher - most significant in choosing teaching ... |
| | | -- was forced to change fields .., he was married and had a child which made it impossible to continue with his education |
| 1 3 | c. Friends | -- was working for a chemical company when a friend, a high school principal, got him interested in teaching .... |
| | | -- she went to teacher's college because many of her friends were going .. |
| 1 9 | d. Other | |
| | 2. Second or later choice | |
| 2 1 | a. Started working or majoring in another field | -- originally studied for the ministry, with a minor in mathematics .... |
| | | -- was a tool and die maker ... and found himself not looking forward with enthusiasm to a life of this work .... |

| Code | Category | Examples |
|---|---|---|
| 2 2 | b. Availability of job when needed | -- originally prepared for a career in business ... there were no positions available at the time of his graduation, so he decided to teach temporarily .... |
| 2 3 | c. Influence of other job | -- had some experience in teaching while in the Army .... |
| | | -- while in college she had the job of laboratory instructor and liked it so well she forgot he original plans .... |
| 2 4 | d. Corollary of other job, subject area | -- she doubts if she would have become a teacher if she had not become a nun .... |
| | | -- he was always interested in becoming a football coach and teaching was the best way for him to realize this ambition .... |
| 2 5 | e. Fortuitous event, opportunity, circumstance | -- during his junior year in college, he was asked whether he was interested in substituting for a sick science teacher in a nearby high school ... he found that his interest in teaching had changed .... |
| 2 6 | f. Easier or more practical financially to get teaching degree | -- he had not the money to go into medical training so went into teaching ... |
| | | -- since it was easier to get a teachers certificate, she changed her major (medicine) and her occupational goal so that she could get married and contribute financially .... |
| 2 9 | g. Other | |
| 3 0 | 3. Early desire (in high school or before) | -- she always loved the idea of teaching. Wanted to be around teaching and children all her life .... |
| 4 0 | 4. Interest in subject matter | -- started preparing for a career in forestry ... areas of biology and botany had always been an interesting field .... |

| Code | Category | Examples |
|---|---|---|
| 5 0 5. | Racial reasons | -- "The opportunities for members of my race have always been relatively good in teaching as compared with other types of work." |
| 6 0 6. | Vocational counseling | -- after World War II he was tested and counseled by the VA with the indication that he would make a good high school science teacher .... |
| 9 0 9. | Other | |

QUESTION A-2. Did you ever consider any other occupation? (one response coded)

| Code | Category | Examples |
|---|---|---|
| 0 | No response | |
| 1 | 1. No | -- she never really thought of or considered other fields of endeavor .... |
| 2 | 2. Yes; planned for (to the extent of taking courses, etc.) or started another career | -- she was studying piano in a university school of music .... |
| | | -- received a B.S. in chemistry and worked for 4½ years in industry .... |
| 3 | 3. Yes; considered another career but did not begin | -- wanted to study medicine; took academic course in high school. Then ... became discouraged because of economics, racial situation; teaching was an outlet for science .... |
| 9 | 9. Other | |

QUESTION A-3. What do you like about teaching? (three responses coded)

| Code | Category | Examples |
|---|---|---|
| 0 0 0. | No response | |
| 1. | Student related satisfactions | |
| 1 1 | a. Contact with students; being with them | -- he likes the association with his youthful students .... |
| 1 2 | b. Helping students with personal problems | -- she likes to help influence young people. "You can do so much for them even when families break down." |
| 1 3 | c. Seeing students develop, improve, progress, become successful adults | -- seeing the successes his pupils have that are attributable to his efforts ... |
| | | -- he especially enjoys the visits paid him by former students ... |
| 1 4 | d. Seeing students learn, gain knowledge, like and do well in subject matter | -- he enjoys "putting the material before the student". To him this appeared to mean watching the students react to and absorb new ideas ... |
| 1 5 | e. Working with people; children | -- he enjoys working with children and appears to be sensitive to the learning by each pupil .... |
| 1 9 | f. Other | |
| 2. | Working conditions | |
| 2 1 | a. Good hours, pleasant atmosphere | -- he likes teaching because the hours are good .... |
| 2 2 | b. Summer vacations | -- the summer vacations which he can devote to study .... |
| 2 3 | c. Financial reward (salary) | -- and the salary is very good .... |
| 2 9 | d. Other | |

| Code | Category | Examples |
|---|---|---|
| | 3. Other psychological satisfactions | |
| 3 1 | a. Variety, no routine, not boring | -- it provided an infinite amount of variety and she was not chained to any set routine .... |
| 3 2 | b. Intellectual stimulation | -- enjoys working with math all the time and especially relishes the discussion of this discipline .... |
| | | -- finds the academic world refreshing ... he enjoys the freedom of thought .... |
| 3 3 | c. Imparting knowledge | -- the excitement that could be fostered in providing information and new insights .... |
| 3 4 | d. Contributing to society | -- feels he is doing something really important for the country and the church.. |
| 3 5 | e. Personal growth and satisfaction | -- "I love teaching" because it gives her opportunity to grow .... |
| 3 9 | f. Other | |
| | 4. Peer-centered satisfactions | |
| 4 1 | a. Professional associations: teachers; organizations | -- chief satisfaction in teaching is the class of people with whom he associates .... |
| 4 2 | b. Assisting other teachers | -- assisting other teachers to do a better job .... |
| 4 9 | c. Other | |
| 5 0 | 5. Likes nothing about teaching | |
| 9 0 | 9. Other | |

QUESTION A-4. What do you dislike about teaching? (three responses coded)

| Code | Category | Examples |
|---|---|---|
| 0 0 | No response | |
| | 1. Working conditions | |
| 1 1 | a. Long hours; heavy teaching load; excessive responsibilities; inadequate time, etc. | -- she dislikes taking up collections, scheduling such auxiliary matters as making appointments for pictures for the school annual .... |
| 1 2 | b. Physical facilities limitations (over-crowding, etc.) | -- the facilities which he has to teach with are the main disadvantages .... |
| 1 3 | c. Janitorial tasks | -- the thing she likes least about teaching is the time consumed by janitorial tasks; cleaning laboratories and storage closets. She thinks it is wasteful .... |
| 1 4 | d. Lack of fringe benefits | -- does not consider that tenure is as good as it could be in this state .... |
| 1 5 | e. Low salary | -- she has no complaints about teaching except salary .... |
| 1 9 | f. Other | |
| | 2. Student related problems | |
| 2 1 | a. Discipline problems | -- he doesn't like to have to discipline students by punishing them .... |
| 2 2 | b. Problems with slow learners; repeaters | -- he does occasionally feel somewhat frustrated at the apparent slow rate of learning on the part of his students .... |
| 2 3 | c. Lack of student appreciation | -- the lack of student appreciation .... |
| 2 4 | d. No time for work with individuals | -- the inability to provide as much individual attention was another area that she disliked about teaching .... |

| Code | Category | Examples |
|---|---|---|
| 2 5 | e. Heterogeneous grouping/ social promotion | -- he dislikes most the (1) automatic social promotion that is followed in most schools today and (2) the wide ranges of abilities he finds in his class groups ... |
| 2 6 | f. Lack of student motivation (lazy) | -- disruption of the classroom by the pupils with no incentive .... |
| 2 9 | g. Other | |
| | 3. Paper work | |
| 3 1 | a. Keeping records, etc.; clerical tasks | -- areas that he disliked included many clerical jobs such as attendance register, completing various forms, and cumulative student personnel folders .... |
| 3 2 | b. Grading | -- she dislikes the drudgery of grading papers. Indicated this is necessary if you want to really know the students ... |
| 3 9 | c. Other | |
| | 4. Problems related to other people | |
| 4 1 | a. School board | -- school boards "sometimes don't recognize the true value of education"... "for example, the emphasis on athletics" |
| 4 2 | b. Parents | -- he dislikes the town people and believes they are unfriendly ... |
| 4 3 | c. Supervisors | -- no great dislike of the high school teaching profession except when he meets some resistance from supervisors on the design of his physics and math curriculum . |
| 4 4 | d. Peers | -- the unprofessional attitude of some teachers .... |
| | | -- the negative attitudes of her colleagues toward students .... |

| Code | Category | Examples |
|---|---|---|
| 4 9 | e. Other (includes "administration" and "general public") | -- his chief gripe about teaching is degree people who write books without ever having spent a day in actual teaching experience of their own .... |
| | 5. Other dissatisfactions | |
| 5 1 | a. Teaching is routine | -- the routine that develops many times |
| 5 2 | b. Teaching a particular subject or section | -- also feels that his resentment at having to teach general math causes him to be slipshod .... |
| 5 3 | c. Low status | -- he is distressed by what he considers to be the inferior position of teachers in the community; "teaching does not have the respect deserved in view of the responsibility." .... |
| 5 4 | d. Lack of academic freedom | -- he dislikes the restrictions put on him by the administration. For example, he isn't free to teach what he wants to about sex .... |
| 6 0 6. | Nothing | -- he could think of no particular irritation which characterized his work .. |
| 9 0 9. | Other | |

