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School Reform through a School/University Partnership

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This is a study of a reform effort to improve mathematics achievement in an elementary school through a partnership with a university. The partnership involved collaborating with university faculty to provide and plan research based professional development. The purposes of the study were to determine if the instructional practices of the teachers changed, if the delivery of staff development changed, and if student achievement improved over a six year period. The research methods used to answer these questions were both qualitative and quantitative. The qualitative methods utilized were: interviews, pre and post classroom observations, and observations of grade level meetings. The quantitative components were the pre and post administration of the "Missouri Teacher Survey of Classroom Practices: Mathematics" and the analysis of test scores on the statewide assessment from 1999-2004. The results indicated some change in instructional practices, significant increases in staff development and collaboration, and increased student achievement in mathematics.

This study investigated the results of a five year elementary school/university partnership in an effort to improve the teaching and learning of mathematics in the elementary school. The intent was to contribute to the understanding of the extent to which school/university partnerships can meet the professional development needs of schools as they strive to meet the requirements of state and federal accountability standards. This study was directed by two definite trends in the literature: (a) The school reform literature of the last several decades has advocated for expansion and redesign of professional development for teachers and school leaders (Collinson & Ono, 2001; Darling-Hammond & McLaughlin, 1995; Fullan, 2001; McLaughlin & Marsh, 1978; Parker & Golden, 1957; Showers, Joyce, & Bennett, 1987; and Sparks & Hirsh, 1997); and (b) The suggestion by many that a redesign of professional development should be some form of partnership between schools and university teacher education departments (Center for Educational Renewal, 1994; Sealey & Robson, 1997).

Peel, Peel, and Baker (2002) also stress the importance of partnerships where schools and universities work together in a collaborative environment, with shared leadership, common vision, support of top leaders, respect and trust, open communication, flexibility, and adequate financial support. Additionally, Essex (2001) cautions that "school-college partnerships hold significant promise for renewal and improvement in education but must be vigorously supported and advanced by top leadership at public school and college levels" (p. 736). The partnership in this study was supported by the university department chairs, the superintendent, and principal of the school. The goals, vision, and activities were collaboratively planned by stakeholders from both the university and the school.

The Professional Development School (PDS) is one model of a school/university partnership. Although this study does not include a PDS, there was an attempt to include key components of the PDS model. Research on PDSs has concluded that effective communication networks that foster collaboration, honesty, and empowerment are vital to effective partnerships. "Educational partnerships that were well received and successful involved real empowerment, collaboration, and trust by all stakeholders, as well as shared power by the leadership" (Peel, et al., p. 320).

The partnership between an elementary school and university in this study was an effort to bring about school reform that would result in improved math performance through staff development. The intent was to improve the instructional practices of teachers and school leaders through research based instructional methods, improve the delivery of staff development as reflected in the research, and improve student achievement in math.

Literature Review

"For many years the dichotomy between the ivory tower of the university and the trenches of the public school have been both an ideological perception and a reality" (Rakow &Robinson, 1997, p. 64). The whole issue of school improvement has focused a great deal of attention on the renewal of both K-12 education and higher education's role in the training of educators. According to Goodlad (1994), school-college partnerships offer significant promise for simultaneous educational renewal. In an attempt to eliminate the barriers between teacher preparation programs and the continuing education of practicing teachers as well as to bring about renewal, there have been many forms of school-college partnerships emerge with varying degrees of success (Essex , 2001). However, if partnerships between higher education and public schools are to be successful they must follow certain tenets that a variety of writers and researcher have identified as necessary for successful partnerships. These characteristics are as follows: (a) Clearly defined purpose and direction; (b) supported both with active participation and adequate resources by top leaders in schools and colleges; (c) trust among partners; (d) open communication; (e) mutual respect among partners; (f) mechanisms to assess progress and measure outcomes; (g) true collaboration; and (h) school-wide representation at the beginning (Essex, 2001; Peel, Peel, & Baker, 2002; Rakow & Robinson, 1997).

