

# Michigan Middle School Mathematics Reform Project (M<sup>3</sup>RP) TEACHER LEADER SURVEY REPORT--2001

## COMPARISON OF RESPONSES SUMMER 2000 and SUMMER 2001

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**Background.** At the beginning of the Teacher Leader Summer Institutes in 2000 and 2001, participants were asked to complete a survey about their content knowledge, preparedness to use particular instructional practices, frequency of use of selected classroom practices, and frequency of student participation in specific lesson activities.

**Sample.** Surveys were administered on the first day of the session in each region. In 2000, 182 teachers completed surveys; in 2001, 159 completed them. Among participants in the second year were teachers who were newly designated Teacher Leaders (TL), participating in summer institutes for the first time. Many of these new TLs replaced previous participants. What follows is a comparison of the group of teachers from each year who completed the survey. A more detailed analysis, comparing individual scores, will be conducted at a later date. A separate report will be prepared.

### Comparison of Responses

□ There were 59 items on the survey that were the same in each of the two years. Teachers were asked to rate these items on a Likert scale. Using a t-test, the following 12 items were found to have a statistically significant difference. Percent of responses and mean scores for all items are shown in the tables below.

For the following 4 items, mean scores improved, meaning that teachers are making a greater use of these teaching strategies.

- Arranging seating in their classrooms to facilitate student discussion
- Using open-ended questions in their discourse with students
- Requiring students to explain their reasoning when giving an answer
- Encouraging students to communicate mathematically in their discourse

For the following 6 items, mean scores improved, meaning that students are being engaged in these activities more this year than in the past.

- Working in cooperative groups
- Making formal presentations to the class about their work
- Working on solving real-world problems
- Engaging in hands-on mathematics activities
- Following specific instructions in an activity
- Designing or implementing their own investigations

For the following 2 items, mean scores decreased, meaning that less of these more traditional activities were occurring in classrooms.

- Teachers introducing content through formal presentation (This means less of this is being done by teachers.)
- Students working independently (This means that less of this is being done.)

These results suggest, based on teacher self-report, that important elements of standards-based investigative-oriented strategies and activities are being used more in the classrooms of Teacher Leaders.

□ TLs were asked to rate their level of preparedness to teach selected mathematics topics on a 4-point scale, with 1 meaning not prepared and 4 meaning well prepared. The percentage of ratings for each scoring category and an average score are shown in the table below.

| Mathematics Topics     | 1            |    | 2   |     | 3   |     | 4             |     | Average Score |     |
|------------------------|--------------|----|-----|-----|-----|-----|---------------|-----|---------------|-----|
|                        | Not Prepared |    |     |     |     |     | Well Prepared |     |               |     |
|                        | 00           | 01 | 00  | 01  | 00  | 01  | 00            | 01  | 00            | 01  |
| Number Sense           | 1%           | 0% | 1%  | 1%  | 29% | 35% | 68%           | 64% | 3.6           | 3.6 |
| Number Operations      | 1%           | 0% | 2%  | 0%  | 22% | 28% | 75%           | 72% | 3.7           | 3.7 |
| Proportional Reasoning | 2%           | 1% | 9%  | 13% | 43% | 48% | 46%           | 38% | 3.3           | 3.2 |
| Algebra                | 3%           | 1% | 11% | 8%  | 32% | 46% | 54%           | 45% | 3.4           | 3.4 |
| Measurement            | 1%           | 1% | 4%  | 4%  | 34% | 44% | 61%           | 51% | 3.6           | 3.4 |
| Geometry               | 1%           | 1% | 11% | 12% | 40% | 51% | 48%           | 36% | 3.4           | 3.2 |
| Probability            | 2%           | 1% | 19% | 19% | 48% | 53% | 32%           | 27% | 3.1           | 3.1 |
| Statistics             | 5%           | 2% | 21% | 23% | 46% | 48% | 28%           | 27% | 3.0           | 3.0 |