QUESTION A-5. What are your strong points as a teacher? (three responses coded)

| Code | Category | Examples |
|---|---|---|
| 0 0 | No response | |
| | 1. Personal level of student to teacher relationship | |
| 1 1 | a. Friendly; liked by students | -- his strong points are: (1) students like him .... |
| 1 2 | b. Gets along well with students | -- he lists as his strong points his ability to get along with students and peers .....<br><br>-- he gets along extremely well with the young people .... |
| 1 3 | c. Has students' respect; confidence; trust | -- he has the kind of personality which appeals to young people. He says that he and the students can have good times at work, without his losing their respect or his command over them .... |
| 1 9 | d. Other | |
| | 2. Personal level of teacher to student relationship | |
| 2 1 | a. Get students to do work; instills enthusiasm, interest, responsibility | -- he believes he is able to motivate the students to greater achievement ....<br><br>-- the ability to challenge his students and make them work, he feels, are his greatest assets as a teacher ....<br><br>-- she feels she is able to obtain a large amount of participation in her classes .... |
| 2 2 | b. Patient with students | -- he considers his patience, especially with the "poor" students, as his strong point ....<br><br>-- I have a gentle firmness with students. I am patient with anyone who is trying .... |

| Code | Category | Examples |
|---|---|---|
| 2 3 | c. Understands students | -- strong points were in the area of personality, feeling that she was especially gifted in being able to understand children and what they needed .... |
| 2 4 | d. Has personal interest in students | -- she does a lot of individual work with students .... |
| | | -- and his real interest in each student .... |
| | | -- he cited his willingness to take time for student problems, academic or personal, during and after school hours ... |
| 2 5 | e. Respects students, has confidence in them | -- and considerateness of the individual student |
| 2 9 | f. Other | |
| | 3. Subject matter strengths | |
| 3 1 | a. Well-prepared in subject matter | -- considers his knowledge of his subject matter field ... (as a strong point) .... |
| | | -- she feels her strong point is a high level of competence in the subject matter. |
| | | -- she feels that her strong points are very good training in her field .... |
| 3 2 | b. Keeps up with subject matter | -- her strong point as a teacher is her continued reading in the field of science. |
| 3 3 | c. Interest and enthusiasm for subject matter | -- his enthusiasm for general mathematics .... |
| 3 9 | d. Other | |

| Code | Category | Examples |
|---|---|---|
| | 4. Communications abilities | |
| 4 1 | a. Good at self-expression; able to get work across, impart knowledge orally | -- he feels that he can explain matters so that youngsters can understand them ...<br><br>-- good timing in presenting points -- that is, saying things at the right time ..<br><br>-- his ability to communicate with high school students .... |
| 4 2 | b. Uses effective teaching methods (communicates with students "on their level," uses effective demonstration devices, uses examples, etc.) | -- techniques of presentation ....<br><br>-- Mr. X expanded upon his strong point by saying that students are inclined to treat laboratory or demonstration periods as times to "goof off" but that this can be overcome if the teacher can tell them how the demonstrations have a logical purpose, a definite form of proof, and a meaning which is one they can recognize .. |
| 4 9 | c. Other | |
| 5 0 | 5. Has effective discipline | -- and his classroom discipline as his strong points ....<br><br>-- she has very good discipline ... Good discipline requires a big heart with fairness and firm hand ....<br><br>-- and class discipline ... "I am a consistent teacher." .... |
| | 6. Experience and interest | |
| 6 1 | a. Has interest in school; enjoys school | -- His greatest strength he thinks is his interest in the total school program and his support of it .... he believes (his students) respond to him well because of it .... |
| 6 2 | b. Experienced in teaching | -- she has been teaching for 20 years .. she does not point to any particular skill as her strong point but feels that she lives her life in the classroom .... |

| Code | Category | Examples |
|---|---|---|
| 6 3 | c. Experience in other jobs, disciplines (broad background of varied experience) | -- broad background academically ... "my ability to correlate science with other subjects" .... |
| | | -- previous experience in various disciplines appears his strongest point .... |
| | | -- the fact that he works in mathematics locally for Western Electric during most of the summers helps him to give reality and practical application to his teaching .... |
| 6 9 | d. Other | |
| 7 0 7. | Planning and organization | -- she considered her strong points as a teacher to be the fact that she was well prepared and confident of her matter in the classroom .... |
| 8 0 8. | No strong points; generally good teacher | -- he thinks he does a good job as a teacher and has been commended by several principals .... |
| 9 0 9. | Other | |
| 9 1 | a. Finds it very difficult to think of and/or express strength | |

QUESTION A-6. What are your weaker points? In what ways do you think your teaching might be improved? (three responses coded)

| Code | Category | Examples |
|---|---|---|
| 0 0 | No response | |
| | 1. Teacher-student relationships | |
| 1 1 | a. Motivating students | -- he thinks he may be weak in motivating students to work harder .... |
| 1 2 | b. Expecting too much of students | -- I cover too much too quickly. (They tell me.) |
| | | -- she expects too much of her students. |
| | | -- his weaker points include being too demanding and aiming too high. He feels he needs to know better how to maximize the learning by the below average students. |
| 1 3 | c. Lack of patience (related to subject-matter learning) | -- she has little patience with children who have ability but who waste it. |
| | | -- his chief weakness is his lack of patience and understanding with backward students .... |
| 1 4 | e. Difficulty in handling individual and group ability differences | -- the weaker points of her teaching involve personal problems of her students. She expressed a need for more experience with children and better understanding of counseling techniques .... |
| | | -- she finds it difficult to teach the slow children .... |
| | | -- seeming inability to work with several groups in the classroom .... |
| | | -- he feels that he teaches the bright students well, and that one of the more irritating matters in high school teaching is the wide spread of ability within a single class .... |
| | | -- the wide ranges of abilities he finds in his heterogeneous class groups. He is critical also of the ranges of abilities found even in homogeneously grouped classes. |

| Code | Category | Examples |
|---|---|---|
| 1 6 | f. Too "easy-going" | -- he also said that he was probably too lenient with his children .... |
| 1 9 | g. Other | |
| | 2. Subject matter | |
| 2 1 | a. Subject matter deficiency | -- a better background in chemistry, and physics .... |
| | | --her weak points are her lack of knowledge of subject matter and lack of organization .... |
| | | -- he said his chief weak points were that he had never taken any physics nor had he taken any mathematics. He had only taken three courses in chemistry ... (he was a teacher of biology, physical geography and physical science, freshman).. |
| 2 2 | b. Keeping up to date on new developments | --he feels he is behind somewhat in his science courses and could improve his work by going back to school .... |
| | | -- he feels his greatest weakness is lack of knowledge of the "new" mathematics. |
| 2 3 | c. Other | |
| | 3. Communicating | |
| 3 | a. Speaking ability; can't express self clearly; poor vocabulary; speech defect | -- he feels that he is not easy in conversation; that he does not always get his explanations sufficiently logically organized .... |
| | | -- his greates drawback in teaching is his speech and a lack of some of the fundamentals of English .... |

| Code | Category | Examples |
|---|---|---|
| 3 2 | b. Instructional methods -- finds it difficult to communicate at student's level, explain, etc. | -- his tendency to lecture, procrastinating in demonstrating -- perhaps too little demonstration to put over the points; of the lesson ....<br><br>-- he sees his weak points as lack of teaching techniques for the lower levels of math .....<br><br>-- at times he talks over the students' heads ....<br><br>-- he finds that he experiences some trouble in explaining materials that are "easy" for him ....<br><br>-- he tends to present material in too "abstract" a manner and does not consider the limited experiences of the students ..<br><br>-- he is inclined to be "windy" and often gets off the subject .... |
| 3 9 | c. Other | |
| 4. | Organizing | |
| 4 1 | a. Inadequate time or misallocation of time | -- would not discuss his weaker points but tended to talk about other areas of dissatisfaction such as lack of time for preparation ....<br><br>-- he doesn't spend enough time in preparation for his classes, and sometimes his conscience bothers him about that .... |
| 4 2 | b. Difficulty planning, preparing class material | -- she feels that her shortcomings are in the area of outlining projects, the acquisition of teaching aids, and the checking of references ....<br><br>-- he feels his teaching could be improved by better preparation for class on his part ....<br><br>-- he feels that lack of planning on his own part may be the reason for the threat of poor discipline .... |