Since many of the school/university partnerships are designed for school improvement/ renewal, most of them have a significant professional development component. Much of the reform literature advocates for the expansion and redesign of professional development for teachers and school leaders (Collinson & Ono, 2001; Darling-Hammond & McLaughlin, 1995; Fullan, 2001; McLaughlin & Marsh, 1978; Showers, Joyce, & Bennett, 1987; and Sparks & Hirsh, 1997). This redesign has been described by many researchers to have key components such as: (a) significant collaboration; (b) job embedded; (c) extend over long periods of time; and (d) significant involvement of school leadership (Sparks & Hirsh, 1997). Unfortunately, it is one thing to identify components and another to act on them.

Lieberman (1995) stated:

In the traditional view of staff development, workshops and conferences conducted outside the school count, but authentic opportunities to learn from and with colleagues inside the school do not. The conventional view of staff development as a transferable package of knowledge to be distributed to teachers in bite-sized pieces needs radical rethinking (p. 591).

Unfortunately, much of what teachers are exposed to continues to be one-shot or one-day workshops with no support and no follow-up (Lewis, 1995). Fullan (2001) states that "over 20 years ago I conducted a review of inservice, as it was then called, and concluded that one-shot workshops were ineffective, topics were selected by people other than those receiving the inservice, and follow-up support for implementation was rare" (p. 255). Dufour and Eaker (1998) indicate that many schools take pride in offering a large variety of staff training. They quote one principal as proudly announcing, "This year we trained all our staff in the Seven Habits of Highly Effective People, assertive discipline, cooperative learning, portfolio assessment, and integrating technology into the classroom" (p. 266). This unthinking and unconnected presentation of multiple innovations with little or no attention being paid to the existing research on educational change, at best, perpetuates mediocrity over mastery. Interestingly, in discussion with many of those responsible for initiating and supporting change, it is clear they understand this dilemma; they simply fail to act on it.

The mastery of any new methodology takes time and a commitment must be met for continued training. Sparks and Hirsh (1997) wrote, "Staff development's success will be judged not by how many teachers and administrators participate in staff development programs or how they perceive its value, but by whether it alters instructional behavior in a way that benefits students" (p. 5).

The National Staff Development Council (NSDC), in cooperation with eleven other educational organizations, has identified standards

for professional development. These standards are organized into three categories; content, process, and context **.** The NSDC recognizes that successful staff development pushes for the intersection of these three categories. It pushes beyond content to include the actual skills or knowledge that educators need to acquire for the content to come alive; the process or means by which educators will acquire the knowledge and skills; and the organization, system, or cultural context that supports staff development initiatives (National Staff Development Council, 1995). Fullan (2001) argues that change involves the incorporation of three areas: curriculum, process, and beliefs. Over time, change in all three must occur if the innovation is to be considered successful.

Purpose of Study

The purpose of this study was to investigate the results of a five year professional development partnership between Southeast Missouri State University and a rural elementary school in southeast Missouri with a primary emphasis on improving mathematics achievement. The purpose was three fold:

1. To determine if the instructional practices of the teachers changed since the beginning of the project in 1998.
2. To determine if the delivery of staff development changed in the school since the beginning of the project in 1998.
3. To determine if mathematics achievement on the MAP improved since the beginning of the project in 1998.

At the beginning of this project, the elementary school had an enrollment of approximately 450 students in grades kindergarten through five and was not performing well on the Missouri Assessment Program (MAP), with student achievement being particularly poor in math. The MAP is a statewide test used in the accreditation process by the state of Missouri and is comprised of three types of items: multiple-choice, constructed response, and performance events. The organizations within the University that were directly involved in the grant funded project were the Regional Professional Development Center within the College of Education and the Linda Godwin Center for Science and Math Education in the College of Math and Science. The two organizations formed a team known as the Improving Mathematics In Missouri (IM) 2 Success Team. This team was composed of faculty from the College of Education , the College of Math and Science, and some highly successful public school teachers from area schools.

The goal of the project was to assist the school in the improvement of mathematics achievement. This was proposed to be accomplished through significant collaborative planning with the teaching staff, high quality job-imbedded professional development that becomes a part of the school culture, and a high level of involvement from the school leadership (the building principal).

