Kentucky Center for Mathematics: 2006-2007 Evaluation

Summary of Results

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Prepared for:

The Kentucky Center for Mathematics

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The Kentucky Center for Mathematics: 2006-2007

Introduction

The Kentucky Center for Mathematics (KCM) was formed through an appropriation given to Northern Kentucky University with the goal of enhancing the teaching of mathematics at all levels, as well as maximizing student learning of mathematics within the state of Kentucky. This is an evaluation of two major KCM programs: the primary grades (K-3) Intervention Program and the Mathematics Coaching Program.

The Intervention Program, involving only grades K-3, revolved around the implementation of one of two intervention programs. The *Number Worlds* program (see https://ca.sranumberworlds.com/) is designed for children who are one or more grade levels behind their peers in basic mathematics. It provides students with hands-on manipulatives to solve a wide range of quantitative problems in a classroom setting. The second program, *Math Recovery* (see http://www.mathrecovery.com/), is also designed for students who are significantly below expected grade level in mathematics. It is designed as an intensive one-on-one intervention program (see the KCM Intervention Programs at a Glance for additional program details: http://www.kymath.org/intervention/doc/INTERVENTION%20PROGRAMS%20AT%20A%20GLANCE.pdf)

The Mathematics Coaching program is designed to develop "coaches" who work with both small groups and one-on-one with mathematics teachers (henceforth "coachees") to help those teachers adopt instructional methods that will enhance student learning of mathematics. Coaches may work within single schools or within a school district. The mission of the KCM is to provide training and support that prepares coaches within Kentucky schools.

The University of Cincinnati Evaluation Services Center (UCESC) serves as an external evaluation consultant to the KCM programs. Dr. Debbie Zorn is the director of UCESC and provided general oversight of the evaluation. Dr. Karen Ludwig, Dr. Cathy Maltbie, and Dr. Jerry Jordan, Research Associates at UCESC, served as the primary evaluators. Jeffrey Marks, a UCESC consultant, provided significant support.

Purpose of the Evaluation

The purpose of this evaluation is to assess the general effectiveness of the mathematics intervention programs (grades K-3) and the mathematics coaching program (grades K-12) as delivered to Kentucky schools. One major objective is to evaluate how

well the KCM functions as a resource for educators in mathematics within the state of Kentucky. Because the KCM serves the schools of Kentucky through the training and support of mathematics coaches and intervention teachers, the evaluation processes were designed to assess how effective this training is directly to participating teachers, but also to those teachers who received coaching throughout the 2006-2007 school year. More importantly however, is the effectiveness of these programs in improving students' understanding of mathematics. Thus a significant part of the evaluation was centered on assessing the mathematics abilities of the children participating in intervention programs.

Evaluation Questions

The evaluation activities performed by UCESC were guided by the following questions:

The support and development activities of the KCM were evaluated in a direct fashion. Coaches, Coachees, and the teachers selected to provide the special intervention programs to students (the Math Intervention Teachers, henceforth "MITs") all provided data aimed at answering the following evaluation questions.

1. To what extent does the KCM provide materials that enhance the knowledge of and increase access to exemplary mathematics research and resources?
    a. To what extent do the materials provided by the KCM give K-12 teachers awareness of and knowledge of effective mathematics resources, such as exemplary curriculum materials, assessment strategies and materials, intervention and remediation programs, and technology, and provide them the access and support necessary to use these resources effectively? Future research will expand this question to adult educators, postsecondary faculty, and other stakeholders.
    b. To what extent does the Clearinghouse on the Kentucky Center for Mathematics website includes information on effective mathematics curriculum and programs, videos of exemplary mathematics teachers in their classrooms, information on effective use of coaches, mentors and lesson study groups, and other materials to support teacher understanding and use of embedded assessment including diagnostic tools such as interviews, open response problems, journals, portfolios, perception of self as a mathematics learner questionnaires, etc, available to all practitioners?

2. To what extent does the KCM create an environment that is conducive to building mathematics capacity?
    a. To what extent does the KCM promote positive attitudes toward mathematics among teachers? Future research will expand this question to school personnel, students, parents, policymakers, and community members

3. To what extent does the KCM, through its professional development activities (Intervention and Coaching programs) expand teachers' mathematical content knowledge, pedagogical skills and knowledge, and enjoyment of teaching mathematics?
    a. Does teachers' content knowledge increase over the course of the year?
    b. Do teachers report they are better able to diagnose students' mathematical skills, concepts, and problem solving abilities and then to differentiate instruction to meet the needs of all students and ensure continuous progress for all?

4. Have student achievement scores improved over the first year (2006-2007)? Research has shown that student achievement usually occurs after teacher behaviors change and is not expected during the first year of implementation.

5. Over time, to what extent does the KCM help increase the number and the retention rate of Kentucky teachers with expertise in mathematics and mathematics teaching over the course of the year? Since there is no expectation for change over the first year, data collected will serve as baseline data.

6. What are the costs and effectiveness of *Math Recovery* and *Number Worlds* as implemented? We will give the KDE cost and student achievement data and the KDE will calculate the comparison between the two programs.

In sum, by addressing these evaluation questions, it will provide an assessment of the KCM's general activities in service of mathematics education in Kentucky. This includes an examination of the knowledge and the attitudes of educators involved in the mathematics coaching program of the KCM. Also, the teachers and the students participating in the primary grades mathematics intervention programs were assessed for their knowledge of mathematics, their attitudes toward mathematics and their attitudes toward the intervention programs themselves. Finally, preliminary comparisons can be made between the different intervention programs.

Evaluation Design

The evaluation employed a longitudinal, quasi-experimental pre/post approach. The guiding questions required longitudinal data from coaches, coachees and MITs regarding their knowledge of, and attitudes toward, mathematics. Coaches, coachees, and MITs also provided data used to assess the KCM's support functions. Student knowledge of mathematics was tested in a longitudinal manner to assess the functional effectiveness of the intervention programs: this assessment included the testing of selected comparisons groups to track student development in an accurate manner. Regarding the coaching program, student achievement will be measured using testing data available from the state.

Coaching Program

Both the coaches' knowledge of mathematics and their beliefs and attitudes about mathematics were tested immediately prior to their participation in the KCM coaches' training sessions (held prior to the academic school year). The coaches were tested again immediately after training was completed. Additionally, their knowledge and attitudes were assessed a final time at the end of the school year. To assess the KCM's support functions, coaches provided direct evaluation of any training they attended immediately after the training was completed. They also completed a more comprehensive assessment of the KCM's functions through a general survey administered after the school year.

All teachers who received coaching from the KCM coaches completed assessments of both their content knowledge of mathematics and their beliefs and attitudes about mathematics in a pretest-posttest manner. Both were assessed prior to the academic school year and after the completion of the school year.

Intervention Program

The teachers responsible for implementing the primary grades intervention programs also completed a measure of content knowledge along with a measure of attitudes and beliefs about mathematics in a pretest-posttest manner. They completed all measures prior to their initial training for their intervention program and immediately after that training. As a posttest, they repeated the same measures at the end of the academic year. They also completed an overall evaluation survey of the KCM's support functions. That overall evaluation instrument also included an assessment of the specific intervention program with which they were involved.

Students' knowledge of mathematics was tested at the beginning of the school year and again at the end of the year. All students who participated in one of the intervention programs were tested. Additionally, each school in which an intervention was administered selected an additional group of students who did not receive the intervention program to be tested as a comparison group.

The evaluation design thus allows for an assessment of how coaches, coachees and MITs might be affected over time by their participation in the KCM's programs. Additionally, all participants are afforded opportunities to evaluate the KCM's activities and functions. Finally, some assessment of the general effectiveness of the coaching and the intervention programs can be accomplished through the direct testing of student knowledge of mathematics.

Fidelity of Program Implementation

The vendors of each intervention program assumed responsibility for verifying the validity of each program's implementation. Both vendors reported doing classroom observation with program MITs.

Number Worlds. The report from the *Number Worlds* vendor (SRA) indicates that they conducted 122 separate classroom observations, 75 of which were relevant to the intervention program. SRA conducted 61 observations of 30 MITs who were implementing *Number Worlds* only. They conducted 14 observations of 7 MITs who were implementing both *Math Recovery* and *Number Worlds*. (32 individuals were observed who were not participating in the KCM intervention program. A grand total of 75 observations were made in class sessions where N*umber Worlds* was being implemented. Observers recorded judgments (either "yes" or "no") on three relevant questions about teacher behaviors and student responses. They also recorded observations of students indicating on a 4-point scale ("none," "few," "most," or "all") how many students displayed understanding of the lesson.

Observers reported that in 93.1% of the observations, *Number Worlds* MITs made use of the manipulative kits. Observers also reported that in 98.6% of the observations the teachers conducted the lessons according to the *Number Worlds* manual. Finally, they reported that in 94.5% of the observations, either "most" or "all" of the students in the classroom seemed to understand the objectives of the lesson.

Math Recovery. The *Math Recovery* vendor also conducted classroom observations to assess the fidelity of program implementation. Eleven of the *Math Recovery* MITs were observed on at least two separate occasions. Observers made pre-lesson observations and also recorded ratings on nine separate dimensions of teacher behaviors during the session. They were identified by the vendor as:

1) use of problem-based teaching
2) initial and on-going assessment
3) cutting-edge teaching
4) settings and tasks
5) engendered more sophisticated strategies
6) observing the child and fine-tuning teaching
7) linking verbal-based strategies to symbolizing and notating

8) promoting sustained thinking and reflection
9) promoting verification and intrinsic satisfaction

Final assessments were provided by the vendor for 11 *Math Recovery* MITs. Three were deemed to be "high implementers." Six were "medium implementers" and two were "low implementers."

Generally it appears that the intervention programs were implemented to the satisfaction of the vendors responsible for designing the programs and providing the basic training to the teachers. One major focus of Year Two activities is to assess implementation fidelity through multiple procedures.

Evaluation Procedures

Participants

A total of 1,947 elementary school children provided data specifically for this evaluation. Also participating in this evaluation were 65 coaches, 743 teachers who received coaching services (i.e., the coachees), and 45 MITs. All participants listed above voluntarily participated in the separate evaluation activities occurring between Summer 2006 and Spring 2007.

Instruments

A total of four basic, separate data collection instruments were employed in this evaluation. Each is briefly described below.

Learning Mathematics for Teaching Test (LMT). Research has shown that teachers with higher levels of content knowledge are more likely to produce students who do well on achievement tests. The LMT (see http://sitemaker.umich.edu/lmt/home) was used to assess the mathematics content knowledge of the coaches and the MITs. The LMT was developed by researchers at the University of Michigan and is widely accepted as a valid measure of the level of knowledge needed to effectively teach mathematics to elementary and middle school students. This instrument was used to determine if the development programs used by the KCM to prepare mathematics coaches increased the teachers' mathematical knowledge in a significant way. The LMT is considered proprietary knowledge and researchers must be trained to administer, score and analyze these tests. Copies of the LMT test therefore cannot be included in this report.

The Mathematics Beliefs and Attitudes Survey (MBS). The MBS was developed by researchers at Northern Kentucky University. It presents items designed to assess *teacher efficacy* (the teachers' own perceptions of their ability to teach effectively), *beliefs about learning mathematics* (beliefs about how students best progress

in their knowledge and skills in mathematics) and *beliefs about the nature of mathematics* (the teachers' beliefs about the fundamental characteristics of mathematics). All coaches, coachees and MITs completed this instrument (Appendix A).

Overall Evaluation Survey (OES). The KCM administered training and development to its coaches and MITs at several points during the year. An Overall Evaluation Survey was developed by the UCESC team for participants to rate how well each training or professional development session added to their knowledge of Kentucky Core Content, mathematics in general, and the ability to teach students. The basic structure of this instrument was essentially the same across applications with specific content questions adapted to fit each development activity (see Appendix A for sample).

Terra Nova. Student performance in the intervention program was assessed through a standard mathematics achievement test, the Terra Nova (see http://www.ctb.com/). This is a widely administered and accepted test of basic mathematics knowledge. The Terra Nova is proprietary; thus a copy cannot be included.

Data Collection

Coaches. Initial training of the mathematics coaches took place in Summer 2006. The first session was held from June 6 - June 16, 2006 and the second from July 17 - July 28, 2006. For both sessions, the LMT and the MBS were administered in a pretest/posttest fashion in order to assess the direct effects of the training sessions. For the June session, the surveys were administered in pencil and paper format by the KCM twice: before training began on June 6 and after training ended on June 16. For the second session in July, the LMT and the MBS were again administered in pencil and paper format by the KCM twice: before training began on July 17 and after training ended on July 28. The Summer OES was administered for a general assessment on the last day of both sessions, June 16 and July 28 respectively.

Winter 2007 training for coaches was held January 29 - January 30, 2007 at NKU and February 1- February 2, 2007 at WKU. Participants completed the OES at the end of this training. All surveys were administered by the KCM and sent to UCESC for data entry and analyses.

Coaches' knowledge and attitudes were assessed again in Spring 2007. During the week of April 16, 2007, coaches received an email invitation to complete the electronic version of the MBS. During the week of April 23, 2007, they received an email invitation to complete the electronic version of the LMT and the electronic version of the MBS. A final administration of the OES was given on May 10, 2007 via email.

Coachees. In Fall 2006, all coachees were surveyed at their home school buildings. These coachees completed the LMT to assess their content knowledge and the MBS to assess their attitudes about teaching mathematics. Surveys were mailed in packets from the KCM to the coaches for distribution to the coachees. Surveys were returned to the KCM and then forwarded to UCESC for data entry and analyses.

Follow-up surveys were administered at the end of the 2006-2007 school year. These surveys were administered electronically. For the final LMT, email invitations were sent to coachees during the week of April 23, 2007. For the final MBS, email invitations were sent to coachees via their coaches during the week of April 16, 2007. UCESC was responsible for downloading all data and for analyses.

Mathematics Intervention Teachers. Mathematics Intervention Teachers had two different training sessions during the summer of 2006. *Number Worlds* training was held on June 12-16, 2006 in Louisville, Kentucky. All surveys were given in a pencil and paper format and included the LMT, the MBS and the OES. The LMT was administered in a pre-post fashion before training began on June 12 and at the end of training on June 16. The MBS was also administered in a pre-post manner, with the pretest given before training on June 12 and the posttest occurring at the end of training on June 16. The Summer OES was administered on June 16. All surveys were administered by the KCM and sent to UCESC for data entry and analyses.

Math Recovery training was held at Eastern Kentucky University July 31-August 4, 2006. All surveys were given in a pencil and paper format, and included the LMT, the MBS, and the OES. The LMT was given as a pre-post test, with the pretest administered before training began on July 31 and the posttest occurring at the end of training on August 4. The MBS was also given as a pre-post test, with the pretest administered before training began on July 31 and the posttest occurring at the end of training on August 4. The Summer OES was administered on August 4 only. All surveys were administered by the KCM and sent to UCESC for data entry and analyses.

Fall 2006 *Number Worlds* training was held October 25-27, 2006 in Newport, Kentucky. The only survey given at this training was the OES in pencil and paper format. The OES was administered by the KCM and sent to UCESC for data entry and analyses. The Fall 2006 *Math Recovery* training was held in Newport, Kentucky on November 15-16, 2006. The only survey given at this training was the OES in pencil and paper format on November 16. The OES was administered by the KCM and sent to UCESC for data entry and analyses.

Winter 2007 *Number Worlds* training was held in Newport, Kentucky on February 22-23, 2007. The OES, in pencil and paper format, was the only survey given during this training. It was administered by the KCM and sent to UCESC for data entry and analyses. A *Math Recovery* training session was held in Winter 2007 and the OES, in pencil and paper format, was the only survey given during this training. The OES was administered by the KCM and sent to UCESC for data entry and analyses.

Mid-year reports were solicited from both *Math Recovery* and *Number Worlds* mathematics intervention teachers by the Kentucky Department of Education. The reports were forwarded to UCESC via the KCM in February 2007 for analysis.

Spring 2007 surveys were administered at the end of the school year and did not coincide with any training. All surveys were administered electronically and included the LMT, the MBS and the OES. For the final LMT (*Number Worlds* and *Math Recovery*) email invitations were sent to MITs by the KCM during the week of April 23, 2007. For the final MBS (*Number Worlds* and *Math Recovery*) email invitations were sent to MITs by the KCM during the week of April 16, 2007. The final OES (*Number Worlds* and *Math Recovery*) was administered by UCESC and email invitations were sent on May 8, 2007. UCESC was responsible for downloading all data and for analyses.

Student Performance. The Terra Nova (K/1-CAT6 Complete Battery, Mathematics section only and 2/3-CAT6 Survey Version, Mathematics section only) was given to participating K-3 students in Fall 2006, before students began the intervention programs, and Spring 2007, as close to the end of the school year as possible. Specific dates of testing were left to the discretion of the schools. For both the Fall 2006 and the Spring 2007 Terra Nova Tests, schools sent the tests to the KCM, which forwarded them to SRA McGraw-Hill for grading and data entry. The KCM verified the data and forwarded it to UCESC for analysis.

Data Analysis

This evaluation employed a number of data analysis strategies to elucidate the nature of the mathematics intervention programs and the coaching programs as implemented across Kentucky school districts throughout the state. Many of these measures were self-reporting on the effects upon teachers' perceptions of 1) their pedagogical and mathematics content knowledge, 2) the efficacy of their coaching or mathematics intervention program experience, 3) the support of the KCM and their regional coordinators, 4) their instructional practice, 5) organizational support for the programs, and 6) these programs' impact on student learning.

The Math Beliefs Survey and the Overall Evaluation Survey used mostly close-ended items at multiple time points (pre-Institute, post-Institute, and/or follow-ups) to assess teachers' perceptions of the nature of mathematics, learning mathematics, self-efficacy regarding personal learning and abilities in mathematics, as well as program quality, utility, and usefulness in teaching mathematics and improving student learning. Descriptive statistics were used to summarize and describe teachers' responses to these close-ended items at any one time point. Frequencies and mean scores created opportunities to compare these beliefs across the period of the year-long evaluation. Although statistical comparisons are made within the report, they should be viewed cautiously because of the following factors: a small number of respondents; a low number of both pre and posttest participants; lack of a sample; and the level of data (mainly nominal and ordinal). Because of these factors, any significant differences that are reported are done so with caution. Comparisons between programs will also be limited due to the difference in participants for each program. Complications also arise when comparing pre-post test data due to attrition of respondents.

Mean scores were used from the LMT and the Terra Nova test results. These scores, which were collected at the beginning and end of the school year, allowed the evaluation to look at the increase or decrease in knowledge that had occurred over the course of the year.

Efforts to compare scores across the year using *paired t-tests* and the ANOVA were hampered by the low number of participants in the surveys for a number of programs. In some cases, the determination of significance for changes over time was omitted due to the small n-values.

Results

For the sake of clarity, results are first presented separately for each of the two programs under evaluation. The results relevant to the MIT program are followed by the results for the Mathematics Coaching program. The final section of the report concludes with a summary of potential year two evaluation activities.

Intervention Program

Program Implementation

Grants supporting the intervention program were awarded to school districts that responded to a request from the Kentucky Department of Education. These grants were for a maximum of $70,000 and, according to the original Request for Proposals, were intended to:

- support training of the Mathematics Intervention Teacher (MIT) for mathematics diagnostic assessment and intervention services and programs.
- implement research-based mathematics diagnostic assessment and intervention services and programs designed to improve the mathematics achievement of targeted primary students for the mathematics intervention teacher.
- provide salary for a certified primary teacher highly trained in mathematics diagnostic assessment and intervention services to support implementation of the mathematics diagnostic assessment and intervention services and programs.
- provide quality professional development on research-based mathematics diagnostic assessment and intervention instructional strategies that improve the mathematics achievement of targeted primary students.
- allow expenses to:
    - cover registration fees and travel for the mathematics intervention teacher to attend state and national conferences specific to mathematics diagnostic assessment and intervention services for primary students.
    - provide release time, substitutes or stipends for the mathematics intervention teacher to participate in job-embedded professional development including study groups and/or self or peer reflection on teaching practices related to mathematics as determined by the KCM.
    - purchase materials required for professional development of the mathematics intervention teacher.
    - contract with a professional development provider of mathematics diagnostic assessment and intervention services.
    - train the mathematics intervention teacher in aligning family involvement activities to support the mathematics intervention program(s).
- purchase instructional materials required as a part of the research-based mathematics intervention program(s).
- purchase up to five computers, not to exceed a cost of $5000 – the computers must be housed in the MIT area and be used by students served by the MIT. Priority for usage of the computers must be the MIT and intervention students.
- purchase software for a computer which is integral to the mathematics diagnostic assessment and intervention program(s).

Mathematics intervention teachers submitted information about the logistical implementation of the two programs, via mid-year reports, submitted to the Kentucky Department of Education. No independent verification was made of these data.

Implementation decisions, including selection of students to receive the intervention, were at the discretion of the individual schools or school districts. A variety of criteria were used to determine which students were included in the intervention groups. These measures included a number of standardized tests as well as locally created assessments. In some cases, recommendations for inclusion of certain students in the program were made based on teacher observation.

Table 1 displays the number of students participating in each separate intervention program by grade. A total of 1019 students were selected to participate in the intervention programs.[1] Results indicate that appropriate selections were made. Terra Nova raw scores can be easily converted into *grade equivalency* scores[2] that are more intuitively interpretable. For example, a grade equivalency score of 1.3 means the student's performance was typical of a student in the third month of their first year in school. The mean pretest grade equivalency scores of the intervention students indicated that they were well below grade expectation in knowledge of mathematics (mean score for kindergarten students was .01, first grade was .11, second grade was 1.08 and third grade was 2.11).

Schools were asked to select students for participation in a comparison group. This proved problematic, as testing revealed that students selected for the comparison group were significantly more advanced in mathematics than the intervention students. Thus, a matched sample procedure (explained below) was used for all student comparisons.

Table 1: Student Participation in MIT Program

	Number Worlds	Math Recovery	Comparison Group	Total
Kindergarten	127	0	86	213
1st Grade	159	66	252	477
2nd Grade	334	8	328	670
3rd Grade	314	10	259	583
Total	934	84	925	1943

* Differences on the total counts presented in the table and the number of participants are the result of missing demographic information.

[1] One student in the Number Worlds program and 3 students from the comparison group were not assigned a grade level and had to be excluded from all analyses.

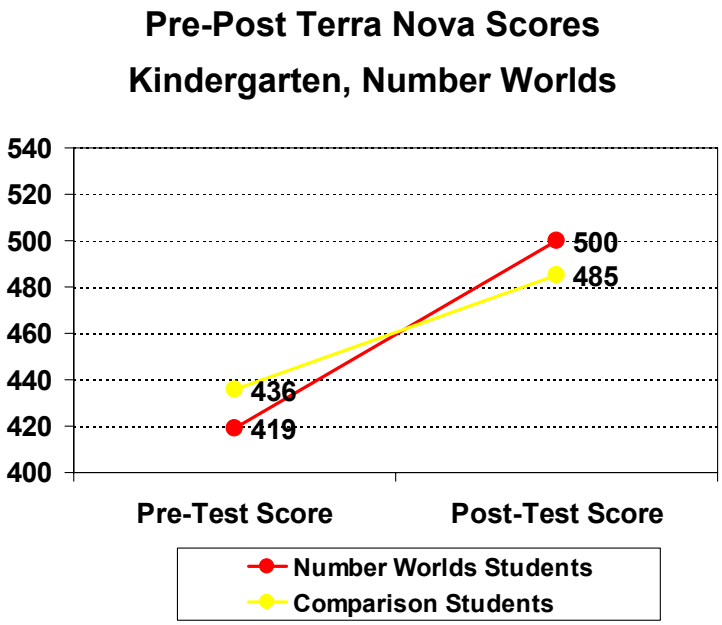
[2] For a complete explanation of this common procedure see, for example, http://www.pearsonedmeasurement.com/research/faq_2d.htm).

Program differences resulted in varying numbers of students participating in each program (Table 1). Reports from *Number Worlds* teachers to the Kentucky Department of Education indicated that, on average, 79% of qualified students were being served by the intervention program. The minimum percentage of qualified students served was 22% and the maximum was 100% (all) students who qualified being served. The *Math Recovery* program had only 5 reports, due in part to the smaller number of teachers involved. On average, 47% of qualified students were served. The minimum percent of qualified students being served was 20% and the maximum was 80%.

Student Achievement Results:[3]

Student performance. Figures 1 and 2 show the trends in early grade (K and 1) student performance based on Terra Nova test scores administered at the beginning of the school year (pretest) and again at the end of the year (posttest). Scores displayed are Terra Nova raw scores.

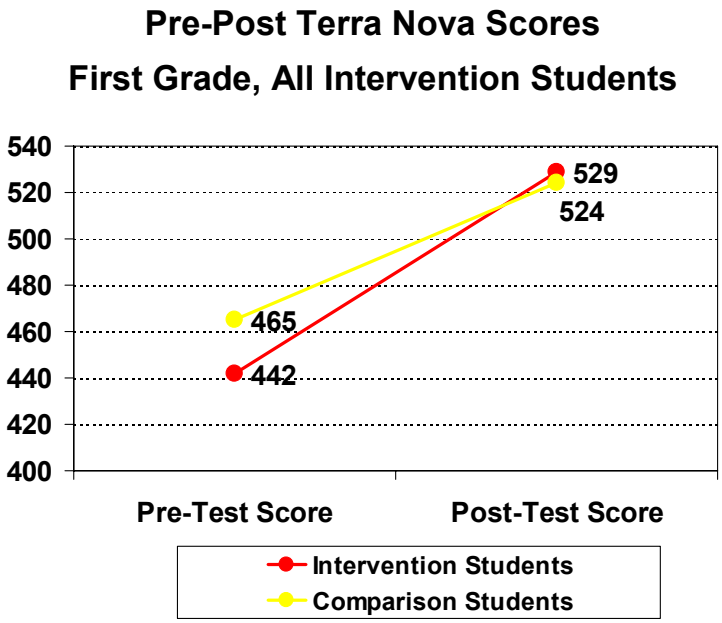
Figure 1: Student Achievement in Kindergarten



Number Worlds Students, N=127
Comparison Group Students, N=86
* Math Recovery was not used at the kindergarten level.

[3] See attached student data report for details in Appendix B.

Figure 2: Student Achievement in First Grade



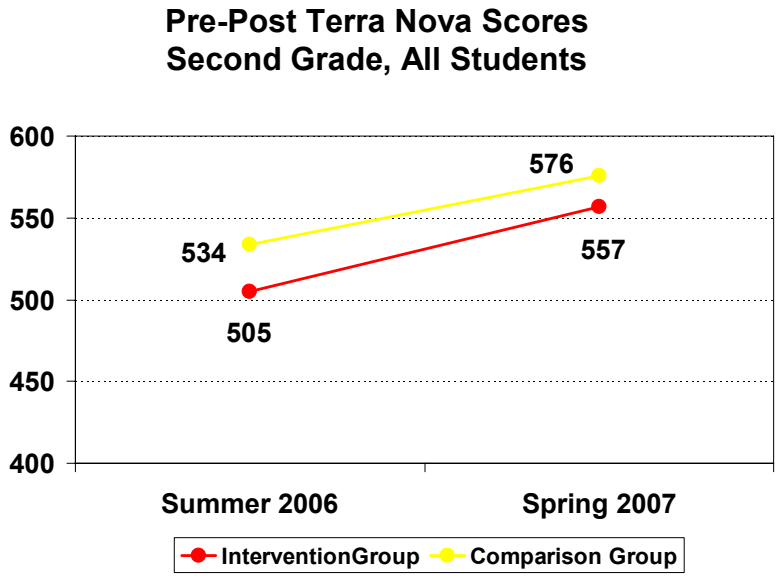
* Intervention Students include both Number Worlds and Math Recovery Students.

Intervention Students, N=225
Comparison Group Students, N=252

The data for the kindergarten and first grade students reveal that students in the intervention group progressed to the point that they outperformed the students in the comparison group on the posttest *even though the comparison group students scored significantly higher on the pretest.*

Figures 3 and 4 display the achievement trends for the second and third grade children. They indicate that the students in the intervention group made substantial improvements over the year, but not to the same extent as the younger students.