| Code | Category | Examples |
|---|---|---|
| 4 3 | c. Lack of order in physical surroundings -- "housekeeping problems" | -- her weakness is lack of order in the physical surroundings of her classroom and labs. The janitor doesn't clean properly, nor does she ... |
| 4 9 | d. Other | |
| 5. | Personal shortcomings | |
| 5 1 | a. Inexperience | -- inexperience and lacking knowledge of what is expected in senior high courses. |
| | | -- his major weakness is his lack of experience in teaching .... |
| 5 2 | b. Lack of confidence | -- sometimes she doesn't convey confidence to her students .... |
| 5 3 | c. Hot temper | -- he stated that he does have one real weak point and that is a very hot temper .... |
| 5 4 | d. Not extroverted enough | -- weak points were expressed in personality; not as forward or as extrovertish as possibly a teacher should be .. |
| 5 9 | e. Other | |
| 6 0 6. | The "Martyr Complex" | -- "giving in" to such tasks as excessive paper marking, collecting money for drives, taking attendance, and so forth constitute what he calls his greatest weakness as a teacher .... |
| | | -- she felt she was too conscientious. People have always told her she was too serious about her work. "Maybe I have always worried too much about children." |
| 7 0 7. | None | -- he could not think of any specific way in which his teaching might be improved. |
| 9 0 9. | Other | -- he feels that he lacks "sufficient imagination that a science teacher should have" .... |

QUESTION A-7. What do you expect to be doing five or ten years from now? (one response coded)

| Code | Category | Examples |
|---|---|---|
| 0 0 | No response | |
| | 1. Stay in education | |
| 1 1 | a. Teach something else including coaching, guidance, another subject | -- he believes that he will remain in teaching and will return to social studies |
| 1 2 | b. Same thing as now -- teach math or science | -- he expects to stay in teaching and not enter administrative work .... |
| | | -- she expects to continue to teach school until she is retired .... |
| | | -- he will more than likely continue in the teaching field for the next ten years. |
| | | -- he expects to make a career of teaching .... |
| | | -- he feels that he will be doing similar work ten years from now .... |
| 1 3 | c. Teach but at a higher level | -- I hope to ... eventually go into college work and leave sciences .... |
| | | -- however, he would like to ... teach at the college level .... |
| | | -- plans to get into college teaching .... |
| | | -- he has hopes of teaching at the junior college level instead of the high school level .... |
| 1 4 | d. Become supervisor | -- try to work his way up to a school superintendent .... |
| | | -- he has the hope that he may someday become the department head .... |

| Code | Category | Examples |
|---|---|---|
| 1 5 | e. Go into administration | -- he plans to become an administrator in the school system ....<br><br>-- he is hopeful that in a few years will be promoted into administrative work . |
| 1 6 | f. Undecided between teaching something else and administration | -- he would like to become athletic director in a moderately large high school ... or, he would like to go into the field of administration .... |
| 1 7 | g. Undecided between continuing in math and/ or science teaching and administration | -- he hopes to remain in classroom teaching, but if at any time he finds his salary insufficient he might be forced to move into administration or counseling.... |
| 1 8 | h. Undecided between teaching math or science and something else | -- he is not sure whether it will be in one field or another ... |
| 1 9 | i. Other | |
| | 2. Get out of education | |
| 2 1 | a. Get job other than teaching | -- he intends to teach mathematics only until the school completes its normal complement of math teachers. He indicated that he is now working towards his PhD in guidance counseling ....<br><br>-- in five years he intends to be operating a science equipment rental business for small high schools ....<br><br>-- at present he is planning ... to go into guidance and counseling, leaving the classroom ....<br><br>-- he hopes ..., to do industrial research in the west ....<br><br>-- his real interest ... is in guidance and counseling ... and he plans to obtain a position in that work in the near future.<br><br>-- within the next five or ten years, Mr. X probably will be in the insurance business full time .... |

| Code | Category | Examples |
|---|---|---|
| 2 2 | b. Get married, raise family | -- she expects to be married in June and give up teaching while she raises a family ..... |
| | | -- she plans to have a family and become "a housewife in a few years" .... |
| | | -- in five or ten years she says she will probably be rearing a family, but expects eventually to return to teaching.. |
| 2 3 | c. Retire | -- in the near future this teacher will be retiring ... |
| | | -- he expects to teach for only one more year; at that time he will be eligible for retirement .... |
| | | -- he expects to retire in 5 to 10 years .... |
| 2 4 | d. Hints that other job would be considered | -- he feels that he will be teaching ten years from now but has considered some job with the Civil Service .... |
| | | -- he feels that he will be teaching 5 or 10 years from now but does not know at what level ..: has thought about Civil Service work but is unsure because Army will soon draft him :... |
| 2 9 | e. Other | |
| 3. | Undecided | |
| 3 1 | a. Predisposition to stay in | -- future plans do not depend on her because she is at the service of the Order. However, she would like to continue teaching .... |
| | | -- anticipates that in five or ten years he will still be in the teaching field, although he thinks he might go into administration. "It might be hard to turn down a good offer in business or industry." However, he thinks that because of his age he is not likely to get such an offer .... |

| Code | Category | Examples |
|---|---|---|
| 3 2 | b. Predisposition to get out | -- uncertain about his future. If he recovers his full health he may go into industrial engineering which will pay him much more than teaching pays .... |
| 9 0 9. | Other | |

QUESTION A-8. How do you expect to do this? (one response coded)

| Code | Category | Examples |
|---|---|---|
| 0 | No response and/or not applicable | |
| 1 | 1. Get advanced degree | -- feels that he will go on for M.A. and possibly PhD ....<br><br>-- he plans to continue his schooling and obtain a masters degree in mathematics.<br><br>-- I hope to continue toward a PhD in philosophy, eventually go into college work ....<br><br>-- he would like to obtain his masters degree in biology ... to attain this objective, he plans to take summer school courses ...<br><br>-- he is working on a degree in school administration .... |
| 2 | 2. Attend institutes; keep studying | -- he sees few methods of improving himself except indicates that he would like to take another NSF Institute training period ...<br><br>-- has taken three NSF institutes at Illinois Wesleyan ... went to the University of Illinois to take certain education courses that he felt would be helpful to him ... has also taken courses at University of Illinois during the winter .... |
| 3 | 3. Improve own school | -- he talks in terms of improving and strengthening the work of the department.. |
| 4 | 4. Through seniority | -- he has the hope that he may some day become the department head. He will always teach and likes it here ....<br><br>-- or stay on as a teacher and try to work his way up to a school superintendent. |
| 5 | 5. Combination of any above | |
| 9 | 9. Other | |