The Success Team initially met with the staff and leadership of the school in the fall of 1998 and a District Action Team was formed. The Success Team worked with the District Action Team to identify school needs and target focused areas through the development of an action plan for the district. The Success Team visited the school in the fall of 1998 for classroom observations and informal discussions with teachers and administrators regarding district mathematics education practices. The results of the MAP testing were also reviewed. During the same semester teachers completed a revised form of the *Missouri Teacher Survey of Classroom Practices: Mathematics*, developed by the Center for Learning, Evaluation, and Assessment Research (CLEAR) at the University of Missouri – Columbia in conjunction with math educators from Missouri and other states. The survey was designed to help teachers and schools improve curriculum and support math education.

After reviewing the results of classroom observations, discussions with teachers and administrators, responses on the Survey, and MAP data, the Success Team helped the District Action Team identify possible activities for the next phase of the project. This collaborative planning resulted in offering staff development activities that focused on analysis of MAP data and needs of the school. These staff development activities were conducted throughout the 1998-1999 school year. A second round of classroom observations and informal discussions with teachers and administrators was conducted in the spring of 1999. Discussions were conducted with representatives of the District Action Team during the fall of 1999 and additional staff development activities including family involvement, teacher collaboration, examination of the curriculum, use of hands-on materials and math journals, and writing performance tasks were planned and conducted. During the spring of 2000 the focus shifted to math textbook adoption during which the Success Team facilitated the organization and process for selection of a new math textbook series.

Some Success Team staff development activities continued during the 2000-2001 and 2001-2002 school years even though the administration and faculty of the elementary school chose to focus on reading. In addition to the activities offered at the school, some teachers from the school participated in the summer math academies offered by Southeast Missouri State . Throughout the planning of the staff

development activities, the Success Team made a determined effort to incorporate the latest research on effective staff development.

Research Design and Studies

The research design selected for this study was a mixed-methodology design, both qualitative and quantitative (Creswell, 1994). This design was chosen because we were examining research questions that required different research methodology. The use of both methods in this study is intended to have several additional purposes: "triangulating and converging findings, elaborating on results, using one method to inform another, discovering paradox or contradiction, and extending the breadth of the inquiry" (Greene, Caracelli, & Graham as cited in Creswell, 1994).

Qualitative

The qualitative components of this study included interviews of teachers and administrators, classroom observations, and observations of grade level meetings. Those interviewed were selected by purposeful snowball sampling beginning with the initial information-rich cases being suggested by the assistant principal and others being suggested by those being interviewed (Patton, 1990). The sampling of people to interview was terminated based on redundancy of information (Lincoln & Guba, 1985). Several grade level meeting observations were conducted to triangulate with the interview data.

Standardized open-ended interviews were used as the dominant strategy to gather data in the teachers' and administrators' own words. This interview technique was chosen to "minimize interviewer effects by asking the same questions of each respondent" (Patton, 1990, p. 285). At the beginning of each interview, the participant was informed of the purpose for the interview and assurances were made that the content of the interview would be treated confidentially (Bogdan & Biklen, 1998). Interviews ranged from 30 to 40 minutes and responses were scripted by the interviewer. Shortly after the interview, the interviewer's notes were transcribed. The interviews were conducted in the building where the teachers and administrators worked and included 19 elementary teachers, the building principal.

Data were analyzed using Tesch's eight steps to consider when coding (as cited in Creswell, 1994). In addition, the research questions helped to define the coding categories. All of the transcriptions were read thoroughly to get a sense of the complete picture. Some ideas were recorded during this initial reading. One transcript was then read and notes were made about possible themes. When this was completed the key words and phrases from the initial reading were examined to determine if there were clusters of themes and trends. Nine clusters were identified and each cluster was assigned a number code. At that point, each transcript was read in detail and number codes were assigned to statements in the interview transcripts. The data belonging to each category were listed on a single list for each category and the lists were examined. Additional clusters were identified within each category and the findings are discussed in a later section of this paper. Notes about classroom and grade level meeting observations were also coded during the analysis process.

Quantitative

The quantitative components of this study are the pre and post administration of the *Missouri Teacher Survey of Classroom Practices: Mathematics* and the analysis of MAP scores from 1999 through 2004. This was accomplished by comparing the classroom practices of teachers in 1999 to those in 2002 as measured by the *Survey* and examining trends in the MAP scores over a six year period.

Presentation of the Data

The data analysis includes the data gathered from interviews, classroom observations, surveys, and examination of Missouri Assessment Program (MAP) test data and is organized below based on the three research questions.