□ TLs were asked to rate their level of preparedness to use selected mathematics teaching/learning strategies in their lessons on a 4-point scale, with 1 meaning not prepared and 4 meaning well prepared. The percentage of ratings for each scoring category and an average score are shown in the table below.

| Mathematics Teaching/<br>Learning Strategies      | 1            |     | 2   |     | 3   |     | 4             |     | Average Score |     |
|---|--------------|-----|-----|-----|-----|-----|---------------|-----|---------------|-----|
|   | Not Prepared |     |     |     |     |     | Well Prepared |     |               |     |
|   | 00           | 01  | 00  | 01  | 00  | 01  | 00            | 01  | 00            | 01  |
| Problem-solving                                   | 2%           | 1%  | 8%  | 10% | 60% | 55% | 31%           | 34% | 3.2           | 3.2 |
| Reasoning and proof                               | 5%           | 13% | 32% | 34% | 50% | 41% | 13%           | 12% | 2.7           | 2.5 |
| Communication                                     | 4%           | 3%  | 18% | 18% | 53% | 54% | 24%           | 25% | 3.0           | 3.0 |
| Making connections within mathematics             | 2%           | 1%  | 15% | 16% | 61% | 56% | 22%           | 26% | 3.0           | 3.1 |
| Making connections from mathematics to real-world | 2%           | 1%  | 22% | 18% | 53% | 56% | 24%           | 26% | 3.0           | 3.1 |

| Mathematics Teaching/<br>Learning Strategies  | 1            |    | 2   |     | 3   |     | 4             |     | Average Score |     |
|---|--------------|----|-----|-----|-----|-----|---------------|-----|---------------|-----|
|   | Not Prepared |    |     |     |     |     | Well Prepared |     |               |     |
|   | 00           | 01 | 00  | 01  | 00  | 01  | 00            | 01  | 00            | 01  |
| Leading a class of students using investigative strategies  | 5%           | 2% | 31% | 24% | 49% | 52% | 16%           | 22% | 2.8           | 2.9 |
| Managing a class of students engaged in hands-on/project-based work                               | 3%           | 1% | 18% | 16% | 47% | 49% | 32%           | 34% | 3.1           | 3.2 |
| Helping students take responsibility for their own learning                                       | 3%           | 1% | 21% | 25% | 50% | 50% | 26%           | 25% | 3.0           | 3.0 |
| Recognizing and responding to student diversity   | 3%           | 1% | 23% | 18% | 43% | 60% | 31%           | 21% | 3.0           | 3.0 |
| Use strategies that specifically encourage participation of females and minorities in mathematics | 7%           | 2% | 35% | 32% | 38% | 45% | 20%           | 20% | 2.7           | 2.8 |
| Involve parents in the mathematics education of their children                                    | 11%          | 6% | 49% | 50% | 34% | 36% | 6%            | 8%  | 2.3           | 2.5 |

□ TLs were asked how often they use selected types of activities in their mathematics lessons on a 5-point scale, with 1 meaning never and 5 meaning all the time. The percentage of ratings for each scoring category and an average score are shown in the table below.

