APPENDIX A

INSTRUMENTATION

Jan 20, 1969
Ann Arbor, Michigan

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Instrumentation

Student Questionnaire: Year 1.

The student questionnaire, composed of several different measures, was designed to assess those variables suggested as predictors of students' behaviors by the expectancy/value theory. The measures currently employed in the project have been developed in several steps summarized below.

Bipolar rating scales anchored at the extremes with short verbal descriptors, e.g.:

How much do you like math?

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were selected for the following reasons. First, it was necessary to employ a rating method appropriate for the entire age range of subjects (5th-12th grade). Changes in the wording of the items from grade to grade could have resulted in increased measurement error. For example, the fifth graders could have understood an item differently than tenth graders, resulting in spurious developmental findings. This format, a visualized rating scale, is easily understood, even by the youngest subjects. Secondly, since response alternatives are not written out, as in the traditional Likert scale, the amount of reading by the subjects was minimized thus reducing time involved in questionnaire administration. Thirdly, the psychometric properties of the interval scales derived from these data are superior to ordinal or categorical/nominal responses for data-analytic purposes.

With these practical and theoretical considerations in mind, items assessing a number of constructs were written. Whenever possible, these were framed as nine point bipolar scales. Items thus generated were piloted on school children in a nearby area, comparable in most respects to the intended sampling area.

The questionnaire was revised in light of results from the pilot sample. The pilot sample was instructed to mark items that were difficult to understand and to alert questionnaire administrators to problems or questions concerning any questionnaire items. Because students indicated difficulty in making such fine discriminations, the nine point scale was reduced to a seven point scale. Students' comments also enabled us to eliminate or reword items which were difficult to understand. Standard instructions were developed for questionnaire administration.

The revised questionnaire was distributed to students in the Ann Arbor school system in spring 1978. The following scales were incorporated into the questionnaire:

a) Perceived difficulty of math: absolute and comparative ratings of current and advanced mathematics courses
b) Expectancies: ratings of students' expected performance in current and advanced mathematics courses

c) Incentive value of mathematics: ratings of attractiveness of math courses and positive and negative outcomes in math

d) Utility: ratings of the perceived usefulness of current and advanced mathematics courses for self

e) Sex-typing of the utility of math: ratings of the perceived usefulness of current and advanced mathematics courses for men and women

f) Perceived effort: ratings of the effort perceived to be necessary to do well in math

g) Cost of effort: ratings of the degree to which effort expended in math has negative consequences

h) Encouragement: ratings of the degree to which parents and teachers have encouraged the student to continue taking advanced math

i) Ability: ratings of ability in current and advanced mathematics

The following constructs were not measured with a seven-point rating scale: plans, attributions, sex-role identity, sex-stereotyping of math. Students indicated their plans for taking mathematics courses from a number of prepared response alternatives. Measures of attributions for success and failure situations employed a forced ranking procedure. Students ranked a set of eight statements in terms of their typicality as explanations for success and failure outcomes on math tests. In addition, open-ended questions elicited responses about students' attributions for success and failure outcomes on math tests.

The model we are testing presumes that sex-role values are important influences on behavior. To measure sex-role values, we employed one original and one standardized test. The original measure of sex-role values derives sex-role scores for each subject as a function of differences among scales. Students rated both the importance of twelve sex-typed behaviors for boys and girls, and rated the frequency with which they engage in those activities. Values are scored as the difference between perception of self and perceived appropriateness of the same behavior for each sex. The standardized test is the Personality Attributes Questionnaire (PAQ) (Spence, Helmreich, and Stapp, 1974). The PAQ incorporates eighteen semantic-differential-type items. This scale was shortened and slightly modified for use with 5th through 8th graders.

Student Questionnaire: Year 2.

The slightly modified version of the student questionnaire was administered to students in the Ann Arbor sample in Year 2. The final version was arrived at by 1) examination of the results from year one,
and 2) interviews with non-math-taking and math-taking high school students. Items with extremely low variance in the previous year's data were eliminated since they do not contribute to behavioral prediction. Open-ended questions with low variability were also eliminated.

In addition, sections of the questionnaire were expanded. Important influences on students' decisions to take math had been elicited in interviews with high school students. Based on these interviews, a rating scale was developed asking students to rate the influence of a number of persons on these decisions. Questions asking students to rate and rank a list of reasons describing why they are currently taking math, and questions about tracking experiences, were added.