Changes in Instructional Practices

The first research question dealt with whether or not the instructional practices of the teachers changed since the beginning of the (IM) 2 project in 1998. The interviews indicated the teachers are still using worksheets and tests to determine grades in math. One teacher commented, "I would like to think I am going to switch away from worksheets." However, some did mention they were beginning to use more performance assessments and a few even commented they were beginning to experiment with portfolios, particularly in grades 1 and 2. Most of the teachers interviewed said they were using more cooperative learning activities, on the average of 1-2 times per week. The assignment of homework varied from never to 3 or 4 times a week. Generally the earlier grades did less homework. Most teachers said they do not use computers in teaching math. However, they did indicate considerable use of the overhead projector. They only had one computer lab in the building and one computer in each classroom. Therefore, the computers were not very accessible. When asked about integrating math into other content areas, the teachers indicated they do considerable integration with reading, science, and social studies.

The teachers indicated their colleagues were very supportive of new ideas for teaching math. A lot of this was accomplished through weekly grade level

meetings that were lead by the assistant principal. The weekly grade level meetings started during the Success Team work were still being held. The principal now prepares the class schedule to allow for common planning time and therefore opportunities to schedule these grade level meetings. Teachers commented on these meetings and how they provided an opportunity to share information with other teachers. They were seen to be very productive and helped reduce the isolation many of the teachers felt before this project began. The teachers also indicated good support from the administration, both the principal and the assistant principal.

The principal tended to agree with most of the interview data from the teachers. He stated that the teachers were using a lot more variety of teaching strategies than before and were using a lot of cooperative learning, but not as much as he would like. He agreed there is some integration of math into other content areas and believes there needs to be more. He also believes the teachers have more opportunities to learn than some of the other schools in the area. "They have a lot of inservice." He stated the MAP and the textbook have the most influence on the math content being taught in the classrooms. He believed the jury was still out on the new textbook. "Teachers really liked the previous book." He stated, "Teachers are definitely more collaborative. (IM) 2 began the collaboration and it has been enhanced with the grade level meetings."

It is important to note that the assistant principal was a third grade teacher prior to 2001-2002, when she became the assistant principal. Therefore, she was in the classroom when the (IM) 2 partnership began. As assistant principal, one of her major responsibilities is to prepare the agenda and meet with the grade level teams. During her interview it was clear that she believed the teachers and the administration were both very supportive of trying new ideas in the classroom. She said they had a lot of staff development in their school and believed the textbook had the most influence on math content. She also agreed there was definitely more collaboration among teachers than before the project began.

One of the authors of this study was a member of the original Success Team and conducted the classroom observations in 1998, 1999 and again in 2002. The teaching observed in 2002 contrasted with the teaching observed in 1998 and 1999 where in some classes the teacher read through the script provided with the book while the students listened and then worked on the assignment. Although direct instruction was observed in 2002, there was a change in the direction of more interaction over previous observations when the previous math series was being used. It should be noted that during observations on each date there were some teachers who used a format of active engagement and exploration that required the students to solve problems and go beyond their beginning level of understanding. The 2002 observations revealed that the more engaging teaching strategies had increased substantially.

In the view of the observer there had been a transition in the way lessons were conducted and the new book was providing a foundation for these changes. Although many teachers were comfortable with the script of the previous series and some would like to return to that format, they are moving away from the scripted format to one based on student understanding and increased student interactions. Many were uncertain about what choices of activities were best to improve student understanding, but as they moved away from a scripted lesson and tried new ideas, it was anticipated they would become more confident in the effectiveness of their teaching.

The data from the *Missouri Student Survey of Classroom Practices: Mathematics* were examined to identify differences between the teacher responses in 1998 and those in 2002. Teachers responded to this survey by ranking each item on a Likert scale of one to five. The percent of teachers responding to the survey questions with strong agreement (score of 4 or 5) was compared. The comparisons are reported when changes from 1998 to 2002 were greater than 10 %.