QUESTION A-8a: Do you find it necessary to devote much time to keeping up with developments in your field? (two responses coded)

| Code | Category | Examples |
|---|---|---|
| 0 0 | No response | |
| 1 0 1. | No need -- without concern, or with excuses | -- he does not find it necessary to devote much time to keeping up ....<br><br>-- he does not find it necessary to devote a lot of time to keeping up with the field at the present time .... |
| 2 0 2. | Need without action -- expression of concern -- "finds it difficult" | -- he finds himself swamped with administrative problems which are quite time-consuming, making it hard for him to keep up ....<br><br>-- he feels a need for more time to study new developments in the biology field ....<br><br>-- he feels he could do a better job if he would devote more time to reading various publications ....<br><br>-- feels that he does not have much free time in which to keep up with his field. He reads science periodicals whenever he finds time .... |
| 3. | Specific actions | |
| 3 1 | a. Takes courses, lectures, workshops, seminars | -- occasionally he visits a nearby university to listen to public science lectures ....<br><br>-- he finds that it takes a good bit of time keeping up ... that he was benefitted considerably by a county sponsored course in teaching techniques ....<br><br>-- every three to five years attends some type of summer program in order to up-date his education .... |

| Code | Category | Examples |
|---|---|---|
| 3 2 | b. Reads periodicals, books, journals | -- the reading of all pertinent journals, the study of reference materials in general ..... |
| | | -- she buys new science publications with help from a university professor in making selections .... |
| | | -- he reads science and math periodicals to which he subscribes .... |
| | | -- on Saturdays and weekends he reviews new tests, reads the Chemical Journal of Education .... |
| 3 3 | c. Spends time on teaching methods | -- spends a fair amount of time reading journal reports about new methods .... |
| 3 4 | d. Active in professional organizations | -- he is a member of the National Council of Teachers of Mathematics .... |
| | | -- he is a member of AIBS and NSTA .... |
| | | -- he participates in a math teachers organization where college and university faculty members present lectures in the area of their specialty .... |
| | | -- he keeps up by his membership in the American Chemical Society, the National Science Teachers Association .... |
| 3 9 | e. Other actions : | |
| 9 0 9 | Other | -- she keeps in close contact with the science department of the local university |
| | | -- considerable time, according to him, was spent on keeping up with developments in the field, approximately five hours per week .... |
| | | -- he finds that it takes a good bit of time keeping up with new ideas in the field .... |
| | | -- various department meetings assisted his knowledge of up to date material ..... |

QUESTION B-1. Are you familiar with the NSF Teacher Training Programs? (one response coded)

| Code | Category | Examples |
|---|---|---|
| 0 0. | No response | |
| 1 0 1. | Has attended -- familiarity assumed | -- Mr. X. has received NSF program brochures, and institute announcements from colleges. As stated above, he is now in an in-service program .... |
| | | -- he felt that the University of D. institute he had taken two years ago was excellent .... |
| | | -- Mrs. A has attended two NSF institutes .... |
| | | -- the interviewee was well acquainted with NSF programs since he had been in two summer institutes and also attended an in-service course .... |
| | 2. Has not attended; degree of familiarity: | |
| 2 1 | a. Familiar; informed | -- indicated she was familiar with the NSF programs ... last year, she said, she applied for the summer science programs .... |
| | | -- Mr. X is very familiar with the NSF programs and in fact, has applied twice for summer institutes .... |
| 2 2 | b. Partially informed; some understanding | -- Mr. R has heard of the NSF teacher-training programs .... |
| | | -- Mr. M is reasonably familiar with the NSF programs, receiving the literature each year .... |
| | | -- Mr. G is quite familiar with the NSF Teacher Training Programs. He needed very little briefing on them .... |

| Code | Category | Examples |
|---|---|---|
| 2 3 | c. Not familiar | -- Mr. J had seen the circulars issued by cooperating schools ... but did not pretend to know much about them .... |
| | | -- S indicates that he is not too familiar with the NSF program .... |
| | | -- he is not well acquainted with the NSF programs; he has heard a little of it from a teacher .... |
| 9 0 9. | Other | |

QUESTION B-2. How did you first hear about them? (one response coded)

| Code | Category | Examples |
|---|---|---|
| 0 | No response | |
| 1 | 1. Other teachers (as peers) | -- he has heard a little of it from a teacher in this school who participated ...<br><br>-- having heard of them through other teachers ... |
| 2 | 2. Principal; supervisor | -- the little information he had obtained came through the principal's office ...<br><br>-- received various announcements of institutes through the principal and other teachers ....<br><br>-- received some information about the institute program through the school principal ....<br><br>-- he first became interested in NSF through the administration of his school . |
| 3 | 3. Professional journals, periodicals, newspapers, magazines | -- he has read about them in magazines, newspapers, etc. ....<br><br>-- he first heard of the institutes in the American Chemical Society journal ....<br><br>-- she believed she first read about the NSF programs in "The Mathematics Teacher" .... |
| 4 | 4. NSF brochures, "circulars," local university material | -- originally, heard about the program through some NSF literature he received in the mail ....<br><br>-- he probably first heard about them in 1957, through circulars sent to him or to the school ....<br><br>-- having heard of them through announcements sent out by nearby colleges and universities ....<br><br>-- she learned of them through the local university .... |

| Code | Category | Examples |
|---|---|---|
| 5 | 5. In college | -- heard about the institutes in mathematics from a fellow student at college .... |
| | | -- he first heard about such programs from a college professor during his senior year .... |
| | | -- at University of S campus -- students were talking about it .... |
| 6 | 6. At other institutes | -- he heard about them while attending another type of institute .... |
| 7 | 7. Professional meetings | -- through the New Jersey Catholic Round-table of Scientists at whose meetings she met many speakers who discussed NSF programs .... |
| 8 | 8. Literature and other teachers | -- she first heard of the program from brochures and other teachers who had attended .... |
| | | -- through brochures, his daughter and other teachers having attended various institutes .... |
| | | -- having heard other teachers discuss them and also having seen some of the literature .... |
| 9 | 9. Other | -- the little information which he has obtained about the NSF program came from some of the administrative officials at East T State College .... |
| | | -- he heard about the NSF programs through the National Council of Teachers of Mathematics and from the colleges operating institutes .... |

QUESTION B-3. As you understand them, what do you see as the basic purposes and values of the Programs? (two responses coded)

| Code | Category | Examples |
|---|---|---|
| 0 | No response | |
| 1 | 1. Up-dating subject matter knowledge | -- to foster an improvement in the background of teachers, keeping them abreast in subject matter .... |
| | | -- to help teachers to become better informed in their subject matter field ... |
| | | -- the purpose of the Institutes is to learn new advances in chemistry .... |
| | | -- the chance to become acquainted with the new ideas in one's field .... |
| | | -- a means of encouraging knowledge of subject matter and keeping up on the part of the teachers .... |
| | | -- to keep the instructor abreast of changing subject matter .... |
| 2 | 2. Broadening subject matter background, improving inadequate backgrounds, review, etc. (Distinguished from (1) by the lack of the idea of "keeping up to date") | -- basic aims and purposes ... to be strengthening of teachers in their subject matter fields, which will raise the quality of teaching .... |
| | | -- basic purposes and values of the program included a better background .... |
| | | -- to increase teachers' knowledge of science .... |
| | | -- to improve teachers' knowledge and ability in science and mathematics .... |
| | | -- the purpose was to increase subject matter competence .... |
| | | -- weak backgrounds in the various areas could be strengthened through the programs .... |
| | | -- to build up the teacher's knowledge of subject matter .... |

| Code | Category | Examples |
|---|---|---|
| 3 | 3. Improvement of teaching techniques, skills, methodology in general | -- he sees it as a way of improving classroom teaching, also .... |
| | | -- to "improve the ability to teach" .. |
| | | -- to help teachers to make subject matter more meaningful to the students ... |
| 4 | 4. The opportunity to work for an advanced degree | -- and providing the opportunity of work toward advanced degrees .... |
| | | -- the means to work for an advanced degree .... |
| | | -- to improve the calibre of teaching through encouraging work toward graduate degrees .... |
| 5 | 5. Psychological and/or social value to participants | -- teacher has added knowledge, prestige, etc. .... |
| | | -- also of benefit is the sharing of ideas with other teachers .... |
| | | -- and exchange of ideas with other teachers were the goals .... |
| | | -- the opportunity to talk with others engaging in the mathematics and science professions proves to be most stimulating. |
| | | -- and also keeping teachers in contact with each other .... |
| 6 | 6. Financial aid to teachers | -- they are of value in providing necessary funds for teachers who would otherwise be unable to go back to school.. |
| | | -- by applying, a teacher can become better qualified to teach and raise his salary .... |

| Code | Category | Examples |
|---|---|---|
| 7 | 7. Student improvement and development | -- it affects the students .... |
| | | -- that is especially important at the present time; scientists are more in demand. Good secondary school instruction in science and mathematics is important; many students make their occupational decisions because of the teachers or teaching they had in high school .... |
| | | -- to get teachers to interest more students to enter science fields .... |
| | | -- to "make stronger students by making stronger teachers" .... |
| 8 | 8. Generalization and abstractions not directed either to subject matter, methodological, teacher or student improvement specifically | -- to make the best possible teachers available .... |
| | | -- they will help our country to play a more important role in the world and will place the U.S. in a more favorable position in comparison with Russia .... |
| | | -- attempts to upgrade the math and science instructional programs .... |
| | | -- to improve the schools ... and also to provide better teachers .... |
| | | -- their purpose seems to be to improve the quality of teachers in science and math .... |
| | | -- to improve the mathematics teachers so they can and will do better jobs in teaching this subject .... |
| | | -- were intended to "broaden their scope" .... |
| 9 | 9. Other (specific) | -- to encourage those with ability and interest to further their study in these fields .... |
| | | -- "producing science teachers that are better qualified and helping to supply an adequate number of such teachers" .... |

