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ABSTRACT

"PBS Mathline Middle School Math Project" is a national program offered by the Public Broadcasting System (PBS) to local affiliates to increase middle school teachers' understanding of the National Council of Teachers of Mathematics Standards, encourage discourse among teachers, and develop classroom applications based on video models of teaching. The purpose of this study was to evaluate the effectiveness of the Mathline Professional Development Program in a midwestern metropolitan region. This paper presents some of the initial findings and describes some of the issues involved in the evaluation, development, and implementation of such a program. The evaluation sought to detail the impact of the program on participating teachers. In addition, the elements of the program were evaluated to determine their effectiveness. Teachers responded favorably to the lessons they had tried and believed that the video lessons lend themselves to integration in the teacher's classroom. On-line discussions were also part of the program but there were teachers who never participated, usually because of technical difficulties. The Mathline survey filled out by teachers is included. (PVD)

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ED 406 152

Understanding National Standards: An Evaluation of a Professional Development Program for Mathematics Teachers

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UNDERSTANDING NATIONAL STANDARDS: AN EVALUATION OF A PROFESSIONAL DEVELOPMENT PROGRAM FOR MATHEMATICS TEACHERS

During the late 1980s, in response to a perceived crisis in education, there was a call for new national standards. The National Council of Teachers of Mathematics (NCTM) was the first organization to complete a standards document. *The Curriculum and Evaluation Standards for School Mathematics* (1989) has served as the cornerstone of reform in mathematics education and presented a vision of how math should be learned, taught and evaluated in K-12 schools.

This past year saw the release of standards for science education. The National Research Council's *National Science Education Standards* (1996) have also painted a vision of what science education in K-12 schools should be. The new document has created a need for updating the knowledge of inservice teachers on the science standards. The science education community can draw from the mathematics education community's experiences of implementing national standards and the development of inservice teachers.

PBS Mathline Middle School Math Project is a national program offered by the Public Broadcasting System (PBS) to local affiliates to increase middle school teachers' understanding of the NCTM mathematics standards. A similar program exists for elementary teachers. The purpose of this study was to evaluate the effectiveness of the *Mathline* professional development program in a midwest metropolitan region. The program was offered by KCPT-19 in Kansas City Missouri. This presentation is intended to present some of the initial findings and describe some of the issues involved in the evaluation, development and implementation of such a program. The Kansas City offering of the *Mathline* program and the evaluation were supported by a grant from the Eisenhower Professional Development Program administered by the Missouri Coordinating Board for Higher Education.

Significance

The *Mathline Middle School Math Project* is an integrated set of activities and materials that focus on the systemic change described by the NCTM. Similar systemic change is being called for by the *National Science Education Standards*. The effectiveness of the video and telecommunications for increasing teachers understanding of national standards has implications for future professional development of inservice teachers in science education. Following the *Mathline* model, the Public Broadcasting Service is currently developing "ScienceLinks" for a possible release as early as the fall of 1997 (NSTA Reports, p. 10).

Program Description

Mathline is a professional development project for elementary and middle school mathematics teachers. Project goals are:

- to increase teachers' understandings of the NCTM Standards,
- to encourage discourse among teachers, and
- to develop classroom applications based on video models of teaching.

Mathline was first launched during the 1994-1995 school year. Teachers who participate are expected to spend at least two-hours a week on project activities for a school year. Participants need to have access to a computer, modem, phone line and a VCR. Communication software is provided. Each participant receives 25 video programs which demonstrate standards-driven instruction, unlimited opportunities to interact with other teachers using on-line communications technology, on-line access to a mentor who provides support to individuals and orchestrates group discussions, and the opportunity to participate in two national interactive video conferences involving teachers across the

country. On-line recourses include an electronic resource center for teachers, instructional and motivational programming for students, and programs to help parents participate in the math education of their children. In addition to modeling Standard-based instruction, the videos also include teacher insights, problems they have experienced and challenges they have faced. Lesson plans for each video are included in the materials. Teachers have the materials at their home so they are free to choose the time and the place most convenient for them to pursue their professional development.