Theoretical and conceptual issues received special attention when the questionnaire was refined/revised in Fall/Winter 1978. Most important was the issue of reliability of scales formed from the individual items. Scales were formed by taking the mean value of several items all presumably measuring the same construct, e.g., self-concept of ability. The alpha coefficient is a measure of test reliability which represents the expected correlation of a test with an alternative test the same items in length. Based on the reliability figures, scales were revised. Scales were constructed so that redundant items, as well as those correlating lower than .25, were dropped from the scales. Reliability values were examined as each revision was accomplished. Scale revision was successful, in that the majority of scales had values of approximately .80 with a range of coefficients from .2943 to .83. Scales with less than .60 will not be used in data analysis. These scales are summarized in Table A. These scales were factor analyzed. The factor scales and their factor loadings are presented in Table B. A final form of the student questionnaire may be found in Appendix E.

Parent Questionnaire

A questionnaire was employed to assess parent attitudes and expectancies. This instrument was designed for the acquisition of three categories of information: 1) the parents' self-reported experiences in math and attitudes regarding mathematics 2) parents' beliefs about their child's attitudes toward math, and 3) parents' beliefs about their children's math abilities and their child's math experiences. Information about several aspects of each category was sought. Parent scales were constructed in a manner similar to that used in constructing student scales. The scales reflected the categories discussed in each of the next three paragraphs. The scales used in final analyses are presented in Table C. These scales were factor analyzed. The factor scales and their factor loadings are presented in Table B. A copy of the parent questionnaire is included in Appendix E.

Referring first to parental attitudes about mathematics, parents were asked to reflect back upon their experiences in high school and to report on their experiences and cognitions at that time. Given the inaccuracies often associated with retrospection, this information was intended not so much to inform us about past conditions as to inform us
how these parents currently view their past high school experiences with mathematics. Current parental attitudes were then assessed. Similar items and scales were used to measure both the "retrospective" and current attitudes. Several items were constructed which parallel items on the student questionnaire. Thus parents were asked about: a) utility of math (e.g. How useful is the math you learned in high school for you or your job?) b) importance or incentive value of math (e.g. How enjoyable was high school math? How important was it to you to get good grades in high school math?) c) ability (e.g. How good were you in advanced high school math?) d) effort (e.g. How hard did you have to try to do well in high school math?) e) difficulty of math (e.g. Compared to other subjects that you took in high school, how difficult was mathematics?). In addition, parents were asked to report the number of math courses they had taken in high school and college, their level of education, and their occupation.

Referring next to parental perceptions of their children’s math attitudes, parents were asked to report what they thought were their children’s attitudes about math and about themselves as math learners. Items in this section were developed to parallel the items and scales in the student questionnaire. In particular, the parents’ perceptions of the following children’s responses were assessed: a) incentive value of math for the child, b) importance to the child of receiving good grades, c) child’s self-concept of math ability, d) child’s perceptions of the difficulty of math, e) child’s perceptions of the effort required to do well in math.

A final section of the parent questionnaire inquired about parental attitudes toward the child’s ability and math education. Parental expectancies for their child’s performance in math were elicited. Additionally, parents rated their own and the math teacher’s influence on the child’s attitudes, indicated their minimal level of aspiration for their child, rated the utility of the math the child had acquired in school and rated their child’s ability and the reasons the parents feel are responsible for their child’s performance. Finally, three items assessed parental sex-typing of the domain of mathematics.

Teacher Questionnaire

Teachers were asked to complete two questionnaires, one asking for their opinions of mathematics, and another rating each participating student in their math class on a six question scale.

The first questionnaire is labeled "Teacher’s Math Survey". It consists of four open-ended questions which ask the teachers to give their opinions regarding: why boys outnumber girls in high school math classes; which factors are most important in determining boys’ and girls’ attitudes toward math; and reasons for poor performance in math by some students. Finally, they are asked to rate, on a seven point scale, how much they enjoy teaching mathematics. On the second questionnaire, for each student, teachers were asked to rate: how well she/he expects this student to do in advanced high school math course, how well the student is doing this year, how hard the student is trying, how much ability the teacher perceives the student has, and how well the
student is doing in math compared to how well he/she could do. If a teacher indicated that a student was not performing to the best of his or her ability, the teacher was asked to explain why this might be happening.

Teachers were given these questionnaires to complete at the time of administration of the student questionnaires. All teachers agreed to complete these forms therefore these data are complete for all participating students in grades five through eleven.