QUESTION B-4a. Why did you decide to apply? (three responses coded)

| Code | Category | Examples |
|---|---|---|
| | APPLICANTS (Crit. Gp. Code 0 or 2) | |
| 0 0 | No response | |
| | I. Improvement concepts | |
| 1 1 | a. Keep up-to-date in field | -- he thinks the purposes of the programs are to up-grade mathematics and science teachers and to bring them up to date in these fields. He applied for an institute to achieve these objectives .... |
| | | -- he applied for the NSF programs as a means of keeping up with what is new in mathematics .... |
| | | -- bringing older teachers up to date, supplementing and enriching present backgrounds, ... his reasons for applying went along with his understanding of the purpose and value of such a program .... |
| 1 2 | b. Financial and/or professional advancement | -- another purpose was to help teachers advance themselves ... she was very happy that she was asked to attend the Institute. |
| | | -- primarily Mr. G thinks of the programs as a help to professional advancement .... |
| 1 3 | c. Increase subject matter background and competence | -- supplementing and enriching present backgrounds .... |
| | | -- to foster an improvement in the background of teachers, keeping them abreast in subject matter .... |
| | | -- to improve the background of teachers in the sciences they teach ... he says he knows teachers in this field whose background in science is "pitiful" .... |
| | | -- to keep the instructor abreast of changing subject matter and to improve the calibre of teaching ... it was for those reasons that he applied .... |

| Code | Category | Examples |
|---|---|---|
| 1 4 | d. "Brush-up", review of subject matter | -- he applied because he felt the need for brushing up .... |
| 1 5 | e. Become better teacher; improve teaching skills and methods | -- he wishes to learn new methods of teaching along with new materials to be taught ....<br><br>-- though the aspect of demonstration and presentation is not neglected ....<br><br>-- and because of his desire to become a more efficient teacher ....<br><br>-- she decided to apply because she wanted help in selecting new material to add to her classes, it was taking too much time to make the selections by herself ...<br><br>-- I decided to apply because I wanted to know more about new materials, techniques and programs .... |
| 1 6 | f. Work for advanced degree | -- he feels he may be able to get his master's degree under the program ....<br><br>-- he is interested in securing a master's degree with at least a major in chemistry. He feels that if the NSF offered such at B University he would take a year off and attend ....<br><br>-- and providing the opportunity to work toward advanced degrees. His decision to apply was due to financial assistance in achieving further education .... |
| 1 7 | g. Meet certification requirements | -- she enrolled in the night classes because she felt she needed the experience and to help fulfill certification requirements in this state ... |
| 1 9 | h. Other | |

| Code | Category | Examples |
|---|---|---|
| | 2. Personal reasons | |
| 2 1 | a. Honor, prestige, value on record | -- attraction of Harvard University ... |
| | | -- he can protect his teaching position through gaining new knowledge and being a better teacher .... |
| 2 2 | b. Financial assistance | -- and to obtain some income for himself and his family during the summer .... |
| | | -- in his case he has to support himself in the summer and feels the allowances in the program are sufficient ..... |
| | | -- the financial help for the programs looms large for Mr. M .... |
| | | -- his decision to apply was due to the financial assistance in achieving further education .... |
| 2 3 | c. Develop new interests | |
| 2 9 | d. Other | |
| 3 0 | 3. Interpersonal (social) values | -- and also keeping teachers in contact with each other .... |
| | | -- comparing and sharing ideas with others, associations, and motivation stimuli .... |
| | | -- and fellowship with colleagues with similar backgrounds and problems .... |
| | | -- the opportunity to talk with others engaging in the mathematics and science professions proves to be most stimulating . |
| 4 0 | 4. Encouraged by principal, department head, colleague | -- what stimulated her to apply was encouragement from her principal who is also specialized in mathematics .... |

| Code | Category | Examples |
|---|---|---|
| 5 0 5. | Enjoys going to school, working with subject matter | -- he applied because "he loves anything to do with biology" .... |
| | | -- Mrs. K applied because she likes to go to school and she finds science to be a fascinating subject .... |
| 6 0 6. | Vacation, travel | -- he applied in order to see more of the country ... he admitted that his primary reason was based upon getting a paid vacation .... |
| | | -- it presented her with an opportunity to travel and get paid for doing so .... |
| 9 0 9. | Other | -- to evaluate himself as a mathematics teacher .... |
| | | -- I wanted to grow more through this program ..... |
| | | -- a thirst for knowledge -- a great desire to learn .... |
| | | -- generalized reasons for attending were attributed to "wanted to improve myself." ..... |
| | | -- his reason for applying was that he had the time in which to attend .... |

QUESTION B-4b. Why did you decide not to apply? (three responses coded)

| Code | Category | Examples |
|---|---|---|
| | NON-APPLICANTS (Crit. Gp. Code 1) | |
| 0 0 | No response | |
| | 1. Other obligations | |
| 1 1 | a. Family (nonfinancial) | -- feels that he is out so much he "just hates to leave the house on those few nights he is free" .... |
| | | -- now her responsibilities to her teenage daughters restrain her from making an application .... |
| | | -- he had always felt that the Institutes are excellent for younger men who have no mortgages on their houses and do not have the responsibilities of an older man .... |
| 1 2 | b. Financial needs | -- for younger men who have no mortgages on their houses .... |
| | | -- he has financial obligations contracted while finishing his B.S. that he must absolve first ..... |
| | | -- has never submitted an application, largely for financial reasons .... |
| | | -- since he has to assist his younger brother in college, it didn't seem feasible to attend an institute right away. |
| 1 3 | c. Make more money in other summer job; has permanent summer job | -- he could make more money at other summer jobs; now that he has the insurance business, he can't afford to leave it for a summer .... |
| | | -- he has not applied for such programs previously because he has a regular summer job which pays him about $900 .... |
| | | -- because of his need to attend coaching schools and operate his summer beg and cattle business .... |

| Code | Category | Examples |
|---|---|---|
| 1 4 | d. Working for degree | -- he is working on a degree in the school administration field; thus he does not plan to be teaching in the future .... |
| 1 9 | e. Other | -- his need to attend coaching schools. |
| | | -- some years ago he was not able to apply because of other obligations .... |
| | | -- he would probably apply .... if he did not have a service obligation ..... |
| | 2. Low drive level | |
| 2 1 | a. Complacent or indifferent; not seeking promotion | |
| 2 2 | b. "Needs vacation" from school year | -- he also suggested that nine months of education per year is enough ... |
| 2 3 | c. Wants summers free or has other summer plans | -- she wants her summers free for other activities. She has worked as a summer camp counselor .... |
| 2 4 | d. Many transcripts, applications | -- it is necessary, if one hopes to be accepted, to apply in several places. Each of these requires a transcript of credits. The cost of the transcripts is the least irritating feature of this. What seems to appal him is the prospect of having a considerable amount of secretarial work thrust upon him in order to have an uncertain chance of acceptance .... |
| 2 5 | e. Other time demands | |
| 2 9 | f. Other | |
| | 3. Feels nonrelevance (need diminished) | |
| 3 1 | a. Has enough education | -- when she finished her masters degree work, which was done during summers, she promised herself that she would never again attend school for credit .... |

| Code | Category | Examples |
|---|---|---|
| 3 2 | b. Near retirement; too old | -- he feels that due to the nearness of his retirement, neither he nor the teaching profession would greatly benefit. |
| | | -- would like to apply but feels he is too old ..... |
| 3 3 | c. Plans to teach, or is teaching, in areas other than science or math | -- these programs offered nothing for his work (he teachers World History and is a counselor) .... |
| | | -- he has no intentions of applying because he does not intend to continue teaching science .... |
| | | -- indicated it doesn't apply to her fields (commercial) ..... |
| 3 4 | d. Institutes not appropriate in content or level | -- the main reason Mr. G has never applied ... is that most of the participating institutions have requirements through elementary calculus .... |
| | | -- he does not feel that they would fit his needs, but might be interested if the work was in geography or perhaps geology . |
| | | -- if something were offered for him in the science field ... programs in science for agricultural education teachers .... |
| | | -- she felt that she lacked the mathematical background to profit from the program .... |
| | | -- he is working on a degree in the school administration field; thus he does not plan to be teaching in the future .... |
| 3 9 | e. Other | |
| 4 0 4. | Feels background is inadequate; requirements are too high; futility of application | -- she felt she would like to attend a math institute but wondered if it would be beyond her ability..... |
| | | -- I became discouraged because "maybe I was not qualified" .... |