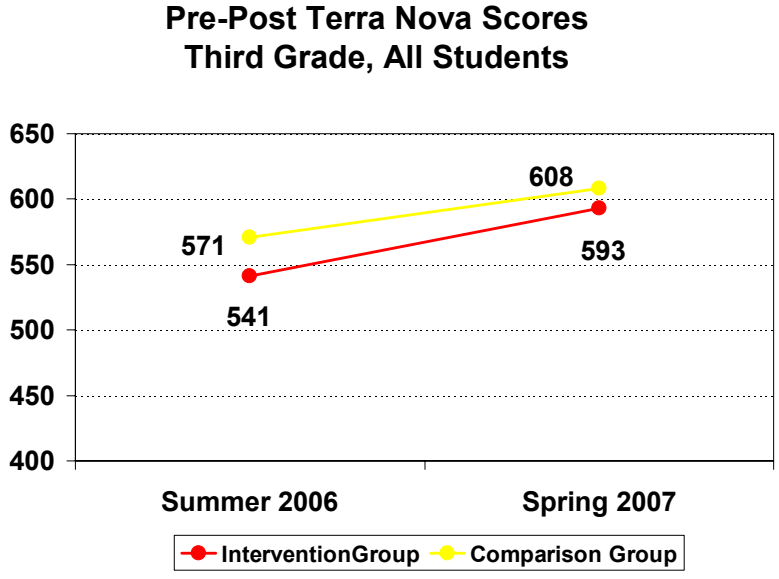
Figure 3: Pre and Post Terra Nova Scores for Second Grade Students



*Intervention Students include both Number Worlds and Math Recovery Students

Intervention Students, N=342
Comparison Group Students, N=328

Figure 4: Pre and Post Terra Nova Scores for Third Grade Students

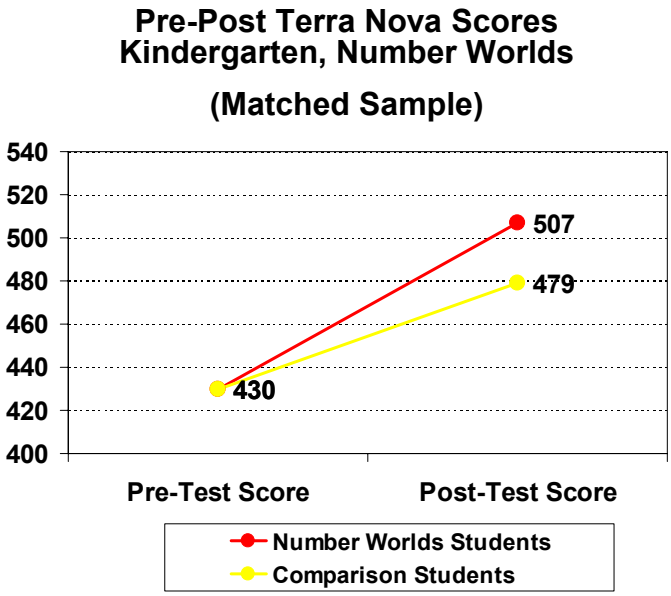


*Intervention Students include both Number Worlds and Math Recovery Students

Intervention Students, N=324
Comparison Group Students, N=259

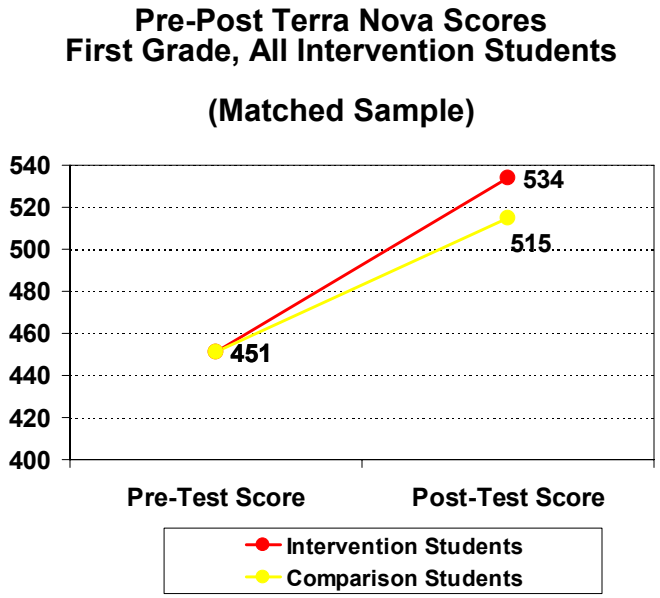
Additional comparisons were made using equivalent comparison groups. Conservative analyses used *matched pairs of students* to verify the differences at the kindergarten and first grade levels. Equivalent comparison groups were created by matching students who had identical pretest scores. Thus more conservative comparisons could be made by examining program effects only for those matched students. Figures 5 through 8 illustrate the more conservative analyses.

Figure 5: Matched Student Achievement in Kindergarten



Number Worlds Students, N=70
Comparison Group Students, N=70
* Math Recovery was not used at the kindergarten level.

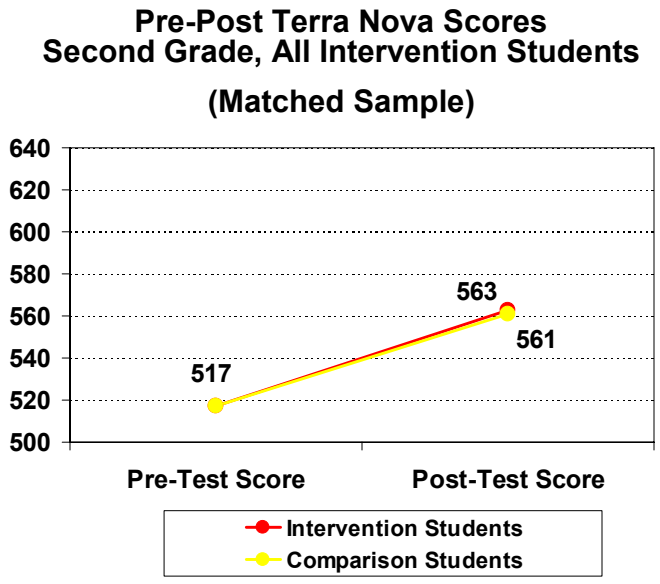
Figure 6: Matched Student Achievement in First Grade



* Intervention Students include both Number Worlds and Math Recovery Students.

Intervention Students, N=171
Comparison Group Students, N=171

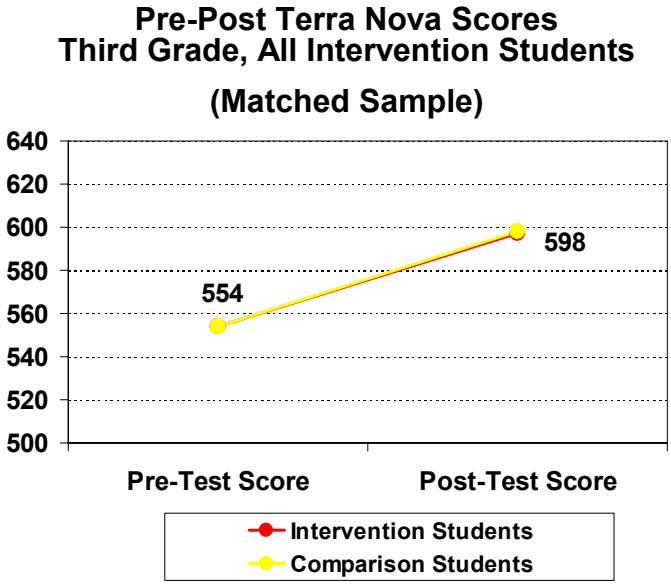
Figure 7: Matched Student Achievement in Second Grade



* Intervention Students include both Number Worlds and Math Recovery Students.

Intervention Students, N=210
Comparison Group Students, N=210

Figure 8: Matched Student Achievement in Third Grade



* Intervention Students include both Number Worlds and Math Recovery Students.

Intervention Students, N=168
Comparison Group Students, N=168

Thus the more conservative data confirm, to a large extent, the initial analyses: kindergarten and first grade students who received interventions outperformed the comparison students. For the second and third grade children, both intervention and comparison groups performed almost identically.

Program comparison. Caution must be taken when comparing the scaled scores and grade equivalency scores of the two programs. For the Terra Nova, the procedure for converting scaled scores to grade equivalency scores assigns all pretest scaled scores 477 or lower a grade equivalency of "0". In this study, the *Number Worlds* students actually started their program at a much lower level (mean scaled score of 437) than did the *Math Recovery* group (mean scaled score of 454) or the comparison students (mean scaled score of 465). These differences are not captured in the grade equivalency scores, as any score at or below 477 would receive the same grade equivalency of 0. It should be noted that, overall, *Math Recovery* students had lower teacher-student ratios and, in many cases, had interventions that took place at a 1:1 ratio[4], whereas *Number Worlds* students were usually taught in a classroom/small group setting, ranging from 2 to 20 students. Table 2.0, on the following page, gives details of the intervention pull-out time and average size of group each program provided.

[4] Of 84 Math Recovery students, 59 had a 1:1 teacher student ratio.

Table 2.0: Description of Intervention Pull-out Hours and Group Size

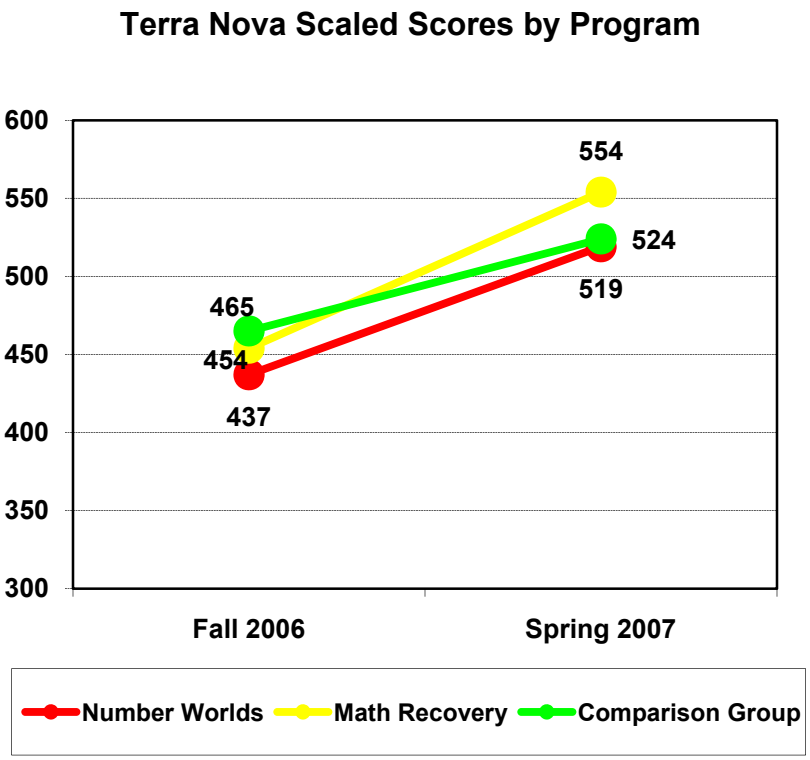
	Number Worlds N=916*	Math Recovery N=84*
Vendor Recommended Number of Weeks	24-30	12-15
Mean Intervention Pull-out Hr/Wk	3.06	2.34
Minimum Hr/Wk	1.66	2
Maximum Hr/Wk	5.0	3.75
Mean Group Size	7	2
Minimum Group Size	2	1
Maximum Group Size	20	5
Average intervention time per student/week.	26.4 minutes	70.2 minutes

* Counts may not equal the number of students in the intervention due to missing data.

Table 2 highlights the fundamentally different nature of the two intervention programs. These differences should be held in mind to guide the interpretation of the comparison data displayed below. Valid comparisons between the two intervention programs are probably not yet possible for several reasons. First the implementation of the programs is a key factor we do not yet know for certain how much teachers may have varied from their programs. Also, *teacher ability* is known to be perhaps the most influential variable in any classroom and we do not yet have data that specify the abilities of the teachers absent any program at all. Finally, a rigorous comparison of programs should probably include parental involvement measures that would help discern program effects.

Figure 9 displays the pre-post Terra Nova scaled scores for both programs and the comparison group at the first grade level. As noted, the pretest Mean score for the comparison group was higher than the Mean for either of the program groups. However, the Mean posttest score for the *Math Recovery* group exceeded the Mean for the comparison group and the Mean score for the *Number Worlds* group approached the level of the comparison group.

Figure 9: Program Comparison: Scaled Scores Gained by Program, First Grade Only



Comparisons between the two different intervention programs were made only at the first grade level, since this is the only grade level that had an adequate number of students working with the *Math Recovery* program (see Table 1, page 10). For each student, UCESC determined how many grade levels were gained during a school year by comparing the grade equivalency score of the student's pretest score with the corresponding grade equivalency score of the posttest score. The difference between these two scores reflects the number of grade levels gained (or lost) by the student during the year. Figure 9.1 depicts the average gain in grade level for students in each program, while Figure 9.2 shows the same results with *matched pairs of students* as described previously.

Figure 9.1: Program Comparison: Average Grade Level Gained by Program

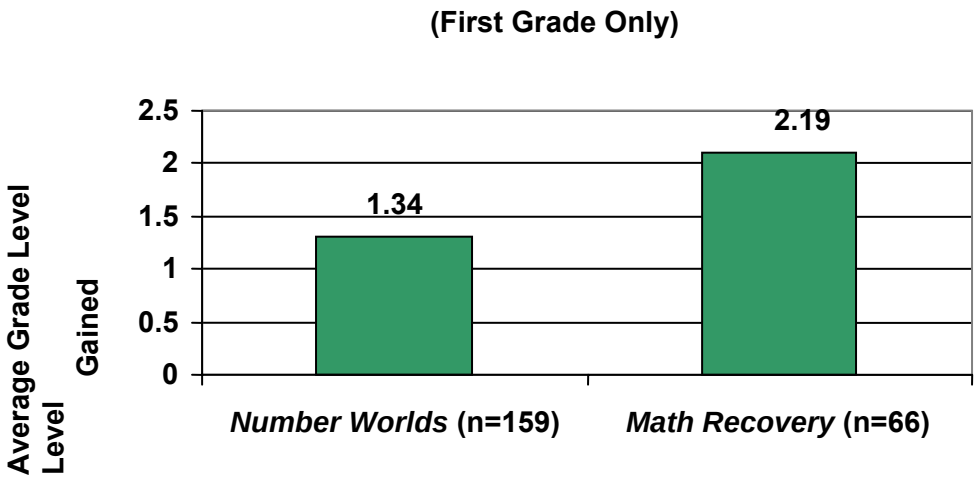
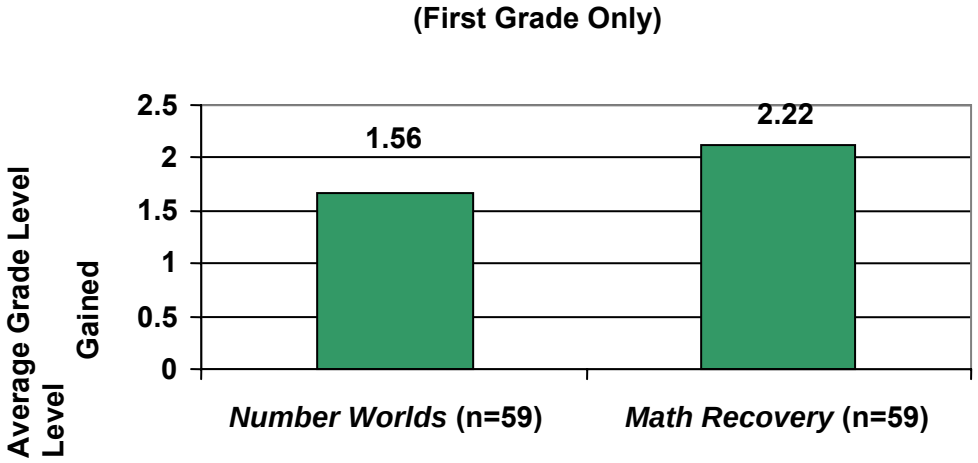
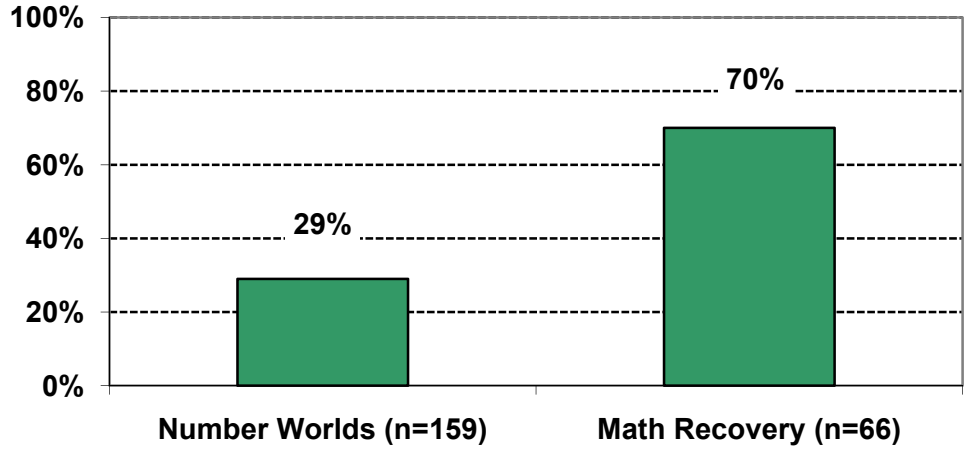


Figure 9.2: Program Comparison: Matched Sample Average Grade Level Gain by Program



Another comparison between programs can be made by examining the percentage of students in each program who met the required grade equivalency at the end of the school year. Each student's posttest grade equivalency score can be evaluated to determine whether or not the student has achieved a performance level appropriate for their grade level (for example, a first grade student's appropriate grade equivalency score at the end of the school year should be 1.9, reflecting one year and nine months of education). Figure 10 compares the two programs on the numbers of students in each program that met grade equivalency expectations.

Figure 10: Program Comparison: Percentage of First Grade Students Reaching Grade Equivalency



Overall, 29% of the *Number Worlds* students achieved a posttest score of at least the grade level expected of a student at that age (46 of 159 students). For *Math Recovery*, 70% of the students achieved at least the appropriate grade level (46 of 66 students).

Teachers' Beliefs, Attitudes and Content Knowledge[5]

The MBS was used to assess the MITs' beliefs and attitudes toward mathematics. The MITs were surveyed prior to beginning their training early in 2006 and again at the end of the 2006-2007 academic-year. Complete data was received from all 45 MITs (33 from the *Number Worlds* program, six from the *Math Recovery* program and six who were administering both programs). Participants also completed the LMT to assess their mathematics content knowledge (complete data from 36 participants).

MIT beliefs and attitudes. Table 2 displays a comparison of pre- and post-survey responses for all MITs on selected MBS items (full display in Appendix C, Tables C-1 to C-3). Results indicate an increase in the teachers' confidence in being able to successfully teach mathematics. For example, when asked if they were good at

[5] See attached data report for details in Appendix C.

mathematics, 66.7% of the participants agreed with this statement when they began the training. At the completion of training, 86.4% agreed. Likewise, the perception of a lack of understanding of mathematics problems dropped from 13.6% at the start of training to just 2.2% by the end of the 2006-2007 academic year.

When looking at questions regarding the nature of mathematics (Table 2), teachers moved away from the idea that mathematics consists mainly of rules, dropping from 37.8% on the pretest to 15.6% on the posttest. Likewise, the percent of MITs who felt it was difficult to discuss mathematics dropped to 0.0% by the end of the 2006-2007 school year.

Table 2.1: MBS Results for All MITs

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Often in mathematics, I do not understand the concept behind a problem. **	13.6	2.20 (.954)	44	2.2	1.69 (.733)	45
I am very interested in mathematics. **	91.1	4.13 (.726)	45	95.6	4.56 (.755)	45
I am good at doing mathematics.**	66.7	3.71 (.757)	45	86.4	4.05 (.569)	44
Learning mathematics mainly involves memorizing procedures.**	22.2	2.40 (1.074)	45	2.2	1.82 (.716)	45
To understand mathematics, students must solve many problems following examples provided.**	31.1	2.89 (1.049)	45	8.9	2.24 (.802)	45
Doing mathematics consists mainly of using rules.**	37.8	3.13 (.842)	45	15.6	2.33 (.953)	45
Getting the right answer is the most important part of mathematics. **	8.9	2.36 (.773)	45	4.7	1.98 (.771)	43
In mathematics, it is not possible to do a problem unless you've first been taught how to do one like it. **	4.4	2.27 (.720)	45	6.7	1.87 (.842)	45
Being able to successfully use a rule or formula in mathematics is more important than understanding why the rule or formula works. **	8.9	2.11 (.714)	45	2.2	1.62 (.716)	45

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
It is difficult to talk about mathematical ideas because all you can really do is explain how to do specific problems.**	4.4	2.11 (.611)	45	.0	1.69 (.514)	45
Solving mathematics problems frequently involves exploration.**	97.8	4.13 (.405)	45	95.6	4.40 (.654)	45
Most mathematics problems are best solved by deciding on the type of problem and then using a previously learned solution for that type of problem. **	53.3	3.42 (.866)	45	37.8	2.89 (1.027)	45
There are several ways to find the correct solution to a mathematics problem.**	97.8	4.24 (.484)	45	100.0	4.71 (.458)	45
Knowing step-by-step procedures is necessary to solve mathematical problems.**	28.9	2.91 (.874)	45	8.9	2.20 (.842)	45

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.
** Difference significant at p .< .05.

A second analysis was done using only those who responded to both the pre- and posttests. Only a few differences were noted, none of which alter the findings listed above.

Table 2.2: MBS Results for MITs Who Have Taken Both the Pre- and the Posttests

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
I am very interested in mathematics.**	88.2	4.09 (.79)	34	97.1	4.62 (.55)	34
I am able to learn mathematics well. **	73.5	3.82 (.87)	34	97.1	4.29 (.52)	34
I am good at doing mathematics. **	67.6	3.71 (.72)	34	87.9	4.06 (.56)	34
Learning mathematics mainly involves memorizing procedures. **	26.5	2.53 (1.11)	34	2.9	1.88 (.77)	34
To understand mathematics, students must solve many problems following examples provided. **	38.2	3.00 (1.13)	34	8.8	2.29 (.80)	34
Doing mathematics consists mainly of using rules. **	41.2	3.21 (.84)	34	17.6	2.41 (.96)	34
Being able to successfully use a rule or formula in mathematics is more important than understanding why the rule or formula works. **	8.8	2.15 (.70)	34	2.9	1.71 (.76)	34
It is difficult to talk about mathematical ideas because all you can really do is explain how to do specific problems. **	2.9	2.12 (.59)	34	.0	1.76 (.50)	34
Solving mathematics problems frequently involves exploration. **	97.1	4.12 (.41)	34	97.1	4.41 (.66)	34
There are several ways to find the correct solution to a mathematics problem. **	97.1	4.18 (.46)	34	100.0	4.62 (.49)	34
Knowing step-by-step procedures is necessary to solve mathematical problems. **	32.4	3.03 (.87)	34	11.8	2.32 (.88)	34

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.
** Difference significant at p .< .05.

Program Characteristics. Only MITs in the *Number Worlds* program showed statistically significant changes in the "Learning Mathematics" and the "Nature of Mathematics" areas of the MBS (statistical analysis is not possible with the small number of participants in the *Math Recovery* program). Table 3.1 displays significant differences on the "Learning Mathematics" items of the MBS for *Number Worlds* MITs. The MITs involved with the *Number Worlds* program began the program with 27.3% of the

participants feeling that mathematics mainly involved memorization and ended the program with only 3.1% feeling the same way. Likewise, the *Number Worlds* MITs felt that students had to solve many problems following the example at the start of the program (33.3%) and by the end of the program, only 9.4% held the same belief. The percent of *Number Worlds* Mathematics Intervention Teachers who felt that it was difficult to discuss mathematics dropped to 0.0% by the end of the 2006-2007 school year.

Table 3.1: MBS Learning Mathematics for *Number Worlds* MITs

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Learning mathematics mainly involves memorizing procedures.**	27.3	2.58 (1.09)	33	3.1	2.00 (0.72)	32
To understand mathematics, students must solve many problems following examples provided.**	33.3	2.91 (1.04)	33	9.4	2.31 (0.78)	32
Doing mathematics consists mainly of using rules.**	42.4	3.24 (0.83)	33	21.9	2.56 (0.95)	32
It is difficult to talk about mathematical ideas because all you can really do is explain how to do specific problems.**	6.1	2.15 (0.67)	33	0.0	1.75 (0.51)	32
There are several ways to find the correct solution to a mathematics problem.**	97.0	4.24 (0.50)	33	100.0	4.63 (0.49)	32
Knowing step-by-step procedures is necessary to solve mathematical problems.**	36.4	3.06 (0.90)	33	12.5	2.47 (0.80)	32

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.
** Difference significant at p. < .05.

A second analysis was done using only those who responded to both the pre- and the posttests. Findings with regard to the Nature of Mathematics and Learning Mathematics were identical except that efficacy questions dealing with interest in and ability to learn mathematics showed significant increases (see Table 3.2).

Table 3.2: MBS Learning Mathematics for Number Worlds MITs

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
I am very interested in mathematics. **	85.7	4.07 (.86)	28	96.4	4.54 (.58)	28
I am able to learn mathematics well. **	75.0	3.86 (.85)	28	96.4	4.29 (.53)	28
Learning mathematics mainly involves memorizing procedures.**	28.6	2.64 (1.10)	28	3.6	2.00 (.77)	28
To understand mathematics, students must solve many problems following examples provided.**	35.7	3.00 (1.05)	28	7.1	2.29 (.76)	28
Doing mathematics consists mainly of using rules.**	42.9	3.29 (.81)	28	21.4	2.54 (.96)	28
It is difficult to talk about mathematical ideas because all you can really do is explain how to do specific problems.**	3.6	2.14 (.59)	28	.0	1.79 (.50)	28
There are several ways to find the correct solution to a mathematics problem.**	96.4	4.14 (.45)	28	100.0	4.57 (.50)	28
Knowing step-by-step procedures is necessary to solve mathematical problems.**	35.7	3.07 (.90)	28	14.3	2.50 (.84)	28

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.
** Difference significant at p. < .05.

The small number of *Math Recovery* MITs makes statistical analysis of pre- and posttest differences invalid. Tables 4-6 present the majority of the items on the MBS for the *Math Recovery* MITs. All Math Recovery teachers took both the pre and the post test.

Table 4: MBS Teacher Efficacy for Math Recovery MITs

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Often in mathematics, I do not understand the concept behind a problem.	33.3	2.83 (1.17)	6	0.0	1.67 (0.52)	**6**
I am able to remember most of the mathematics I learn in a course after the course is over.	83.3	3.83 (0.98)	6	66.7	3.83 (1.17)	**6**
I get frustrated if I don't understand what I am studying in mathematics.	83.3	4.17 (0.75)	6	100.0	4.33 (0.52)	**6**
I like doing mathematics.	100.0	4.33 (0.52)	6	100.0	5.00 (0.00)	**6**
I am very interested in mathematics.	100.0	4.17 (0.41)	6	100.0	5.00 (0.00)	**6**
I am able to learn mathematics well.	66.7	3.67 (1.03)	6	100.0	4.33 (0.52)	**6**
If I cannot solve a mathematics problem within a few minutes, I will stop trying to solve it.	16.7	2.17 (1.47)	6	16.7	1.83 (1.17)	**6**
I am good at doing mathematics.	66.7	3.50 (0.84)	6	100.0	4.17 (0.41)	**6**
I am able to successfully solve most mathematical problems with which I am confronted.	**83.3**	**3.83 (0.41)**	**6**	**100.0**	**4.17 (0.41)**	**6**

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

Table 5: MBS Learning Mathematics for Math Recovery MITs

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
People learn mathematics by listening to lecture.	0.0	1.40 (0.55)	5	0.0	1.17 (0.41)	**5**
Learning mathematics mainly involves memorizing procedures.	16.7	2.00 (1.10)	6	0.0	1.33 (0.52)	**6**
In order to learn mathematics you need to learn a different method for each new type of problem.	16.7	2.67 (0.82)	6	0.0	1.50 (0.84)	**6**
People learn mathematics by working together in cooperative groups.	83.3	4.00 (0.63)	6	50.0	3.00 (1.26)	**6**
I try to understand the reasoning behind the procedures I use in mathematics.	100.0	4.17 (0.41)	6	100.0	4.50 (0.55)	**6**
I know I understand mathematics when I can apply mathematics to a new situation.	100.0	4.50 (0.55)	6	100.0	4.67 (0.52)	**6**
People learn mathematics by doing hands on activities.	100.0	4.67 (0.52)	6	100.0	4.67 (0.52)	**6**
I know I understand mathematics when I get a good grade on an exam.	50.0	3.17 (0.98)	6	16.7	2.83 (0.75)	**6**
Anyone can learn mathematics.	100.0	4.67 (0.52)	6	100.0	4.67 (0.52)	**6**
I know I understand mathematics when I can explain the mathematics to someone else.	100.0	4.67 (0.52)	6	100.0	5.00 (0.00)	**6**
Making mistakes is part of learning mathematics.	**100.0**	**4.50 (0.55)**	**6**	**100.0**	**4.83 (0.41)**	**6**

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

Table 6: MBS the Nature of Math for Math Recovery MITs

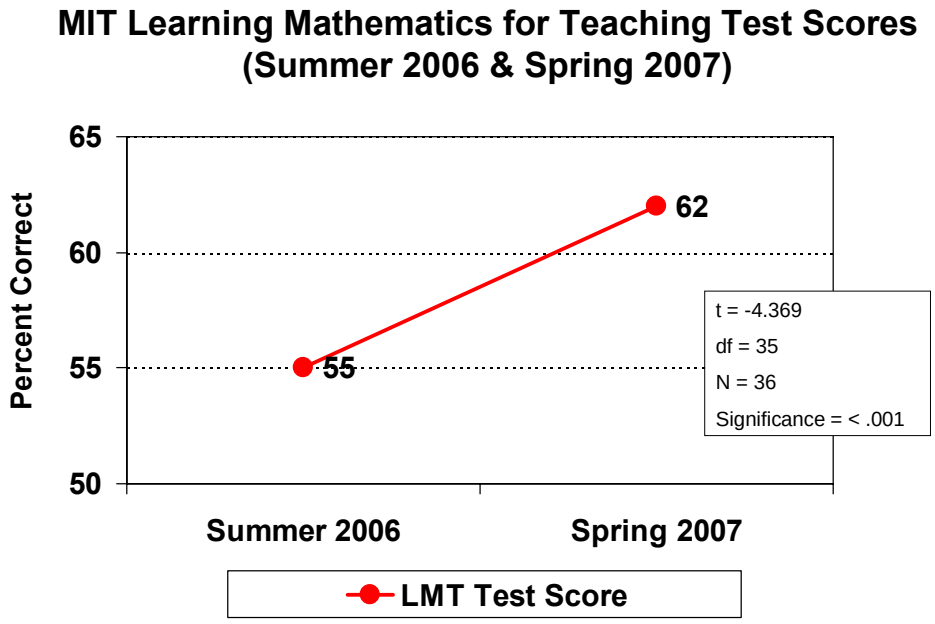
	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
To understand mathematics, students must solve many problems following examples provided.	50.0	3.00 (1.55)	6	16.7	2.33 (1.03)	**6**
Doing mathematics consists mainly of using rules.	33.3	2.83 (0.98)	6	0.0	1.83 (0.75)	**6**
Getting the right answer is the most important part of mathematics.	16.7	2.67 (1.21)	6	0.0	1.80 (0.45)	**5**
It is difficult to talk about mathematical ideas because all you can really do is explain how to do specific problems.	0.0	2.00 (0.63)	6	0.0	1.67 (0.52)	**6**
Solving mathematics problems frequently involves exploration.	100.0	4.33 (0.52)	6	100.0	4.83 (0.41)	**6**
Most mathematics problems are best solved by deciding on the type of problem and then using a previously learned solution for that type of problem.	50.0	3.17 (0.98)	6	16.7	2.00 (1.10)	**6**
Mathematics is an uncreative subject.	0.0	1.33 (0.52)	6	0.0	1.17 (0.41)	**6**
The most important part of mathematics is computation.	0.0	1.83 (0.41)	6	16.7	1.83 (1.17)	**6**
There are several ways to find the correct solution to a mathematics problem.	100.0	4.33 (0.52)	6	100.0	4.83 (0.41)	**6**
Those who are good in mathematics can solve a mathematics problem within a few minutes.	33.3	2.50 (1.22)	6	33.3	2.67 (1.21)	**6**
Knowing step-by-step procedures is necessary to solve mathematical problems.	**16.7**	**2.83 (0.75)**	**6**	**0.0**	**1.50 (0.55)**	**6**

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

Tentatively, it appears as though the *Math Recovery* MITs may also have gained some confidence in their teaching; there are increases in the items asking about understanding mathematics concepts and being good at mathematics (see Table 4).