Observational Procedure

The observational system used in this study is a modified version of two other systems: Brophy and Good’s Teacher-Child dyadic interaction system and Dweck et. al’s observational procedure used to code evaluative feedback. Appropriate modifications were made following pilot observations in a variety of classrooms. Important considerations in modifying these existing observational systems were their relevance to the research goals of this project and their administrative ease. Care was taken to include recording of behaviors assumed to be related to teachers’ expectancies and teachers’ attributions for students’ performances.

The observational system focused on dyadic interactions between teachers and individual students; thus, only occasions in which the teacher was interacting with a single student were recorded. The recording of each interaction included the following: who initiated the interaction, the context of the interaction, student response to teacher, and teacher feedback to student. In addition, the setting in which the interaction took place was coded, i.e., whether the interaction was public and monitored by the class or a private interaction between student and teacher. Special effort was made to pick up two types of teacher statements we felt critical for our study: explicit statements made by teachers to a student regarding how well the student can or should do on an assignment or test (expectancy statements), and explicit statements regarding the teacher’s assessment of which factors explained the quality of the student’s work (attributional statements). We recorded these statements verbatim. Table D summarizes our coding system. The coding manual, which gives a detailed explanation of the system, and a copy of a coding sheet, is included in Appendix E.

Observers completed a three week training program before observing began in the sample classrooms. Training included discussing the manual, coding written transcripts and videotapes of classroom interactions and coding in classrooms not included in the sample. In the training classrooms, observers independently coded four one hour sessions with a criterion coder. Only after obtaining a .75 agreement did the observer begin to collect data in the sample classrooms. Because much of the data involved sequential coding, teacher-student interactions were scored as agreements only if the entire sequence was coded identically. For example, during response opportunities, both coders had to agree on type of question, level of question, student response, and teacher feedback for the interaction to be counted as an
agreement. The percentages of agreement for each observer are shown in Table E. The mean percentages of agreement ranged from 75% to 86% for the five observers.

The observer spent at least three sessions in the classroom before beginning to collect data. These sessions were used by observers to acquaint themselves with the students so that interactions could be assigned reliably to the student involved. These sessions also helped in making the students and teachers feel comfortable with the observer's presence. After these practice sessions, ten classroom sessions were observed. These sessions were sequential when possible. Data were not collected on days with atypical events, e.g., films, tests or teacher absence.

In Fall 1978, teachers were offered a profile of their classrooms. The frequency and proportion of differing types of interactions in their classroom were compared to that observed in classrooms of the same and different grade levels. See Appendix F for a copy of the text and tables given to teachers. These reports were presented to the teachers individually so that questions could be answered immediately.
- FINAL REPORT

TABLE A

MATHEMATICS ATTITUDE SCALES INCLUDED IN THE STUDENT QUESTIONNAIRE

**Future Expectancies for Math:FUTEXP**

8. How successful do you think you'd be in a career which required mathematical ability? (not very successful/very successful) (V=18)

2. How well do you think you'll do in your mathematics course next year? (not at all well/very well) (V=182)

6. How well do you think you'll do in advanced high school mathematics courses (like Algebra II, Trigonometry, or Calculus)? (not at all well/very well) (V=186)

1b. How well would you expect to do in Trigonometry and Pre-Calculus? (not at all well/very well) (V=232)

2b. How well would you expect to do in this course (Calculus)? (not at all well/very well) (V=234)

3. How well do you think you'll do in your mathematics course next year? (not at all well/very well) (V=273)

2. How well do you think you would do in your mathematics course next year? (not at all well/very well) (V=292)

**Current Expectancies for Math:CUR, CRNTEXP**

7. Compared to other students in your class, how well do you expect to do in mathematics this year? (much worse than other students/much better than other students) (V=17)

48. How well do you expect to do on your next math test? (not at all well/very well) (V=60)

53. How well do you think you will do in your math course this year? (very poorly/very well)

alpha=.7899

alpha=.8341
TABLE A (cont'd.)