Mathline has operated nationwide for a three-year period. At the national level, Rockman ET AL of San Francisco California has conducted the project evaluation. The evaluation utilized a multifaceted research design including: pre- and post-project surveys, phone interviews, three on-line surveys, and analysis of discussion on the national on-line bulletin board.

Rockman ET AL's findings during the first and second year of implementation have shown the program to be effective. The program's success began with the recruitment of teachers. Teachers appear motivated to join *Mathline* because of the desire to learn new instructional technologies (74%), to exchange ideas with their peers (55%) and because they wanted to learn instructional strategies for implementing the NCTM standards (52%). Other findings include:

- 50% of the participating teachers reported that the project had a positive impact on their teaching style,
- 60% felt students' attitudes toward mathematics were more positive,
- 80% felt students' involvement in math increased and the phobia of math had decreased,
- 83% felt this was more effective than other staff development programs.

Participants in the national programs also indicated substantial increases in their access to and use of computers and modems. However, teachers experienced some obstacles, too. These obstacles included technical difficulties, lack of satisfactory access to equipment, lack of adequate training to feel at ease using the equipment, and the anxiety about their technology skills added stress to their time constraints. (Rockman ET AL, 1995, 1996)

Research Questions

The evaluation sought to detail the impact of the program on the participating teachers . Acceptance of national standards depends upon teachers' beliefs. Among the influences on a teacher's behaviors are the teacher's attitude and beliefs about students, mathematics, and math instruction. (Thompson, 1992) In addition to documenting changes in the teachers, the elements of the program were evaluated to determine their effectiveness. Answers were sought to the following research questions:

1. What were the characteristics of the participants?
2. What was the impact on the teachers' classrooms?
3. Did the program encourage discourse between teachers and students, other teachers, parents and the administration?
4. What elements of the program were the most effective?

Design, Instruments and Procedures

This summative evaluation of the *Mathline* project was designed to assess and document the impact of the project. Data were obtained from a pre-project survey, observations of on-line discussions, time on-line as compiled by system software, and a mid-project survey. The relationship between research questions and the various sources of

evidence are summarized in Table 1. The survey data were analyzed for trends and differences among participants from the beginning of the program to the end.

The pre-project survey consisted of five main parts. The first part was a variation of the Standards Belief Instrument (Zollman and Mason, 1992) and consisted of 20 questions using a 4-point Likert scale to address the teacher's attitudes and beliefs about mathematics, and mathematics teaching as envisioned by the NCTM Standards. In addition, there were five open-ended essay questions concerning the implementation of the NCTM Standards in a classroom. Twenty-three questions pertained to the frequency of various types of activities in their classrooms and the math concepts taught, (Nelson, Weiss and Conaway, 1992) and eight questions related to the frequency of conversations about mathematics with different groups of people. Demographic data were also gathered on the pre-project survey. The survey instrument is included in the appendix.

The mid-project survey consisted of open-ended questions. The teachers were asked to identify the location of the *Mathline* computer, names of the videos they have watched, the usefulness of the content, ability to integrate videos into their classrooms, video lessons taught in their classroom and any problems with on-line access.

The pre-project pencil-and-paper survey was administer from July until October, 1996 as participants joined the program. The mid-project was administered in January, 1997. There were both pencil-and-paper and on-line forms of the mid-project survey. On-line observations of a cohort of participants were made in October and November, 1996 and again in January and February, 1997. In addition, time and number of calls data from the system software was collected over four months starting in November, 1996 and ending in February, 1997.

TABLE 1: Summary of Research Questions and Instruments

Research Question	Instrument
What were the characteristics of the participants?	pre-project survey
What was the impact on the teachers' classrooms?	pre-project survey mid-project survey
Did the program encourage discourse between teachers and students, other teachers, parents and the administration?	pre-project survey on-line observations time on-line data
What elements of the program were the most effective?	mid-project survey on-line observations time on-line data

Limits of Evaluation

The implementation of the program changed as the program progressed. The original starting date was changed and new groups added late in the project effectively eliminating a precise starting date. The completion date was also changed and finally extended to cover the entire school year making it impossible to complete the research before this presentation. Some of the activities such as communication between the mentors and the teachers could not be documented but had to be self-reported. Since the program is self-paced, not everyone completed the same amount of materials in the same amount of time. In addition, return rates on surveys were low. Without face-to-face contact, it was difficult to get the materials returned. The evaluation also lacked a comparison group.