Table 1

Relative Importance of Different Factors in Determining Math Grades

	1998 N=16	2002 N=21
	Percent of teachers selecting 4 or 5 on the Likert Scale	
Performance Tasks	80%	91%
Portfolio	36%	48%
Individual Seatwork	73%	48%
Objective tests	43%	57%
Worksheets	33%	62%

The first area reported is that of the Relative Importance of Different Factors in Determining Math Grades (Table 1). The data revealed several important shifts. Three shifts that are considered to be more desirable changes in instructional practices were that a higher percentage of teachers indicated performance tasks and portfolios were more

important in determining math grades and fewer teachers selected individual seatwork in 2002. However, two items that are considered less desirable changes were the increased use of objective tests and worksheets. The increased importance of performance tasks may have been influenced by the new textbook that contains suggestions for these tasks, thereby making them easier to incorporate. It is possible that the decrease in seatwork may reflect a more active environment; however, the increase in the importance of worksheets is not necessarily consistent with this change.

Table 2

Instructional Activities in Math

	1998 N=16	2002 N=21
	Percent of teachers selecting 4 or 5 on the Likert Scale	
Reading about math from textbook	27%	70%
Using portfolios for assessment	7%	19%
Reaching conclusions about math data	73%	43%
Making tables, graphs, or charts	60%	38%
Applying math concepts to everyday life	87%	76%
Seatwork on weekly basis	73%	91%

Table 2 indicates that in the area of Instructional Activities in Math there was an increase in the frequency of reading about math from a textbook, and using portfolios for assessment purposes. However, among the teachers who reported the frequency to be once a week or more, there were several decreases including: (a) reaching conclusions about math data; (b) making tables, graphs, or charts; and (c) applying math concepts to everyday life. Additionally, there was an increase in the number of teachers reporting students doing individual seatwork on at least a weekly basis. The changes in reading from the math book are probably explained by the change in textbook. The new textbook series has more material for students to read and therefore this increase is understandable. The increase in use of portfolios was only by some of the K-2 teachers who reported during the interviews that they were using portfolios as a means of assessment. It is possible that the decrease in the use of math data to reach conclusions as well as applying math concepts to everyday life was a consequence of the teachers' lack of familiarity with the new textbook. If this is the case, it would be expected they will be better able to make these connections as they become more familiar with the book. Part II of the survey examined teacher attitude toward instructional style. To aid in the interpretation of the data we have divided the statements into four groups: student centered classroom (Table 3), teacher centered classroom (Table 4), statements about assessment (Table 5), and a statement about technology. In the area of student centered classroom (Table 3), there are four positive changes of more than 10 percentage points. These include statements supporting imbedding subject matter in authentic experiences, the use of cooperative learning, student responsibility for learning, and preparation time and hands-on activities. All of these changes reflect a shift toward a more student centered environment. In contrast, it must also be noted that three statements received responses indicating less support than previously. These include the: encouragement of novel solutions, students creating their own learning strategies, and the use of projects and centers for instruction. These responses reflect a shift away from student centered learning.

Table 3

Teacher Attitude Toward Instructional Style: Student Centered Classroom

	1998 N=16	2002 N=21
	Percent of teachers selecting 4 or 5 on the Likert Scale	
Imbedding subject matter in authentic experiences	60%	79%
Use of Cooperative Learning	47%	62%
Student Responsibility for Learning	33%	48%
Preparation Time & Hands-on Activities	13%	48%
Encouragement of Novel Solutions	87%	74%
Students Creating Own Learning Strategies	53%	38%
Use of Projects and Centers for Instruction	53%	38%

Six responses of the Survey identified as "Teacher centered" received a lower percent of teacher support in 2002 than in 1998 (Table 4). This may be interpreted as a decrease in teacher centered instruction. The statements in this category include: teachers should impart knowledge, students learning basic skills before participating in higher learning, teacher control of instruction, curriculum decisions, student progress, and the relationship between instruction and assessment. The decrease in agreement with these questions strongly supports a shift away from a teacher centered approach.

Table 4

Teacher Attitude toward Instructional Style: Teacher Centered Classroom

	1998 N=16	2002 N=21
	Percent of teachers selecting 4 or 5 on the Likert Scale	
Teacher Should Impart Knowledge	86%	62%
Students Learn Basic Skills before Higher Learning	80%	52%
Teacher Control of Instruction	57%	29%
Curriculum Decisions	47%	29%
Student Progress	47%	10%
Relationship between Instruction and Assessment	27%	5%

In the section on Assessment, the teachers' agreement increased on statements viewing assessment as more than a test for a grade (Table 5). Also, the percent in agreement declined on the value of a test. This section also reflects a positive change in the teachers' attitudes.