Math Ability: ABIL, ABILITY

2. How good at math are you? (not at all good/very good) (V=12)

16. If you were to order all the students in your math class from the worst to the best in math, where would you put yourself? (the worst/the best) (V=26)

36. In comparison to most of your other academic subjects, how good are you at math? (much worse/much better) (V=48)

alpha=.7974

Perceived Math Ability: PETA, PERTABIL

13. How good at math does your mother think you are? (not at all good/very good) (V=23)

22. How good at math does your father think you are? (not at all good/very good) (V=32)

19. How good at math does your teacher think you are? (not at all good/very good) (V=29)

alpha=.8164

Difficulty of Current Math: CURDIFF, CRNTDIF

4. In general, how hard is math for you? (very easy/very hard) (V=14)

18. Compared to most other students in your class, how hard is math for you? (much easier/much harder) (V=28)

28. Compared to most other school subjects that you have taken or are taking, how hard is math for you? (my easiest course/ my hardest course) (V=38)

alpha=.8118
TABLE A (cont'd)

Perceived Difficulty of Current Math: PERDIFF

41. How hard does your mother think math is for you? (very easy/very hard) (V=53)
44. How hard does your father think math is for you? (very easy/very hard) (V=56)
47. How hard does your teacher think math is for you? (very easy/very hard) (V=59)

alpha=.7870

Effort: COMBEFF

3. How hard do you have to try to get good grades in math? (a little/a lot) (V=13)
33. How hard do you have to study for math tests to get a good grade? (a little/a lot) (V=45)
37. To do well in math I have to work... (Check one)
   1) much harder in math than in other subjects.
   2) somewhat harder in math than in other subjects.
   3) a little harder in math than in other subjects.
   4) the same as in other subjects.
   5) a little harder in other subjects than in math.
   6) somewhat harder in other subjects than in math.
   7) much harder in other subjects than in math. (V=49) hard) (V=67)

How much time do you spend on math homework? Check one.
   a) an hour or more a day
   b) 30 minutes a day
   c) 15-30 minutes a day
   d) about 1 hour a week
   e) about 30 minutes a week
   f) about 30 minutes every two weeks
   g) I rarely do any math homework.

17. How hard do you try in math? (a little/a lot) (V=27)
27. Compared to most other students you know, how much time do you have to spend working on your math assignments? (much less time than other students/a lot more time than other students) (V=37)

alpha=.7505
TABLE A (cont'd.)

**Utility of Basic Math: BAS. USE, BAS. UTIL (Year 1)**

3. How useful is learning basic math (like adding and dividing) for what you want to do after you graduate and go to work? (not at all useful/very useful)

58. How useful do you think the things you have learned in basic math are for your other school courses? (not very useful/very useful)

alpha = .6137 *Included in Year 1 only

**Utility of Advanced Math: ADV. USE, UTIL. AV, FUT. UTIL**

9. How useful is what you would learn in high school math (like Algebra II, Trigonometry, or Calculus) for what you want to do when you finish school and go to work? (Not very important/very important) (V=19)

20. How useful is what you would learn in advanced high school math (like Algebra II, Trigonometry, or Calculus) for your daily life outside of school? (not at all useful/very useful) (V=30) (V=271)

alpha = .7522

**Importance of Math: IMPORT**

23. I feel that, to me, being good at solving problems which involve math or reasoning mathematically is: (not at all important/very important) (V=33)

34. How important is it to you to get good grades in math? (not at all important/very important) (V=46)

38. How upset would you be if you got a low mark in math? (not at all upset/very upset) (V=50)

alpha = .7353

**Interest in Math: INTEREST**

1. In general, I find working on math assignments (very boring/very interesting) (V=11)

   In general, I find working on math games ...(boring/interesting)

31. How much do you like doing math? (not very much/very much) (V=41)

alpha = .8004
- FINAL REPORT

TABLE A (cont'd.)

**Liking for Math Teacher:** LIKE.TCHR

49. How much do you like your math teacher? (not very much/very much) (V=61)

alpha unavailable

**Perceived Importance of Math to Parent:** IMPFORPA

15. How upset do you think your mother would be if you got a low mark in math? (not very much/very much) (V=25)

24. How upset do you think your father would be if you got a low mark in math? (not very much/very much) (V=34)

alpha=.7763

**Performance in Math:** PERF, PERFORM

32. In math, most of the time, how well do you do in each of the following things?
   a) When the teacher calls on you for an answer in class (very poorly/very well) (V=42)
   b) When taking a test I have studied for (very poorly/very well) (V=43)
   c) When doing math homework problems (very poorly/very well) (V=44)

52. How have you been doing in math this year? (very poorly/very well) (V=64)

alpha=.7614

**Minimum Standards For Performance in Math:** MINSTAN (Year 2)*

5. What is the lowest grade or evaluation mark you would be satisfied with in your present math course? (V=15)

alpha is unavailable

*Included in Year 2 only
TABLE A (Cont'd.)