MIT content knowledge. The LMT is used to assess the knowledge necessary to teach mathematics to elementary and middle school students. These questions were developed by the research group at the University of Michigan and were written so that 50% of mathematics teachers will get 50% of the questions correct. All MITs completed this test prior to MIT training and again at the end of the school year. Figure 11 displays the change in the LMT scores for the MITs. The Mean pretest score was 55, the Mean posttest was 62. This represented a 12.7% increase in LMT scores over the course of nine months.

Figure 11: MIT Learning Mathematics for Teaching Test Scores



Intervention Program Overall Assessment[6]

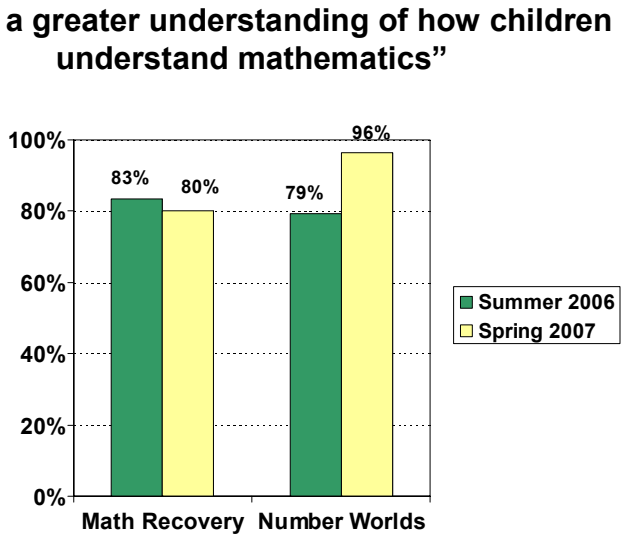
The MITs completed a series of OES surveys throughout the year. After each major professional development program they attended, they completed an OES that contained both general items and items specific to the training they had just received. Additionally, they completed a general OES at the end of the 2006-2007 academic-year that focused more on general impressions of the KCM staff and its support functions.

[6] See attached survey data report for details in Appendix C.

This general OES also asked about contextual support needed from school or district personnel. Results imply that teachers perceived an improvement in their own instructional and content knowledge. They also reported generally positive impressions of the KCM staff and the KCM resources and, generally, felt that they had received adequate contextual support.

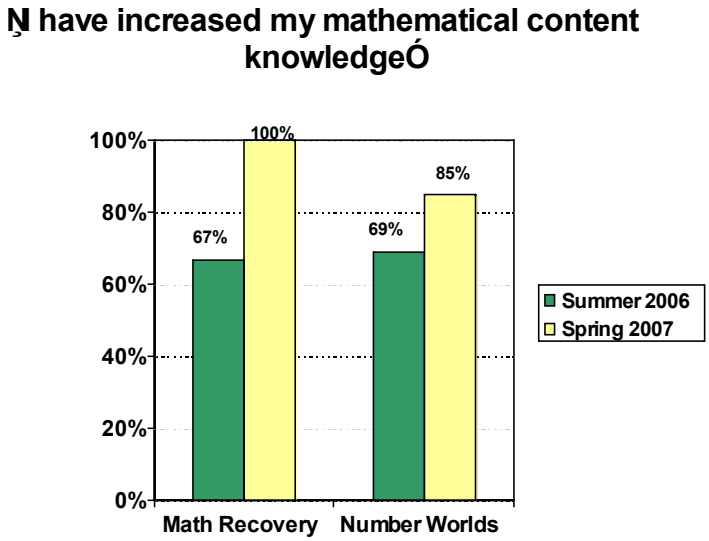
MITs' perceptions of knowledge and effectiveness. Teachers of both intervention programs reported having a "greater understanding of how children learn mathematics" as a result of their training (Figure 12). Eighty-three percent of *Math Recovery* teachers stated that they had a "greater understanding of how children learn mathematics" and were relatively unchanged by the end of the program at 80%, while the *Numbers World* program increased to 96%, after starting at 79%.

Figure 12: MIT Perceptions of Understanding of Mathematics



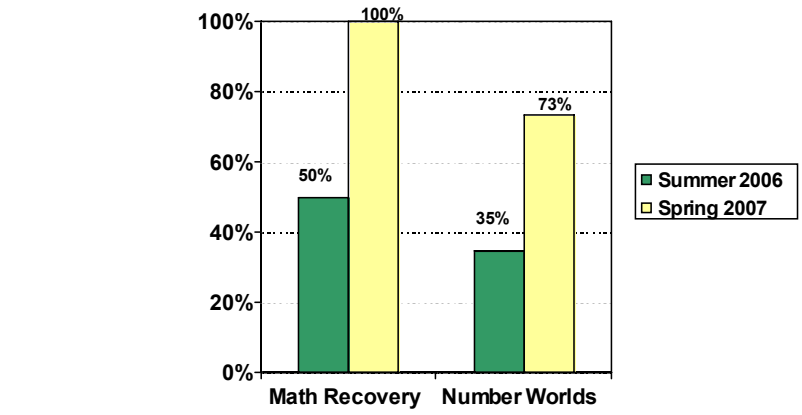
As displayed in Figure 13, MITs also reported that the training they received had increased their content knowledge of mathematics. *Math Recovery* teachers started out at 67% and ended the program at full agreement (100%) that the training they received had increased their content knowledge of mathematics, while the *Numbers World* program increased to 85% from 69%.

Figure 13: MIT Perceptions of Knowledge Increase



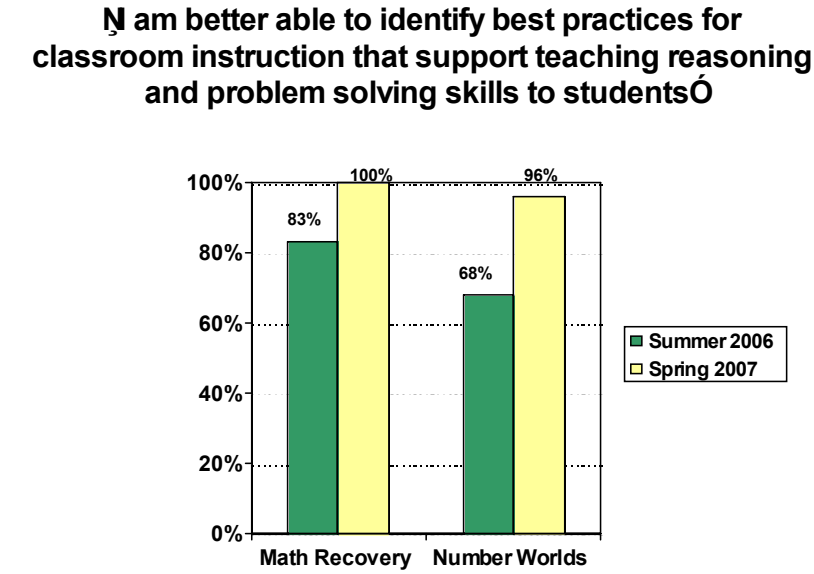
Teachers reported an increase in their knowledge of Kentucky core content, the documentation of standards which must be taught for every grade in mathematics (Figure 14). The responses to this question provided one of the most substantial increases of any item across all surveys. The *Math Recovery* teachers began the program at a 50% rate of agreement but completed the program at 100% of agreement. *Number Worlds* teachers began at 35% in agreement and ended at 73% in agreement.

Figure 14: MIT Perceptions of Knowledge of Core Content



The OES also asked about teachers' ability to identify best practices for teaching mathematics. There was a substantial increase (over 90% agreement) on this item after one year of MIT professional development (Figure 15).

Figure 15: MIT Perceptions of Identifying Best Practices



MITs from both programs had very positive views regarding how these programs affected student learning of mathematics (Tables 7 and 8). They began in the summer 2006 survey with strong beliefs that the program would be effective, that the program would fit in with the school and the program would actively involve children in mathematics. The teachers' only real concern was the ease of implementation, where fewer than 60% of participants felt that the program would be easy to implement in their schools. This percentage, however, increased to 88.5% by Spring 2007.

Table 7: OES Student Learning of Mathematics Number Worlds MITs

	Summer 2006 (n=29)		Spring 2007 (n=26)	
	Percent Strongly Agree or Agree	Mean (std. dev.)	Percent Strongly Agree or Agree	Mean (std. dev.)
The program will be an effective program for teaching students mathematics.	100.0	4.48 (.509)	96.2	4.38 (.571)
The program will fit easily into my school's mathematics curriculum.	86.2	4.14 (.639)	88.5	4.19 (.749)
The program will be easy to implement in my school.	58.6	3.72 (.797)	88.5	4.19 (.749)
Encourages learning that is in line with Kentucky Core Content.	93.1	4.28 (.591)	92.3	4.15 (.543)
The program involves children in actively doing mathematics.	100.0	4.66 (.484)	100.0	4.65 (.485)
The program will give students a solid foundation in mathematics.	89.7	4.41 (.682)	96.2	4.35 (.562)
The program will help student's develop a strong conceptual framework from which to build future mathematics skills.	96.6	4.52 (.574)	88.5	4.42 (.703)
The program will promote student learning by identifying where they need additional instruction and support.	100.0	4.66 (.484)	100.0	4.50 (.510)

** Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

Table 8: OES Student Learning of Mathematics Math Recovery MITs

	Summer 2006 (n=6)		Spring 2007 (n=5)	
	Percent Strongly Agree or Agree	Mean (std. dev.)	Percent Strongly Agree or Agree	Mean (std. dev.)
The program will be an effective program for teaching students mathematics.	100.0	5.00 (.000)	100.0	5.00 (.000)
The program will fit easily into my school's mathematics curriculum.	100.0	4.50 (.548)	100.0	4.80 (.447)
The program will be easy to implement in my school.	83.3	4.17 (.753)	100.0	4.80 (.447)
Encourages learning that is in line with Kentucky Core Content.	100.0	4.50 (.548)	100.0	4.80 (.447)
The program involves children in actively doing mathematics.	100.0	5.00 (.000)	100.0	5.00 (.000)
The program will give students a solid foundation in mathematics.	100.0	5.00 (.000)	100.0	5.00 (.000)
The program will help student's develop a strong conceptual framework from which to build future mathematics skills.	100.0	5.00 (.000)	100.0	5.00 (.000)
The program will promote student learning by identifying where they need additional instruction and support.	100.0	5.00 (.000)	100.0	5.00 (.000)

** Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

MIT perceptions of support and development resources. MITs completed OES instruments immediately after completing their training sessions (prior to the school year) and near the end of the school year. Tables 9 and 10 summarize the MITs perceptions of that training.

Table 9: OES Value of the Professional Development Number Worlds MITs

	Summer 2006 (n=29)		Spring 2007 (n=26)	
	Percent Strongly Agree or Agree	Mean (std. dev.)	Percent Strongly Agree or Agree	Mean (std. dev.)
The length of the professional development program was appropriate for the topics covered.	13.8	2.41 (.983)	73.1	3.77 (.951)
I was pleased with the overall quality of this professional development program.	75.9	3.79 (.819)	80.8	3.88 (.766)
The Number Worlds program is a better program for assisting young children in learning mathematics than programs used during the 2005-2006 school year.	69.0	3.69 (.967)	65.4	3.77 (.992)

** Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

Table 10: OES Value of the Professional Development Math Recovery MITs

	Summer 2006 (n=6)		Spring 2007 (n=5)	
	Percent Strongly Agree or Agree	Mean (std. dev.)	Percent Strongly Agree or Agree	Mean (std. dev.)
The length of the professional development program was appropriate for the topics covered.	100.0	4.50 (.548)	100.0	4.80 (.447)
I was pleased with the overall quality of this professional development program.	100.0	5.00 (.000)	100.0	5.00 (.000)
The Math Recovery program is a better program for assisting young children in learning mathematics than programs used during the 2005-2006 school year.	66.7	3.33 (1.862)	60.0	3.40 (2.191)

** Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

Clearly, MITs found their training valuable. The one substantial change came in the *Number Worlds* MITs' perception about the length of the professional development program (Table 9). MITs felt more positively about the length of the programming in the Spring than in the Fall.

The Spring 2007 OES included items that asked MITs about their perceptions of the support they had received from key personnel as they implemented their program. Tables 11 and 12 present a summary of MIT responses to these items. Except for the area of time to prepare for lessons, the MITs in *Math Recovery* felt that they were being supported well by their schools and districts in areas such as proper space and respect from other teachers in the building (Table 11).

Table 11: OES School and District Support for the Program Math Recovery MITs

	Strongly Disagree %	Disagree %	Neutral %	Agree %	Strongly Agree %	Count
I receive the necessary support from my school district to implement the Math Recovery Program in my school.	0	0	0	16.7	83.3	12
I am given time to properly prepare for lessons.	0	0	8.3	33.3	58.3	12
My principal supports my attendance at the Math Recovery professional development sessions that occurs throughout the year.	0	0	0	0	100.0	12
I am provided, by the school, proper space to teach Math Recovery lessons to students.	0	0	0	9.1	90.9	11
Other teachers in my building value my efforts as a mathematics intervention teacher.	0	0	0	33.3	66.7	12
The MIT program, as implemented in my school, has improved the quality of mathematics teaching in my school.	0	0	0	33.3	66.7	12

The teachers in the *Number Worlds* program felt less supported by their district, did not feel that they had enough space, and did not feel as valued by other teachers in the building as the *Math Recovery* teachers surveyed (Table 12).

Table 12: OES School and District Support for the Program Number Worlds MITs

	Strongly Disagree %	Disagree %	Neutral %	Agree %	Strongly Agree %	Count
I receive the necessary support from my school district to implement the Number Worlds Program in my school.	0	0	5.6	27.8	66.7	36
I am given time to properly prepare for lessons.	0	0	2.8	36.1	61.1	36
My principal supports my attendance at the Number Worlds professional development sessions that occurs throughout the year.	0	0	2.8	19.4	77.8	36
I am provided, by the school, proper space to teach Number Worlds lessons to students.	0	2.8	5.6	27.8	63.9	36
Other teachers in my building value my efforts as a mathematics intervention teacher.	0	5.6	2.8	52.8	38.9	36
The MIT program, as implemented in my school, has improved the quality of mathematics teaching in my school.	0	2.8	8.3	44.4	44.4	36

The OES also assessed how MITs perceived the KCM resources and personnel. Since the MITs work at locations all across the state of Kentucky, the KCM maintains a website as a primary resource for the MITs. The Spring OES indicated that 95.1% of the MITs had used the KCM website as a resource. MITs who had accessed the website were asked to evaluate elements of the website for their usefulness. Table 13 summarizes their evaluations (see also Tables C-19 & C-20, Appendix C).

Table 13: OES MIT Evaluations of the KCM Website Resources (Percent of Respondents)

Please rate the usefulness of the following "resources for teachers" found on the Kentucky Center for Mathematics webpage	Have not Used %	Not at all Useful (1) %	(2) %	(3) %	(4) %	Very Useful (5) %	Have not Used %
Information on math curricula	7.5	.0	5.0	12.5	45.0	30.0	40
Professional development opportunities	15.0	.0	7.5	12.5	25.0	40.0	40
Math games/puzzles/practice	25.0	.0	.0	17.5	30.0	27.5	40
Interactive math manipulatives	35.0	.0	.0	20.0	22.5	22.5	40
Assessment materials (including Open Response)	35.0	.0	5.0	7.5	40.0	12.5	40
Math tools (dictionaries/graph paper…)	45.0	.0	2.5	20.0	17.5	15.0	40
National and international research and statistics on teaching and learning mathematics	57.5	.0	2.5	7.5	25.0	7.5	40
Lesson plans	59.0	2.6	2.6	15.4	15.4	5.1	39
Webquests	65.0	.0	5.0	10.0	15.0	5.0	40
Mathematics competitions	72.5	2.5	5.0	5.0	12.5	2.5	40
Summer and school year opportunities for pre-college students' webpage	75.0	5.0	5.0	10.0	5.0	.0	40
Teacher scholarships and grants	75.0	.0	2.5	2.5	12.5	7.5	40
Kentucky graduation requirements	82.5	.0	5.0	.0	10.0	2.5	40
Student scholarships	85.0	.0	5.0	2.5	5.0	2.5	40

Two things are apparent in the data displayed. First, MITs using various resources rate them very favorably (see Table C-21). However, many resources are not being accessed by MITs.

The KCM employs Regional Coordinators who function as primary resource persons for the MITs. The Spring OES asked MITs about their contact with the regional coordinators. Over 90% of the MITs indicated that they had contacted their regional coordinator at some point (37 out of 41 respondents). Over 62% (23 of 37) reported that they contacted their regional coordinator 10 times or more. The primary mode of contact was email (see Table C-22, Appendix C). *All* MITs (100%) reported that the regional coordinator had responded in a timely manner. Over 97% (36 of 37) reported that the regional coordinator had been helpful in their response. The general OES also included an open-ended item asking the MITs if they had further comments on their regional coordinators. The full text of those comments is displayed in Table 14.

Table 14: OES MIT Comments Regarding Regional Coordinators

- She was in my opinion the best RC an MIT could have. She showed me a lot.
- I hope the regional coordinator program is continued, as it gives us a liaison to KCM and she can answer questions perhaps more quickly.
- She is always ready to assist in any way possible.
- I am glad to have mine for another year.
- I enjoyed completing our book study together. It was very beneficial and helped me make sense of what math instruction should be.
- I consider the Regional Coordinator to be one of the best support systems in the implementation of this program. Through her and the Centra meetings, we had many wonderful discussions about mathematics strategies and the way children learn mathematics. She shared articles, websites and went out of her way to look for resources that she thought would be beneficial to us in the implementation of the program.
- She was extremely helpful and encouraging.
- NO
- My regional coordinator was extremely supportive and a great resource!
- Very good resource to have.
- Very helpful. If she didn't know the answer she would find someone who did.
- My regional coordinator was very helpful this year. As the facilitator of the Centra meetings, she offered support, provided resources and information, and lead our group in meaningful discussions.
- She has been wonderful to work with. She is always helpful, and if she doesn't have information on something I need, she finds it.
- no
- “XXXX” is an awesome regional coordinator. She is more than willing to help us with anything we need and will come to our school at the drop of a hat if we need her.
- “XXXX” is very supportive to anything I requested.
- “XXXX” is great!
- My regional coordinator, “XXXX”, has been an invaluable resource during my first MIT year - she has brought a lot of knowledge to the program and has offered a lot of support and advice, all in a very positive manner.
- “XXXX” was pleasant and helpful at each meeting. She was a joy to work with.
- Very helpful and very flexible!!

- Extremely supportive and helpful during this somewhat stressful first year.
- The regional coordinator is very helpful.
- She is very helpful and loves her job! I have enjoyed getting to know her.
- It has been fantastic to have the opportunity to work so closely with my regional coordinator.

Finally, the OES asked the MITs about their contact with the KCM staff. Over 90% (37 of 41) indicated that they had contacted the KCM staff "…for the purpose of answering a specific question, getting information, finding a resource, or other problem or concern that you needed assistance within your MIT duties[.]" A total of 32.4% indicated they had contacted the KCM staff 10 times or more (12 of 37). Again, email was the more frequent mode of contact. A full 100% of MITs reported that the KCM staff had responded in a timely manner. Thirty-four of 37 (91.9%) indicated that the response was helpful. The full text of the general comments about the KCM staff is displayed below in Table 15.

Table 15: OES MIT Comments Regarding the KCM Staff

- Everyone has answered promptly or let me know they would have to research the question and would get back as soon as possible. Very professional and caring.
- "XXXX" really stands out in my mind, she was extremely helpful to me this year as well as others. Every time I had a question It was answered within the hour by someone, most of the time "XXXX".
- "XXXX" and the research assistants at KCM have always been willing to answer questions or find the answer to the questions that we have had this year. I can't say enough good things about the work they did for the MIT's this year.
- NO
- Overall, everyone was supportive and helpful in aiding me in my position.
- "XXXX" has been tremendous!! Without her help and support and encouragement throughout the school year this grant would have not been able to be so successful!!
- They have been very helpful and quick to respond.
- "XXXX" has been wonderful! I am glad that I have had the opportunity to work with her this year!
- Questions were answered quickly!
- "XXXX" and "XXXX" have both been angels to me

The KCM Mathematics Coaching Program

One of the major activities of the Kentucky Center for Mathematics has been the creation and ongoing support of a statewide Mathematics Coaching Program. The Mathematics Coaching Program is designed to develop "coaches" who work with mathematics teachers both one-on-one and in small groups to help those teachers adopt instructional methods that will enhance student learning of mathematics. Coaches may work within single schools or within a school district. The implementation of the coaching programs was site-specific; that is, selection of coaches and decisions about which teachers would be coached were left to school or district personnel. A total of 68 mathematics coaches were identified for data collection purposes. They worked in 39 elementary schools, 12 middle schools and 19 high schools (a total of 70 schools, since some coaches worked in more than one school or more than one type of school).

The mission of the KCM is to provide training and support that prepares mathematics coaches within Kentucky schools. Both coaches and the teachers they support were assessed in a longitudinal manner (see *Data Collection* in this report, p.11). Analysis of these data provides an evaluation of the beliefs, attitudes and the mathematics content knowledge of the both the coaches and the coachees. These results are reported below. Additionally, coaches provided feedback about the effectiveness of the KCM's resources. Participants' direct perceptions of the KCM's activities are reported in a separate section. Finally, baseline KCCT data are presented for coaching program schools.

Coaches' Beliefs, Attitudes and Content Knowledge[7]

The MBS was used to assess the coaches' beliefs and attitudes about mathematics. They were surveyed in June or July 2006 at their initial training (pretest) and again in the spring as a posttest. The LMT was employed to assess participants' content knowledge of mathematics. The LMT is grade level-specific and has questions relating to content knowledge needed to teach at specific levels. Current research shows that an increase in content knowledge by the teacher will improve the efficacy of that teacher in the classroom. Results are reported separately for elementary school coaches and coaches at the middle school or high school level.

Elementary Coaches. Elementary school coaches showed no changes during the year regarding *teacher efficacy* (see Appendix D). Table 16.1 displays the items regarding the *nature of mathematics* in which elementary school coaches showed significant changes. Among other changes, these coaches seem to have experienced significant change in their belief that students must learn mathematics by solving examples as well as the belief that doing mathematics requires the application of rules.

[7] A complete display of data for the coaching program is included in Appendix D.

Table 16.1: MBS Nature of Mathematics for Elementary Coaches

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
People learn mathematics by working together in cooperative groups. **	91.2	4.03 (0.46)	34	94.7	4.42 (0.61)	19
People learn mathematics by doing hands on activities. **	97.1	4.32 (0.53)	34	100.0	4.72 (0.46)	18
I know I understand mathematics when I can explain the mathematics to someone else. **	97.1	4.44 (0.56)	34	100.0	4.78 (0.43)	18
To understand mathematics, students must solve many problems following examples provided. **	27.3	2.88 (0.89)	34	5.6	2.22 (0.73)	18
Doing mathematics consists mainly of using rules. **	35.3	3.00 (0.89)	34	11.8	2.24 (0.90)	17
In mathematics, it is not possible to do a problem unless you've first been taught how to do one like it. **	8.8	2.15 (0.70)	34	0.0	1.72 (0.46)	18
Knowing step-by-step procedures is necessary to solve mathematical problems. **	23.5	2.91 (0.87)	34	10.5	2.21 (0.79)	19

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.
** Significant at .05.

A second analysis was done using only those who responded to both the pre- and posttests (see Table 16.2). Only a few differences were noted, none of which alter the findings listed above.

Table 16.2: MBS Nature of Mathematics for Elementary Coaches Who Took Both the Pre- and Posttests)

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
To understand mathematics, students must solve many problems following examples provided. **	22.2	2.83 (.92)	19	5.6	2.22 (.73)	19
Doing mathematics consists mainly of using rules. **	21.1	2.84 (.76)	19	11.8	2.24 (.90)	19
In mathematics, it is not possible to do a problem unless you've first been taught how to do one like it. **	5.3	2.05 (.52)	19	0.0	1.72 (.46)	19
There are several ways to find the correct solution to a mathematics problem.**	94.7	4.16 (.90)	19	94.7	4.68 (.58)	19
Knowing step-by-step procedures is necessary to solve mathematical problems. **	26.3	3.16 (.76)	19	10.5	2.21 (.79)	19

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.
** Significant at .05.

Table 17 displays data relevant to changes in elementary coaches' beliefs about the *nature of mathematics*. The table indicates that while certain beliefs were already quite strong among the coaches, they became even stronger over the course of the year.

Table 17: MBS Learning Mathematics for Elementary Coaches

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Q13. People learn mathematics by working together in cooperative groups. **	91.2	4.03 (0.46)	34	94.7	4.42 (0.61)	19
Q16. People learn mathematics by doing hands on activities. **	97.1	4.32 (0.53)	34	100.0	4.72 (0.46)	18
Q19. I know I understand mathematics when I can explain the mathematics to someone else. **	97.1	4.44 (0.56)	34	100.0	4.78 (0.43)	18

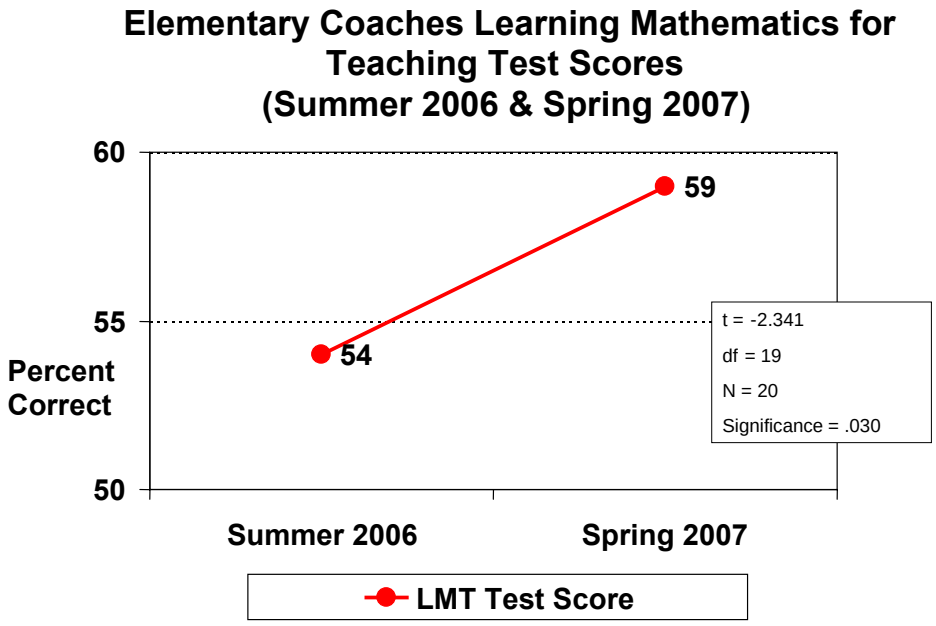
* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.
** Significant at .05.

Coaches at the elementary level exhibited changes in items relating to the inquiry-based model of mathematics reflected in such questions as learning in cooperative groups, learning by hands-on activities, and learning through explanation of mathematical concepts (Table 17). For all three questions, the percentage of participants agreeing or strongly agreeing with the statement increased by about three percentage points.

A second analysis was done using only those who responded to both the pre- and posttests and no significant differences were found with regard to *learning mathematics*.

Coaches also completed the LMT in a pretest/posttest manner. Figure 17 displays the change in content knowledge over the school year for elementary level coaches. These coaches showed a significant gain in content knowledge from summer of 2006 to spring 2007.

Figure 16: LMT for Elementary Coaches



Middle and high school coaches. Middle and high school coaches showed significant changes on only two items on the MBS. These statements were regarding the nature of mathematics (see Table 18). The first question dealt with the length of time needed to solve a problem, and the second statement dealt with the necessity of knowing step-by-step procedures to solve mathematics problems.

Table 18: MBS: The Nature of Mathematics for Middle / High School Coaches

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Those who are good in mathematics can solve a mathematics problem within a few minutes. **	17.2	2.52 (0.87)	29	0.0	2.06 (0.43)	17
Knowing step-by-step procedures is necessary to solve mathematical problems. **	34.5	2.93 (0.88)	29	11.8	2.35 (0.79)	17

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.
** Significant at .05.

A second analysis was done using only those who responded to both the pre- and posttests and no significant differences were seen with regard to any questions on the MBS.

The middle and high school coaches showed no statistically significant changes in content knowledge over the school year as measured by the LMT. The mean percentage correct for the pretest (Summer 2006) was 76.04%. The mean for the end of the year (Spring 2007) was 78.9% correct (t = -1.38, N = 18, df = 17, p. = .19).