| Code | Category | Examples |
|---|---|---|
| 5 0 | 5. Location | -- she is planning to apply for a summer institute. She expressed a wish that X Y College here in Denver would run an institute .... (NOTE: this is rather a borderline case for this category.) |
| 6 0 | 6. Application up to Superior | -- she would like to attend an institute sometime, but she is not in a position to apply for it. She can only wait to be asked by her Superior to do so .... |
| 7 0 | 7. Not familiar with program | -- he could not say at this time whether he might be interested in an institute; he would have to have more information concerning what the courses consisted of .... |
| | | -- she did not apply ... because she only received one announcement, from a far-away school. She didn't know that close-by school also participated .... |
| | | -- the little information which she gave to me was mis-information .... |
| | 8. Presumes he or she is not eligible | |
| 8 1 | a. Because of age | -- he always thought that he was above the age limit .... |
| 8 2 | b. Because of experience | -- she has not, of course, applied for participation, since she has not been eligible on the experience criteria .... |
| 8 9 | c. Other | -- she has not applied because she has not met the requirements of most of the individual schools .... |
| 9 0 | 9. Other | -- also, being a bachelor, he feels that he doesn't need the money provided by NSF . |
| | | -- feels it is an inconvenience to the teacher and should be held on released time. |
| 9 1 | a. Against "new methods" | -- but he feels the "new concepts" are poor sunstitutes for fundamentals .... |

QUESTION B-5. Have you ever talked with any other teachers who have attended such programs? What did they have to say? (one response coded).

| Code | Category | Examples |
|---|---|---|
| 0 | No response | |
| 1 | 1. Generally positive attitude | -- all said they enjoyed it and felt that they gained much knowledge from attending ....<br><br>-- those who had attended spoke highly of the programs ....<br><br>-- other teachers with whom she had talked feel that the basic aims of the program, as she sees them, were fulfilled by participation. They were generally entnusiastic ....<br><br>-- they indicated it is very helpful to them and ... most of them talk about the economics, that is, the honorariums and the stipends ....<br><br>-- felt that the institutes met the basic aims which she set forth ....<br><br>-- he had not heard much comment on the institutes from other teachers, what he had heard was favorable, it was considered a service to the teachers ....<br><br>-- "they sold me on the programs. These teachers who have participated are the best public relations ....<br><br>-- two of his colleagues who attended the institutes described the work with high enthusiasm .... |

| Code | Category | Examples |
|---|---|---|
| 2 | 2. Qualified positive attitude (mixed reaction) | -- has found mixed reactions. He feels that the effectiveness of the institutes must vary from place to place .... |
| | | -- some of the teachers have liked them; other have not. The great majority say they have been helpful. Many ... say that the institutes try to accomplish so much in a limited time .... |
| | | -- he said some of the other teachers were not as happy in the institutes as he was .... |
| | | -- most of the teachers ... like them and feel that they received much help. The teachers' reactions depended upon how the institute is conducted, upon variations in the programs, and provisions for recreation .... |
| | | -- he has not talked with anyone except the In-Service students and they seemed to like it but .... |
| 3 | 3. Generally negative or critical reactions | -- the major objections offered by those who have attended are (lists 4 objections, no good points) .... |
| | | -- in general he said that others he has talked with have been impressed with the quality of institute work. He said, however, that some had had experiences like his at the first institute and didn't like the programs .... |
| | | -- some teachers feel that the programs should be geared to giving information that can be used directly in the classroom. With this he disagreed; .... |

| Code | Category | Examples |
|---|---|---|
| 4 | 4. Main reaction was toward heavy work load and/or subject matter difficulty | -- he has heard from some teachers that they feel that the material was too deep for their preparation ....<br><br>-- the teachers who attended these programs described them as worthwhile, but rough ....<br><br>-- all he heard were positive reactions though he did mention that those that were enrolled in elementary institutes felt they were overworked, going to classes from eight to five ....<br><br>-- both of them reported that they had gained much from the institutes. However, they had to work hard .....<br><br>-- only two general types of complaints: (1) the courses are too difficult because of an insufficient background and (2) it creates financial hardships on some who attend ....<br><br>-- former participants with whom he has talked have been favorably impressed, but in their words, "They really pour it to you." .... |
| 5 | 5. Deterring reactions | -- discussions with other teachers ... rather scared her. She felt she would like to attend a math institute but wondered if it would be beyond her ability. |
| 6 | 6. Didn't talk with any other teachers | -- he had very little contact with other teachers and has heard nothing specific about the institutes .... |
| 7 | 7. Combination of 3 and 4 above | |
| 8 | 8. Combination of 4 and 5 above | |
| 9 | 9. Other | |

QUESTION B-6. We are interested in reasons why teachers might not apply. What ideas do you have about this? (three responses coded)

| Code | Category | Examples |
|---|---|---|
| 0 0. | No response | |
| | 1. Other obligations | |
| 1 1 | a. Family (nonfinancial) | -- personal affairs would probably be the biggest drawback to a teacher in not applying .... |
| | | -- one main deterrent ... is the difficulty involved in uprooting a whole family for a two-month period .... |
| | | -- the inconvenience to family life ... sometimes it takes them away from the family when this is not possible .... |
| | | -- they feel they can't uproot their families and take them along ..... |
| | | -- are unable to leave their families for the length of time that is needed .... |
| 1 2 | b. Financial need | -- a great financial sacrifice by those with families .... |
| | | -- financial responsibilities for families probably deter some teachers .... |
| | | -- some teachers can't afford to attend the institutes as the stipends aren't large enough .... |
| | | -- not enough money .... |
| | | -- other teachers, especially men, do not apply because they cannot afford it .. |

| Code | Category | Examples |
|---|---|---|
| 1 3 | c. Make more money in other summer job; has permanent summer job. | -- cannot afford to be idle during the summer, have to work at an after-school job to make ends meet ....<br><br>-- the chief deterrent to application, he feels, is the summer employment which most teachers depend upon ... teachers' summer jobs are parts of their economic plans ....<br><br>-- some do have summer occupations which they cannot give up ....<br><br>-- they make more money at other jobs.<br><br>-- some have to provide for families and can make more money working; some have regular summer jobs they cannot leave .... |
| 1 4 | d. Working for degree or certification | -- if it doesn't apply to the M.A., this might be another reason why people didn't apply ....<br><br>-- some teachers have planned continuing summer work ... leading to advance degrees. |
| 1 9 | e. Other | |
| | 2. Low drive level | |
| 2 1 | a. Complacent or indifferent; not seeking promotion | -- because too much owkr is required, they lack confidence in themselves, they believe the work is too difficult for them ... they are not ambitious, and they are not seeking promotions ....<br><br>-- lack of interest in improving themselves as teachers ....<br><br>-- "the main reason is that many people just don't care enough" ....<br><br>-- they may not be interested in improving themselves ....<br><br>-- because of a lack of professional attitude .... |

| Code | Category | Examples |
|---|---|---|
| 2 2 | b. Needs vacation from school year (or at the end of a long, hard day) | -- are too tired at the end of the day. |
| 2 3 | c. Wants summers free or has other summer plans | -- this teacher and others like him want their summers free ..... |
| | | -- others have summer activities which would overlap the institute .... |
| 2 4 | d. Many transcripts, applications | -- he can't think of any hindering circumstances except the considerable amount of work involved in applying and the good possibility of rejection .... |
| | | -- "Any math or science teacher should be selected" without too much "red tape".. |
| 2 5 | e. Other time demands | -- he expressed some worry about conflict between National Guard duty and attendance at summer institutes. Other men, he felt, would have the same problem. |
| 2 9 | f. Other | |
| | 3. Feels nonrelevance (need diminished) | |
| 3 1 | a. Has enough education | -- also feeling that they have received enough education .... |
| 3 2 | b. Near retirement; too old | -- some are too old, too near retirement.. |
| | | -- most of those eligible have applied if they were young enough .... |
| | | -- not enough incentive for older teachers to apply. Even if they could meet entrance requirements, they might be embarrassed by younger teachers in the class who are more up-to-date .... |

The psychological implications of the personality pattern which has been described to the non-applicant teacher are important. First, subject matter becomes primarily a vehicle through which the teacher contacts the student, and obtains the self-gratifications required by his personality pattern. Should any conflict of desires appear, it is the emotional satisfactions involved in teaching which will prevail over the intellectual aspects and the intellectual stimulation and satisfaction which may be gotten by other groups. This type of pattern will often result in discipline problems (because the teacher will not wish to lose the students' respect and affection by being hard on them), dislike of student criticism and grading, and poor presentation of subject matter to the extent that its presentation requires confidence in his own preparation and ability to put across the material.