Anticipated Difficulty of Future Math: FUTDIF

3. How difficult do you think next year's math will be for you? (much easier than this year/much harder than this year) \((V=183)\) (NOTE: V183 used in scale only for 9th graders)

7. How hard do you think advanced high school math will be for you? (very easy/very hard) \((V=187)\)

8. Compared to most other school subjects you may take in high school, how hard do you think advanced high school math will be for you? (my easiest course/my most difficult course) \((V=188)\)

1a. If you took Trigonometry and Pre-Calculus, how hard do you think it would be for you? (not at all hard/very hard) \((V=231)\)

2a. If you took Calculus, how hard do you think it would be for you? (not at all hard/very hard) \((V=233)\)

alpha=.7732

Perceived Expectancies for Math: PERCEXP, PAREXP

45. How well do you think your father expects you to do in math this year? (not very well/very well) \((V=57)\)

57. How well do you think your mother expects you to do in math this year? (not very well/very well) \((V=69)\)

42. How well do you think your teacher expects you to do in math this year? (not very well/very well) \((V=54)\)

alpha=.8672

Cost of Effort To Do Well in Math: COST*

40. Is the amount of effort it will take to do well in your math course this year worthwhile to you? (not very worthwhile/very worthwhile) \((V=52)\)

54. Is the amount of effort it would take to do well in advanced high school math courses (like Algebra II, Trigonometry, or Calculus) worthwhile to you? (not very worthwhile/very worthwhile) \((V=56)\)

57. How much does the amount of time you spend on math keep you from doing other things you would like to do? (takes away no time/takes away a lot of time) *\(\text{V}(52)\) included in Year 2 only

alpha=.719
- FINAL REPORT

TABLE A (cont’d.)

Parent Encouragement to Continue in Math: ENC RG

Rate on a scale of 1 to 7 how much each of the following people have encouraged or discouraged you:

Mother (strongly discouraged me/strongly encouraged me) (V=221)
Father (strongly discouraged me/strongly encouraged me) (V=222)

\[ \text{alpha} = 0.7091 \]

Plans for Future Math Courses: INTENT (Year 1)

41. Would you take more math if you didn’t have to? (Check one)
   a) I very definitely would take more math
   b) I probably would take more math
   c) maybe I would take more math
   d) I’m not sure
   e) maybe, but not that likely
   f) I probably would not take any more math
   g) I very definitely would not take any more math (V=543)
   How much more math would you take? (V=739)

1. Do you plan to take any math courses in high school? Yes
   No
   a) Three years of math
   b) Two years of math
   c) One year of math
   d) None
   Which math courses do you plan to take?
TABLE A (cont'd.)

Plans and Future Choices in Math: INTENT (Year 2)

4. Would you take more math if you didn't have to? (Check one)
   1) I very definitely would take more math
   2) I probably would take more math
   3) maybe I would take more math
   4) I'm not sure
   5) maybe, but not that likely
   6) I probably would not take any more math
   7) I very definitely would not take any more math (V=184)

5. How much more math would you take if you did not have to?
   1) I would not take any more math
   2) I would take one or two years of junior high school math
   3) I would take math through ninth grade
   4) I would take math through ninth grade, plus one more year of
      high school math
   5) I would take math through ninth grade, plus two more years of
      high school math
   6) I would take math all the way through high school (V=185)

5. What math courses, if any, do you plan to take in the 11th grade?
   (Please be as specific as you can, for example, Trigonometry and
   Pre-Calculus, Calculus, etc.)
   a) first semester (V=275)
   b) second semester (V=276)
   c) I do not plan to take math in the 11th grade (V=277)

6. What math courses, if any, do you plan to take in the 12th grade?
   a) first semester (V=278)
   b) second semester (V=279)
   c) I do not plan to take math in the 12th grade (V=280)
**TABLE A (cont'd.)**

**Parents' Use of Math: MPARUSE\***

56. How much does your mother use math? (not very much/very much)

**Sex Stereotyping of the Utility of Math for Women: ST.USE.F**

2. How useful do you think women find basic math in their jobs? (not at all useful/very useful)

12. How useful do you think that women find advanced high school math in their jobs? (not at all useful/very useful)

39. How useful do you think women find basic math (like adding and dividing) in their everyday activities? (not at all useful/very useful)

\[ \text{alpha} = .742 \]

**Sex Stereotyping of the Utility of Math for Men: ST.USE.M**

17. How useful do you think men find basic math (like adding and dividing) in their jobs? (not at all useful/very useful)

51. How useful do you think men find basic math in their everyday activities? (not at all useful/very useful)

51. How useful do you think men find advanced high school math (like Advanced Algebra and Calculus) in their jobs? (not at all useful/very useful)

\[ \text{alpha} = .6850 \]

**Sex Stereotyping of Math Ability: ST.ABIL, ST.ABIL2\***

29. In general, I think boys are...
   a) much better than girls at math, b) somewhat better than girls at math, c) a little better than girls at math, d) the same as girls at math, e) a little worse than girls at math, f) somewhat worse than girls at math, g) much worse than girls at math. Why? 