Coachees' Beliefs, Attitudes and Content Knowledge[8]

Coachees also completed the MBS and the LMT as a part of a longitudinal design (see *Data Collection* on p. 11). The pretests were administered early in Fall 2006 and the posttests were administered in April 2007 (near the end of the school year).

Elementary coachees. Elementary school coachees showed statistically significant change on only one item on the MBS (see Appendix D). On the pretest, 6.5% of elementary coachees agreed with the statement, "The most important part of mathematics is computation." On the posttest, 13.1% agreed. A second analysis was done using only those who responded to both the pre- and posttests, and no significant differences were seen with regard to any questions on the MBS.

[8] A complete display of data for the coaching program is included in Appendix D.

The LMT results showed no significant change in content knowledge for the elementary school coachees. These analyses were complicated by the fact that the coachees took two different versions of the LMT (Form A as the pretest and Form B as the posttest). Data corrected to reflect the different forms of the test indicated no significant change from pretest to posttest (t = -.56, N = 126, df = 125, $p.$ = .56).

Middle school and high school coachees. The middle school and high school coachees showed no statistically significant differences from pretest to posttest on the MBS (see Appendix D). A second analysis was done using only those who responded to both the pre- and posttests and no significant differences were seen with regard to any questions on the MBS.

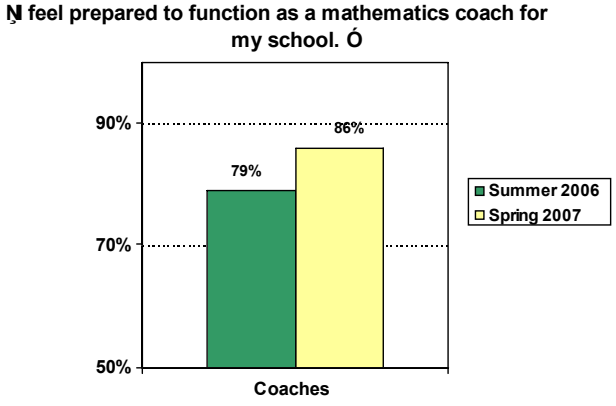
Likewise, the LMT indicated no significant change in content knowledge for the middle and high school coachees (t = -1.62, N = 91, df = 90, $p.$ = .11).

Coach and Coachee Overall Evaluation of the Program

All coaches participating in the KCM Mathematics Coaching program completed the OES on multiple occasions. They completed a version of the OES immediately after any of the coaches' professional development programs they attended. They also completed a general version of the OES near the end of the 2006-2007 school year.

Teaching knowledge. First, coaches reported substantial changes in their responses regarding their knowledge of mathematics and teaching mathematics. There was an increase in the percentage of coaches who agreed with the statement about preparation for coaching (Figure 17).

Figure 17: Preparation as a Mathematics Coach



Similarly, there was an increase in agreement with statements regarding measurement and assessment (Figures 18 and 19).

Figure 18: Proficiency in Multiple Methods for Measuring Student Performance

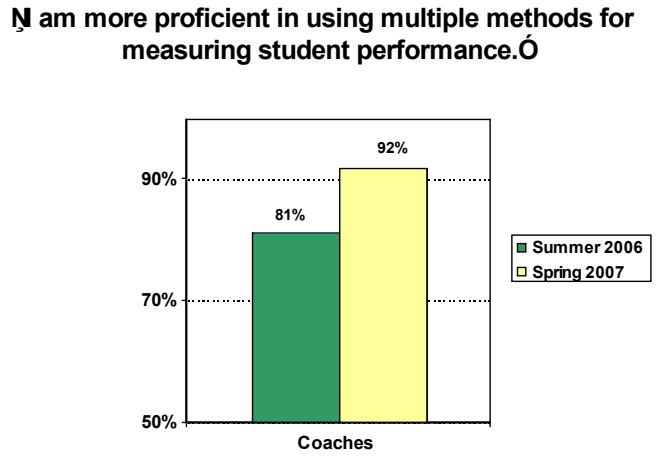
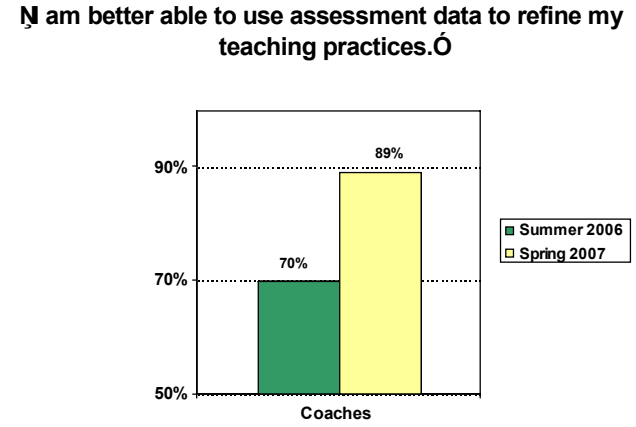
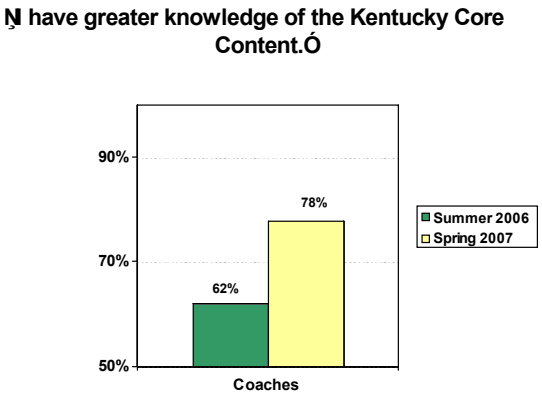


Figure 19: Ability to Use Assessment Data



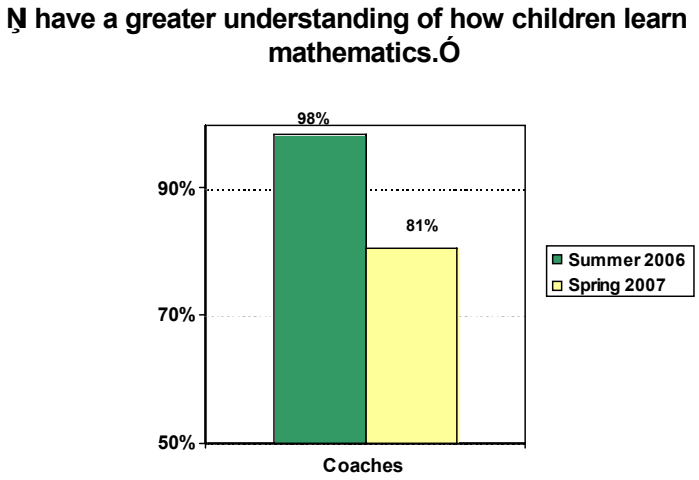
There was also a substantial increase in agreement with the statement regarding Kentucky Core Content (Figure 20).

Figure 20: Knowledge of Kentucky Core Content



One interesting *decrease* emerged in the level of agreement with the statement about understanding how children learn mathematics (Figure 21). The level of agreement with this statement decreased from 98% on the pretest to 81% on the posttest. However, the explanation probably resides in the wording of this item. The item asks if the coach has experienced an increase in their understanding of how children learn. Initially, it appears as though *nearly all* the coaches gained some insight from the initial training. At the end of the year, a very high percentage is still claiming to have increased their knowledge. But it appears that the impact was not as pervasive as it had been at first.

Figure 21: Understanding of How Children Learn Mathematics



KCM support. The OES also presented a general item asking about the usefulness of the professional development the KCM organized for coaches. Responses were overwhelmingly positive. Figures 22 and 23 illustrates the fact that coaches found

materials helpful and felt very positively about the professional development provided by the KCM.

Figure 22: Efficacy of Materials and Resources

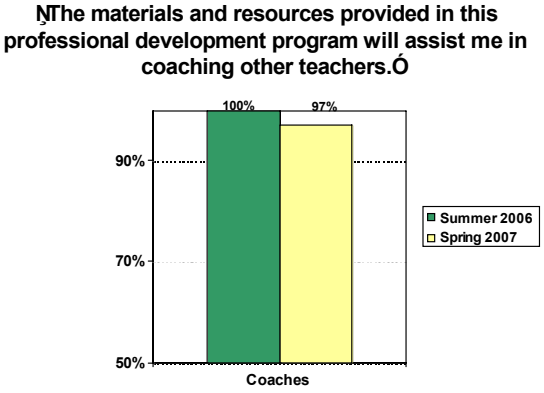
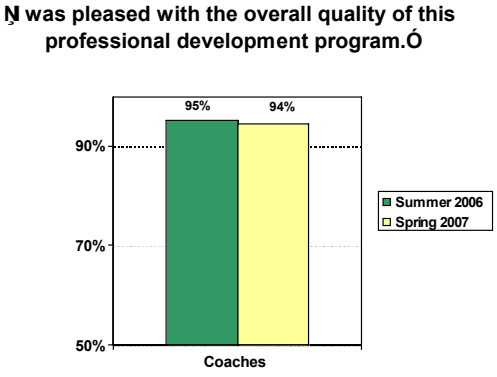


Figure 23: The Overall Quality of the Professional Development Program



Related items on the OES asked specifically about the website created and maintained by the KCM as a resource to coaches. A high percentage (90%) of the coaches indicated that they *had* accessed the KCM website during the school year. Table 19 displays the coaches' evaluations of the usefulness of each component of the website.

Table 19: OES Coaches' Perceptions of Usefulness" of the KCM Web Resource

	Have not Used %	Not at all Useful (1) %	(2) %	(3) %	(4) %	Very Useful (5) %	Count
Professional development opportunities	36.1	.0	2.8	11.1	19.4	30.6	36
Math games/puzzles/practice	27.8	.0	8.3	13.9	19.4	30.6	36
Interactive math manipulatives	30.6	.0	8.3	11.1	13.9	36.1	36
Math tools (dictionaries/graph paper…)	44.4	.0	8.3	5.6	11.1	30.6	36
Lesson plans	44.4	.0	5.6	16.7	11.1	22.2	36
Information on math curricula	25.0	.0	2.8	5.6	25.0	41.7	36
Assessment materials (including Open Response)	36.1	.0	2.8	13.9	11.1	36.1	36
Webquests	52.8	.0	.0	16.7	13.9	16.7	36
Mathematics competitions	58.3	2.8	.0	19.4	8.3	11.1	36
Summer and school year opportunities for pre-college students' webpage	63.9	2.8	.0	11.1	11.1	11.1	36
Student scholarships	66.7	5.6	2.8	16.7	5.6	2.8	36
Teacher scholarships and grants	52.9	2.9	.0	14.7	20.6	8.8	34
Kentucky graduation requirements	61.1	2.8	.0	22.2	5.6	8.3	36
National and international research and statistics on teaching and learning mathematics	52.8	.0	2.8	22.2	8.3	13.9	36

Coaches were also asked specifically about contact with their regional coordinators. Nearly 73% (29 of 40) indicated that they had contacted the coordinator at least once. Nearly a third (31%) had contacted the coordinator more than ten times. Email was the most common mode of contact (55%) with a substantial number of coaches (41%) also indicating that they used both email and telephone to contact the coordinator. All coaches indicated that the coordinators' responses had been timely and

28 of 29 indicated that the responses had been helpful. Table 20 presents the full text of the coaches' general comments about the regional coordinators.

Table 20: OES: Coaches' Open-Ended Comments About Their Regional Coordinators

Comments about regional coordinators…

- **[My RC]** was great.
- **[My RC]** was an awesome RC. **[My RC]** has great knowledge of math and CENTRA. **[My RC]** was always well prepared for meetings. You can tell **[My RC]** spends time researching and thinking of ways to assist the coaches.
- **[My RC]** was very much in tune to my needs and was very supportive in my goal to be an effective Math Coach.
- Great support system.
- I enjoyed working with **[My RC]**.
- I feel that regional coordinators are vital. They are the glue that holds everything together. **[My RC]** was my regional coordinator and was very helpful. **[My RC]** led Centra meetings and has been a WONDERFUL resource. **[My RC]** has done an outstanding job.
- In an advisory role, they have been wonderful support in beginning a coaching program in mathematics at my school.
- It is nice to have their support and encouragement, especially during the first year when everything is new and we're learning.
- Mine was very supportive and nonjudgmental when conducting my observation and reflection.
- My RC was a great listener and always tried to help me solve the problems I was having. It really helped having **[My RC]** to help with this program.
- My regional coordinator did not attend any of the training sessions in which I participated. Of the regional coordinators that I trained with, I found them to be OUTSTANDING-Especially my Centra leader. I was disappointed that I was not assigned a regional coordinator that I had met in training.
- **[My RC]** was wonderful. I enjoyed working with **[My RC]** and hope to work with **[My RC]** again next year.
- Very willing to help.

The final OES included a parallel set of questions referring to the KCM staff. Nearly 63% (25 of 40) coaches indicated that they had contacted the KCM staff. Only six coaches reported contacting the KCM ten or more times. Eighteen of 25 indicated that email had been the mode of contact. All 25 indicated that the response from the KCM staff had been timely and all 25 indicated that the response had been at least somewhat helpful. Table 21 displays the coaches' open-ended comments about the KCM staff.

Table 21: OES: Coaches' Open-Ended Comments Regarding the KCM Staff

Coaches' comments about the staff at the KCM, in general

- Again, everyone was so helpful and wonderful to work with.
- **[The KCM Staff Member]** is absolutely wonderful, so kind, patient, and responsive to our needs. **[The KCM Staff Member]** did a great job planning our PD. We were always treated with great respect.
- **[The KCM Staff Member]** is wonderful to work with and will be "XXXX". **[The KCM Staff Member]** always has such a positive attitude and follows up on questions very quickly.
- **[The KCM Staff Member]** was AMAZING. **[The KCM Staff Member]** is a wonderful leader and always made us feel that every question was important. **[The KCM Staff Member]** was always there for us if we needed **[The KCM Staff Member]**.
- **[The KCM Staff Member]** will be "XXXX"!
- I felt that **[The KCM Staff Member]** did an OUTSTANDING job at getting the coaching program off of the ground. **[The KCM Staff Member]** was very knowledgeable and instrumental in making the KCM a success. **[The KCM Staff Member]** was an EXTREMELY valuable part of the KCM team. **[The KCM Staff Member]** did an outstand job.
- **[The KCM Staff Member]** and **[The KCM Staff Member]** were both helpful. **[The KCM Staff Member]** has been a fantastic Leader for the Math Coaches.
- **[The KCM Staff Member]**, **[The KCM Staff Member]** and **[The KCM Staff Member]** have all done an exceptional job. They have gone above and beyond to ensure this year was a valuable learning experience for all. It is obvious they are dedicated to improving the mathematics programs in Kentucky.
- They are a great resource for most all of the questions I have inquired about! Thanks to all of them!
- They have always tried to assist me and respond in a timely manner with my questions, concerns, and needs for support.
- They were very helpful in answering any questions that I had. They always pointed me in the right direction and did so in a very timely manner.

General support. Coaches were asked a set of questions about general support for their coaching program within their school or district. Table 22 displays their responses. Responses are generally positive, with the majority of coaches feeling that they have the support necessary to be effective and that other personnel appreciate the coaching activities. However, significant minorities of coaches feel they do not get enough support. In particular, a substantial number of coaches feel that they do not have enough time to conduct coaching activities.

Table 22: OES: Coach Support From School or District

	Strongly Disagree %	Disagree %	Neutral %	Agree %	Strongly Agree %	Count
I receive the necessary support from my school district to implement the Mathematics Coaching Program in my school.	22.5	7.5	5.0	22.5	42.5	40
I am given time to properly prepare for my role as a coach.	17.5	15.0	2.5	27.5	37.5	40
I am given the proper amount of time to properly conduct my duties as a coach.	20.5	17.9	2.6	25.6	33.3	39
My school district supports my attendance at the Mentor/Coaching professional development sessions that occur throughout the year.	0.0	0.0	5.0	45.0	50.0	40
I am provided, by the school, proper space to conduct my duties as a mathematics coach in my school.	7.5	10.0	5.0	35.0	42.5	40
Other teachers in my school value the coaching program.	2.5	5.0	12.5	60.0	20.0	40
The coaching program, as implemented in my school, has improved the quality of mathematics teaching in my school.	2.5	2.5	15.0	55.0	25.0	40

Focus Group with Coaches

Implementation of the coaching program was dependent on the district and school buildings. According to the contracts signed by each district, the coaches were to work with other teachers half-time and teach the remainder of the school day. From anecdotal comments, some coaches reported that they were teaching full-time in the classroom and coaching others after school and during planning periods, while others were coaching only one day per week. Since coaches were not queried as to how each coach implemented the program on a day-to-day basis, fidelity of implementation differences were not systematically documented and are thus considered a variable for year one data analysis. To enable us to document implementation and to expand upon final survey responses, we conducted a focus group with seven coaches in June 2007 at the end of their first year.

The coaching program was introduced to other teachers in the school during a beginning of the year staff meeting. Typically, the number of teachers each coach worked with decreased over the academic year. The coaches stated that their expectation that they would work with a large number of teachers was overly optimistic. Their activities were teacher-specific and coaches reported that their relationships with teachers had deepened. Most coaches conducted regular professional development activities throughout the year; they usually waited for the teacher to approach them for support. All coaches stated that they had grown immensely and they felt that the program was beneficial to their school, teachers and students. The coaches were looking forward to their second year of coaching. They felt that they knew what to do to be efficient from the start with no learning curve to slow them down during Year Two. While the coaches discussed that it would be nice to coach full-time, they felt that they needed to continue to be the classroom with students so that they could test the instructional strategies they were recommending to other teachers. An area for future exploration was administrative support as it relates to space, materials, and keeping the half-day coaching time “sacred” for working with teachers and not filling in for other teachers.

To document implementation during the second year of the program additional focus groups are being implemented with continuing and new coaches and the addition of an implementation survey into Year Two evaluation procedures. Additionally, we plan to conduct a survey among the teachers being coached to assess their perceptions of the coaching program.

KCCT Data

Table 23 provides KCCT scores for all schools that participated in the coaching program. Since it may not be reasonable to expect immediate effects for the coaching program, these data are included as baselines for future comparisons.

Table 23: KCCT Scores for Schools with Coaching Programs

School Name	Math Index for 2006	Math Index for 2007	% Increase or Decrease
Bates Elementary School	88.5	85.3	-3.6
Bell County High School	61.7	57.4	-6.9
Bondurant Middle School	72.6	78.7	8.4
Burlington Elementary School	89.0	95.9	7.8
Cairo Elementary School	88.1	96.2	9.3
Cane Run Elementary School	94.7	88.1	-7.0
Cochrane Elementary School	65.2	75.6	15.9
Cooper Whiteside Elementary School	71.4	58.7	-17.8
Coral Ridge Elementary School	90.9	94.8	4.3
Corbin High School	76.1	79.8	4.9
Crawford Middle School	65.9	68.3	3.7
Engelhard Elementary School	86.4	99.2	14.8
Greensburg Elementary School	73.9	92.9	25.7
Greenville Elementary School	81.3	94.1	15.8
Greenwood High School	84.1	88.3	4.9
Hawthorne Elementary School	97.6	110.5	13.2
Heath Middle School	87.7	95.3	8.6
Hogsett Elementary School	92.8	82.0	-11.6
Indian Trail Elementary School	82.9	90.5	9.2
Joe Harrison Carter Elementary School	70.6	112.2	59.0
Johnsontown Road Elementary School	74.6	77.5	3.9
Knight Middle School	48.4	57.4	18.7

School Name	Math Index for 2006	Math Index for 2007	% Increase or Decrease
LaGrange Elementary School	86.2	93.6	8.5
Laukhuf Elementary School	86.1	82.8	-3.9
Lincoln County High School	55.1	62.8	14.1
Madeline M Breckinridge Elem School	87.9	81.8	-6.9
Malcolm B Chancey, Jr. Elementary School	83.8	99.0	18.0
McFerran Elementary School	97.2	89.4	-8.0
Medora Elementary School	81.3	97.1	19.5
Oldham County High School	88.4	86.4	-2.3
Pendleton County High School	57.8	56.2	-2.6
Phillip A Sharp Middle School	68.6	88.0	28.4
Raceland-Worthington High School	59.9	59.4	-0.9
Raceland-Worthington High School	59.9	79.7	32.9
Rangeland Elementary School	89.1	88.5	-0.6
Shacklette Elementary School	86.4	79.4	-8.0
Shelby County East Middle School	64.3	80.4	25.1
Shelby County High School	70.7	68.3	-3.4
Shelby County West Middle School	69.1	76.2	10.2
Slaughter Elementary School	69.0	82.0	18.8
Thomas Jefferson Middle School	50.4	68.0	35.1
Trigg County High School	70.2	67.2	-4.3
Warren Central High School	73.5	68.7	-6.6
Warren East High School	70.0	67.7	-3.2
Warren East Middle School	80.8	85.0	5.2
Wellington Elementary School	75.7	80.9	6.9
West Jessamine High School	70.3	70.3	0.0
West Jessamine Middle School	78.0	90.1	15.6
Wheeler Elementary School	94.6	101.2	7.1

Planned Year Two Evaluation Activities

Evaluation activities will expand in the second year of the KCM programs. The external evaluation will continue to be coordinated by Evaluation Services Center staff with data collection assistance from the KCM's staff. During year two, an overall goal is to integrate the evaluation and research findings leading to a better understanding of the underlying teaching and learning mechanisms associated with these mathematics interventions and coaching programs. Then, programs can be modified, if needed, and disseminated to a larger number of Kentucky teachers and students, with the goal of, significantly improving student achievement. An initial program theory logic model for the mathematics intervention and coaching program appears in Appendix E. A summary of the evaluation activities by program are given below and the complete evaluation plan for year two appears in Appendix F.

Intervention Program

As year one results have indicated, the participating teachers and students have benefited from the implementation of both the Number Worlds and Math Recovery intervention programs. Initially, we had hoped that the evaluation would assist in a cost-benefit comparison between the programs but we did not receive this data from the vendors thus leaving the evaluation without reliable and valid measures of fidelity both within and between the programs. While we plan to continue using data collection instruments developed and fielded during year one, we have added evaluation activities that will help us build a model to better understand how program implementation factors affect outcomes of these intervention programs. With additional MITs in each program, the data analysis becomes more robust.

The questions guiding year two evaluation activities are outlined below:

1. How are teachers implementing the program within schools and classrooms? What are the day-to-day activities of the MITs and what support do they have and need?
2. Are teachers implementing these programs as intended?
3. For administrators, why did they apply for the program, what is their satisfaction level with the program and why? What additional resources are needed?
4. For parents, what do they know about the program and how has it helped their child? Depending on the evaluation budget, data addressing this question will be collected either as teacher perceptions or from parents directly.

As a new activity, we will conduct numerous focus groups among MITs groups to collect more detailed data related to program implementation and effects of the program on themselves, their students, and others in their buildings**.** These data will help inform future surveys among all participants. We plan to talk with MITs using either the *Number Worlds* or *Math Recovery* programs. Additionally, mid-year and final-year reports requested by the KDE will be analyzed to gain a better understanding of

implementation factors. The group of MITs using both programs can provide an interesting perspective and these subjects might be more effectively studied as part of a research project since the analysis is especially complex.

SRA has generously agreed to continue to fund Terra Nova testing among the students in the intervention programs. This will enable us to begin longitudinal data collection and analysis. As the number of intervention students in third grade increases, we can begin to correlate the Terra Nova test results with test results available from the state. This will enable the KCM to reduce its reliance on outside funding and reduce the number of standardized tests given to students. Both will increase sustainability of the Center.

Returning MITs will participate in more advanced professional development opportunities and their reactions to these will be evaluated with new instruments. First-year MITs will participate in professional development similar to last year and the same data collection procedures will be utilized as last year to assess their perceptions and reactions to the training they obtain.

While teachers reported very positive interactions with the KCM staff, regional coordinators, and vendors, these interactions will continue to be assessed and monitored. The specific factors contributing to positive CENTRA meetings will be discussed in the focus groups.

Coaching Program

The evaluation questions guiding year two evaluation activities are:

1. What are coaches doing on a day-to-day basis?
2. Explore the quality of coaching activities conducted. How closely are coaches implementing Cognitive Coaching? Are the coaches using other research-based practices?
3. Explore the year one result that the coaches do not have enough resources. What resources do they need and can be given?
4. How do coaches view the program? What are the benefits from their perspective?
5. For administrators, why did they apply for the program, what is their satisfaction level with the program and why? What additional resources are needed?
6. What differences are there in student achievement data (as required by KDE) for schools with coaches versus comparable schools?

Evaluation activities for the coaching program will also focus on better documenting implementation among both first and second year coaches. The program requires each school district or school to contribute the money to cover the coach's half-day salary. This cost-sharing feature of the proposal was also in the year two applications and year two evaluation activities will attempt to obtain data that documents what effects

these conditions had on the self-selection of participating districts or schools, implementation, attitudes and behaviors and ultimately student achievement in mathematics. We will be conducting focus group discussions with experienced and first year coaches and administering a questionnaire in February to obtain self-report implementation data from each coach. We will attempt to determine if there are changes for second year coaches.

Baseline KCCT data was collected for the 2006 - 2007 academic year. Over time we expect to see positive changes in attitudes, content knowledge, and pedagogy of coaches and subsequently the coaches; this in turn should lead to positive changes in students' attitudes and student achievement as measured by state testing data.

We had difficulty finding an affordable instrument that could be efficiently used to measure teachers' content knowledge and pedagogical content knowledge but identified and used the LMT tests created at University of Michigan. Administration of these tests was converted from paper and pencil to electronic formats during the first year. We will continue to administer these tests electronically but the time involved to complete the LMT is potentially prohibitive. Coaches need to ask their teachers to complete this test at the beginning and end of the academic year and it has caused issues in some cases. During Year Two, we will review the literature again to attempt to locate a more user-friendly test to assess both mathematics content knowledge and pedagogical content knowledge for elementary, middle and high school teachers participating in the KCM's programs.

Finally, we will be obtaining data from the teachers working directly with the coaches and their administrators to obtain direct feedback on the impact the coaching program is having on others in a coach's building. During year one, we asked coaches perceptions of the impact they had on others and they felt it was improving both teaching and learning of mathematics in their schools. These additional activities will help to validate these results and give teachers and administrators an "official mechanism" to directly assess the coaching program they are experiencing on a day-to-day basis.

We do not have plans to collect data from coaches and administrators who left the program after one year. This is an opportunity for additional research.

Appendixes

Appendix A: Data Collection Instruments

Mathematics Beliefs Survey

Kentucky Center for Mathematics

Thank you for taking the time to complete this survey. You are being asked to complete this survey to measure teacher attitudes towards mathematics, teaching mathematics, and learning mathematics. This survey may or may not benefit you directly, but it will assist the Kentucky Center for Mathematics in gauging teacher attitudes towards mathematics within the State of Kentucky. There are no anticipated risks associated with your participation in this survey. Participants can withdraw from the survey at any time.

All responses to the survey will remain confidential. Data will be analyzed in aggregate and no individual responses will be reported. By completing this survey, you indicate your consent to participate in the study. This project has been approved by the Northern Kentucky University's Institutional Review Board. Approval of this project only signifies that the procedures adequately protect the rights and welfare of the participants.

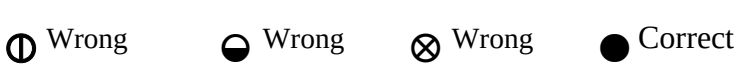
Confidential Identifier: Because we will be collecting information over the next year through multiple surveys and observations, we need an identification number which will allow researchers to match responses to the same individual. Therefore we are asking that you provide the following information. All "identifiers" will be stripped from the final database.

The last 4-digits of your Social Security number

Month of your birth (e.g., January = 01, March = 03, October = 10)

Day of your birth (1st = 01, 15th = 15, 23rd = 23)

Directions: Please read the following responses and choose which response most accurately describes your opinion. Please fill in the circles <u>completely</u>.



	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Often in mathematics, I do not understand the concept behind a problem.	O	O	O	O	O
2. I am able to remember most of the mathematics I learn in a course after the course is over.	O	O	O	O	O
3. I get frustrated if I don't understand what I am studying in mathematics.	O	O	O	O	O
4. I like doing mathematics.	O	O	O	O	O
5. I am very interested in mathematics.	O	O	O	O	O
6. I am able to learn mathematics well.	O	O	O	O	O
7. If I cannot solve a mathematics problem within a few minutes, I will stop trying to solve it.	O	O	O	O	O
8. I am good at doing mathematics.	O	O	O	O	O
9. I am able to successfully solve most mathematical problems with which I am confronted.	O	O	O	O	O
10. People learn mathematics by listening to lecture.	O	O	O	O	O
11. Learning mathematics mainly involves memorizing procedures.	O	O	O	O	O
12. In order to learn mathematics you need to learn a different method for each new type of problem.	O	O	O	O	O
13. People learn mathematics by working together in cooperative groups.	O	O	O	O	O
14. I try to understand the reasoning behind the	O	O	O	O	O

procedures I use in mathematics.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
15. I know I understand mathematics when I can apply mathematics to a new situation.	O	O	O	O	O
16. People learn mathematics by doing hands on activities.	O	O	O	O	O
17. I know I understand mathematics when I get a good grade on an exam.	O	O	O	O	O
18. Anyone can learn mathematics.	O	O	O	O	O
19. I know I understand mathematics when I can explain the mathematics to someone else.	O	O	O	O	O
20. Making mistakes is part of learning mathematics.	O	O	O	O	O
21. To understand mathematics, students must solve many problems following examples provided.	O	O	O	O	O
22. Doing mathematics consists mainly of using rules.	O	O	O	O	O
23. Getting the right answer is the most important part of mathematics.	O	O	O	O	O
24. In mathematics, it is not possible to do a problem unless you've first been taught how to do one like it.	O	O	O	O	O
25. Being able to successfully use a rule or formula in mathematics is more important than understanding why the rule or formula works.	O	O	O	O	O
26. It is difficult to talk about mathematical ideas because all you can really do is explain how to do specific problems.	O	O	O	O	O
27. Solving mathematics problems frequently involves exploration.	O	O	O	O	O

28. Most mathematics problems are best solved by deciding on the type of problem and then using a previously learned solution for that type of problem.	O	O	O	O	O
29. Mathematics is an uncreative subject.	O	O	O	O	O
30. The most important part of mathematics is computation.	O	O	O	O	O
31. There are several ways to find the correct solution to a mathematics problem.	O	O	O	O	O
32. Those who are good in mathematics can solve a mathematics problem within a few minutes.	O	O	O	O	O
33. Knowing step-by-step procedures is necessary to solve mathematical problems.	O	O	O	O	O

Evaluation of Number Worlds Training Program
Kentucky Center for Mathematics

Thank you for taking the time to complete this survey. You are being asked to complete this survey to evaluate the effectiveness of the professional development you have received through the Kentucky Center of Mathematics (KCM) regarding the Number Worlds Mathematic Intervention Teacher (MIT) program. This survey may or may not benefit you directly but your input could assist the KCM in improving future professional development programs for teachers within the State of Kentucky. There are no anticipated risks associated with your participation in this survey. Participants can withdraw from the survey at any time.