Secondly, since the teacher perceives his own inadequacies, and relegates them to a second position in his vocational scheme of things, he is likely to be uncomfortable in a situation requiring subject matter competence. It is quite likely that attendance at Programs would threaten to reveal his inadequacies in subject matter preparation, and possibly his lack of confidence in his own basic ability to meet the requirements and standards of the Programs.

Virtually the opposite is true of the applicant, particularly the successful applicant. The evidence suggests that these individuals are subject matter oriented and find their satisfactions in the teaching situations, not so much from gratification at student contacts, student interactions, but from the intellectual stimulation and the satisfaction of imparting the subject matter and watching students assimilate the subject matter and become proficient in it. It is only natural that such teachers would find the prospect of Teacher Training Programs stimulating, and an intellectual challenge, and it is only natural (as they do) that such teachers would be interested in further intellectual self-improvement via education, workshops, courses, programs, etc. Having this interest they do not experience as much conflict between professional and family obligations, and they will be more secure personally in the classroom and study situation.

A further point should be made regarding what appears to be the energy level of the non-applicant group. Even were they so inclined, the evidence appears to suggest that this group is generally a low drive level, low motivation group, and thus will be content to proceed more or less at status quo rather than to develop a strong drive for self-improvement or change of any sort. It would be predicted that this group would resist, or at best drift, with radical changes.

A word might be said about the applicant-rejectee group. It appears that the pattern of this group is a high drive level at which there are many and various activities, without the channelized and specific interest in the subject matter that characterizes the AA group. Thus, this group sees Programs as a desirable thing, is willing to try, but failing to receive one is capable, apparently, of shaking his head, saying, "too bad", and trying again or letting it go without particular worry. Selection procedures have probably tended to separate this group from the AA group on ability as well.

It should also be mentioned that in terms of academic background and ability, the AR group tends to be very much like the NA group. This suggests that, to

| Code | Category | Examples |
|---|---|---|
| 5 0 5. | Location | -- lack of many more and varied programs in locality and residence ....<br><br>-- physical nearness of certain programs .... |
| 6 0 6. | Application up to superior | |
| 7 0 7. | Not familiar with program | -- he feels this confusion about particular institutes and some specific requirements are causing many teachers not to apply ....<br><br>-- many teachers fail to apply because they do not know of the opportunities and objectives of the NSF programs ....<br><br>-- others because of a lack of knowledge of the program ....<br><br>-- they don't have information on how to go about this; although they may have heard certain facts concerning NSF, they may not feel that such programs really apply to them .... |
| 8 0 8. | Presumes not eligible | |
| 8 1 | a. Because of age | |
| 8 2 | b. Because of experience | |
| 8 9 | c. Other | |
| 9 0 9. | Other | -- his colleages feel that there is a tendency to pick those individuals who teach in larger systems ....<br><br>-- lack of sureness on the part of teachers that they will remain in the teaching field.....<br><br>-- if teachers were expected to live on campus, they might not apply .... |
| 9 1 | a. Against "new methods" | -- feel that all this "new-fangled" math weakens the teaching of fundamentals. |

QUESTION B-7. In what ways might these programs, as you now understand them, be modified to fit your particular needs better? (three responses coded)

| Code | Category | Examples |
|---|---|---|
| 0 0 | No response | |
| | 1. Availability (convenience; location and scheduling) | |
| 1 1 | a. Get local institute or more convenient location | -- if, on certain years, the location pattern of institutes would be shifted to smaller colleges ....<br>-- the institute would need to be within commuting distance because his wife works here .....<br>-- if the local institution were able to offer both the In-Service and Summer Institute ....<br>-- if summer institutes by being increased would provide opportunities of a local nature .... |
| 1 2 | b. Have night or Saturday programs available | -- if it were during the regular school year with sessions one evening each week . |
| 1 3 | c. Hold on released time | -- he would also request that these programs be conducted in his school building and on school time .... |
| 1 9 | d. Other | |
| | 2. Improve communications | |
| 2 1 | a. More explicit information in university announcements | -- suggested that the numbering or level of courses offered be more specific ....<br>-- NSF should insist that universities be more explicit on what is offered ....<br>-- a better description of courses and programs could be offered by schools conducting NSF programs ....<br>-- a better statement as to what type of chance or opportunity you would have for selection would be beneficial .... |

| Code | Category | Examples |
|---|---|---|
| 2 2 | b. Convince applicant he would be helped | -- NSF should approach the prospective student and sell him on the program .... |
| 2 3 | c. Improve distribution | -- her only comment in this area was, "Why didn't I get a brochure?" .... |
| 2 6 | d. Other | -- those teachers who attended could be better salesmen and ambassadors .... better campaigns were fostered to show that various types of programs were available .... |
| | 3. Application and selection | |
| 3 1 | a. Simplify application procedure | -- he would prefer to make one application which would cover all schools rather than applying to each one .... |
| | | -- his dissatisfactions all related to the application procedure ... making so many applications, providing the same information so many times, is a tremendous chore, he feels .... |
| | | -- should the institute be filled at a given university, the application could be passed on to second and third choice schools without the applicant having to make out separate forms .... |
| 3 2 | b. Get better, seriously motivated teachers to attend | -- should select the good teachers to participate ... this would stimulate teachers to vie for the honor of an institute appointment .... |
| | | -- if there was some method of judging what students are really serious and those who were just out to attend institutes to receive money .... |
| 3 3 | c. Get people with more homogeneous backgrounds | -- those attending a specific institute should be approximately homogeneous in their backgrounds .... |
| | | -- the in-service course he is now attending is made up a variety of backgrounds... this presented problems .... |

| Code | Category | Examples |
|---|---|---|
| 3 4 | e. Lower requirements for acceptance; greater availability of courses | -- the admission requirements are too high ..... |
| | | -- more teachers would apply if there were several levels of prerequisites from each institution .... |
| | | -- a relaxation of acceptance standards would improve the program ... |
| | | -- should lower their requirements to take in teachers who "weren't straight A students" .... |
| | | -- he sensed that NSF should not be so restrictive in taking people but should consider individuals like himself .... |
| 3 9 | f. Other | -- many teachers apply to one place, causing overloaded institutes at some places, with too few applying at others .. |
| | | -- there should be an extension of application time .... |
| | 4. Conduct of program | |
| 4 1 | a. Get instructors with relevant high school experience, | -- he would like to have a chance to work with "first rate high school science teachers" who had developed good programs and techniques .... |
| 4 2 | b. More emphasis on methods; practical application of knowledge | -- he would like more directional help in experimental departures directly appropriate for his own teaching .... |
| | | -- if more emphasis were placed on methods (how teachers could teach - demonstrate) .... |
| | | -- more attention to how the materials learned by the teachers can be applied in their high school classes -- perhaps a unit at each of the institutes to this end .... |
| | | -- along with the new concepts, teach the appropriate instructional techniques .. |

| Code | Category | Examples |
|---|---|---|
| 4 3 | c. Adjust the level and/or scope of work | -- they shouldn't cram in too much .... |
| | | -- lowering the level of the work to that which can be used by the teacher in his high school classes .... |
| | | -- most of them fit my needs, but some programs might be elementary for some people .... |
| 4 4 | d. Have more laboratory work | -- make more use of the labs .... |
| | | -- in speaking of the in-service institute which he attends ... more laboratory work should be done .... |
| 4 5 | e. Better planning and organizing of institutes | -- some provision might be made to have a supply of texts available for the first class meeting .... |
| | | -- greater coordination between what the afternoon visiting lecturers talked about and the morning classes .... |
| | | -- improvements could be made in scheduling ... many times demonstrations and classroom lectures were given at the same time .... |
| 4 9 | f. Other | |
| | 5. Program improvements or changes | |
| 5 1 | a. More institutes (includes both location and continuity) | -- there is a need for more institutes for those who simply want to brush up .... |
| | | -- would like to see more sequential programs over a 3 year period of time .... |
| | | -- more and varied programs ... in more institutions .... |
| | | -- there should be some sequential arrangement through which a teacher could take repeated institutes .... |
| | | -- provide and spread out more institutes. |