* Alpha coefficient not available for single item scales.
- FINAL REPORT

TABLE A (cont’d.)

Math Aptitude and Past History: CHMAAPT

Average of standardized scores on most recent MAT, CAT, and past math grades plus the constant 4.

Math as a Male Domain: MATH.MAL

ST.USE.M minus ST.USE.F scales

Sex Role Identity

Personality attribute questionnaire.

1. Scored as Neutral (Low masculine, Low feminine)
   Masculine (High masculine, Low feminine)
   Feminine (Low masculine, High feminine)
   Androgynous (High masculine, High feminine)

2. Scored as Masculine (MASC)
   Feminine (FEM).

Career Plans

In this section we would like to ask you some questions about your future plans. Please indicate which of the following you plan to do after you graduate from high school.

1.---Continue your education (college, vocational training, etc.). Please indicate what you plan to study in college or the type of vocational training you are interested in. -----

2.---Look for a job. Please indicate the type of job you are interested in.

3.---Other plans (please describe).

Attributions

1. People use different reasons to explain why they have done things well or poorly. Think of the last math test you did not do so well on (one you did poorly on). Why do you think you did so poorly? ---

2. People use different reasons to explain why they have done things well or poorly. Think of the last math test you did well on. Why do you think you did so well? ---
TABLE A (cont'd.)

Success Attributions

We are going to give a list of reasons that students often give for why they have done well on a math test. Think about a time when you did very well a math test. Read the list. Then answer the questions at the bottom of the list.

a) I did well on the math test because I am smart in math.
b) I did well on the math test because my teacher helped me learn the math.
c) I did well on the math test because my parents helped me learn math.
d) I did well on the math test because I like math so much.
e) I did well on the math test because I have worked very hard on my math all year.
f) I did well on the math test because I studied very hard for the math test.
g) I did well on the math test because math tests are easy.
h) I did well on the math test because I was feeling so good at the time I took the test.

Pick the reason you think is the most important reason for why you did so well on that math test. Write the letter on that reason here ________ Now cross out that reason with your pencil.

Now pick the reason you think is the next most important reason and write its letter here ________ Cross out the reason.

Now pick the reason you think is the third most important reason and write its letter here ________ Cross out the reason.

Now pick the reason you think is the fourth most important reason and write its letter here ________ Cross out the reason.

Now pick the reason you think is the fifth most important reason and write its letter here ________ Cross out the reason.

Now pick the reason you think is the sixth most important reason and write its letter here ________ Cross out the reason.

Now pick the reason you think is the seventh most important reason and write its letter here ________ Cross out the reason.
TABLE A (cont'd.)

Failure Attributions

Now we are going to give a list of reasons that students often give for why they have done poorly on a math test. Think about the times when you didn't do very well on a math test. Read the list. Then answer the questions at the bottom of the list.

a) I did poorly on the math test because I am not very smart in math.
b) I did poorly on the math test because my teacher did not give me as much help as I needed.
c) I did poorly on the math test because my parents did not give me as much help as I needed.
d) I did poorly on the math test because I don't like math very much.
e) I did poorly on the math test because I have not worked very hard in math this year.
f) I did poorly on the math test because I didn't study hard enough for the test.
g) I did poorly on the math test because the math test was hard.
h) I did poorly on the math test because I was not feeling very good at the time I took the test.

Pick the reason you think is the most important reason for why you did so poorly on that test. Write the letter of that reason here _________. Now cross out that reason with your pencil.

Now pick the reason you think is the next most important reason and write its letter here _________. Cross out the reason.

Now pick the reason you think is the third most important reason and write its letter here _________. Cross out the reason.

Now pick the reason you think is the fourth most important reason and write its letter here _________. Cross out the reason.

Now pick the reason you think is the fifth most important reason and write its letter here _________. Cross out the reason.

Now pick the reason you think is the sixth most important reason and write its letter here _________. Cross out the reason.