All responses to the survey will remain confidential. Data will be analyzed in aggregate and no individual responses will be reported. By completing this survey, you indicate your consent to participate in the study. This project has been approved by the Northern Kentucky University's Institutional Review Board. Approval of this project only signifies that the procedures adequately protect the rights and welfare of the participants.

Confidential Identifier: Because we will be collecting information over the next year through multiple surveys and observations, we need an identification number which will allow researchers to match responses to the same individual. Therefore, we are asking that you provide the following information. All "identifiers" will be stripped from the final database.

The last 4-digits of your Social Security number

Month of your birth (e.g., January = 01, March = 03, October = 10)

Day of your birth (e.g., 1st = 01, 15th = 15, 23rd = 23)

Directions: Please read the following responses and choose which response most accurately describes your opinion. ***When answering these questions please think not only about this professional development training, but also about training received in the summer and fall of 2006, weekly CENTRA meetings, and any other support you may have received from your regional coordinator or the Kentucky Center for Mathematics, and how it has or has not helped you in your roll as a MIT in your school.*** **Please fill in the circles <u>completely</u>.**

Examples: ◐ Wrong ◒ Wrong ⊗ Wrong ● Correct

With the Number Worlds MIT program…	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I have a greater understanding of how students learn mathematics.	O	O	O	O	O
2. I have increased my knowledge of effective instructional strategies for teaching mathematics.	O	O	O	O	O
3. I have increased my mathematical content knowledge.	O	O	O	O	O
4. I have greater knowledge of the Kentucky Core Content.	O	O	O	O	O
5. I can better analyze student work for the purpose of identifying the mathematical skills the work represents.	O	O	O	O	O
6. I am better able to identify best practices for classroom instruction that support teaching reasoning and problem solving skills to students.	O	O	O	O	O
7. Is an effective program for teaching students mathematics	O	O	O	O	O
8. Fits easily into my school's mathematics curriculum.	O	O	O	O	O
9. Is easy to implement in my school.	O	O	O	O	O
10. Encourages learning that is in line with Kentucky Core Content.	O	O	O	O	O
11. Involves children in actively doing mathematics.	O	O	O	O	O
12. Gives students a solid foundation in mathematics.	O	O	O	O	O
13. Helps student's develop a strong conceptual framework from which to build future	O	O	O	O	O

mathematics skills.					
14. Promotes student learning by identifying where they need additional instruction and support.	O	O	O	O	O
Overall…	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
15. The amount of time required in training for the Number Worlds program is appropriate to meet my needs as a MIT in my school.	O	O	O	O	O
16. I am pleased with the overall quality of this professional development program.	O	O	O	O	O

17. Number Worlds is a better program for assisting young children in learning mathematics than programs used during the 2005-2006 school year.

O Strongly Disagree
O Disagree
O Neutral
O Agree
O Strongly Agree

18. The MOST effective part of this professional development program was… (Be specific and list activity, section, topic, weekly CENTRA meetings, the regional coordinators, KDE, KCM, etc.). Why?

19. The part of this professional development program that was LEAST effective was… (Be specific and list activity, section, topic, weekly CENTRA meetings, the regional coordinators, KDE, KCM etc.). Why?

20. The final set of questions that you will be asked are about different types of support that you may or may not have received. Please read the list of statements below, and state whether you agree or disagree with each.

Support from your school or district…	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
a. I receive the necessary support from my principal to implement the Number Worlds program in my classroom.	O	O	O	O	O
b. I am given time to properly prepare for class.	O	O	O	O	O
c. My principal supports my attendance at the Number Worlds professional development sessions that occur throughout the year.	O	O	O	O	O
d. I am provided, by the school, a proper space to teach the Number Worlds lessons to students.	O	O	O	O	O
e. Other primary teachers in my building value the diagnostic intervention program.	O	O	O	O	O

Support from SRA, the company who produced Number Worlds…	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
f. The Number Worlds program gives me all of the cards, manipulatives, props, and other materials that are needed to follow the lesson plans provided in the manuals.	O	O	O	O	O
g. SRA responds quickly to answer my questions.	O	O	O	O	O
h. I am satisfied with the technology support that I receive from SRA.	O	O	O	O	O
i. I am satisfied with the instructional support that I receive from SRA	O	O	O	O	O
j. The Number Worlds Assess CD allows me to create useful assessments for evaluating my student's progress.	O	O	O	O	O

22. Please use the space provided below to note any additional support that you need from both your school/district and SRA.

Appendix B: Data Report for MIT First Year Student Achievement Data

Data Report: Students

A total of 1,947 Kentucky school children (947 females, 959 males, and 41 of unknown gender) participated in this study, with full parental consent. Overall, 1,019[9] children received supplementary mathematics education via the *Number Worlds* program (with 935 students participating) or the *Math Recovery* program (84 children participating). *Generally*, *these 1,019 children were selected for the mathematics intervention because of observed deficiencies in mathematics abilities*. That is, they were observed to perform at a level below what is expected for their actual grade level. The remaining 928 children participated in this study as a part of the comparison (nonintervention) group. The table below details student participation by grade level and the nature of their participation.

Table B-1: Student Participation by Grade Level

		Intervention program			
		Number Worlds	**Math Recovery**	**Control Group**	**Total**
Grade	Kind	127	0	86	213
	1st Grade	159	66	252	477
	2nd Grade	334	8	328	670
	3rd Grade	314	10	259	583
	Missing	1	0	3	4
Total		935	84	928	1947

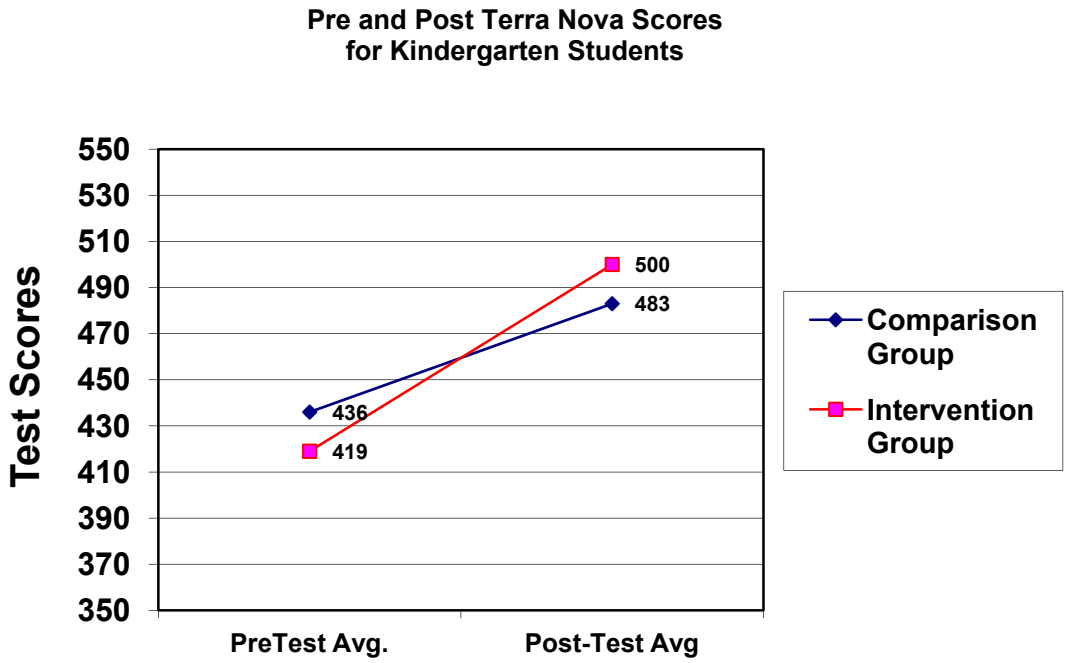
As a part of the study, the children's year-end test scores were evaluated for grade equivalency. That is, each student could be evaluated for an indication of whether or not their math performance was at a level appropriate for their grade level in school. A total of 1015 children who received the intervention were evaluated for grade equivalency.[10] These students were chosen for the intervention because they were below grade equivalency or considered to be at risk. Less than 1% of these students scored at or above grade equivalency at the beginning of the year. By the end of the year, 325 (32%) met grade equivalency performance levels.

[9] Many analyses use fewer than this number because some students will have missing data in their files (e.g. students move so there is no posttest, or some data is not reported). Only complete data sets are used in many analyses.

[10] One child did not have a grade level assigned to them and were therefore left out of the analyses. Three other children had such high grade level equivalencies that they were removed from these analyses to prevent a skewing of the data/findings.

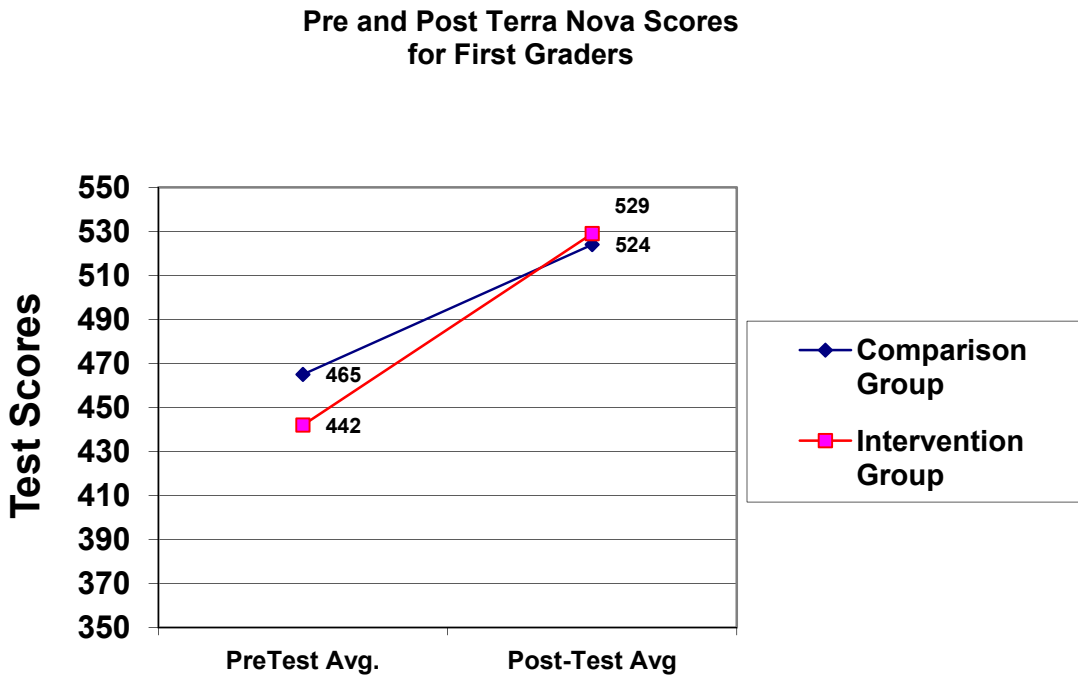
Program effects were examined in more detail by analysis of intervention effects within each grade level. Initial analyses were complicated by the fact that the comparison groups were *not* equivalent to the intervention groups. The average pretest scores for the comparison group were significantly *higher* than the pretest scores for the intervention group. But, analyses of these initial comparison groups indicate that intervention effects vary by the grade level of the child. The graphs below show trends in student differences on Terra Nova test scores administered at the beginning of the school year (pretest) and again at the end of the year (posttest).

Figure B-1: Pre and Post Terra Nova Scores for Kindergarten Students



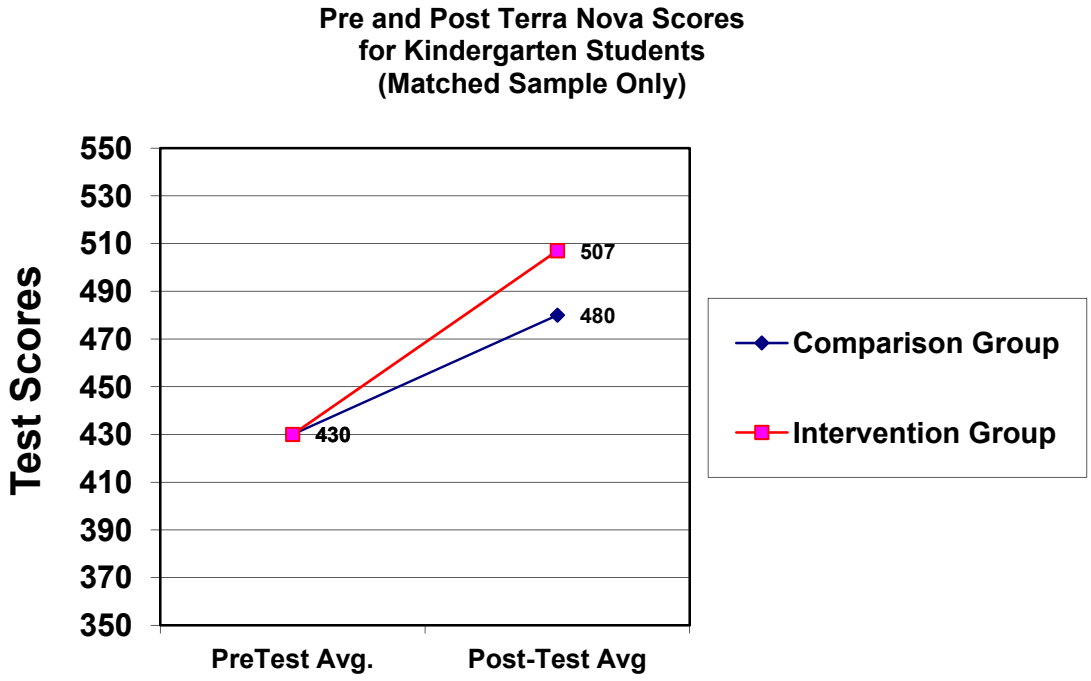
Intervention Students, N = 127
Comparison Students, N = 86

Figure B-2 Pre and Post Terra Nova Scores for First Grade Students



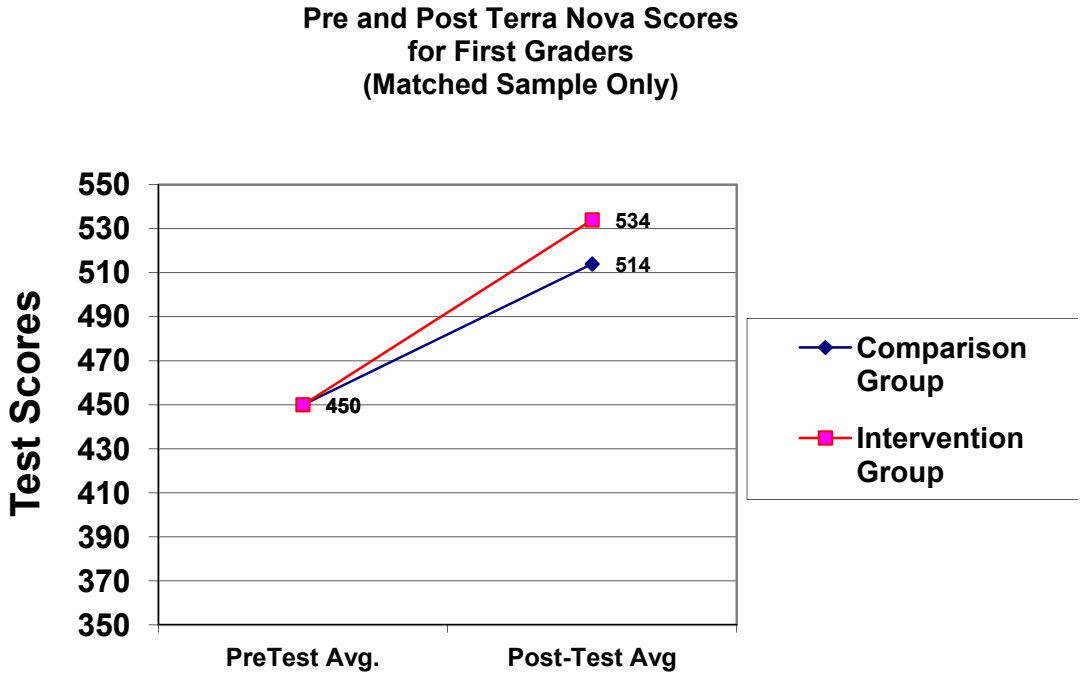
Intervention Students, N = 225
Comparison Students,N = 252

Figure B-3 Pre and Post Terra Nova Scores for Kindergarten Grade Students (Matched Sample)



Intervention Students, N = 70
Comparison Students,N = 70

Figure B-4 Pre and Post Terra Nova Scores for First Grade Students (Matched Sample)



Intervention Students, N = 171
Comparison Students,N = 171

The mathematics interventions actually took place through two different programs, *Number Worlds* and *Math Recovery*. It is important to keep in mind that the two programs are qualitatively different in their goals and their strategies. In this study, comparisons are also complicated by the fact that the vast majority of children in the intervention condition are in the *Number Worlds* program. The table below displays enrollment numbers for each program.

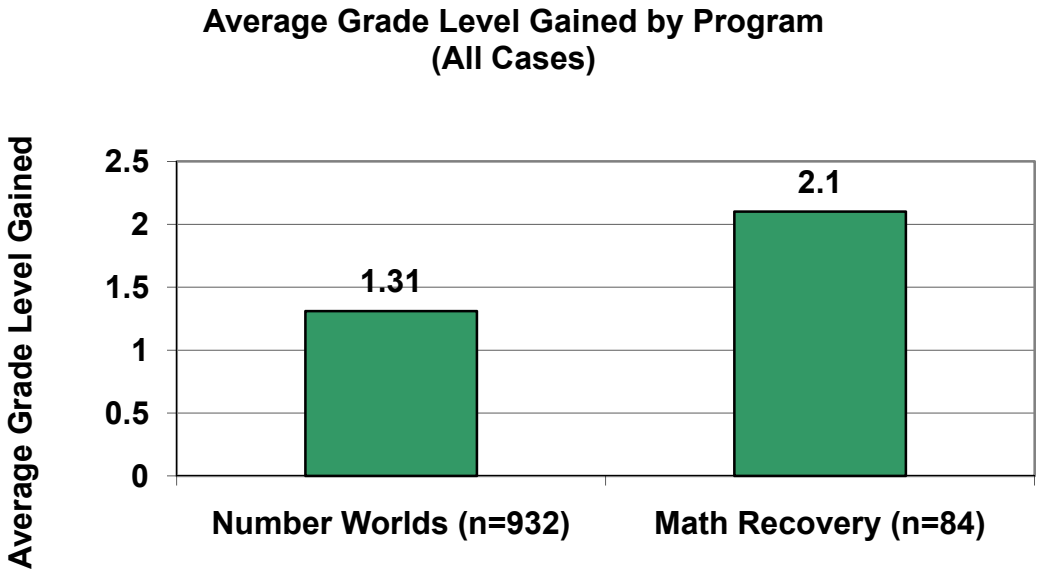
Table B-2: Math Intervention Students

	Frequency	Percent
Number Worlds	935	48.0
Math Recovery	84	4.3
Comparison Group	928	47.7
Total	1947	100.0

Additionally, the bulk of the *Math Recovery* students were in the first grade (66 of the 84 total *Math Recovery* students). There were no *Math Recovery* students in Kindergarten, 8 in the second grade and 10 in the third grade.

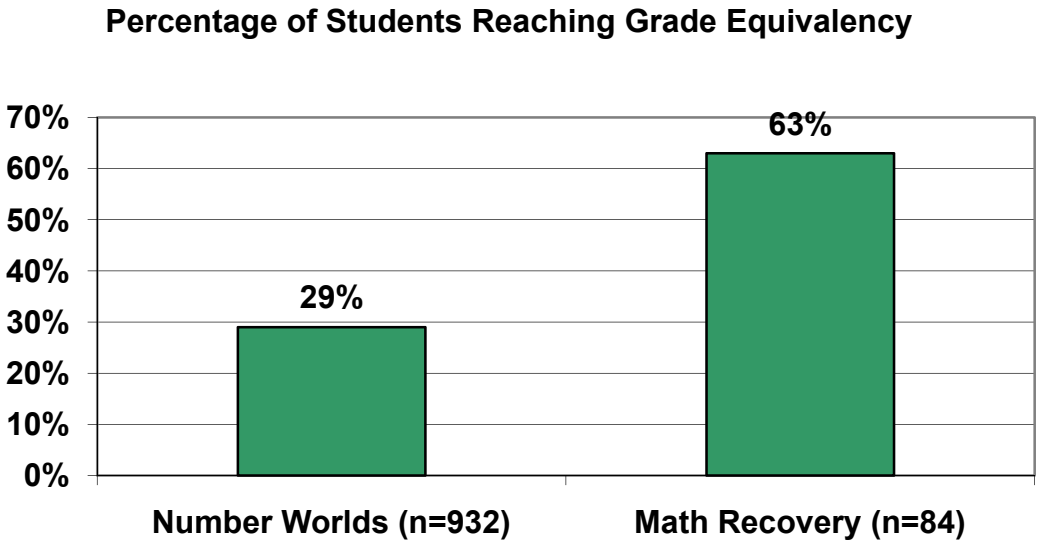
Comparisons between the two programs were made across all grade levels. First, for each student it was possible to determine how many grade levels were gained within a school year by comparing the grade equivalency of their pretest score with the grade equivalency of their post test score. The difference between these two scores reflects how many grade levels were gained (or lost) during the year. The chart below displays a comparison in the average gain in grade level for students in each program.

Figure B-5: Average Grade Level Gained by Program



* Three children had such high grade level equivalencies that they were removed from these analyses to prevent a skewing of the data/findings

Figure B-6: Percentage of Students Reaching Grade Equivalency



* Three children had such high grade level equivalencies that they were removed from these analyses to prevent a skewing of the data/findings

Appendix C: MIT Program Teacher Data

Table C-1: MBS Teacher Efficacy (All MITs)

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Q1. Often in mathematics, I do not understand the concept behind a problem. **	13.6	2.20 (.95)	44	2.2	1.69 (.73)	45
Q2. I am able to remember most of the mathematics I learn in a course after the course is over.	77.8	3.80 (.81)	45	84.4	4.00 (.71)	45
Q3. I get frustrated if I don't understand what I am studying in mathematics.	66.7	3.56 (.97)	45	60.0	3.42 (1.06)	45
Q4. I like doing mathematics.	88.9	4.18 (.83)	45	95.6	4.44 (.76)	45
Q5. I am very interested in mathematics. **	91.1	4.13 (.73)	45	95.6	4.56 (.76)	45
Q6. I am able to learn mathematics well.	71.1	3.82 (.83)	45	88.9	4.13 (.82)	45
Q7. If I cannot solve a mathematics problem within a few minutes, I will stop trying to solve it.	8.9	2.16 (.88)	45	4.4	1.89 (.78)	45
Q8. I am good at doing mathematics. **	66.7	3.71 (.76)	45	86.4	4.05 (.57)	44
Q9. I am able to successfully solve most mathematical problems with which I am confronted.	80.0	3.82 (.61)	45	84.4	4.00 (.64)	45

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.
** Significant at .05.

Table C-2: MBS Learning Mathematics (All MITs)

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Q10. People learn mathematics by listening to lecture.	2.3	1.73 (.872)	44	.0	1.48 .590)	44
Q11. Learning mathematics mainly involves memorizing procedures.**	22.2	2.40 (1.074)	45	2.2	1.82 (.716)	45
Q12. In order to learn mathematics you need to learn a different method for each new type of problem.	11.1	2.31 (.763)	45	6.7	2.02 (.783)	45
Q13. People learn mathematics by working together in cooperative groups.	75.6	3.80 (.661)	45	71.1	3.69 (.874)	45
Q14. I try to understand the reasoning behind the procedures I use in mathematics.	97.7	4.18 (.540)	44	97.8	4.33 (.522)	45
Q15. I know I understand mathematics when I can apply mathematics to a new situation.	95.6	4.29 (.549)	45	100.0	4.48 (.505)	44
Q16. People learn mathematics by doing hands on activities.	95.6	4.44 (.586)	45	95.5	4.48 (.590)	44
Q17. I know I understand mathematics when I get a good grade on an exam.	57.8	3.38 (.886)	45	46.7	3.18 (.936)	45
Q18. Anyone can learn mathematics.	93.3	4.27 (.580)	45	95.6	4.36 (.645)	45
Q19. I know I understand mathematics when I can explain the mathematics to someone else.	97.8	4.47 (.548)	45	100.0	4.62 (.490)	45
Q20. Making mistakes is part of learning mathematics.		4.49 (.549)	45	97.8	4.69 (.596)	45

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.
** Significant at .05.

Table C-3: MBS The Nature of Math (All MITs)

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Q21. To understand mathematics, students must solve many problems following examples provided.**	31.1	2.89 (1.05)	45	8.9	2.24 (.80)	45
Q22. Doing mathematics consists mainly of using rules.**	37.8	3.13 (.84)	45	15.6	2.33 (.95)	45
Q23. Getting the right answer is the most important part of mathematics. **	8.9	2.36 (.77)	45	4.7	1.98 (.77)	43
Q24. In mathematics, it is not possible to do a problem unless you've first been taught how to do one like it. **	4.4	2.27 (.72)	45	6.7	1.87 (.84)	45
Q25. Being able to successfully use a rule or formula in mathematics is more important than understanding why the rule or formula works. **	8.9	2.11 (.71)	45	2.2	1.62 (.72)	45
Q26. It is difficult to talk about mathematical ideas because all you can really do is explain how to do specific problems.**	4.4	2.11 (.61)	45	.0	1.69 (.51)	45
Q27. Solving mathematics problems frequently involves exploration. **	97.8	4.13 (.41)	45	95.6	4.40 (.65)	45
Q28. Most mathematics problems are best solved by deciding on the type of problem and then using a previously learned solution for that type of problem. **	53.3	3.42 (.87)	45	37.8	2.89 (1.03)	45
Q29. Mathematics is an uncreative subject.	.0	1.71 (.46)	45	2.2	1.60 (.72)	45
Q30. The most important part of mathematics is computation. **	11.1	2.47 (.84)	45	8.9	2.11 (.86)	45
Q31. There are several ways to find the correct solution to a mathematics problem.**	97.8	4.24 (.48)	45	100.0	4.71 (.46)	45
Q32. Those who are good in mathematics can solve a mathematics problem within a few minutes.	22.2	2.60 (.89)	45	13.3	2.40 (.99)	45
Q33. Knowing step-by-step procedures is necessary to solve mathematical problems.**	28.9	2.91 (.87)	45	8.9	2.20 (.84)	45

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.
** Significant at .05.

Table C-4: *Number Worlds* MITs: MBS Teacher Efficacy

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Q1. Often in mathematics, I do not understand the concept behind a problem.	9.4	2.03 (0.90)	32	3.1	1.66 (0.79)	32
Q2. I am able to remember most of the mathematics I learn in a course after the course is over.	78.8	3.79 (0.82)	33	87.5	4.03 (0.65)	32
Q3. I get frustrated if I don't understand what I am studying in mathematics.	60.6	3.36 (0.99)	33	50.0	3.16 (1.08)	32
Q4. I like doing mathematics.	87.9	4.15 (0.91)	33	93.8	4.34 (0.83)	32
Q5. I am very interested in mathematics.	87.9	4.09 (0.80)	33	93.8	4.44 (0.84)	32
Q6. I am able to learn mathematics well.	72.7	3.85 (0.83)	33	93.8	4.19 (0.78)	32
Q7. If I cannot solve a mathematics problem within a few minutes, I will stop trying to solve it.	9.7	2.12 (0.78)	33	3.1	1.88 (0.71)	32
Q8. I am good at doing mathematics.	66.7	3.76 (0.71)	33	87.1	4.06 (0.57)	31
Q9. I am able to successfully solve most mathematical problems with which I am confronted.	81.8	3.82 (0.64)	33	84.4	4.00 (0.67)	32

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.
** Significant at .05.

Table C-5: *Number World* MITs: MBS Learning Mathematics

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Q10. People learn mathematics by listening to lecture.	3.0	1.79 (0.93)	33	0.0	1.53 (0.62)	32
Q11. Learning mathematics mainly involves memorizing procedures.**	27.3	2.58 (1.09)	33	3.1	2.00 (0.72)	32
Q12. In order to learn mathematics you need to learn a different method for each new type of problem.	12.1	2.33 (0.78)	33	9.4	2.22 (0.75)	32
Q13. People learn mathematics by working together in cooperative groups.	57.8	3.76 (0.66)	33	71.9	3.75 (0.80)	32
Q14. I try to understand the reasoning behind the procedures I use in mathematics.	96.9	4.22 (0.61)	32	96.9	4.31 (0.54)	32
Q15. I know I understand mathematics when I can apply mathematics to a new situation.	93.9	4.27 (0.57)	33	100.0	4.47 (0.51)	32
Q16. People learn mathematics by doing hands on activities.	93.9	4.39 (0.61)	33	93.5	4.45 (0.62)	31
Q17. I know I understand mathematics when I get a good grade on an exam.	60.6	3.36 (0.90)	33	53.1	3.28 (0.85)	32
Q18. Anyone can learn mathematics.	90.9	4.18 (0.58)	33	93.8	4.19 (0.64)	32
Q19. I know I understand mathematics when I can explain the mathematics to someone else.	97.0	4.42 (0.56)	33	100.0	4.53 (0.51)	32
Q20. Making mistakes is part of learning mathematics.	97.0	4.55 (0.56)	33	96.9	4.63 (0.66)	32

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.
** Significant at .05.