Sample

There are 120 participating teachers in the middle school project and 34 in the elementary project. A majority of teachers are from the Kansas City metropolitan area, but twenty-seven of the middle school teachers are from the Springfield, Missouri area . The participants recruited are representative of the teachers in the Kansas City and Springfield areas. The demographics data from the pre-intervention survey is presented in Tables 2, 3, 4 and 5. Of the 154 teachers in the program, 54 responded to the survey yielding a 35% response rate. The teachers appear to be predominately female and white. (see Table 2 and 3) Most of the teachers are from public schools but there is fair representation from private and parochial schools. (Table 4) Teachers from rural, suburban and urban areas are all represented. (Table 5) In addition, the average number of years teaching was 13.59 years. There were more teachers who had taught for over 20 years than teachers who had taught for less than 10.

TABLE 2: Gender

Gender	Percent of MATHLINE participants (%)
Male	14.58
Female	85.42

TABLE3: Ethnicity

Ethnicity	Percent of MATHLINE participants (%)
White	95.83
Black	4.16
Other	0.0

TABLE 4: Type of School

Type of School	Percent of MATHLINE participants (%)
Public	77.08
Private	8.33
Parochial	14.58

TABLE 5: Location of School

Location of School	Percent of MATHLINE participants (%)
Rural	25.00
Suburban	45.83
Urban	29.16

Pre-Intervention Survey

The pre-intervention survey was developed to determine the characteristics of the participants and to gather baseline data for comparison at the end of the program. The *Mathline* project is intended to impact on the teachers in the following areas:

- Knowledge of the NCTM Standards;
- Attitude toward content knowledge, preparation in mathematics, and ability to motivate students;
- Frequency of communication with students, administrators, parents, and other teachers;
- Classroom instruction and activities.

To measure the impact of the project, a survey was created and administered during the fall of 1996. The results of the survey will serve as a baseline for comparison with data gathered at the end of the project in the spring of 1997.

Attitudes, Beliefs and Classrooms

The survey instrument revealed that teachers agree with the idea that all children can learn and that they can make a difference in the lives of their children. Teachers also agree with the idea that they can do their job regardless of the school environment. Teachers agree with the idea that some children have problems which make it difficult for them to be good students. In general, the teacher have positive attitudes toward their content knowledge, preparation, and abilities to motivate and inspire students.

The participants identified how often during a typical week they engaged in certain instructional activities such as using a calculator, working in small groups and working with manipulatives. During a typical week, teachers will have the students do problems from the textbook and work in groups several times. Teachers have the students do work sheets, work with manipulatives, use a computer, and use a calculator on average once a week. Teachers used published mathematics tests and mathematics projects less than once a week.

Teachers were asked how may times during an average week they communicated with various people about math. During an average week, teachers will communicate with students and other teachers inside the school around 5-6 times. They will communicate with parents and other math teachers in the school around twice a week. Teachers will communicate with the administration, math teachers outside the school and other teachers outside the school about once a week.

Standards

The Standards Belief Instrument (Zollman and Mason, 1992) seems to indicate the teachers are, on a whole, in agreement with the NCTM Standards. The exception occurs in several survey items. These items showed that the teachers stressed the increased use of key words, skill preceding word problems, absorbing information through repeated practice and reinforcement, and that math is a collection of concepts and skills, more than the National Standards.

In addition to the Standards Belief Instrument, the teachers were presented with the following description of a 7th grade classroom:

> Students are working with partners, their desks pushed together and covered with color tiles, graph paper, markers, scissors and paper. Some students are huddled together, making shapes with the tiles. Others are recording their color-tile shapes on graph paper, while others are sharing their finding with another partner. Still others are writing in their journals. The teacher is circulating through the room, monitoring the progress of each pair. "Be sure to share your results with the pair across from you. We will have a group discussion in about five minutes."