Now pick the reason you think is the seventh most important reason and write its letter here _________. Cross out the reason.
### Table B

**Factor Scales**

<table>
<thead>
<tr>
<th>Student Attitudes</th>
<th>Self concept of math ability</th>
<th>Factor score</th>
<th>Concept of math value</th>
<th>Factor score</th>
<th>Perception of task difficulty</th>
<th>Factor score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability</td>
<td>.84</td>
<td>Importance</td>
<td>.53</td>
<td>Required effort</td>
<td>.81</td>
<td></td>
</tr>
<tr>
<td>Performance</td>
<td>.80</td>
<td>Basic utility</td>
<td>.56</td>
<td>Actual effort</td>
<td>.63</td>
<td></td>
</tr>
<tr>
<td>Current expectancies</td>
<td>.91</td>
<td>Interest</td>
<td>.42</td>
<td>Current difficulty</td>
<td>.57</td>
<td></td>
</tr>
<tr>
<td>Current difficulty</td>
<td>.60</td>
<td>Util. adv</td>
<td>.88</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Future expectancy</td>
<td>.70</td>
<td>Cost. adv</td>
<td>.73</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### TABLE B (cont'd)

**Perceptions of Related Socializers**

<table>
<thead>
<tr>
<th>Socializers' perception of task difficulty</th>
<th>Socializers' perception of math ability</th>
<th>Parental encouragement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale Factor score</td>
<td>Scale Factor score</td>
<td>Scale Factor score</td>
</tr>
<tr>
<td>Parents' perception of current/future math difficulty</td>
<td>.67</td>
<td>Parents' perception of math ability</td>
</tr>
<tr>
<td>Teacher's perception of current/future math difficulty</td>
<td>1.6</td>
<td>Teacher's expectancies</td>
</tr>
<tr>
<td>Teacher's expectancies</td>
<td></td>
<td>Teacher's expectancies</td>
</tr>
</tbody>
</table>

Factor loadings not standardized
**TABLE B (cont'd)**

**Parent Attitudes**

<table>
<thead>
<tr>
<th>Perceived importance of math for child</th>
<th>Father’s perception of task difficulty</th>
<th>Mother’s perception of task difficulty</th>
<th>Perceived math ability of child</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale</td>
<td>Factor score</td>
<td>Scale</td>
<td>Factor score</td>
</tr>
<tr>
<td>PAREFFCH (Mother)</td>
<td>1.7</td>
<td>PAREFFCH (Father)</td>
<td>2.4</td>
</tr>
<tr>
<td>PARIMPCCH (Mother)</td>
<td>.51</td>
<td>PARTDCH (Father)</td>
<td>2.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Factor loadings not standardized.
### TABLE C

Parent Attitude Scales Used in Analyses

**Parent's perception of importance of math for child: PARIMPCCH**

1. How important is it to you that your child do well in math? (not at all important/very important)
2. Compared to other academic subjects, how important is it to you that your child do well in math? (not at all important/very important)

- Mothers' alpha = .49
- Fathers' alpha = .47

**Parent's perception of child's ability: PARABCH**

1. My child is: (not at all good at math/very good at math).
2. In comparison with other academic subjects, my child is: (much worse in math than in other subjects/much better in math than in other subjects)

- Mothers' alpha = .61
- Fathers' alpha = .53

**Parent's perception of child's effort needed to do well: PAREFFCH**

1. To do well in math, my child has to try: (a little/a lot)
2. In comparison with other academic subjects, to do well in math my child has to try: (much less than in other subjects/much more than in other subjects)

- Mothers' alpha = .74
- Fathers' alpha = .65

**Parent's future expectancy for child: PARFEXCH**

1. If your child plans to take math next year, how well do you expect him/her to do? (not at all well/very well)
2. How well do you think your child would do in first year algebra? (not at all well/very well)

3. How well do you think your child would do in an advanced math course like calculus? (not at all well/very well)

Mothers' alpha = .66
Fathers' alpha = .83

**Parents' perception of task difficulty for child: PARTDCH**

1. My child found math: (very easy/very hard)

2. In comparison with other academic subjects, my child found math: (much easier than other subjects/much harder than other subjects)

Mothers' alpha = .79
Fathers' alpha = .76

**The importance of math for parents in the past: PAPIMPA**

1. I felt that doing well in my math courses was: (not at all important/very important)

2. I felt that, in comparison with other academic subjects, doing well in math courses was: (much less important than other subjects/much more important than other subjects)

3. If I received what I considered a low grade in a math course, I would have felt: (not at all upset/very upset)

Mothers' alpha = .73
Fathers' alpha = .75

**Parents' past math ability: PAPAPANA**

1. I felt I was: (not at all good at math/very good at math)

2. I felt that, in comparison with other academic subjects, I was: (much worse at math than at other subjects/much better at math than at other subjects)
**TABLE C (cont'd.)**