Table 5

Teacher Attitude toward Instructional Style: Assessment

	1998 N=16	2002 N=21
	Percent of teachers selecting 4 or 5 on the Likert Scale	
Assessment is more than a Test for a Grade	71%	86%
Value of a Test	27%	5%

The final section relates to technology. Unfortunately the teachers' response to the role of technology indicates a decreased level of support (73% in 1998, and 38% in 2002). However, the teachers' use of overhead projectors increased dramatically. In 1998 only 33% reported frequent use while 91% reported using them frequently in 2002. Overhead projectors were scarce in 1998, but have been purchased for all rooms since that time. This was supported through the observations that were made in 2002. However, the teachers are not making use of other forms of technology as reported in the survey and confirmed through the interviews. This is a result of having little or no other equipment available for their use.

Project Influence on Staff Development

The second research question sought to answer whether or not the delivery of staff development had changed since the beginning of the (IM) 2 project in 1998. An attempt was made by the Success Team to design staff development that was consistent with the latest research on effective staff development. The key components of effective staff development attempted by the Success Team were: (a) significant collaboration between staff members; (b) job embedded staff development; (c) staff development that extends over long periods of time; and (d) significant involvement of school leadership.

An example of the use of significant collaboration was the process used in the selection of the new math series by the District Action Team composed of faculty members and involving consultation with the entire faculty. This process required numerous meetings to organize the process. The entire faculty was involved in piloting materials and the final decision was made at a meeting of all faculty members. This level of decision making was new to the school and resulted in a feeling of ownership. One important indicator of improved collaboration was the teachers' response to an item on the Survey. In responding to the statement that most teachers in the school contribute actively in making decisions about the math curriculum, there was a dramatic change from 47% in 1998 to 71% in 2002. One of the more significant findings was that even though the faculty and administration decided, during the second year of the (IM) 2 program, they wanted to concentrate on literacy, elements of collaboration evident in the (IM) 2 work carried over into the balanced literacy project they began in 2000-2001. When asked if there was more collaboration among faculty members than before the project started, the answer was a resounding yes. They indicated the things that had stimulated this collaboration were the collaborative development of the math curriculum, their involvement in selecting the new textbook, and the weekly grade level meetings. They indicated they collaborated on such things as strategies for teaching, pace, sequence, and instructional materials. One teacher said, "The collaboration learned during the math project has carried over into the balanced literacy program." Another said, "I feel less isolated than four years ago."

Significant involvement of school leadership was evidenced by the employment of one of the third grade teachers to be an assistant principal with primary responsibilities in the area of student assessment, staff development, and the scheduling and facilitation of weekly grade level meetings. These meetings were scheduled during the school day as a result of common planning times scheduled by

the principal. Although teachers did not seem to consider the weekly meetings as staff development, they did consider these meetings important for the sharing of new instructional ideas and methods, planning for instruction, and discussions of student assessment. These weekly grade level meetings are evidence of staff development that extends over a long period of time.

The teachers indicated their colleagues were very supportive of new ideas for teaching math. A good deal of this was accomplished through the grade level meetings. They also indicated good support from the administration, both the principal and the assistant principal.Overall the teachers stated they have many opportunities for teacher learning. They cited the training they received in 1999 and 2000 through the (IM) 2 project and the balanced literacy training they were receiving in 2001-2002. Some said there was too much encouragement for teacher learning and one said there was not much. However, most teachers indicated there was the appropriate amount of support for teacher learning.

Student Achievement in Math

The third research question addressed the changes in student achievement as measured by the MAP. We examined MAP test data from the spring of 1999 through the spring of 2004 for Mathematics. The MAP tests are administered statewide in Missouri with Mathematics being administered in the fourth, eighth, and eleventh grades. There are five levels of performance: Step 1; Progressing; Nearing Proficient; Proficient; and Advanced. Step 1 is the lowest level and Advanced the highest. Table 6 indicates the percent of fourth grade students in each level for the six years since the (IM) 2 project began.