The teachers were then asked to answer four questions relating to the essay:

1. Based on this brief description, what do you feel are the strengths of this classroom?
2. What do you feel are the weakness of this classroom?
3. What questions about this classroom would you ask the teacher?
4. How is this classroom consistent with your understanding of the NCTM Standards?

Of the 54 participants who completed the pre-project survey, only 42 answered the essay questions.

Responses to the first question, strengths of the classroom, fell into six categories. Similar answers were counted together within a category. For example, references by the teachers to student collaboration, small group work, peer tutoring and working together were all counted as examples of cooperative learning. Individual answers listed fewer than five times were combined into a Miscellaneous category. The teachers frequently identified communication of math knowledge, cooperative learning, use of manipulatives and the teacher acting a facilitator as strengths of the classroom. The results are summarized in Table 6.

TABLE 6: Strength of Classroom Responses

Categories	Number of responses
Communication, exchange of ideas, writing, speaking, discussions, sharing	22
Cooperative learning, collaboration, small group work, working together	16
Miscellaneous (multiple tasks, progress at own rate, connect to real world, problem solving, process learning, noncompetitive)	16
Use of Manipulatives, hands-on, concrete objects	14
Teacher is a Facilitator, coach, monitor	11
Students actively involved	7

The second question addressed weakness in the classroom. Weaknesses were collected into categories as with the preceding example. Most respondents did not see any problems with the classroom. Several teachers had problems with cooperative learning environments. The most negative comment concerning cooperative learning by a teacher was, "In 1996, this is not realistic for seventh grade students at any socioeconomic level in my opinion." Some teachers expressed concerns about management issues such as level of noise, record keeping and the lack of apparent objectives. The results are summarized in Table 7.

TABLE 7: Weakness of Classroom Responses

Categories	Number of Responses
None	17
Problems with Cooperative Learning	9
Teacher Management Issues such as no objectives, noise level, record keeping	8
Miscellaneous: time, ADD students, too many activities, no uniformity	4
Assessment	3

When asked what type of questions they would like to ask the teacher of the described classroom, the participants answers fell into five categories. The results are summarized in Table 8. Most teachers had questions which related to teacher management. Typical questions included source of ideas, what type of questions, how often are such activities used, and how is student behavior controlled. Teachers also had many questions concerning cooperative learning. Some questions focused on teacher management such as how are partners selected. Other questions focused on the utility of using cooperative learning. An example of this is the question asked by one teacher "Will they be able to handle the more traditional learning styles of K.C.'s high schools?" How do you assess the students and what are the objectives for the lesson were also frequent questions.

TABLE 8: Questions you would ask the teacher

Categories	Number of Responses
Teacher Management: source of ideas, keeping students on-task, questioning, teacher monitoring, frequency of such activities, control of student behavior	20
Management of Cooperative Learning: how much time in groups, partner selection, absences, ideal group size	19
How do you assess students?	18
What are the objectives, goals, purpose?	17
Miscellaneous: Can they do mental math, how do they handle traditional high schools	3

When asked if the classroom was consistent with their understanding of the NCTM Standards, the vast majority said it was. The results are summarized in Table 9. Twenty-two of the respondents included why they believed it was consistent. The most frequently listed reasons were the use of manipulatives, verbal and written communication of mathematics, use of cooperative learning, and the focus on problem solving.

TABLE 9: Consistent with NCTM Standards

Categories	Number of Responses
Yes	34
Don't know	2
No answer	6

On-Line Activity Level

The on-line activity level of the teachers has been monitored in two different ways. The first method involved comparing the amount of time spent on-line by a randomly selected set of 35 participants. This information is automatically recorded by the system software. The second method was to monitor one cohort of 31 participants and record their level of activity using a 3-point scale. This second group was a cohort formed by the *Mathline* staff and supervised by the same mentor.

Method 1

A set of 35 participants were randomly selected from the list of 154 participants. The total amount of time spent on-line and the number of times the participant called each month were recorded for four months starting in November, 1996 and ending in February, 1997. The data were automatically collected by the system's operating software. The results are summarized in Table 10. The total number of calls, average calls per participant, total times, and average times per participant were all fairly consistent from one month to another. There were some changes due in part to the holiday season, especially in December. There was a wide range of activity levels. Some people only called in four times a month, others as many as 100 times, but everyone was consistent month to month.