**Effort required of parents to do well in the past: PAREFFPA**

1. To do well in my math courses, I had to try: (a little/a lot)

2. In comparison with my other academic subjects, to do well in math I had to try: (much less than other subjects/much more than in other subjects)

*Mothers' alpha = .77*

*Fathers' alpha = .71*

**Difficulty of math for parents in the past: PARTDPNA**

1. For me, math courses were: (very easy/very hard)

2. In comparison with other academic subjects, for me math courses were: (much easier than other courses/much harder than other courses)

*Mothers' alpha = .94*

*Fathers' alpha = .31*

**Difficulty of math for parents in the present: PARTDPOR**

1. In general, when I must solve problems or do work which involves math, I find this: (very easy/very hard)

2. If you had a job which required mathematical ability of the level needed to do well in high school math, how much trouble would you have meeting the demands of the job? (a little/a lot)

3. In general, I believe that advanced high school math is:
   1) much harder than most other academic courses
   2) a little harder than most other academic courses
   3) about as hard as most other academic courses
   4) a little easier than most other academic courses
   5) much easier than most other academic courses

*Mothers' alpha = .26*

*Fathers' alpha = .48*

**Importance of math for parents in the present: PAREMPPE**

1. I find that, in terms of my everyday activities (outside employment), the basic arithmetic skills
TABLE C (cont'd.)

learned in school are: (not at all useful/very useful)

2. I find that, in terms of my everyday activities (outside employment), the math that I learned in high school is: (not at all useful/very useful)

3. For me to be good at solving problems which involve mathematically is: (not all important/very important)

Mothers' alpha = .59

Fathers' alpha = .73

Parents' current math ability: PARABPR

1. I would describe my mathematical aptitude or ability as: (not at all good/very good)

Alpha is unavailable

Parents' current enjoyment of math: PARENJPR

1. In general, I find solving problems or doing tasks which involve math: (not at all enjoyable/very enjoyable)

Alpha is unavailable
# Table D

## Overview of Observational System

### I. Response Opportunities: Situation in which teacher publicly questions students in class

<table>
<thead>
<tr>
<th>Type of Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.) Discipline -- teacher calls on student to redirect student's attention</td>
</tr>
<tr>
<td>2.) Direct -- teacher calls on student who has not volunteered</td>
</tr>
<tr>
<td>3.) Open -- teacher calls on student who has raised his/her hand</td>
</tr>
<tr>
<td>4.) Call-out -- student calls out the answer without permission</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level of Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.) Response -- questions that have a right or wrong answer</td>
</tr>
<tr>
<td>2.) Self-reference -- questions that ask for opinion or prediction</td>
</tr>
</tbody>
</table>

### C. Type of Student Response

<table>
<thead>
<tr>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.) Answer</td>
</tr>
<tr>
<td>2.) Don't know</td>
</tr>
<tr>
<td>3.) No response at all</td>
</tr>
</tbody>
</table>

### D. Teacher's Feedback

<table>
<thead>
<tr>
<th>Feedback Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.) Praise or criticism directed to quality of the work</td>
</tr>
<tr>
<td>2.) Praise or criticism directed to the form of the work</td>
</tr>
<tr>
<td>3.) Praise or criticism directed to conduct</td>
</tr>
<tr>
<td>4.) Affirm</td>
</tr>
<tr>
<td>5.) Negate</td>
</tr>
<tr>
<td>6.) No feedback</td>
</tr>
<tr>
<td>7.) Give answer</td>
</tr>
<tr>
<td>8.) Ask other -- calls on another student to answer the question</td>
</tr>
<tr>
<td>9.) Sustaining feedback -- gives the student another opportunity to answer the question</td>
</tr>
<tr>
<td>10.) Attributions to ability, effort and task difficulty</td>
</tr>
</tbody>
</table>

### II. Student-Initiated Questions

<table>
<thead>
<tr>
<th>Type of Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.) Content</td>
</tr>
<tr>
<td>2.) Procedural</td>
</tr>
</tbody>
</table>

### B. Teacher's Feedback

### III. Dyadic Interactions: Situations in which teacher interacts privately with student

<table>
<thead>
<tr>
<th>Initiation of Interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.) Teacher</td>
</tr>
<tr>
<td>2.) Student</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Feedback</th>
</tr>
</thead>
</table>