| Mathematics Teaching Activities                                       | 1<br>never                                     |     | 2   |     | 3   |     | 4   |     | 5<br>all the time |     | Average Score |     |
|---|--|-----|-----|-----|-----|-----|-----|-----|-------------------|-----|---------------|-----|
|   | 00   | 01  | 00  | 01  | 00  | 01  | 00  | 01  | 00                | 01  | 00            | 01  |
|   | Introduce content through formal presentations | 0%  | 1%  | 3%  | 6%  | 14% | 25% | 50% | 44%               | 33% | 21%           | 4.1 |
| Arrange seating to facilitate student discussion                      | 1%   | 1%  | 8%  | 7%  | 22% | 15% | 37% | 36% | 33%               | 37% | 3.9           | 4.0 |
| Use open-ended questioning strategies                                 | 0%   | 0%  | 4%  | 3%  | 24% | 22% | 50% | 39% | 22%               | 33% | 3.9           | 4.1 |
| Require students to explain their reasoning when giving an answer     | 0%   | 1%  | 3%  | 1%  | 13% | 11% | 48% | 32% | 37%               | 52% | 4.2           | 4.4 |
| Encourage student to communicate mathematically                       | 0%   | 1%  | 4%  | 1%  | 20% | 13% | 50% | 42% | 26%               | 41% | 4.0           | 4.2 |
| Encourage students to explore alternative methods for solutions       | 0%   | 1%  | 3%  | 1%  | 22% | 24% | 44% | 41% | 31%               | 30% | 4.0           | 4.0 |
| Allow students to work at their own pace                              | 0%   | 0%  | 11% | 9%  | 27% | 19% | 40% | 51% | 22%               | 17% | 3.7           | 3.8 |
| Help students make connections between mathematics and the real-world | 1%   | 0%  | 4%  | 3%  | 24% | 19% | 57% | 50% | 14%               | 25% | 3.8           | 4.0 |
| Use assessment to find out what students know before or during a unit | 8%   | 5%  | 19% | 21% | 34% | 35% | 26% | 29% | 13%               | 7%  | 3.2           | 3.1 |
| Embed assessment in regular class activities                          | 4%   | 2%  | 17% | 11% | 33% | 36% | 35% | 36% | 11%               | 11% | 3.3           | 3.4 |
| Assign mathematics homework   | 0%   | 1%  | 2%  | 3%  | 4%  | 9%  | 33% | 38% | 61%               | 47% | 4.5           | 4.3 |
| Read/comment on reflections students write in notebooks/journals      | 24%  | 22% | 29% | 24% | 33% | 33% | 12% | 17% | 2%                | 1%  | 2.4           | 2.5 |

□ TLs were asked how often their students take part in activities in their mathematics lessons on a 5-point scale, with 1 meaning never and 5 meaning all the time. The percentage of ratings for each scoring category and an average score are shown in the table below.