TABLE 10: On-Line activity level as measured by system software

	November 1996	December 1996	January 1997	February 1997
Total Number Calls	2041	1757	1784	2037
Average Number calls/ participant	58.3	50.2	51.0	58.2
Total Time (hours)	270.582	232.993	304.506	283.485
Average Time/participant (hours)	7.73	6.66	8.70	8.09

Method 2

A cohort of 31 teachers was monitored in October and November, 1996 and again in January and February, 1997. Data for December were lost during a system crash in early January. Each persons level of participation was indicated by using a 3-point scale:

0 Never logged in
1 Logged on
2 Posted at least once
3 Posted frequently

The cohort's mentor evaluated each member of the cohort. Between October and November more people become active at levels 2 and 3 as shown in Table 11. In general, the activity level of the individuals in this group increased only slightly between October and November. In January and February, the level remained fairly consistent. Individuals tended to stay active at the same level later in the program. Those who were not active on-line after October remained inactive.

TABLE 11: Group 1 Activity Level, N=31

Month	Percent at Level 0	Percent at Level 1	Percent at Level 2	Percent at Level 3
October 1996	35	23	35	7
November 1996	31	21	28	21
January 1997	27	30	23	20
February 1997	25	32	21	22

A similar survey of the Springfield *Mathline* group (N=22) in early January found 18% of the participates active at level 3, 45% at level 2, and 36% at level 0. Two of the participants who had not logged on indicated problems with access and modem difficulties. The results from both methods and from the Springfield group are all consistent. The teachers were active on-line and their level of activity was consistent from one month to another. The level of activity varied greatly between individuals.

Mid-Project Survey

A mid-project survey was completed in January 1997. A total of 30 teachers completed the survey, yielding a response rate of 19.5%. The results show that most of the participants use a computer at school (53%) or at home (30%). There was no pattern to which day of the week or time when the teachers accessed the on-line resources. Thirty-percent of the respondents reported some technical difficulties but they all also included praise for the technical support and help received from *Mathline* and KCPT staff.

The teachers were also asked about how many videos they had watched and how many of the video lessons they had implemented in their classrooms. Fifty-three percent of the respondents reported having watched all of the videos. The remaining teachers averaged eight videos watched. When asked which videos they had implemented in their classrooms, the average teacher had taught three lessons based on the videos in their classroom. The teachers were watching and applying the videos in their classrooms. Teacher comments included "The students caught on much quicker than I had anticipated and enjoyed the challenge," "Yes, the kids love the games and hands-on activities." Most teachers reported the videos were easy to integrate into their current classrooms. Several teachers reported problems with the integration, "I am having difficulty with that one; especially matching them up with my MMAT [state mandated standardized test] objectives, " and "...just because of the sheer time pressure of what I must teach."

Findings

What were the characteristics of the participants? The pre-project survey revealed that most of the participants were experienced teachers who were familiar with the NCTM Standards. The teachers identified use of manipulatives, verbal and written communication, use of cooperative learning and a focus on problem solving as key elements of the Standards.

What was the impact on the teachers' classrooms? The pre-project survey and mid-project survey showed that the teachers were beginning to implement some of the activities from the videos in their classrooms. The teachers responded favorably to the lessons they

had tried and believe the video lessons lend themselves to integration in the teacher's classroom. Teachers were frequently interested in how to manage cooperative learning groups and assessment in their classrooms.

Did the program encourage discourse between teachers and students, other teachers, parents and the administration? The pre-project survey showed that teachers were fairly isolated within their schools. This project provides an avenue for the teachers to talk with experts and other teachers outside of their buildings. The level of participation by the teachers varied greatly between individuals. A small percentage of the participants never logged-on or participated in the on-line activities. For those who did use the on-line resources, the level of activity was fairly constant from one month to another.