| Code | Category | Examples |
|---|---|---|
| 5 2 | b. Expand emphasis to other subject matter fields | -- he also recommended programs in earth sciences because of their relation to the geography that he teacher and he would find such things as anthropology and perhaps even history of science appropriate. |
| | | -- to help meet the needs of teachers who deal with the less able student .... |
| 5 3 | c. Add supplementary activities | -- support should be given teachers who want to enroll in regular college math. courses .... |
| | | -- if the materials covered were published for distribution to science teachers .... |
| | | -- a field representative sent out to help teachers on the job would be of great value .... |
| | | -- seminars for teachers in local areas would also be helpful .... |
| 5 4 | d. Guarantee credit | -- through which a teacher could take repeated institutes and apply the study done on advanced degrees .... |
| 5 5 | e. Combined institutes | -- for offerings in a math-science combination; this would benefit the elementary teachers .... |
| 5 9 | f. Other | -- by gearing it to some individuals like himself who must play a dual role (administrator and teacher) .... |
| | | -- universities should provide housing arrangements .... |
| | | -- solid science programs taught by scientists but with the cooperation of professors of agriculture or agriculture education .... |
| | | -- there should be institutes for the more basic data .... |
| | | -- freedom to select courses .... |

| Code | Category | Examples |
|---|---|---|
| | 6. Financial changes | |
| 6 1 | a. Stipend | -- more flexibility in setting allowances might help .... |
| | | -- some teachers can't afford to attend as the stipends aren't large enough .... |
| 6 2 | b. Travel allowance | -- the travel allowance is too low, especially for married persons with a family .... |
| | | -- the stipend he believes to be reasonable, but not the travel allowance .. |
| 6 9 | c. Other | |
| 9 0 | 9. Other | -- broader programs must be offered ... |
| | | -- the loyalty oaths should always be required of those attending .... |
| | | -- some programs should be improved if no diversification was present .... |
| | | -- "it's I who need the modification, not the program." .... |
| | | -- he would very much like to have some real "solid" help in learning about newer methods ... and form his own judgment about their soundness .... |

AREA C. How do the people around you feel and act toward education and science? (three responses coded)

| Code | Category | Examples |
|---|---|---|
| | 1. Parents and Community | |
| 1 0 | a. No response | |
| 1 1 | b. Positive attitude with substantiating evidence | -- there has been a trend for most parents to become increasingly interested in math and sciences in the last few years ... there is often pressure by parents to cause their children to think of th[illegible] as potential engineers or doctors [illegible] children simply aren't able to do work of high quality .... |
| | | -- people in the community are science conscious ... there is good attendance of parents at PTA meetings and they seem to be interested in the total program of the school .... |
| | | -- parents and children in the school had almost gone overboard for math and science. The reaction from parents if students did not do well in her classes was often quite strong .... |
| 1 2 | c. Positive attitude with no substantiating evidence | -- community in general is very favorable to science and mathematics .... |
| 1 3 | d. Indifferent; qualified positive | -- parents are not too much interested in math and science. They are nonchalant in their attitude .... seldom does a parent consult her about low grades .... |
| | | -- the majority are interested ... but many of them are not sufficiently interested to inquire further about the materials or concepts ... many do not possess the academic background to enable them to understand |
| 1 4 | e. Evidence of some negative attitude | -- science is wonderful as long as it is in the news. People give generous lip service in educating their children. They have distorted values in financial matters. |

| Code | Category | Examples |
|---|---|---|
| | 2. Teachers | |
| 2 0 | a. No response | |
| 2 1 | b. Positive attitude | -- other teachers also have a positive viewpoint regarding sciences and math .... |
| | | -- the school community teachers respect the importance of science and mathemtaics .... |
| 2 2 | c. Indifferent; qualified positive | -- teachers and students probably support the efforts in math and science about as well as anywhere .... |
| 2 3 | d. Evidence of some negative attitude | -- a number of teachers in other fields are a little unhappy about the big push being given the sciences .... |
| | | -- teachers do not feel there is an over-emphasis in the teaching but many convey that on a national basis over-emphasis is present .... |
| | 3. Students | |
| 3 0 | a. No response | |
| 3 1 | b. Positive attitude | -- he believes that probably 70% of the students who graduate go on to college ... |
| | | -- students are interested in learning; a large percentage of them go to college . |
| | | -- parents and students as well were positively identified with education and progress through it, particularly with sciences and mathematics .... |
| 3 2 | c. Neutral to negative attitude | -- students probably support the efforts in math and science about as well as anywhere .... |
| | | -- students are about average in their perception of the role of math and science. |
| | | -- he finds that children with poor attitudes reflect the attitudes of their parents .... |

APPENDIX B

## POSSIBLE PROGRAM MODIFICATIONS

This Appendix presents the percentage distributions of responses of each Criterion Group to the question: "In what ways might the Program be changed to suit your needs better?".

APPENDIX B

PERCENTAGE DISTRIBUTION OF RESPONSES TO THE QUESTION: "IN WHAT WAYS MIGHT THE PROGRAMS BE CHANGED TO SUIT YOUR NEEDS BETTER?"

| Category | Percentage by Group * AR | NA | AA |
|---|---|---|---|
| 1. Availability | | | |
| 1a. get local institute or more convenient location | 10.9 | 12.1 | 7.1 |
| 1b. have night or Saturday programs available | -- | 0.6 | 2.0 |
| 1c. hold on released time | -- | 1.4 | -- |
| 1d. other | 1.7 | 3.0 | 2.9 |
| 2. Improve Communications | | | |
| 2a. more explicit information in university announcements | 3.3 | 5.7 | 4.5 |
| 2b. convince applicant he would be helped | 2.0 | 0.5 | -- |
| 2c. improve distribution of brochures | 2.0 | 2.7 | -- |
| 2d. other | 1.3 | 1.9 | 4.1 |
| 3. Application and Selection | | | |
| 3a. simplify application procedure | 6.4 | 0.5 | 3.4 |
| 3b. get better, more serious teachers to attend | -- | 0.8 | 1.6 |
| 3c. get people with more homogeneous backgrounds | 1.8 | 1.4 | 7.1 |
| 3d. even out number of acceptances | 4.7 | 0.6 | 0.8 |

APPENDIX B, continued

| Category | Percentage by Group AR | NA | AA |
|---|---|---|---|
| 3e. lower acceptance requirements; increase course availability | 6.8 | 5.1 | 5.8 |
| 3f. other | 9.3 | 2.2 | 4.2 |
| 4. Conduct of Program | | | |
| 4a. get instructors with relevant high school experience | 1.1 | 0.3 | 3.8 |
| 4b. more emphasis on method; practical application | 14.6 | 5.0 | 17.1 |
| 4c. adjust level or scope of work | 19.2 | 8.5 | 14.1 |
| 4d. more laboratory work | -- | 1.2 | 2.6 |
| 4e. better planning and organization | 1.5 | 0.6 | 7.3 |
| 4f. other | 1.4 | 3.1 | 5.8 |
| 5. Program Improvements or Changes | | | |
| 5a. more institutes | 9.4 | 3.1 | 8.2 |
| 5b. expand to other subject matter fields | 0.3 | 2.6 | 2.0 |
| 5c. add supplementary activities | 0.3 | 2.8 | 2.1 |
| 5d. guarantee credit | 1.5 | 4.3 | 5.6 |
| 5e. combined institutes (science and math) | 2.6 | -- | 1.1 |
| 5f. other | 10.8 | 8.4 | 13.6 |

APPENDIX B, continued

| Category | Percentage by Group | | |
|---|---|---|---|
| | AR | NA | AA |
| 6. Financial Change | | | |
| 6a. stipend | 1.4 | 2.1 | 2.6 |
| 6b. travel allowance | 1.1 | 1.7 | 1.0 |
| 6c. other | -- | 0.5 | -- |
| 9. Other | -- | 3.8 | 2.8 |

* Percentages do not add to 100% due to multiple responses and occasional non-response.