| Student<br>Mathematics Activities                                    | 1<br>never |     | 2   |     | 3   |     | 4   |     | 5<br>all the time |     | Average<br>Score |     |
|--|------------|-----|-----|-----|-----|-----|-----|-----|-------------------|-----|------------------|-----|
|  | 00         | 01  | 00  | 01  | 00  | 01  | 00  | 01  | 00                | 01  | 00               | 01  |
| Participate in discussion with teacher to further math understanding | 0%         | 1%  | 2%  | 1%  | 16% | 10% | 43% | 50% | 39%               | 35% | 4.2              | 4.2 |
| Work in cooperative learning groups                                  | 0%         | 1%  | 4%  | 4%  | 24% | 13% | 46% | 51% | 26%               | 29% | 3.9              | 4.1 |
| Work independently   | 1%         | 1%  | 3%  | 4%  | 8%  | 19% | 61% | 56% | 27%               | 18% | 4.1              | 3.9 |
| Make formal presentations to the class                               | 9%         | 8%  | 45% | 30% | 32% | 42% | 11% | 14% | 3%                | 3%  | 2.5              | 2.8 |
| Read from a mathematics textbook in class                            | 8%         | 8%  | 21% | 28% | 26% | 25% | 30% | 27% | 15%               | 9%  | 3.2              | 3.0 |
| Answer textbook/worksheet questions                                  | 2%         | 1%  | 2%  | 6%  | 12% | 17% | 41% | 40% | 43%               | 33% | 4.2              | 4.0 |
| Practice routine computations/algorithms                             | 0%         | 3%  | 5%  | 6%  | 19% | 24% | 46% | 43% | 30%               | 22% | 4.0              | 3.8 |
| Review homework/worksheet assignments                                | 1%         | 1%  | 2%  | 0%  | 12% | 11% | 29% | 43% | 55%               | 42% | 4.6              | 4.3 |
| Work on solving a real-world problem                                 | 0%         | 0%  | 8%  | 3%  | 38% | 29% | 44% | 50% | 11%               | 15% | 3.6              | 3.8 |
| Share ideas or solve problems with each other in small groups        | 2%         | 1%  | 6%  | 3%  | 22% | 21% | 50% | 47% | 21%               | 26% | 3.8              | 3.9 |
| Engage in hands-on mathematical activities                           | 0%         | 0%  | 13% | 6%  | 44% | 38% | 37% | 42% | 7%                | 11% | 3.4              | 3.6 |
| Play mathematics games   | 1%         | 3%  | 25% | 18% | 44% | 53% | 28% | 23% | 2%                | 2%  | 3.0              | 3.0 |
| Follow specific instructions in an activity/investigation            | 1%         | 1%  | 11% | 9%  | 42% | 35% | 41% | 38% | 6%                | 15% | 3.4              | 3.6 |
| Design or implement their own investigation                          | 29%        | 22% | 43% | 41% | 23% | 25% | 4%  | 6%  | 1%                | 4%  | 2.0              | 2.3 |
| Work on extended mathematics investigations or projects              | 25%        | 18% | 46% | 49% | 23% | 22% | 5%  | 6%  | 2%                | 2%  | 2.1              | 2.2 |
| Record, represent and/or analyze data                                | 2%         | 2%  | 28% | 27% | 48% | 42% | 21% | 21% | 2%                | 6%  | 3.0              | 3.0 |
| Write a description of a plan, procedure, or problem-solving process | 16%        | 13% | 40% | 31% | 31% | 36% | 12% | 14% | 2%                | 3%  | 2.4              | 2.6 |
| Write reflections in a notebook or journal                           | 34%        | 30% | 24% | 24% | 22% | 23% | 16% | 19% | 4%                | 1%  | 2.3              | 2.4 |
| Use calculators for learning or practicing skills                    | 3%         | 3%  | 7%  | 8%  | 26% | 20% | 42% | 44% | 22%               | 23% | 3.7              | 3.8 |
| Use calculators as a tool  | 23%        | 14% | 21% | 19% | 21% | 23% | 25% | 32% | 11%               | 9%  | 2.8              | 3.0 |
| Use calculators to develop conceptual understanding                  | 13%        | 9%  | 25% | 24% | 34% | 32% | 21% | 24% | 7%                | 8%  | 2.8              | 3.0 |
| Use Calculator-based Labs (CBLs)                                     | 80%        | 72% | 14% | 21% | 4%  | 3%  | 2%  | 2%  | 0%                | 0%  | 1.3              | 1.3 |
| Use computers for learning or practicing skills                      | 44%        | 38% | 27% | 40% | 18% | 13% | 10% | 4%  | 2%                | 2%  | 2.0              | 1.9 |
| Use computers as a tool  | 48%        | 26% | 35% | 33% | 37% | 30% | 3%  | 8%  | 3%                | 0%  | 2.3              | 2.2 |

Student Mathematics Activities continued . . .

| Student<br>Mathematics Activities  | 1<br>never |     | 2   |     | 3   |     | 4   |     | 5<br>all the time |    | Average<br>Score |     |
|--|------------|-----|-----|-----|-----|-----|-----|-----|-------------------|----|------------------|-----|
|  | 00         | 01  | 00  | 01  | 00  | 01  | 00  | 01  | 00                | 01 | 00               | 01  |
| Take short-answer tests  | 22%        | 26% | 35% | 33% | 37% | 30% | 3%  | 8%  | 3%                | 0% | 2.3              | 2.2 |
| Take tests requiring<br>constructed responses  | 2%         | 6%  | 26% | 13% | 49% | 55% | 19% | 16% | 4%                | 8% | 3.0              | 3.1 |
| Engage in performance<br>tasks for assignment<br>purposes                                    | 13%        | 12% | 40% | 35% | 32% | 36% | 13% | 11% | 2%                | 3% | 2.5              | 2.6 |
| Conduct systematic<br>observa-tion of student<br>activities for the purpose of<br>assessment | 22%        | 18% | 36% | 33% | 22% | 27% | 15% | 13% | 5%                | 4% | 2.5              | 2.5 |

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