What elements of the program were the most effective? The videos seemed to be the most effective component of the project. The teachers actively watched the videos and tried some of those lessons in the classroom. Having a model which to follow lead to successful experiences. The on-line discussions were also successful but there were people who never participated, usually because of technical difficulties. The KCPT staff did an excellent job of training the teachers and providing support, but some of the technical difficulties discouraged active participation. Marybeth Swartz, an on-line facilitator for KCPT, reported "The program would be more successful if more participants were on-line. I am sure that many of our teachers think that the videos are the program; whereas, the greatest strength is the on-line interchange of ideas."

A preliminary analysis of the results indicates that the *Mathline* project had a positive influence on how teachers see themselves, on their beliefs and attitudes towards mathematics and teaching math, and on their understanding of the NCTM Standards. Teachers have reported that they are increasingly engaging the NCTM Standards and have changed the environment in their math classrooms to be more consistent with the Standards. Many of the teachers have become active members of an on-line community discussing mathematics teaching and learning issues. The implication is that *Mathline* provides a model program which the science education community can duplicate for preparing science teachers to implement the National Science Education Standards.

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NAME:_____ DATE:_____

MATHLINE Survey

This survey is designed to help the staff at MATHLINE evaluate the success of the program. The information gathered will be used to improve the program so that it can better meet the needs of math teachers. Thank you for your time and willingness to complete this survey. Record your answers on this report and please return it to the evaluator.

Part I

Please answer all items. Use the following response categories:

A strongly agree
B agree
C disagree
D strongly disagree

1. Problem solving should be seperate, distinct part of the mathematics curriculum.	A	B	C	D
2. Students should share their problem-solving thinking and approaches with other students.	A	B	C	D
3. Mathematics can be thought of as a language that must be meaningful if students are to communicate and apply mathematics productively.	A	B	C	D
4. A major goal of mathematics instruction is to help children develop the belief that they have the power to control their own success in mathematics.	A	B	C	D
5. Children should be encouraged to justify their solutions, thinking and conjectures in a single way.	A	B	C	D
6. The study of mathematics should include opportunities of using mathematics in other curriculum areas.	A	B	C	D
7. The mathematics curriculum consists of several discrete strains such as computation, geometry, and measurement which can be best taught in isolation.	A	B	C	D
8. In K-4 mathematics, increased emphasis should be given to use of clue words (key words) to determine which operation to use in problem solving.	A	B	C	D
9. In K-4 mathematics, skill in computation should precede word problems.	A	B	C	D
10. Learning mathematics is a process in which students absorb information, storing it in easily retrievable fragments as a result of repeated practice and reinforcement.	A	B	C	D
11. Mathematics should be thought of as a collection of concepts, skills and algorithms.	A	B	C	D

12. A demonstration of good reasoning should be regarded even more than student's ability to find correct answers.	A	B	C	D
13. Appropriate calculators should be available to all students at all times.	A	B	C	D
14. Learning mathematics must be an active process.	A	B	C	D
15. Children enter kindergarten with considerable mathematical experience, a partial understanding of many mathematical concepts, and some important mathematical skills.	A	B	C	D

Part II

Please answer all items. Use the following response categories:

A Strongly Agree
B Somewhat Agree
C Somewhat Disagree
D Strongly Disagree

16. All children can learn.	A	B	C	D
17. I can really make a difference in the lives of my students.	A	B	C	D
18. If I do my job well, my students will benefit regardless of how the rest of the school functions.	A	B	C	D
19. Many children come to school with so many problems that it's very difficult for them to be good students.	A	B	C	D
20. Even the best teachers will find it difficult to really teach more than two-thirds of their students.	A	B	C	D

Part III

Please answer all items., Use the following response categories:

A strongly agree
B agree
C disagree
D strongly disagree

21. The content knowledge I possess is adequate to teach mathematics.	A	B	C	D
22. I have positive feelings about my preparation for teaching mathematics.	A	B	C	D
23. Teaching math is an enjoyable experience.	A	B	C	D
24. It is difficult to motivate children to want to learn about math.	A	B	C	D
25. I feel I have the skills necessary to inspire children to want to learn about math.	A	B	C	D
26. I believe I will convey an enthusiastic attitude towards math to children.	A	B	C	D

Think about your plans for this mathematics class for the entire year. How much emphasis will you give each of the following?