Table C-6: *Number World* MITs: MBS The Nature of Math

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Q21. To understand mathematics, students must solve many problems following examples provided.**	33.3	2.91 (1.04)	33	9.4	2.31 (0.78)	32
Q22. Doing mathematics consists mainly of using rules.**	42.4	3.24 (0.83)	33	21.9	2.56 (0.95)	32
Q23. Getting the right answer is the most important part of mathematics.	9.1	2.33 (0.74)	33	6.5	2.13 (0.81)	31
Q24. In mathematics, it is not possible to do a problem unless you've first been taught how to do one like it.	3.0	2.21 (0.74)	33	6.3	1.97 (0.69)	32
Q25. Being able to successfully use a rule or formula in mathematics is more important than understanding why the rule or formula works.	12.1	2.18 (0.77)	32	3.1	1.81 (0.74)	32
Q26. It is difficult to talk about mathematical ideas because all you can really do is explain how to do specific problems.**	6.1	2.15 (0.67)	33	0.0	1.75 (0.51)	32
Q27. Solving mathematics problems frequently involves exploration.	97.0	4.09 (0.38)	33	93.8	4.28 (0.68)	32
Q28. Most mathematics problems are best solved by deciding on the type of problem and then using a previously learned solution for that type of problem.	57.6	3.55 (0.83)	33	50.0	3.25 (0.84)	32
Q29. Mathematics is an uncreative subject.	0.0	1.79 (0.42)	33	3.1	1.72 (0.77)	32
Q30. The most important part of mathematics is computation.	15.2	2.61 (0.90)	33	9.4	2.28 (0.81)	32
Q31. There are several ways to find the correct solution to a mathematics problem.**	97.0	4.24 (0.50)	33	100.0	4.63 (0.49)	32
Q32. Those who are good in mathematics can solve a mathematics problem within a few minutes.	21.2	2.64 (0.86)	33	12.5	2.50 (0.98)	32
Q33. Knowing step-by-step procedures is necessary to solve mathematical problems.**	36.4	3.06 (0.90)	33	12.5	2.47 (0.80)	32

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.
** Significant at .05.

Table C-7: MIT *Math Recovery* Regarding Teacher Efficacy

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Q1. Often in mathematics, I do not understand the concept behind a problem.	33.3	2.83 (1.17)	6	0.0	1.67 (0.52)	6
Q2. I am able to remember most of the mathematics I learn in a course after the course is over.	83.3	3.83 (0.98)	6	66.7	3.83 (1.17)	6
Q3. I get frustrated if I don't understand what I am studying in mathematics.	83.3	4.17 (0.75)	6	100.0	4.33 (0.52)	6
Q4. I like doing mathematics.	100.0	4.33 (0.52)	6	100.0	5.00 (0.00)	6
Q5. I am very interested in mathematics.	100.0	4.17 (0.41)	6	100.0	5.00 (0.00)	6
Q6. I am able to learn mathematics well.	66.7	3.67 (1.03)	6	100.0	4.33 (0.52)	6
Q7. If I cannot solve a mathematics problem within a few minutes, I will stop trying to solve it.	16.7	2.17 (1.47)	6	16.7	1.83 (1.17)	6
Q8. I am good at doing mathematics.	66.7	3.50 (0.84)	6	100.0	4.17 (0.41)	6
Q9. I am able to successfully solve most mathematical problems with which I am confronted.	83.3	3.83 (0.41)	6	100.0	4.17 (0.41)	6

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

Table C-8: MIT *Math Recovery* Regarding Learning Mathematics

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Q10. People learn mathematics by listening to lecture.	0.0	1.40 (0.55)	5	0.0	1.17 (0.41)	6
Q11. Learning mathematics mainly involves memorizing procedures.	16.7	2.00 (1.10)	6	0.0	1.33 (0.52)	6
Q12. In order to learn mathematics you need to learn a different method for each new type of problem.	16.7	2.67 (0.82)	6	0.0	1.50 (0.84)	6
Q13. People learn mathematics by working together in cooperative groups.	83.3	4.00 (0.63)	6	50.0	3.00 (1.26)	6
Q14. I try to understand the reasoning behind the procedures I use in mathematics.	100.0	4.17 (0.41)	6	100.0	4.50 (0.55)	6
Q15. I know I understand mathematics when I can apply mathematics to a new situation.	100.0	4.50 (0.55)	6	100.0	4.67 (0.52)	6
Q16. People learn mathematics by doing hands on activities.	100.0	4.67 (0.52)	6	100.0	4.67 (0.52)	6
Q17. I know I understand mathematics when I get a good grade on an exam.	50.0	3.17 (0.98)	6	16.7	2.83 (0.75)	6
Q18. Anyone can learn mathematics.	100.0	4.67 (0.52)	6	100.0	4.67 (0.52)	6
Q19. I know I understand mathematics when I can explain the mathematics to someone else.	100.0	4.67 (0.52)	6	100.0	5.00 (0.00)	6
Q20. Making mistakes is part of learning mathematics.	100.0	4.50 (0.55)	6	100.0	4.83 (0.41)	6

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

Table C-9: MIT *Math Recovery* Regarding the Nature of Math

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Q21. To understand mathematics, students must solve many problems following examples provided.	50.0	3.00 (1.55)	6	16.7	2.33 (1.03)	6
Q22. Doing mathematics consists mainly of using rules.	33.3	2.83 (0.98)	6	0.0	1.83 (0.75)	6
Q23. Getting the right answer is the most important part of mathematics.	16.7	2.67 (1.21)	6	0.0	1.80 (0.45)	5
Q24. In mathematics, it is not possible to do a problem unless you've first been taught how to do one like it.	16.7	2.50 (0.84)	6	16.7	2.00 (1.55)	6
Q25. Being able to successfully use a rule or formula in mathematics is more important than understanding why the rule or formula works.	0.0	2.00 (0.63)	6	0.0	1.00 (0.00)	6
Q26. It is difficult to talk about mathematical ideas because all you can really do is explain how to do specific problems.	0.0	2.00 (0.63)	6	0.0	1.67 (0.52)	6
Q27. Solving mathematics problems frequently involves exploration.	100.0	4.33 (0.52)	6	100.0	4.83 (0.41)	6
Q28. Most mathematics problems are best solved by deciding on the type of problem and then using a previously learned solution for that type of problem.	50.0	3.17 (0.98)	6	16.7	2.00 (1.10)	6
Q29. Mathematics is an uncreative subject.	0.0	1.33 (0.52)	6	0.0	1.17 (0.41)	6
Q30. The most important part of mathematics is computation.	0.0	1.83 (0.41)	6	16.7	1.83 (1.17)	6
Q31. There are several ways to find the correct solution to a mathematics problem.	100.0	4.33 (0.52)	6	100.0	4.83 (0.41)	6
Q32. Those who are good in mathematics can solve a mathematics problem within a few minutes.	33.3	2.50 (1.22)	6	33.3	2.67 (1.21)	6
Q33. Knowing step-by-step procedures is necessary to solve mathematical problems.	16.7	2.83 (0.75)	6	0.0	1.50 (0.55)	6

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

Table C-10: MIT's Participating in Both *Math Recovery* & *Number Worlds* Regarding Teacher Efficacy

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Q1. Often in mathematics, I do not understand the concept behind a problem.	16.7	2.50 (0.84)	6	0.0	1.86 (0.69)	7
Q2. I am able to remember most of the mathematics I learn in a course after the course is over.	66.7	3.83 (0.75)	6	85.7	4.00 (0.58)	7
Q3. I get frustrated if I don't understand what I am studying in mathematics.	83.3	4.00 (0.63)	6	71.4	3.86 (0.69)	7
Q4. I like doing mathematics.	83.3	4.17 (0.75)	6	100.0	4.43 (0.53)	7
Q5. I am very interested in mathematics.	100.0	4.33 (0.52)	6	100.0	4.71 (0.49)	7
Q6. I am able to learn mathematics well.	66.7	3.83 (0.75)	6	57.1	3.71 (1.11)	7
Q7. If I cannot solve a mathematics problem within a few minutes, I will stop trying to solve it.	0.0	2.33 (0.82)	6	0.0	2.00 (0.82)	7
Q8. I am good at doing mathematics.	66.7	3.67 (1.03)	6	71.4	3.86 (0.69)	7
Q9. I am able to successfully solve most mathematical problems with which I am confronted.	66.7	3.83 (0.75)	6	71.4	3.86 (0.69)	**7**

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

Table C-11: MIT's Participating in Both *Math Recovery* & *Number Worlds* Regarding Learning Mathematics

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Q10. People learn mathematics by listening to lecture.	0.0	1.67 (0.82)	6	0.0	1.50 (0.55)	6
Q11. Learning mathematics mainly involves memorizing procedures.	0.0	1.83 (0.75)	6	0.0	1.43 (0.53)	7
Q12. In order to learn mathematics you need to learn a different method for each new type of problem.	0.0	1.83 (0.41)	6	0.0	1.57 (0.53)	7
Q13. People learn mathematics by working together in cooperative groups.	66.7	3.83 (0.75)	6	85.7	4.00 (0.58)	7
Q14. I try to understand the reasoning behind the procedures I use in mathematics.	100.0	4.00 (0.00)	6	100.0	4.29 (0.49)	7
Q15. I know I understand mathematics when I can apply mathematics to a new situation.	100.0	4.17 (0.41)	6	100.0	4.33 (0.52)	6
Q16. People learn mathematics by doing hands on activities.	100.0	4.50 (0.55)	6	100.0	4.43 (0.53)	7
Q17. I know I understand mathematics when I get a good grade on an exam.	50.0	3.67 (0.82)	6	42.9	3.00 (1.41)	7
Q18. Anyone can learn mathematics.	100.0	4.33 (0.52)	6	100.0	4.86 (0.38)	7
Q19. I know I understand mathematics when I can explain the mathematics to someone else.	100.0	4.50 (0.55)	6	100.0	4.71 (0.49)	7
Q20. Making mistakes is part of learning mathematics.	100.0	4.17 (0.41)	6	100.0	4.86 (0.38)	7

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

Table C-12: MIT's Participating in Both *Math Recovery* & *Number Worlds* Regarding the Nature of Math

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Q21. To understand mathematics, students must solve many problems following examples provided.	0.0	2.67 (0.52)	6	0.0	1.86 (0.69)	7
Q22. Doing mathematics consists mainly of using rules.	16.7	2.83 (0.75)	6	0.0	1.71 (0.76)	7
Q23. Getting the right answer is the most important part of mathematics.	0.0	2.17 (0.41)	6	0.0	1.43 (0.53)	7
Q24. In mathematics, it is not possible to do a problem unless you've first been taught how to do one like it.	0.0	2.33 (0.52)	6	0.0	1.29 (0.49)	7
Q25. Being able to successfully use a rule or formula in mathematics is more important than understanding why the rule or formula works.	0.0	1.83 (0.41)	6	0.0	1.29 (0.49)	7
Q26. It is difficult to talk about mathematical ideas because all you can really do is explain how to do specific problems.	0.0	2.00 (0.00)	6	0.0	1.43 (0.53)	7
Q27. Solving mathematics problems frequently involves exploration.	100.0	4.17 (0.41)	6	100.0	4.57 (0.53)	7
Q28. Most mathematics problems are best solved by deciding on the type of problem and then using a previously learned solution for that type of problem.	33.3	3.00 (0.89)	6	0.0	2.00 (0.82)	7
Q29. Mathematics is an uncreative subject.	0.0	1.67 (0.52)	6	0.0	1.43 (0.53)	7
Q30. The most important part of mathematics is computation.	0.0	2.33 (0.52)	6	0.0	1.57 (0.53)	7
Q31. There are several ways to find the correct solution to a mathematics problem.	100.0	4.17 (0.41)	6	100.0	5.00 (0.00)	7
Q32. Those who are good in mathematics can solve a mathematics problem within a few minutes.	16.7	2.50 (0.84)	6	0.0	1.71 (0.49)	7
Q33. Knowing step-by-step procedures is necessary to solve mathematical problems.	0.0	2.17 (0.41)	6	0.0	1.57 (0.53)	7

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

Table C-13: MIT Program, Overall Evaluation Survey Mathematical Knowledge and Teaching Mathematics
(*Number Worlds* Only, Summer 2006 Survey, Spring 2007 Survey)

	Summer 2006 (n=29)		Spring 2007 (n=26)	
	Strongly Agree or Agree (%)	Mean (std. dev.)	Strongly Agree or Agree (%)	Mean (std. dev.)
I have a greater understanding of how children learn mathematics.	79.3	4.21 (.77)	96.2	4.58 (.58)
This training has increased my knowledge of effective instructional strategies for teaching mathematics.	89.7	4.21 (.62)	100.0	4.62 (.50)
I have increased my mathematical content knowledge.	69.0	3.76 (.95)	84.6	4.31 (.84)
I have greater knowledge of the Kentucky Core Content.	34.5	3.00 (1.04)	73.1	3.96 (.72)
I can better analyze student work for the purpose of identifying the mathematical skills the work represents.	86.2	3.97 (.63)	88.5	4.31 (.79)
I am better able to identify best practices for classroom instruction that support teaching reasoning and problem solving skills to students.	67.9	3.75 (.80)	96.2	4.46 (.71)

** Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

Table C-14: MIT Program, Overall Evaluation Survey Mathematical Knowledge and Teaching Mathematics
(*Math Recovery* Only, Summer 2006 Survey, Spring 2007 Survey)

	Summer 2006 (n=6)		Spring 2007 (n=5)	
	Strongly Agree or Agree (%)	Mean (std. dev.)	Strongly Agree or Agree (%)	Mean (std. dev.)
I have a greater understanding of how children learn mathematics.	83.3	4.17 (1.60)	80.0	4.20 (1.789)
This training has increased my knowledge of effective instructional strategies for teaching mathematics.	66.7	3.67 (1.51)	100.0	5.00 (.00)
I have increased my mathematical content knowledge.	66.7	3.83 (1.60)	100.0	4.80 (.45)
I have greater knowledge of the Kentucky Core Content.	50.0	3.50 (.55)	100.0	4.40 (.55)
I can better analyze student work for the purpose of identifying the mathematical skills the work represents.	100.0	4.67 (.52)	100.0	4.80 (.45)
I am better able to identify best practices for classroom instruction that support teaching reasoning and problem solving skills to students.	83.3	4.33 (.82)	100.0	5.00 (.00)

** Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

Table C-15: MIT Program, Overall Evaluation Survey Learning Mathematics and Implementation of Program
(*Number Worlds* Only, Summer 2006 Survey, Spring 2007 Survey)

	Summer 2006 (n=29)		Spring 2007 (n=26)	
	Strongly Agree or Agree (%)	Mean (std. dev.)	Strongly Agree or Agree (%)	Mean (std. dev.)
The program will be an effective program for teaching students mathematics.	100.0	4.48 (.51)	96.2	4.38 (.57)
The program will fit easily into my school's mathematics curriculum.	86.2	4.14 (.64)	88.5	4.19 (.75)
The program will be easy to implement in my school.	58.6	3.72 (.80)	88.5	4.19 (.75)
Encourages learning that is in line with Kentucky Core Content.	93.1	4.28 (.59)	92.3	4.15 (.54)
The program involves children in actively doing mathematics.	100.0	4.66 (.48)	100.0	4.65 (.49)
The program will give students a solid foundation in mathematics.	89.7	4.41 (.68)	96.2	4.35 (.56)
The program will help student's develop a strong conceptual framework from which to build future mathematics skills.	96.6	4.52 (.57)	88.5	4.42 (.70)
The program will promote student learning by identifying where they need additional instruction and support.	100.0	4.66 (.48)	100.0	4.50 (.51)

** Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

Table C-16: MIT Program, Overall Evaluation Survey Learning Mathematics and Implementation of Program
(*Math Recovery* Only, Summer 2006 Survey, Spring 2007 Survey)

	Summer 2006 (n=6)		Spring 2007 (n=5)	
	Strongly Agree or Agree (%)	Mean (std. dev.)	Strongly Agree or Agree (%)	Mean (std. dev.)
The program will be an effective program for teaching students mathematics.	100.0	5.00 (.00)	100.0	5.00 (.00)
The program will fit easily into my school's mathematics curriculum.	100.0	4.50 (.55)	100.0	4.80 (.45)
The program will be easy to implement in my school.	83.3	4.17 (.75)	100.0	4.80 (.45)
Encourages learning that is in line with Kentucky Core Content.	100.0	4.50 (.55)	100.0	4.80 (.45)
The program involves children in actively doing mathematics.	100.0	5.00 (.00)	100.0	5.00 (.00)
The program will give students a solid foundation in mathematics.	100.0	5.00 (.00)	100.0	5.00 (.00)
The program will help student's develop a strong conceptual framework from which to build future mathematics skills.	100.0	5.00 (.00)	100.0	5.00 (.00)
The program will promote student learning by identifying where they need additional instruction and support.	100.0	5.00 (.00)	100.0	5.00 (.00)

** Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

Table C-17: MIT Program, Overall Evaluation Survey Value of the Professional Development Program
(*Number Worlds* Only, Summer 2006 Survey, Spring 2007 Survey)

	Summer 2006 (n=29)		Spring 2007 (n=26)	
	Strongly Agree or Agree (%)	Mean (std. dev.)	Strongly Agree or Agree (%)	Mean (std. dev.)
The length of the professional development program was appropriate for the topics covered.	13.8	2.41 (.98)	73.1	3.77 (.95)
I was pleased with the overall quality of this professional development program.	75.9	3.79 (.82)	80.8	3.88 (.77)
The Number Worlds program is a better program for assisting young children in learning mathematics than programs used during the 2005-2006 school year.	69.0	3.69 (.97)	65.4	3.77 (.99)

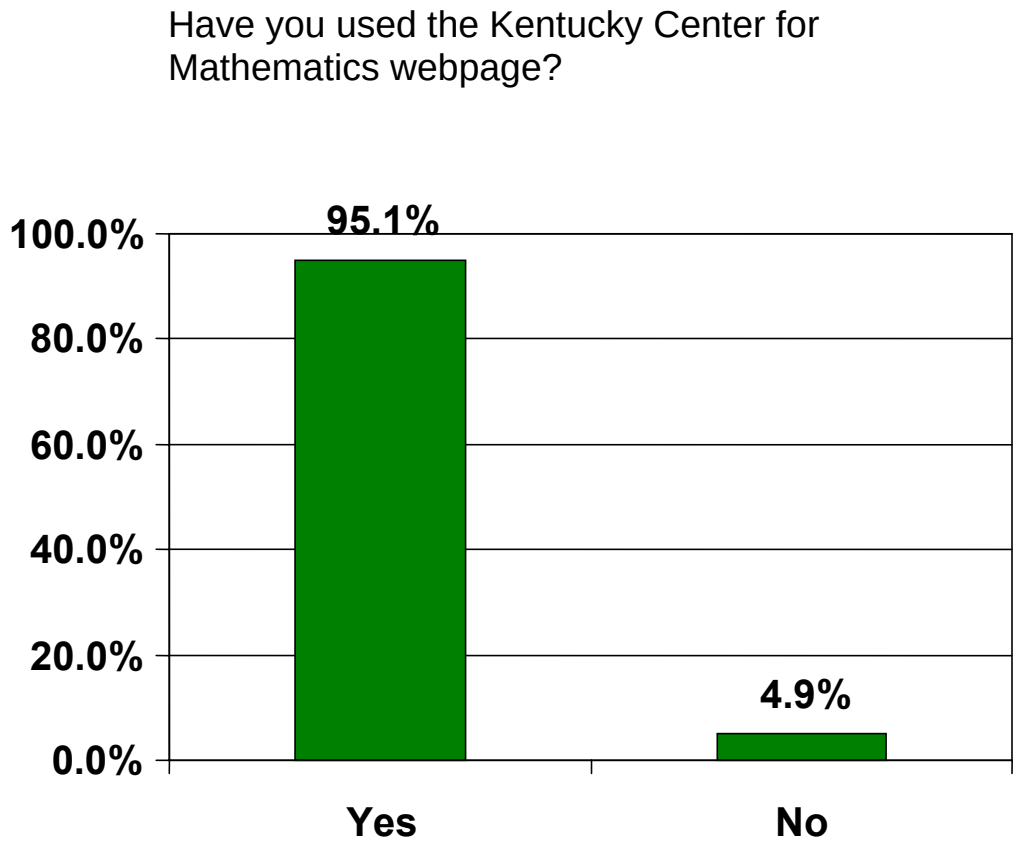
** Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

Table C-18: MIT Program, Overall Evaluation Survey Value of the Professional Development Program
(*Math Recovery* Only, Summer 2006 Survey, Spring 2007 Survey)

	Summer 2006 (n=6)		Spring 2007 (n=5)	
	Strongly Agree or Agree (%)	Mean (std. dev.)	Strongly Agree or Agree (%)	Mean (std. dev.)
The length of the professional development program was appropriate for the topics covered.	100.0	4.50 (.55)	100.0	4.80 (.45)
I was pleased with the overall quality of this professional development program.	100.0	5.00 (.00)	100.0	5.00 (.00)
The Math Recovery program is a better program for assisting young children in learning mathematics than programs used during the 2005-2006 school year.	66.7	3.33 (1.86)	60.0	3.40 (2.19)

** Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

Figure C-1: Usage of the KCM Website



Spring 2007 Survey

n = 41

Table C-19: Percent of MIT's Who State that Web Resource Is "Useful"

(Only Respondents Who Stated They Had Visited KCM's Webpage)

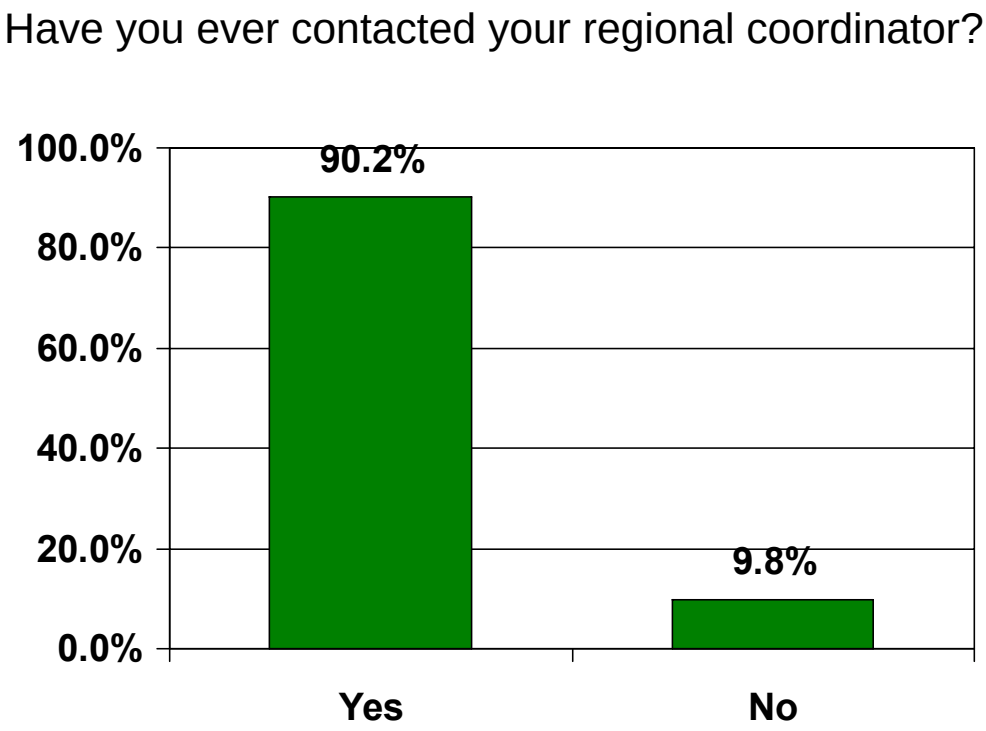
Please rate the usefulness of the following "resources for teachers" found on the Kentucky Center for Mathematics webpage…	Have Not Used	Not At All Useful (1)	(2)	(3)	(4)	Very Useful (5)	Count
Information on math curricula	7.5	.0	5.0	12.5	45.0	30.0	40
Professional development opportunities	15.0	.0	7.5	12.5	25.0	40.0	40
Math games/puzzles/practice	25.0	.0	.0	17.5	30.0	27.5	40
Interactive math manipulative	35.0	.0	.0	20.0	22.5	22.5	40
Assessment materials (including Open Response)	35.0	.0	5.0	7.5	40.0	12.5	40
Math tools (dictionaries/graph paper…)	45.0	.0	2.5	20.0	17.5	15.0	40
National and international research and statistics on teaching and learning mathematics	57.5	.0	2.5	7.5	25.0	7.5	40
Lesson plans	59.0	2.6	2.6	15.4	15.4	5.1	39
Webquests	65.0	.0	5.0	10.0	15.0	5.0	40
Mathematics competitions	72.5	2.5	5.0	5.0	12.5	2.5	40
Summer and school year opportunities for pre-college students' webpage	75.0	5.0	5.0	10.0	5.0	.0	40
Teacher scholarships and grants	75.0	.0	2.5	2.5	12.5	7.5	40
Kentucky graduation requirements	82.5	.0	5.0	.0	10.0	2.5	40
Student scholarships	85.0	.0	5.0	2.5	5.0	2.5	40

Table C-20: Mean Score of MIT's Who Used Web Resources

(Only Respondents Who Stated They Had Visited KCM's Webpage)

Please rate the usefulness of the following "resources for teachers" found on the Kentucky Center for Mathematics webpage…	Mean (std.dev.)	Count
Professional development opportunities	4.15 (.99)	34
Math games/puzzles/practice	4.13 (.78)	30
Information on math curricula	4.08 (.83)	37
Interactive math manipulatives	4.04 (.82)	26
Teacher scholarships and grants	4.00 (.94)	10
Assessment materials (including Open Response)	3.92 (.80)	26
National and international research and statistics on teaching and learning mathematics	3.88 (.78)	17
Math tools (dictionaries/graph paper…)	3.82 (.91)	22
Webquests	3.57 (.94)	14
Kentucky graduation requirements	3.57 (1.13)	7
Lesson plans	3.44 (1.03)	16
Student scholarships	3.33 (1.21)	6
Mathematics competitions	3.27 (1.19)	11
Summer and school year opportunities for pre-college students' webpage	2.60 (1.08)	10

Figure C-2: Contacted the Regional Coordinator



Spring 2007 Survey
n = 41

Table C-21: Frequency of Contact with the Regional Coordinator

Please estimate how many times in the past year you contacted your regional coordinator.
(Spring 2007 Survey, Both Math Recovery & Number Worlds MIT's)

	Frequency	Percent
1	1	2.7
2	2	5.4
3	5	13.5
4	3	8.1
5	4	10.8
6	3	8.1
7	4	10.8
10	5	13.5
11	2	5.4
15	1	2.7
20	3	8.1
23	1	2.7
25	3	8.1
27	1	2.7
35	2	5.4
Many	5	13.5

n = 37

Table C-22: Method of Contact with the Regional Coordinator

How did you contact your regional coordinator?
(Spring 2007 Survey, Both Math Recovery & Number Worlds MIT's)

	Frequency	Percent
Phone		
Email	26	68.4
Both Phone & Email	9	23.7
Other	3	7.9

n = 38

Table C-23: Timeliness of the Regional Coordinator

Overall, did the regional coordinator respond to you/your need in a timely manner?

(Spring 2007 Survey, Both Math Recovery & Number Worlds MIT's)

	Frequency	Percent
Yes	36	100.0
No	0	.0

n=36

Table C-24: Helpfulness of the Regional Coordinator

Overall, was your regional coordinator helpful in responding to your needs as a coach?