Table 6

Mathematics Achievement on the MAP

	1999	2000	2001	2002	2003	2004
Advanced	4	3	4	6	4	18
Proficient	24	14	19	27	24	56
Nearing Proficient	41	56	51	55	50	24
Progressing	25	25	25	10	21	1
Step 1	5	3	1	2	0	0

Limitations of Study

This study was restricted to a partnership between only one elementary school and a university, as such, the generalizability of the results can be questioned. However, Patton (1990) makes an argument for extrapolation rather than generalization. He defines extrapolation as "modest speculations on the likely applicability of findings to other situations under similar, but not identical conditions" (page 489).

Another limitation of this study is that one of the authors was involved in the project as a member of the team that carried out the partnership with the elementary school. Although their desire for the project to be successful could bias their interpretation of the data, a desire to discover information that would lead to improving future partnerships should mostly negate the influence of researcher bias.

A third limitation is that there are many variables affecting student achievement making it difficult to establish a cause and effect relationship between the partnership/staff development and any increase in math test scores.

Conclusions

There is considerable evidence in Tables 2 and 3 that teachers' attitudes moved away from a teacher centered attitude toward a more student centered attitude during the period 1998-2002. The pre and post survey of teachers also indicated considerable change in their attitudes about tests with a 15% increase in the number of teachers considering assessment as being more than a test for a grade and 22% fewer supporting the value of a test for assessment purposes only (Table 5). Overall there is a strong trend toward a classroom that is student centered and using multiple forms of assessment.

Two other prominent findings in the surveys and the interviews are that after working collaboratively to select a new textbook for math and re-writing the math curriculum as a part of the (IM) 2 project, the teachers increased substantially in their view that most teachers contribute actively to making decisions about the math curriculum, from 47% in 1998 to 71% in 2002.

During and immediately after this partnership project there was substantial improvement in the MAP test scores in mathematics. In addition to the improvement of test scores there was considerably greater emphasis on staff development and a change in the delivery of staff development. The staff development became more job-embedded through weekly grade level meetings and greater teacher involvement in needs assessment and curriculum decisions. As a result of the (IM) 2 Success Team work, the school made a significant commitment to teacher collaboration through the assignment of an assistant principal for the purpose of monitoring student assessment and facilitating weekly grade level meetings. Teachers indicated a substantial increase in the amount of collaboration since the beginning of the partnership. The principal

also modeled the emphasis on instruction by planning time in the schedule for grade level meetings and making it possible for faculty to participate in numerous staff development opportunities including summer institutes sponsored by the Regional Professional Development Center at Southeast Missouri State .

Findings from the data indicated that some of the more positive changes in teachers' instructional practices were: An increased use of performance assessments; experimenting with portfolios, especially in grades k-2; more cooperative learning activities; considerable integration of math into other subject areas; and more teaching based on student understanding and interaction rather than reading through a script to the class and having them do individual work at their seats. The data indicate that these changes can be attributed primarily to the selection of the new math textbook, increased collaboration, the increased amount and ongoing nature of staff development, support by the administration, and the weekly grade level meetings facilitated by the assistant principal.

This project makes a strong case for partnerships between institutions of higher education and K-12 institutions in the area of school improvement, not so much in the roll of an outside expert to tell them how, but rather as an outside facilitator to help create a culture of learning and collaboration. As stated earlier in this article the Success Team's goal was to assist the school in the improvement of mathematics achievement through high quality professional development, significant collaborative planning involving the teaching staff, and a high level of involvement from the school leadership. The results documented in this article provide significant evidence that: (a) The teachers increased their use of student centered instructional methods in their classrooms; (b) The school leadership made a significant commitment to ongoing staff development and collaboration with the teaching staff; and (c) Student achievement in math, as measured by the MAP, has improved substantially in the six years, since the beginning of the project.

Even though the scope of this partnership limits the ability to develop a cause and effect relationship between the activities of the partnership and the improved math achievement, one could argue that the activities of the members of the Success Team and the District Action Team were a catalyst for a new focus on student achievement and through this focus and the staff development provided contributed to the upward trend in mathematics achievement over the last six years. One could also reason for Patton's (1990) theory of extrapolation rather than generalization, "likely applicability of findings to other situations under similar, but not identical conditions" (page 489). There is certainly opportunity for further study of the impact of school-university partnerships and research based staff development on student achievement.

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