A heavy emphasis
B moderate emphasis
C little emphasis
D no emphasis

27. Whole number operations	A	B	C	D
28. Common fractions	A	B	C	D
29. Decimal fractions	A	B	C	D
30. Ratio or proportion	A	B	C	D
31. Percent	A	B	C	D
32. Measurement	A	B	C	D
33. Geometry	A	B	C	D
34. Tables and graphs	A	B	C	D
35. Probability or statistics	A	B	C	D
36. Algebra formulas and equations	A	B	C	D
37. Learning mathematics facts and concepts	A	B	C	D
38. Learning skills and procedures needed to solve routine problems	A	B	C	D
39. Developing reasoning and analytic ability to solve unique problems	A	B	C	D
40. Learning how to communicate ideas in mathematics effectively	A	B	C	D

Part IV

About how often do students in this class do the following types of activities for mathematics?

A	almost every day
B	several times a week
C	about once a week
D	less than once a week
E	never

41. Take teacher-generated mathematical tests.	A	B	C	D	E
42. Take other published mathematical tests.	A	B	C	D	E
43. Do mathematics problems from textbooks.	A	B	C	D	E
44. Do mathematics problems from worksheets.	A	B	C	D	E
45. Work in small groups.	A	B	C	D	E
46. Work with objects like rulers, counting blocks, or geometric solids.	A	B	C	D	E
47. Write reports or do mathematics projects.	A	B	C	D	E
48. Use calculators.	A	B	C	D	E
49. Use a computer.	A	B	C	D	E

Part V

During the average week, how many times to you communicate with the following people about your math class. Communication includes talking in person, letters, phone calls, email.

50. Students (outside of math class) . . _____

51. Parents . . . . . _____

52. Administration . . . . . _____

53. Other mathematics teachers in your school _____

54. Other teachers inside your school . . _____

55. Math teachers outside your school . _____

56. Other teachers outside your school . _____

57. Members of the Community outside of school and students' parents . . _____

Part VI

Please answer the following essay questions. Consider the following seventh grade classroom:

> Students are working with partners, their desks pushed together and covered with color tiles, graph paper, markers, scissors, and paper. Some students are huddled together, making shapes with the tiles. Others are recording their color-tile shapes on graph paper, while others are sharing their finding with another partner. Still others are writing in their journals. The teacher is circulating through the room, monitoring the progress of each pair. "Be sure to share your results with the pair across from you. We will have a group discussion in about five minutes."

58. Based on this brief description, what do you feel are the strengths of this classroom?

59. What do you feel are the weakness of this classroom?

60. What questions about this classroom would you ask the teacher?

61. How is this classroom consistent with your understanding of the NCTM Standards?

Part VII

62. In your opinion, what is mathematics?

Demographic Data

This form is optional, please do not answer any questions which you are not comfortable with. Circle the response which best represents you.

1. What is your gender? Male Female

2. Which best describes you?
   American Indiana or Alaskan Native
   Asian or Pacific Islander
   Hispanic
   Black
   White

3. Counting this year, how many years in total have you taught at either the elementary or middle level? (include any permanent full-time or part-time assignments, but not substitute assignments)

4. About how many separate courses (at the undergraduate or graduate level) have you taken in each of the following areas? Fill in one circle on each line.

Methods of teaching elementary mathematics	none	1	2	3 or more
Methods of teaching middle-school mathematics	none	1	2	3 or more
Geometry for elementary or middle school teachers	none	1	2	3 or more
College algebra, trigonometry, elementary functions	none	1	2	3 or more
Number systems and numeration	none	1	2	3 or more
Geometry	none	1	2	3 or more
Probability/ statistics	none	1	2	3 or more
Calculus	none	1	2	3 or more

5. During the last year, how much time in total have you spent on in-service education in mathematics or the teaching of mathematics? Include attendance at professional meetings and conferences, workshops, and courses.

none
less than 6 hours
6-15 hours
16-35 hours
more than 35 hours

6. Is your school: public private parochial

7. Is your school: rural suburban urban

8. What grade level do you teach? _____

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