(Spring 2007 Survey, Both Math Recovery & Number Worlds MIT's)

	Frequency	Percent
Yes, helpful	36	97.3
Somewhat helpful	1	2.7
No, not at all helpful	0	.0

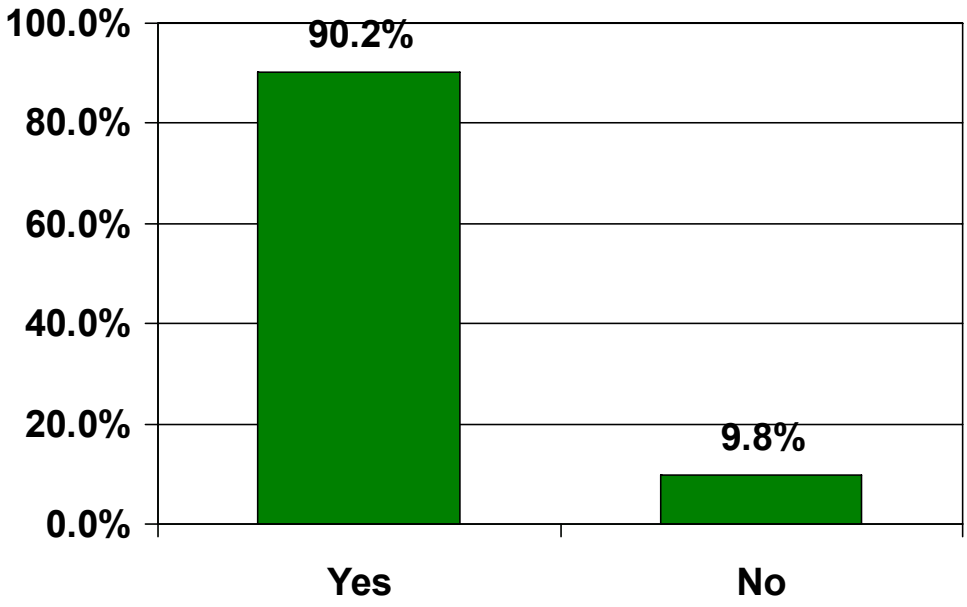
n= 37

Table C-25: MITs' Comments Regarding Regional Coordinators

- She was in my opinion the best RC an MIT could have. She showed me a lot.
- I hope the regional coordinator program is continued, as it gives us a liaison to KCM and she can answer questions perhaps more quickly.
- She is always ready to assist in any way possible.
- I am glad to have mine for another year.
- I enjoyed completing our book study together. It was very beneficial and helped me make sense of what math instruction should be.
- I consider the Regional Coordinator to be one of the best support systems in the implementation of this program. Through her and the Central meetings, we had many wonderful discussions about mathematics strategies and the way children learn mathematics. She shared articles, websites and went out of her way to look for resources that she thought would be beneficial to us in the implementation of the program.
- She was extremely helpful and encouraging.
- NO
- My regional coordinator was extremely supportive and a great resource!
- Very good resource to have.
- Very helpful. If she didn't know the answer she would find someone who did.
- My regional coordinator was very helpful this year. As the facilitator of the Centra meetings, she offered support, provided resources and information, and lead our group in meaningful discussions.
- She has been wonderful to work with. She is always helpful, and if she doesn't have information on something I need, she finds it.
- no
- "XXXX" is an awesome regional coordinator. She is more than willing to help us with anything we need and will come to our school at the drop of a hat if we need her.
- "XXXX" is very supportive to anything I requested.
- "XXXX" is Great!
- My regional coordinator, "XXXX", has been an invaluable resource during my first MIT year - she has brought a lot of knowledge to the program and has offered a lot of support and advice, all in a very positive manner.
- "XXXX" was pleasant and helpful at each meeting. She was a joy to work with.
- Very helpful and very flexible!!
- Extremely supportive and helpful during this somewhat stressful first year.
- The regional coordinator is very helpful.
- She is very helpful and loves her job! I have enjoyed getting to know her.
- It has been fantastic to have the opportunity to work so closely with my regional coordinator.

Figure C-3: Contacting KCM

In the past year, have you initiated contact with staff at the Kentucky Center for Mathematics for the purpose of answering a specific question, getting information, finding a resource, or other problem or concern that you needed assistance with in your MIT duties?



Spring 2007 Survey
n = 41

Table C-26: Frequency of Contact with KCM

Please estimate how many times in the past year you initiated contact with a staff person from KCM.
(Spring 2007 Survey, Both Math Recovery & Number Worlds MIT's)

	Frequency	Percent
1	2	5.4
2	2	5.4
3	5	13.5
4	5	13.5
5	8	21.6
6	1	2.7
7	2	5.4
10	2	5.4
11	1	2.7
15	1	2.7
20	2	5.4
23	1	2.7
25	1	2.7
27	1	2.7
35	1	2.7
Many	2	5.4

n = 37

Table C-27: Method of Contacting KCM

How did you contact the staff person at KCM?
(Spring 2007 Survey, Both Math Recovery & Number Worlds MIT's)

	Frequency	Percent
Phone		
Email	29	78.4
Both Phone & Email	7	18.9
Other	1	2.7

n = 37

Table C-28: Timeliness of KCM

Overall, did the staff person from KCM respond to you/your need in a timely manner?

(Spring 2007 Survey, Both Math Recovery & Number Worlds MIT's)

	Frequency	Percent
Yes	37	100.0
No	0	.0

n= 37

Table C-29: Helpfulness of KCM

Overall, was the staff person from KCM helpful in responding to your needs as a MIT?

(Spring 2007 Survey, Both Math Recovery & Number Worlds MIT's)

	Frequency	Percent
No, not at all helpful	0	0.0
Somewhat helpful	3	8.1
Yes, helpful	34	91.9

n= 37

Table C-30: MITs' Comments Regarding the Staff at the KCM

- Everyone has answered promptly or let me know they would have to research the question and would get back as soon as possible. Very professional and caring.
- "XXXX" really stands out in my mind, she was extremely helpful to me this year as well as others. Every time I had a question it was answered within the hour by someone, most of the time "XXXX".
- "XXXX" and the research assistants at KCM have always been willing to answer questions or find the answer to the questions that we have had this year. I can't say enough good things about the work they did for the MIT's this year.
- NO
- Overall, everyone was supportive and helpful in aiding me in my position.
- "XXXX" has been tremendous!! Without her help and support and encouragement throughout the school year this grant would have not been able to be so successful!!
- They have been very helpful and quick to respond.
- "XXXX" has been wonderful! I am glad that I have had the opportunity to work with her this year!
- Questions were answered quickly!
- "XXXX" and "XXXX" have both been angels to me

Appendix D: KCM Coaching Program Data

Coaches

Table D-1: Elementary Schools' Coaches Regarding Teacher Efficacy

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Q1. Often in mathematics, I do not understand the concept behind a problem.	11.8	2.24 (0.82)	34	10.5	2.26 (0.87)	19
Q2. I am able to remember most of the mathematics I learn in a course after the course is over.	69.7	3.61 (0.83)	34	63.2	3.53 (0.96)	19
Q3. I get frustrated if I don't understand what I am studying in mathematics.	58.8	3.41 (0.86)	34	68.4	3.53 (0.90)	19
Q4. I like doing mathematics.	73.5	4.06 (0.78)	34	78.9	4.11 (1.15)	19
Q5. I am very interested in mathematics.	85.3	4.12 (0.88)	34	78.9	4.26 (1.05)	19
Q6. I am able to learn mathematics well.	72.7	3.73 (0.94)	34	63.2	3.53 (1.12)	19
Q7. If I cannot solve a mathematics problem within a few minutes, I will stop trying to solve it.	17.6	2.38 (0.95)	34	10.5	2.11 (0.81)	19
Q8. I am good at doing mathematics.	50.0	3.38 (0.85)	34	63.2	3.58 (1.17)	19
Q9. I am able to successfully solve most mathematical problems with which I am confronted.	55.9	3.53 (0.75)	34	68.4	3.63 (0.76)	19

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.
** Significant at .05.

Table D-2: Elementary Schools' Coaches Regarding Learning Mathematics

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Q10. People learn mathematics by listening to lecture.	0.0	1.44 (0.50)	34	10.5	1.58 (0.96)	19
Q11. Learning mathematics mainly involves memorizing procedures.	5.9	1.94 (0.81)	34	10.5	2.00 (0.94)	19
Q12. In order to learn mathematics you need to learn a different method for each new type of problem.	11.8	2.18 (0.80)	34	15.8	2.21 (0.92)	19
Q13. People learn mathematics by working together in cooperative groups. **	91.2	4.03 (0.46)	34	94.7	4.42 (0.61)	19
Q14. I try to understand the reasoning behind the procedures I use in mathematics.	100.0	4.21 (0.41)	34	94.7	4.47 (0.61)	19
Q15. I know I understand mathematics when I can apply mathematics to a new situation.	94.1	4.26 (0.57)	34	94.7	4.53 (0.61)	18
Q16. People learn mathematics by doing hands on activities. **	97.1	4.32 (0.53)	34	100.0	4.72 (0.46)	18
Q17. I know I understand mathematics when I get a good grade on an exam.	38.2	3.03 (0.90)	34	27.8	2.89 (0.90)	18
Q18. Anyone can learn mathematics.	84.8	4.06 (0.79)	34	88.9	4.11 (0.58)	18
Q19. I know I understand mathematics when I can explain the mathematics to someone else. **	97.1	4.44 (0.56)	34	100.0	4.78 (0.43)	18
Q20. Making mistakes is part of learning mathematics.	100.0	4.53 (0.51)	34	94.4	4.56 (0.62)	18

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.
** Significant at .05.

Table D-3: Elementary Schools' Coaches Regarding the Nature of Math

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Q21. To understand mathematics, students must solve many problems following examples provided. **	27.3	2.88 (0.89)	34	5.6	2.22 (0.73)	18
Q22. Doing mathematics consists mainly of using rules. **	35.3	3.00 (0.89)	34	11.8	2.24 (0.90)	17
Q23. Getting the right answer is the most important part of mathematics.	8.8	2.32 (0.64)	34	5.6	2.17 (0.71)	18
Q24. In mathematics, it is not possible to do a problem unless you've first been taught how to do one like it. **	8.8	2.15 (0.70)	34	0.0	1.72 (0.46)	18
Q25. Being able to successfully use a rule or formula in mathematics is more important than understanding why the rule or formula works.	2.9	1.85 (0.66)	34	5.6	1.72 (1.02)	18
Q26. It is difficult to talk about mathematical ideas because all you can really do is explain how to do specific problems.	2.9	1.94 (0.49)	34	10.5	2.00 (0.82)	19
Q27. Solving mathematics problems frequently involves exploration.	94.1	4.32 (0.59)	34	100.0	4.63 (0.50)	19
Q28. Most mathematics problems are best solved by deciding on the type of problem and then using a previously learned solution for that type of problem.	44.1	3.21 (0.98)	34	21.1	2.68 (1.00)	19
Q29. Mathematics is an uncreative subject.	0.0	1.62 (0.55)	34	0.0	1.68 (0.58)	19
Q30. The most important part of mathematics is computation.	5.9	2.24 (0.70)	34	5.3	1.89 (0.74)	19
Q31. There are several ways to find the correct solution to a mathematics problem.	97.1	4.29 (0.76)	34	94.7	4.68 (0.58)	19
Q32. Those who are good in mathematics can solve a mathematics problem within a few minutes.	8.8	2.41 (0.74)	34	15.8	2.47 (0.77)	19
Q33. Knowing step-by-step procedures is necessary to solve mathematical problems. **	23.5	2.91 (0.87)	34	10.5	2.21 (0.79)	19

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.
** Significant at .05.

Table D-4: Middle / High School Coaches Regarding Teacher Efficacy

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Q1. Often in mathematics, I do not understand the concept behind a problem.	0.0	1.61 (0.50)	28	0.0	1.47 (0.51)	17
Q2. I am able to remember most of the mathematics I learn in a course after the course is over.	96.4	4.25 (0.65)	28	82.4	3.76 (1.25)	17
Q3. I get frustrated if I don't understand what I am studying in mathematics.	69.0	3.52 (0.99)	29	76.5	3.71 (0.92)	17
Q4. I like doing mathematics.	100.0	4.83 (0.38)	29	100.0	4.94 (0.24)	17
Q5. I am very interested in mathematics.	96.6	4.83 (0.47)	29	100.0	4.94 (0.24)	17
Q6. I am able to learn mathematics well.	100.0	4.62 (0.49)	29	100.0	4.53 (0.51)	17
Q7. If I cannot solve a mathematics problem within a few minutes, I will stop trying to solve it.	3.4	1.66 (0.90)	29	0.0	1.47 (0.62)	17
Q8. I am good at doing mathematics.	93.1	4.45 (0.74)	29	100.0	4.53 (0.51)	17
Q9. I am able to successfully solve most mathematical problems with which I am confronted.	96.6	4.24 (0.51)	29	100.0	4.53 (0.51)	17

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.
** Significant at .05.

Table D-5: Middle / High School Coaches Regarding Learning Mathematics

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Q10. People learn mathematics by listening to lecture.	6.9	1.69 (0.93)	29	0.0	1.82 (0.73)	17
Q11. Learning mathematics mainly involves memorizing procedures.	0.0	1.86 (0.59)	28	11.8	1.94 (1.14)	17
Q12. In order to learn mathematics you need to learn a different method for each new type of problem.	10.3	2.10 (0.82)	29	11.8	2.06 (0.97)	17
Q13. People learn mathematics by working together in cooperative groups.	79.3	3.90 (0.56)	29	94.1	4.00 (0.35)	17
Q14. I try to understand the reasoning behind the procedures I use in mathematics.	100.0	4.45 (0.51)	29	100.0	4.53 (0.51)	17
Q15. I know I understand mathematics when I can apply mathematics to a new situation.	100.0	4.59 (0.50)	29	100.0	4.76 (0.44)	17
Q16. People learn mathematics by doing hands on activities.	100.0	4.34 (0.48)	29	94.1	4.24 (0.56)	17
Q17. I know I understand mathematics when I get a good grade on an exam.	48.3	3.28 (0.88)	29	52.9	3.35 (0.93)	17
Q18. Anyone can learn mathematics.	93.1	4.31 (0.71)	29	94.1	4.18 (0.53)	17
Q19. I know I understand mathematics when I can explain the mathematics to someone else.	100.0	4.76 (0.44)	29	100.0	4.76 (0.44)	17
Q20. Making mistakes is part of learning mathematics.	100.0	4.66 (0.48)	29	100.0	4.59 (0.51)	17

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.
** Significant at .05.

Table D-6: Middle / High School Coaches Regarding the Nature of Math

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Q21. To understand mathematics, students must solve many problems following examples provided.	41.4	3.00 (1.07)	29	29.4	2.82 (0.88)	17
Q22. Doing mathematics consists mainly of using rules.	17.2	2.62 (0.86)	29	25.0	2.75 (0.86)	16
Q23. Getting the right answer is the most important part of mathematics.	3.4	2.24 (0.58)	29	23.5	2.59 (1.18)	17
Q24. In mathematics, it is not possible to do a problem unless you've first been taught how to do one like it.	0.0	1.86 (0.35)	29	5.9	1.94 (0.66)	17
Q25. Being able to successfully use a rule or formula in mathematics is more important than understanding why the rule or formula works.	3.4	1.79 (0.82)	29	5.9	1.88 (0.86)	17
Q26. It is difficult to talk about mathematical ideas because all you can really do is explain how to do specific problems.	3.4	1.83 (0.66)	29	0.0	1.71 (0.47)	17
Q27. Solving mathematics problems frequently involves exploration.	96.6	4.31 (0.54)	29	100.0	4.41 (0.51)	17
Q28. Most mathematics problems are best solved by deciding on the type of problem and then using a previously learned solution for that type of problem.	58.6	3.41 (0.95)	29	52.9	3.41 (0.87)	17
Q29. Mathematics is an uncreative subject.	3.7	1.59 (0.84)	27	0.0	1.53 (0.51)	17
Q30. The most important part of mathematics is computation.	6.9	2.17 (0.80)	29	0.0	1.94 (0.75)	17
Q31. There are several ways to find the correct solution to a mathematics problem.	100.0	4.52 (0.51)	29	100.0	4.65 (0.49)	17
Q32. Those who are good in mathematics can solve a mathematics problem within a few minutes. **	17.2	2.52 (0.87)	29	0.0	2.06 (0.43)	17
Q33. Knowing step-by-step procedures is necessary to solve mathematical problems. **	34.5	2.93 (0.88)	29	11.8	2.35 (0.79)	17

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.
** Significant at .05.

Coachees

Table D-7: Elementary Coachees Regarding Teacher Efficacy

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Q1. Often in mathematics, I do not understand the concept behind a problem.	8.7	2.02 (0.88)	92	10.6	2.13 (0.98)	94
Q2. I am able to remember most of the mathematics I learn in a course after the course is over.	64.1	3.57 (1.00)	92	59.6	3.45 (1.08)	94
Q3. I get frustrated if I don't understand what I am studying in mathematics.	64.9	3.54 (1.10)	91	71.2	3.56 (1.04)	94
Q4. I like doing mathematics.	65.6	3.82 (1.02)	90	72.3	3.89 (0.92)	94
Q5. I am very interested in mathematics.	64.2	3.77 (1.02)	92	64.9	3.74 (1.05)	94
Q6. I am able to learn mathematics well.	60.5	3.59 (1.10)	91	59.8	3.57 (1.00)	92
Q7. If I cannot solve a mathematics problem within a few minutes, I will stop trying to solve it.	23.1	2.38 (1.13)	91	24.7	2.44 (1.15)	93
Q8. I am good at doing mathematics.	58.3	3.48 (1.09)	91	56.0	3.49 (1.03)	93
Q9. I am able to successfully solve most mathematical problems with which I am confronted.	64.1	3.60 (0.87)	92	63.4	3.52 (0.94)	93

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.
** Significant at .05.

Table D-8: Elementary Coachees Regarding Learning Mathematics

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Q10. People learn mathematics by listening to lecture.	3.3	1.54 (0.73)	91	3.2	1.61 (0.71)	93
Q11. Learning mathematics mainly involves memorizing procedures.	21.8	2.55 (0.98)	92	26.6	2.61 (1.03)	94
Q12. In order to learn mathematics you need to learn a different method for each new type of problem.	10.9	2.30 (0.77)	92	12.8	2.37 (0.75)	94
Q13. People learn mathematics by working together in cooperative groups.	68.4	3.66 (0.68)	92	71.3	3.69 (0.72)	94
Q14. I try to understand the reasoning behind the procedures I use in mathematics.	92.3	4.10 (0.71)	92	89.4	4.02 (0.62)	94
Q15. I know I understand mathematics when I can apply mathematics to a new situation.	95.6	4.32 (0.59)	91	97.9	4.29 (0.50)	94
Q16. People learn mathematics by doing hands on activities.	93.5	4.41 (0.73)	92	91.5	4.34 (0.66)	94
Q17. I know I understand mathematics when I get a good grade on an exam.	56.5	3.47 (0.93)	92	49.5	3.23 (0.97)	93
Q18. Anyone can learn mathematics.	76.9	3.96 (0.82)	91	75.6	3.82 (0.83)	94
Q19. I know I understand mathematics when I can explain the mathematics to someone else.	97.8	4.46 (0.58)	92	100.0	4.47 (0.50)	94
Q20. Making mistakes is part of learning mathematics.	98.9	4.49 (0.52)	92	100.0	4.44 (0.50)	94

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.
** Significant at .05.

Table D-9: Elementary Coachees Regarding the Nature of Math

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Q21. To understand mathematics, students must solve many problems following examples provided.	43.3	3.13 (1.09)	90	49.5	3.28 (1.00)	93
Q22. Doing mathematics consists mainly of using rules.	39.2	3.04 (0.95)	92	44.7	3.14 (0.90)	94
Q23. Getting the right answer is the most important part of mathematics.	10.9	2.36 (0.85)	92	12.8	2.48 (0.81)	94
Q24. In mathematics, it is not possible to do a problem unless you've first been taught how to do one like it.	12.0	2.30 (0.89)	92	10.6	2.37 (0.73)	94
Q25. Being able to successfully use a rule or formula in mathematics is more important than understanding why the rule or formula works.	22.9	2.14 (0.86)	92	10.6	2.16 (0.83)	94
Q26. It is difficult to talk about mathematical ideas because all you can really do is explain how to do specific problems.	8.9	2.18 (0.79)	90	6.5	2.15 (0.68)	92
Q27. Solving mathematics problems frequently involves exploration.	93.3	4.18 (0.61)	89	97.8	4.24 (0.48)	92
Q28. Most mathematics problems are best solved by deciding on the type of problem and then using a previously learned solution for that type of problem.	52.2	3.38 (0.76)	90	56.0	3.40 (0.81)	91
Q29. Mathematics is an uncreative subject.	4.4	1.93 (0.77)	91	2.2	1.88 (0.74)	92
Q30. The most important part of mathematics is computation.**	6.5	2.27 (0.77)	92	13.1	2.40 (0.84)	92
Q31. There are several ways to find the correct solution to a mathematics problem.**	98.9	4.40 (0.51)	92	95.7	4.24 (0.52)	94
Q32. Those who are good in mathematics can solve a mathematics problem within a few minutes.	20.7	2.60 (0.90)	92	14.9	2.45 (0.82)	94
Q33. Knowing step-by-step procedures is necessary to solve mathematical problems.	47.9	3.20 (0.92)	92	40.5	3.07 (0.89)	94

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

** Significant at .05.

Table D-10: Middle / High School Coachees Regarding Teacher Efficacy

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Q1. Often in mathematics, I do not understand the concept behind a problem.	1.4	1.54 (0.72)	69	2.8	1.46 (0.78)	69
Q2. I am able to remember most of the mathematics I learn in a course after the course is over.	85.5	3.96 (1.01)	69	88.4	4.09 (1.03)	69
Q3. I get frustrated if I don't understand what I am studying in mathematics.	53.0	3.10 (1.26)	68	49.2	3.13 (1.11)	69
Q4. I like doing mathematics.	92.8	4.55 (0.83)	69	94.2	4.61 (0.81)	69
Q5. I am very interested in mathematics.	88.4	4.42 (0.91)	69	91.3	4.54 (0.80)	69
Q6. I am able to learn mathematics well.	94.2	4.46 (0.80)	69	95.7	4.54 (0.58)	69
Q7. If I cannot solve a mathematics problem within a few minutes, I will stop trying to solve it.	5.9	1.71 (0.83)	68	2.9	1.57 (0.72)	69
Q8. I am good at doing mathematics.	94.2	4.36 (0.64)	69	95.5	4.33 (0.56)	67
Q9. I am able to successfully solve most mathematical problems with which I am confronted.	92.8	4.23 (0.62)	69	98.5	4.34 (0.56)	68

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.
** Significant at .05.

Table D-11: Middle / High School Coachees Regarding Learning Mathematics

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Q10. People learn mathematics by listening to lecture.	14.9	2.48 (0.86)	67	15.9	2.41 (0.96)	69
Q11. Learning mathematics mainly involves memorizing procedures.	26.1	2.64 (1.08)	69	23.1	2.54 (0.99)	69
Q12. In order to learn mathematics you need to learn a different method for each new type of problem.	8.7	2.09 (0.78)	69	11.9	2.28 (0.85)	67
Q13. People learn mathematics by working together in cooperative groups.	68.1	3.68 (0.63)	69	66.7	3.62 (0.77)	69
Q14. I try to understand the reasoning behind the procedures I use in mathematics.	94.2	4.25 (0.76)	69	94.2	4.33 (0.59)	69
Q15. I know I understand mathematics when I can apply mathematics to a new situation.	91.3	4.36 (0.69)	69	100.0	4.41 (0.50)	68
Q16. People learn mathematics by doing hands on activities.	68.2	3.94 (0.70)	69	82.6	3.96 (0.72)	69
Q17. I know I understand mathematics when I get a good grade on an exam.	62.2	3.59 (0.86)	69	59.9	3.51 (0.83)	69
Q18. Anyone can learn mathematics.	82.6	4.03 (0.79)	69	85.5	3.99 (0.68)	69
Q19. I know I understand mathematics when I can explain the mathematics to someone else.	100.0	4.58 (0.50)	69	98.6	4.52 (0.53)	69
Q20. Making mistakes is part of learning mathematics.	98.6	4.45 (0.58)	69	100.0	4.54 (0.50)	69

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.
** Significant at .05.

Table D-12: Middle / High School Coachees Regarding the Nature of Math

	Summer 2006			Spring 2007		
	Percent Strongly Agree or Agree	Mean Score (SD)	Count	Percent Strongly Agree or Agree	Mean Score (SD)	Count
Q21. To understand mathematics, students must solve many problems following examples provided.	57.4	3.41 (0.90)	68	39.7	3.16 (0.94)	68
Q22. Doing mathematics consists mainly of using rules.	47.1	3.16 (0.91)	68	44.9	3.23 (0.96)	69
Q23. Getting the right answer is the most important part of mathematics.	132	2.37 (0.91)	68	18.8	2.57 (0.87)	69
Q24. In mathematics, it is not possible to do a problem unless you've first been taught how to do one like it.	11.8	2.18 (0.81)	68	5.8	2.13 (0.71)	69
Q25. Being able to successfully use a rule or formula in mathematics is more important than understanding why the rule or formula works.	5.9	2.07 (0.80)	68	5.8	2.16 (0.76)	69
Q26. It is difficult to talk about mathematical ideas because all you can really do is explain how to do specific problems.	2.9	1.99 (0.63)	68	2.9	1.99 (0.65)	69
Q27. Solving mathematics problems frequently involves exploration.	83.9	3.91 (0.64)	68	91.3	4.12 (0.53)	69
Q28. Most mathematics problems are best solved by deciding on the type of problem and then using a previously learned solution for that type of problem.	55.9	3.38 (0.90)	68	53.6	3.33 (0.89)	69
Q29. Mathematics is an uncreative subject.	1.5	1.82 (0.67)	68	0.0	1.78 (0.59)	69
Q30. The most important part of mathematics is computation.	4.4	2.34 (0.68)	68	8.7	2.35 (0.78)	69
Q31. There are several ways to find the correct solution to a mathematics problem.	95.6	4.26 (0.54)	68	98.5	4.37 (0.52)	68
Q32. Those who are good in mathematics can solve a mathematics problem within a few minutes.	11.8	2.53 (0.82)	68	5.7	2.33 (0.76)	69
Q33. Knowing step-by-step procedures is necessary to solve mathematical problems.	42.6	3.13 (0.94)	68	35.3	3.15 (0.87)	68

* Mean Score is calculated on a 5 point scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.
** Significant at .05.

Coaching Program Data

Table D-13: Coaching Program, Overall Evaluation Survey: Mathematical Knowledge and Teaching Mathematics

	Summer 2006 (n=63)		Winter 2007 (n=61)		Spring 2007 (n=36)	
	Strongly Agree or Agree %	Mean (std. dev.)	Strongly Agree or Agree %	Mean (std. dev.)	Strongly Agree or Agree %	Mean (std. dev.)
I have a greater understanding of how children learn mathematics.*	98.4	4.32 (.505)	95.1	4.30 (.558)	80.6	4.11 (.950)
This training has increased my knowledge of effective instructional strategies for teaching mathematics.*	98.4	4.39 (.523)	96.7	4.48 (.566)	91.7	4.28 (.815)
I have increased my mathematical content knowledge.*	83.9	4.10 (.740)	82.0	4.00 (.730)	83.3	3.89 (.854)
I have greater knowledge of the Kentucky Core Content.	61.9	3.60 (.814)	80.3	4.07 (.727)	77.8	3.94 (.955)
I can better analyze student work for the purpose of identifying the mathematical skills the work represents.	88.9	4.00 (.596)	80.3	4.07 (.772)	88.9	4.06 (.893)
I am better able to identify best practices for classroom instruction that support teaching reasoning and problem solving skills to students.	96.8	4.25 (.507)	96.7	4.41 (.559)	88.9	4.22 (.898)
I am more proficient in using multiple methods for measuring student performance.	81.0	3.92 (.703)	86.9	4.10 (.700)	91.7	4.14 (.833)
I am better able to use assessment data to refine my teaching practices.	69.8	3.70 (.775)	82.0	4.02 (.764)	88.9	4.14 (.867)

(Mean score is calculated on a 5 point scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree and 5 = Strongly Agree.
* n = 62

Table D-14: Coaching Program, Overall Evaluation Survey: Coaching & Support for Mathematics Education within the School

	Summer 2006 (n=62)		Winter 2007 (n=61)		Spring 2007 (n=36)	
	Strongly Agree or Agree (%)	Mean (std. dev.)	Strongly Agree or Agree (%)	Mean (std. dev.)	Strongly Agree or Agree (%)	Mean (std. dev.)
I am better able to coach others on the use of best practices for classroom instruction that support reasoning & problem solving skills.	95.2*	4.30 (.557)	93.4	4.26 (.575)	88.9	4.28 (.914)
I feel prepared to function as a mathematics coach for my school.	79.0	3.89 (.704)	88.5	4.25 (.745)	85.7***	4.11 (1.051)
I have a greater knowledge of strategies to support change within my school's mathematics curriculum.	88.7	4.11 (.770)	90.0**	4.25 (.728)	88.9	4.28 (.974)
I learned to develop action plans that will support my work as a coach in my school.	83.9	3.95 (.734)	78.7	3.95 (.805)	83.3	4.19 (.889)
I learned to implement action plans that will support my work as a coach in my school.	77.4	3.81 (.743)	77.0	3.90 (.746)	88.9	4.25 (.841)
I will be able to relay the teaching strategies presented in this professional development course to other teachers.	90.3	4.18 (.587)	96.7	4.23 (.560)	88.9	4.31 (.920)

Mean score is calculated on a 5 point scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

* n = 63

** n = 60

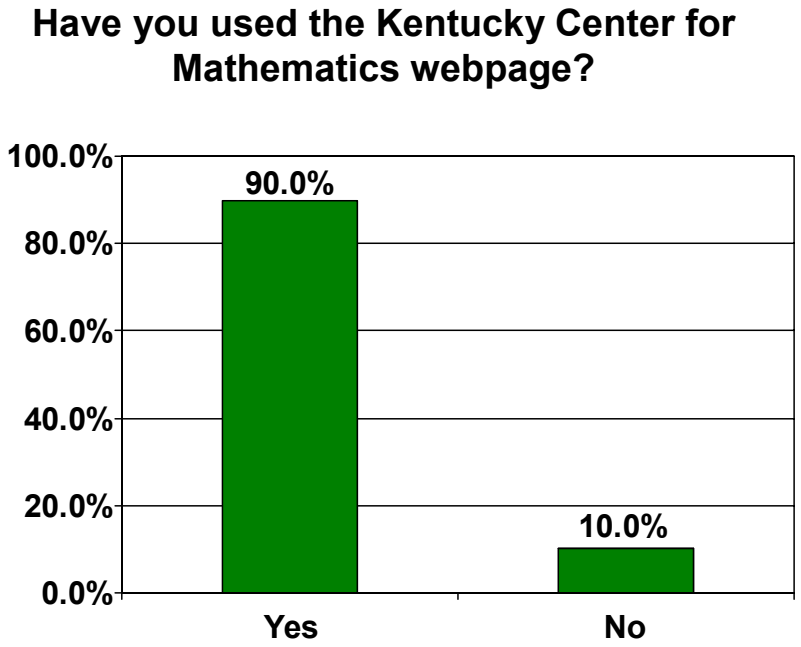
*** n = 35

Table D-15: Coaching Program, Overall Evaluation Survey: Coaching & Support for Mathematics Education within the School

	Summer 2006 (n=61)		Winter 2007 (n=60)		Spring 2007 (n=36)	
	Strongly Agree or Agree (%)	Mean (std. dev.)	Strongly Agree or Agree (%)	Mean (std. dev.)	Strongly Agree or Agree (%)	Mean (std. dev.)
The materials and resources provided in this professional development program will assist me in coaching other teachers.	100.0	4.48 (.504)	98.3	4.63 (.520)	97.2	4.64 (.762)
The length of the professional development training was appropriate for the topics covered.	57.4	3.49 (.994)	91.7	4.15 (.755)	83.3	4.11 (1.036)
I was pleased with the overall quality of this professional development program.	95.1	4.28 (.552)	98.3	4.63 (.520)	94.4	4.58 (.874)

(Mean score is calculated on a 5 point scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

Figure D-1: Usage of the KCM Website



Spring 2007 Survey
n = 40

Table D-16: Opinion of Coaches Regarding "Usefulness" of KCM Web Resource
(Only Respondents Who Stated They Visited KCM's Webpage)

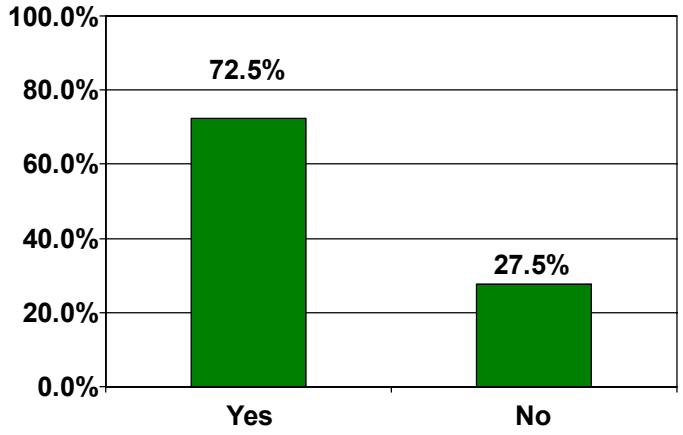
Please rate the usefulness of the following "resources for teachers" found on the Kentucky Center for Mathematics webpage…	Have Not Used %	Not At All Useful (1) %	(2) %	(3) %	(4) %	Very Useful (5) %	Count
Professional development opportunities	36.1	.0	2.8	11.1	19.4	30.6	36
Math games/puzzles/practice	27.8	.0	8.3	13.9	19.4	30.6	36
Interactive math manipulatives	30.6	.0	8.3	11.1	13.9	36.1	36
Math tools (dictionaries/graph paper…)	44.4	.0	8.3	5.6	11.1	30.6	36
Lesson plans	44.4	.0	5.6	16.7	11.1	22.2	36
Information on math curricula	25.0	.0	2.8	5.6	25.0	41.7	36
Assessment materials (including Open Response)	36.1	.0	2.8	13.9	11.1	36.1	36
Webquests	52.8	.0	.0	16.7	13.9	16.7	36
Mathematics competitions	58.3	2.8	.0	19.4	8.3	11.1	36
Summer and school year opportunities for pre-college students' webpage	63.9	2.8	.0	11.1	11.1	11.1	36
Student scholarships	66.7	5.6	2.8	16.7	5.6	2.8	36
Teacher scholarships and grants	52.9	2.9	.0	14.7	20.6	8.8	34
Kentucky graduation requirements	61.1	2.8	.0	22.2	5.6	8.3	36
National and international research and statistics on teaching and learning mathematics	52.8	.0	2.8	22.2	8.3	13.9	36

Table D-17: Mean Score of Coaches Rating the "Usefulness" of KCM Web Resource
(Only Respondents Who Stated They Visited KCM's Webpage)

Please rate the usefulness of the following "resources for teachers" found on the Kentucky Center for Mathematics webpage…	Mean (std. dev.)	Count
Professional development opportunities	4.22 (.902)	23
Math games/puzzles/practice	4.00 (1.058)	26
Interactive math manipulatives	4.12 (1.092)	25
Math tools (dictionaries/graph paper…)	4.15 (1.137)	20
Lesson plans	3.90 (1.071)	20
Information on math curricula	4.41 (.797)	27
Assessment materials (including Open Response)	4.26 (.964)	23
Webquests	4.00 (.866)	17
Mathematics competitions	3.60 (1.121)	15
Summer and school year opportunities for pre-college students' webpage	3.77 (1.166)	13
Student scholarships	2.92 (1.165)	12
Teacher scholarships and grants	3.69 (1.014)	16
Kentucky graduation requirements	3.43 (1.089)	14
National and international research and statistics on teaching and learning mathematics	3.71 (.985)	17

Figure D-2: Contacting the Regional Coordinator

Have you ever contacted your regional coordinator?



Spring 2007 Survey
n = 40

Table D-18: Frequency of Contact with the Regional Coordinator

Please estimate how many times in the past year you contacted your regional coordinator.

	Frequency	Percent
1	1	3.4
2	6	20.7
3	5	17.2
4	2	6.9
5	1	3.4
7	2	6.9
8	3	10.3
11	2	6.9
12	1	3.4
13	1	3.4
15	2	6.9
20	2	6.9
22	1	3.4

n = 29

Table D-19: Method of Contact with the Regional Coordinator

How did you contact your regional coordinator?

	Frequency	Percent
Phone	0	0.0
Email	16	55.2
Both Phone & Email	12	41.4
Other	1	3.4

n = 29

Table D-20: Timeliness of the Regional Coordinator

Overall, did the regional coordinator respond to you/your need in a timely manner?

	Frequency	Percent
Yes	29	100.0
No	0	0.0

n=29

Table D-21: Helpfulness of the Regional Coordinator

Overall, was your regional coordinator helpful in responding to your needs as a coach?

	Frequency	Percent
Yes, helpful	27	93.1
Somewhat helpful	1	3.4
No, not at all helpful	1	3.4

n=29

Table D-22: Coaches' Comments Regarding Regional Coordinators

- **[My RC]** was great.
- **[My RC]** was an awesome RC. **[My RC]** has great knowledge of math and CENTRA. **[My RC]** was always well prepared for meetings. You can tell **[My RC]** spends time researching and thinking of ways to assist the coaches.
- **[My RC]** was very much in tune to my needs and was very supportive in my goal to be an effective Math Coach.
- Great support system.
- I enjoyed working with **[My RC]**
- I feel that regional coordinators are vital. They are the glue that holds everything together. **[My RC]** was my regional coordinator and was very helpful. **[My RC]** led Centra meetings and has been a WONDERFUL resource. **[My RC]** has done an outstanding job.
- In an advisory role, they have been wonderful support in beginning a coaching program in mathematics at my school.
- It is nice to have their support and encouragement, especially during the first year when everything is new and we're learning.
- Mine was very supportive and nonjudgmental when conducting my observation and reflection.
- My RC was a great listener and always tried to help me solve the problems I was having. It really helped having **[My RC]** to help with this program.
- My regional coordinator did not attend any of the training sessions in which I participated. Of the regional coordinators that I trained with, I found them to be OUTSTANDING- Especially my Centra leader. I was disappointed that I was not assigned a regional coordinator that I had met in training.
- **[My RC]** was wonderful. I enjoyed working with **[My RC]** and hope to work with **[My RC]** again next year.
- Very willing to help.

Figure D-3: Contacting KCM

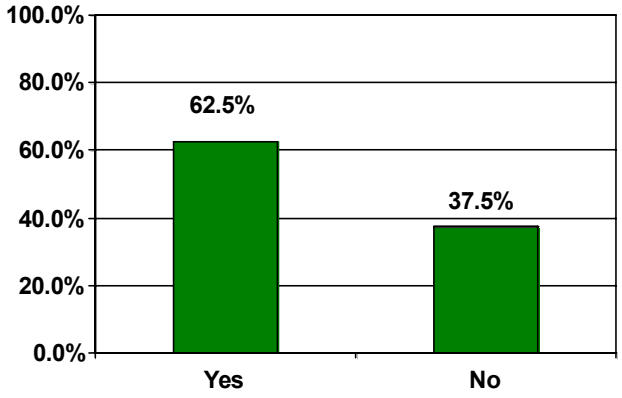


Table D-23: Frequency of Contact with KCM

Please estimate how many times in the past year you initiated contact with a staff person from KCM.

	Frequency	Percent
1	1	4.2
2	3	12.5
3	5	20.8
4	2	8.3
5	6	25.0
8	1	4.2
10	1	4.2
12	1	4.2
30	1	4.2
Many times	3	12.5

n = 24

Table D-24: Method of Contact with KCM

How did you contact the staff person at KCM?

	Frequency	Percent
Phone	0	0.0
Email	18	72.0
Both Phone & Email	7	28.0
Other	0	0.0

n = 25

Table D-25: Timeliness of KCM

Overall, did the staff person from KCM respond to you/your need in a timely manner?

	Frequency	Percent
Yes	25	100.0
No	0	0.0

n= 25

Table D-26: Helpfulness of KCM

Overall, was the staff person from KCM helpful in responding to your needs as a coach?

	Frequency	Percent
Yes, helpful	23	92.0
Somewhat helpful	2	8.0
No, not at all helpful	0	0.0

n= 25

Table D-27: Coaches' Comments Regarding the Staff at the KCM

- Again, everyone was so helpful and wonderful to work with.
- **[The KCM Staff Member]** is absolutely wonderful, so kind, patient, and responsive to our needs. **[The KCM Staff Member]** did a great job planning our PD. We were always treated with great respect.
- **[The KCM Staff Member]** is wonderful to work with and will be "XXXX". **[The KCM Staff Member]** always has such a positive attitude and follows up on questions very quickly.
- **[The KCM Staff Member]** was AMAZING. **[The KCM Staff Member]** is a wonderful leader and always made us feel that every question was important. **[The KCM Staff Member]** was always there for us if we needed **[The KCM Staff Member]**.
- **[The KCM Staff Member]** will be "XXXX"!
- I felt that **[The KCM Staff Member]** did an OUTSTANDING job at getting the coaching program off of the ground. **[The KCM Staff Member]** was very knowledgeable and instrumental in making the KCM a success. **[The KCM Staff Member]** was an EXTREMELY valuable part of the KCM team. **[The KCM Staff Member]** did an outstand job.
- **[The KCM Staff Member]** and **[The KCM Staff Member]** were both helpful. **[The KCM Staff Member]** has been a fantastic Leader for the Math Coaches.
- **[The KCM Staff Member]**, **[The KCM Staff Member]** and **[The KCM Staff Member]** have all done an exceptional job. They have gone above and beyond to ensure this year was a valuable learning experience for all. It is obvious they are dedicated to improving the mathematics programs in Kentucky.
- They are a great resource for most all of the questions I have inquired about! Thanks to all of them!
- They have always tried to assist me and respond in a timely manner with my questions, concerns, and needs for support.
- They were very helpful in answering any questions that I had. They always pointed me in the right direction and did so in a very timely manner.

Table D-28: Helpfulness of CENTRA Meetings

How helpful were CENTRA Meetings in assisting you with your coaching duties?

	Frequency	Percent
No, not at all helpful	3	7.5
Somewhat helpful	15	37.5
Yes, helpful	22	55.0

n= 40

Table D-29: Helpfulness of CENTRA Books and Topic Discussions

How helpful were the following CENTRA book readings and/or topic discussions?

	Yes, Helpful %	Somewhat Helpful %	No, Not at all Helpful %	Count
Motivation Strategies for the Classroom	55.0	15.0	7.5	40
Differentiation In Practice	57.5	15.0	5.0	40
Formative Assessment Strategies	57.5	15.0	5.0	40

Table D-30: If you did not attend one or more CENTRA meetings, please review the list below and select the reasons that most closely fit why you did not attend the meeting(s)?
(Multiple response question, n=26)

Reason	Frequency
Other school responsibilities	20
Server or internet issues internal to my school	16
Computer problems	8
Technical issues external to my school	5
Forgot	4
Other reason	4

Table D-31: Support that you received from your school or district

	Strongly Disagree %	Disagree %	Neutral %	Agree %	Strongly Agree %	Count
I receive the necessary support from my school district to implement the Mathematics Coaching Program in my school.	22.5	7.5	5.0	22.5	42.5	40
I am given time to properly prepare for my role as a coach.	17.5	15.0	2.5	27.5	37.5	40
I am given the proper amount of time to properly conduct my duties as a coach?	20.5	17.9	2.6	25.6	33.3	39
My school district supports my attendance at the Mentor/Coaching professional development sessions that occur throughout the year.	0.0	0.0	5.0	45.0	50.0	40
I am provided, by the school, proper space to conduct my duties as a mathematics coach in my school.	7.5	10.0	5.0	35.0	42.5	40
Other teachers in my school value the coaching program.	2.5	5.0	12.5	60.0	20.0	40
The coaching program, as implemented in my school, has improved the quality of mathematics teaching in my school.	2.5	2.5	15.0	55.0	25.0	40

Table D-32: Participation in Next Year's Mathematic Coaching Program

Are you participating in the mathematics coaching program next year?

	Frequency	Percent
Yes	29	72.5
No	11	27.5

n= 40

Table D-33: Reasons for Not Participating in the Coaching Program Next Year

- My school is closing and I am being reassigned to a classroom in another school.
- There was no money in our school budget to provide half-day release time. There WAS administrative support but no funds available.
- School will not fund.
- I am participating next year, but wanted to make a comment about g. above. I feel that the quality of mathematics teaching will improve more next year than this, because our team meetings will change from vertical team meetings to content team meetings.
- There was no money available in the budget for next year to pay for the half-time substitute necessary for me to participate in the coaching program.
- I'm not able to participate in the mathematics coaching program next year because I'm leaving my current school and transferring to another school in the district.
- I was a classroom teacher this year and it was very difficult to try and be a math coach and classroom teacher. I don't think anyone should do this. Math coach needs to be a full time position or a job performed by someone who is either has a few classes to teach or is an academic resource person. Classroom teachers can't give both their students and the job of Math coach the proper time and energy to make both successful.
- The principal stated that we did not have the funding to support a part time math coach.
- It is still under discussion with my principal.
- At this point, funding is not available to continue. However, my principal said that could change after July 1 and if all possible he would like to rehire me part-time to coach. Hopefully, that will happen. Teachers do not want to see me leave.
- NO funding available.
- The schedule does not allow time for coaching.

Appendix E: Program Theory – Kentucky Center for Mathematics

Program Theory: Kentucky Center for Mathematics

Context: Resources, Capacity, Influences and Relationships	*Implementation:* Quality and Quantity	*Outcomes:* Effectiveness, Magnitude and Satisfaction	*Intended Impact*

INPUTS	ACTIVITIES	OUTPUTS	SHORT-TERM OUTCOMES	INTERMEDIATE OUTCOMES	LONG-TERM OUTCOMES	IMPACT
Coaching Program			**(1 year out)**	**(3 years out)**	**(5 years out)**	
HUMAN RESOURCES • Executive Director • Director • Assistant Director • Graduate Students • Webmaster • Regional Coordinators • University Faculty Contacts FINANCIAL RESOURCES • Funds from KDE and CPE ORGANZATIONAL RESOURCES • NKU • KDE • CPE • CMA • Trainers	PROCESSES • Coordinate and implement training • Provide support to schools districts and personnel TOOLS • Curricular Literature (both pedagogical and content oriented) EVENTS • Provide PD for coaches o Year 1 Coaches – 5 days of Math Solutions; 8 days of Cognitive Coaching℠ o Year 2 Coaches – 2 days of Coaching	TYPES OF SERVICES OR PRODUCTS DELIVERED • Trained coaches • Training resources • EILA credit for administrators • Research and evaluation conclusions LEVELS OF SERVICES OR PRODUCTS DELIVERED • Amount of training • 78 coaches trained LEVELS OF PARTICIPATION IN PROGRAM ACTIVITIES • 95% of coaches attend all training sessions	CHANGES IN ATTITUDES AND BEHAVIORS • Mathematics teachers working together in schools • More positive attitudes and beliefs among mathematics teachers CHANGES IN KNOWLEDGE AND SKILLS: COACH • Increase in coaching skills • Increase in mathematical and pedagogical content knowledge	• Increased positive work outlook for teachers • Students express a more positive attitude toward mathematics • Continued increases in coaching skills • Continued increases in mathematical and pedagogical content knowledge	• Increased retention of KY mathematics teachers	INTENDED CHANGES AT ORGANIZATION, COMMUNITY, OR SYSTEM LEVEL • Increased student achievement in mathematics at all grades

<table>
<tr><th>INPUTS</th><th>ACTIVITIES</th><th>OUTPUTS</th><th>SHORT-TERM OUTCOMES</th><th>INTERMEDIATE OUTCOMES</th><th>LONG-TERM OUTCOMES</th><th>IMPACT</th></tr>
<tr>
<td rowspan="4">COMMUNITY RESOURCES
• KY K-12 schools

TECHNOLOGICAL RESOURCES
• Website
o Server
• Centra</td>
<td rowspan="4">Classroom Management;

5 days of Cognitive Coaching
2 days of Edvantia

• Provide PD for Administrators
o Overview of coaching program and related services
o 1 day of Cognitive Coaching

• Centra Meetings
o Weekly 1 hour meeting
o Book studies
o Problem solving
o Resource Sharing
• Attend conferences
o KTLC
o KCTM

ACTIONS
• Attend CMA meetings
• Facilitate Centra</td>
<td rowspan="4">• 95% of coaches participate in evaluation activities

• 95% of coaches attend KTLC and KCTM conferences
• 95% of coaches participate in Centra meetings

DIRECT RESULTS OF PROGRAM ACTIVITIES
• Increased number of active coaches in state, districts and schools</td>
<td colspan="3">CHANGES IN KNOWLEDGE AND SKILLS: COACHEE</td>
<td rowspan="4"></td>
</tr>
<tr>
<td>• Increase in pedagogical content knowledge</td>
<td>• Increase in mathematical and pedagogical content knowledge</td>
<td></td>
</tr>
<tr>
<td colspan="3">CHANGES IN KNOWLEDGE AND SKILLS: STUDENTS</td>
</tr>
<tr>
<td></td>
<td>• Increase student knowledge as measured by classroom achievement</td>
<td>• Increased student achievement on KY Core Content Tests</td>
</tr>
</table>

INPUTS	ACTIVITIES	OUTPUTS	SHORT-TERM OUTCOMES	INTERMEDIATE OUTCOMES	LONG-TERM OUTCOMES	IMPACT
	Meetings • Publicize and promote KCM o Present at conferences o Update the website • Seek additional funding sources TECHNOLOGY • Collect data online (surveys, applications, assessments, visit-summaries) • Create and maintain databases • Develop and expand online resources		CHANGES IN STATUS OR LEVEL OF FUNCTIONING • School administrators continue coaching program within their schools • Coaches sharing teaching knowledge with other teachers	• More schools train coaches • Coaches sharing coaching knowledge with teachers and administrators and the professional community	• Increased numbers of highly qualified teachers in mathematics across the state • School administrators continue coaching program within their schools after coaches are fully trained. • Certified coaches	
Diagnostic Intervention Program			**(1 year out)**	**(2 years out)**	**(3 years out)**	
HUMAN RESOURCES • Executive Director • Director • Assistant Director • Graduate Students • Webmaster • Regional Coordinators	PROCESSES • Coordinate and implement training • Provide support to schools districts and personnel TOOLS • Curricular Literature (both	TYPES OF SERVICES OR PRODUCTS DELIVERED • Trained MITs • Training resources • Research and evaluation conclusions LEVELS OF	CHANGES IN ATTITUDES AND BEHAVIORS • MITs exhibit more positive attitudes and sound beliefs regarding mathematics and the teaching/ learning of mathematics	CHANGES IN ATTITUDES AND BEHAVIORS • MITs continue to exhibit positive attitudes and sound beliefs regarding mathematics and the teaching/ learning of mathematics	CHANGES IN ATTITUDES AND BEHAVIORS • MITs continue to exhibit positive attitudes and sound beliefs regarding mathematics and the teaching/ learning of mathematics	INTENDED CHANGES AT ORGANIZATION, COMMUNITY, OR SYSTEM LEVEL • Increased student achievement in mathematics

INPUTS	ACTIVITIES	OUTPUTS	SHORT-TERM OUTCOMES	INTERMEDIATE OUTCOMES	LONG-TERM OUTCOMES	IMPACT
• University Faculty Contacts FINANCIAL RESOURCES • Funds from KDE and CPE ORGANZATIONAL RESOURCES • NKU • KDE • CPE • CMA • Trainers COMMUNITY RESOURCES • KY K-12 schools TECHNOLOGICAL RESOURCES • Website o Server Centra	pedagogical and content oriented) • Intervention program materials EVENTS • Provide PD for MITs o LIST DETAILS • Centra Meetings o LIST DETAILS • Attend conferences o LIST DETAILS ACTIONS • Attend CMA meetings • Facilitate Centra Meetings • Publicize and promote KCM o Present at conferences o Update the website • Seek additional funding sources TECHNOLOGY • Collect data online (surveys, applications, assessments, visit-summaries)	SERVICES OR PRODUCTS DELIVERED • Amount of training • # MITs trained LEVELS OF PARTICIPATION IN PROGRAM ACTIVITIES • 100% of MITs attend all training sessions • 100% of MITs participate in evaluation activities • 100% of MITs attend KTLC and KCTM conferences • 100% of MITs participate in Centra meetings DIRECT RESULTS OF PROGRAM ACTIVITIES • Number of active MITs in state	• MIT's implement more effective teaching strategies • Intervention students express a more positive attitude toward mathematics CHANGES IN KNOWLEDGE AND SKILLS: MIT • Increase in mathematical and pedagogical content knowledge CHANGES IN KNOWLEDGE AND SKILLS: STUDENT • Increase in mathematical content knowledge CHANGES IN STATUS OR LEVEL OF FUNCTIONING • School administrators support the MITs • MITs sharing experiences and knowledge within school	• MIT's continue to implement more effective teaching strategies • Intervention students continue to express a more positive attitude toward mathematics CHANGES IN KNOWLEDGE AND SKILLS: MIT • Continue to increase mathematical and pedagogical content knowledge CHANGES IN STATUS OR LEVEL OF FUNCTIONING • School administrators continue, or expand, the MIT program within their schools • MITs sharing experiences and knowledge with others inside their school • Students continue to perform at grade	• MIT's continue to implement more effective teaching strategies • Intervention students continue to express a more positive attitude toward mathematics CHANGES IN KNOWLEDGE AND SKILLS: MIT • Continue to increase mathematical and pedagogical content knowledge CHANGES IN STATUS OR LEVEL OF FUNCTIONING • School administrators continue, or expand, the MIT program within their schools with or without direct funding • Other schools request intervention training • MITs sharing experiences and knowledge with	

INPUTS	ACTIVITIES	OUTPUTS	SHORT-TERM OUTCOMES	INTERMEDIATE OUTCOMES	LONG-TERM OUTCOMES	IMPACT
	• Create and maintain databases • Develop and expand online resources			level	others inside and outside their school • Fewer students need intervention • KY personnel lead MIT training	
Additional KCM Activities						
HUMAN RESOURCES • Executive Director • Directors • Assistant Directors • Graduate Students • Webmaster • Post-Secondary Faculty • Regional Coordinators FINANCIAL RESOURCES • Funds from KDE and CPE ORGANZATIONAL RESOURCES • Post-Secondary Institutions • KDE • CPE • CMA	• Conduct research related to improved mathematics teaching and learning • Identify needs and plan for KCM expansion • Publicize and promote KCM activities • Seek additional funds • Identify and provide additional resources for p-16 and adult educators • Foster and facilitate collaboration among all stakeholders in the mathematics education community	• Reports and presentations • New programs and expansion of existing programs • Number of contacts • Print and online resources • Partnerships	• Increased awareness of and participation in KCM programs	• Extend the existing knowledge base related to the teaching and learning of mathematics • Improvement of mathematics teaching and learning in KY	• Further extend the existing knowledge base related to the teaching and learning of mathematics • Continued Improvement of mathematics teaching and learning in KY	INTENDED CHANGES AT ORGANIZATION, COMMUNITY, OR SYSTEM LEVEL • Increased student achievement in mathematics at all grades

INPUTS	ACTIVITIES	OUTPUTS	SHORT-TERM OUTCOMES	INTERMEDIATE OUTCOMES	LONG-TERM OUTCOMES	IMPACT
TECHNOLOGICAL RESOURCES • Website o Server						

Appendix F: Planned Year 2 Evaluation Activities

PLANNED YEAR 2 EVALUATION ACTIVITIES
MIT PROGRAM – July 1, 2007 through June 30, 2008

Note: Additional emphasis on collecting data to help select case studies for year 3.

1. **How are teachers implementing the program within schools and classrooms? These are day-to-day activities of the MITs and what support do they have and need.**
2. **Are teachers implementing these programs as intended?**
3. **For administrators, why did they apply for the program, what is their satisfaction level with the program, why, and what additional resources are needed?**
4. **For parents, what do they know about the programs and how has it helped their child?**

** Denotes activities that would clarify evaluation findings, yield valuable information, or improve measures for future years, but that will not be central to the year 2 evaluation plan.

EVALUATION ACTIVITY
• Year One Data Analysis, Updates, and Summary Report 2007
• Unanticipated activities related to Year 1 Summary Report due December 2007 o Analysis of Year 1 implementation data provided by SRA (30 hours)
• Planning, IRB, Meetings & Administrative Tasks o Includes the creation of a KCM Logic Model
• Review, work with KDE to revise KDE mid-year report and end-of-year report (negotiable), Analyses of each report to determine local implementation and effects on teachers and students within the building, as reported to KDE.
• Administer LMT test and Math Beliefs survey electronically. Monitor responses, give results to MIT's, merge and clean, and analyze data.
• Review, identify, and pilot perspective Math Beliefs survey that is more geared toward experienced math teachers**
• Work with Terry H. to conduct IRT study to make reductions in the number of questions on the LMT test** o KCM will recruit a total of 20 teachers to take both forms of the elementary and 20 teachers to take both forms of the middle/high test. o ESC will administer the test, data entry, clean the data file, and give it to Terry for analysis.

EVALUATION ACTIVITY
• Conduct 4 focus groups during training sessions (2 in winter and 2 in spring). Includes travel, creation of question protocol for Yr 1 & 2 MIT's, preparation, discussion indexing, and analyses.
• Restructure survey and analyze "overall evaluations" for Cohort 1 in their second year -- to be administered three times. o September and January surveys will be hard copy. Includes revision of questions, data entry, cleaning, and analysis. o May survey will be electronic. Includes revision of questions, cleaning, and analysis.
• Revise links, adjust surveys, and analyze existing "overall evaluations" to Cohort 2 after training events. Some of these surveys are hard copy and some are electronic. All files will need to be merged prior to final analysis.
• Merge data files/Clean data files/Analyze Terra Nova data for all intervention students o Pre-post for returning students o Pre-post for new students o Post only for previous students no longer in the intervention from years one and two o Because we are tracking over time as well as looking at scores for each year, multiple datasets will need to be created and the analysis becomes more complex.
• Create, conduct and analyze telephone interviews among Administrators (40 completed)**
• Design and analyze a Parent "Post-Card Survey" that is sent home via the child and sent directly to UCESC**
• Compile basic demographics for each school district involved in the program
• Summary Reports 2008 o Interim summary of results completed in January 2008 and September 2008 for Project team review and presentations to funding sources and CMA o Final summary of results and explanation of methodology in December 2008

** Denotes activities that would clarify evaluation findings, yield valuable information, or improve measures for future years, but that will not be central to the year 2 evaluation plan.

PLANNED YEAR 2 EVALUATION ACTIVITIES
COACHING PROGRAM - July 1, 2007 through June 30, 2008

Note: Additional emphasis on collection data to help select case studies for year 3.

1. **What are coaches doing on a day-to-day basis?**
2. **Explore the quality of coaching activities conducted. How closely are coaches implementing Cognitive Coaching? Are coaches using other research-based practices?**
3. **Explore the year one result that the coaches do not have enough resources. What resources do they need and can be given?**
4. **How do coaches view the program? What are the benefits from their perspective?**
5. **For administrators, why did they apply for the program, what is their satisfaction level with the program, why, and what additional resources are needed?**
6. **What differences are there in student achievement data (as required by KDE) for schools with coaches versus comparable schools?**

ACTIVITY
• Year One Data Analysis, Updates, and Summary Report 2007
• Planning, IRB, Meetings & Administrative Tasks
• Administer LMT test and Math Beliefs survey electronically to Coaches and Coachees. Monitor responses, give results to Coaches and Coachees, Merge and clean, and analyze data.
• Participate in a pilot program to determine quality of coaching o Just an estimate and can be adjusted, as needed.
• Restructure survey, administer and analyze "overall evaluations" for Cohort 1 in their second year, to be administered four times. o Summer, fall, and January surveys will be hard copy. Includes revision of questions, data entry, cleaning, and analysis. o May survey will be electronic. Includes revision of questions, cleaning, and analysis.
• Revise links, adjust surveys, and analyze existing "overall evaluations" to Cohort 2 after training events. Some of these surveys are hard copy and some are electronic. All files will need to be merged prior to final analysis. We are assuming 4 surveys (summer, fall, January, and May)
• Design, administer and analyze a new Coaches survey to get implementation data in February. This survey will be administered electronically.

ACTIVITY
• Conduct 5 focus groups among coaches during training sessions (1 in summer, 2 in winter and 2 in spring) o Creation of question protocols (for Yr 1 & 2 coaches), preparation, discussion indexing, and analyses.
• Create, conduct and analyze telephone interviews among Administrators (40 completed)
• Design, administer and analyze a new Coachees survey at the end of the school year. This survey will be distributed electronically. o Because we are potentially dealing with a large number of respondents, this cost may need to be adjusted depending on the number of open-ended questions that will need to be analyzed.
• Collect and begin basic analysis of student achievement data (from KDE website) for schools with coaches and comparable schools.
• Work with KDE and other researchers to determine how to analyze the different student achievement data that Kentucky collects over time.
• Summary Reports o Interim summary of results completed in January 2008 and September 2008 for Project team review and presentations to funding sources and CMA o Final summary of results and explanation of methodology in December 2008