

Final Report

Cover Page

Project Title Connect 4 Math			
1. Three Rivers Community College			
2. Project Director	Dr. Mary Lou Brown		Chair, Division of Math, Science and Technology & Director, Teacher Education
	2080 Three Rivers Community College Poplar Bluff, MO 63901		573-840-9621
	E-mail Address		mlbrown@trcc.edu
	Signature		Date
3. Co-Director	Kevin Wheeler		Mathematics Faculty
	2080 Three Rivers Community College Poplar Bluff, MO 63901		573-840-9629
	E-mail Address		kwheeler@trcc.edu
	Signature		Date
Education Division	Three Rivers Community College	Dr. Mary Lou Brown	
Arts and Science Division	William Woods University	Dr. Sherry McCarthy	
High-Need School District(s)	1. Doniphan R-I		Kevin Sandlin
	2. Ripley County R - III		
	3. Naylor R-II		Steve Cookson
	4. Poplar Bluff R-I		Sarah Long
Additional Partner(s)	1. Neelyville R-IV		
	2. Twin Rivers R-X		
5. Address and telephone number where project director may be contacted:		6.	
Three Rivers Community College 2080 Three Rivers Blvd. Poplar Bluff, MO 63901 573-840-9621		Dr. Mary Lou Brown Three Rivers Community College 2080 Three Rivers Blvd. Poplar Bluff, MO 63901 573-840-9621 mlbrown@trcc.edu Signature:	

Abstract/Summary

The “Connect 4 Math” project served six school districts in the Three Rivers Community College (TRCC) service area, four of which are ‘high needs’ districts. A cohort of twenty grade 5-8 math teachers participated in a four day summer institute on mathematics’ teaching strategies and techniques tied to the state math GLEs. The institute was followed by four quarterly workshops (regroups) during the school year that focused on MAP data analysis, inquiry based learning, benchmark testing, content knowledge and effective teaching practices. One Math Coach was trained through professional developmental seminars and the Math Academy. The Math Coach not only improved her mathematical knowledge but learned coaching methods to work with fellow teachers. The Math Coach worked daily throughout the school year with cohort members to model lessons, develop materials and lesson plans, and to improve pedagogical practices. Cohort members taught with the Math Coach present in their classroom and all participants worked on reflective practices. The Math Coach met regularly with higher education faculty for on-going training. The higher education faculty included Dr. Mary Lou Brown, Division Chair for both math and teacher education, Kevin Wheeler, TRCC mathematics instructor and coordinator for Math for Elementary Teachers, and Chris Schneider, William Woods University mathematics instructor.

The structure of the project focused on improved student achievement in math at grades 5-8 as measured by the Stanford 9 pre/post test and the State MAP test. The measurable objectives, beyond increasing student achievement, included: **1) Increased teacher skills and knowledge through the math coach modeling lessons & working**

individually with the participating teachers, the summer institute which focused on inquiry based instruction & process instruction in math, quarterly regroup meetings of the cohort , and colleague visits. **2)** Increased effective teaching practices/strategies due to collaboration with our trained math coach who worked daily in buildings and with individual teachers providing effective modeling, lesson plans and materials and supplies. **3)** Improved assessment data monitoring and effectiveness of instruction through embedding MAP data analysis in regroup discussions, and training the math coach and all participants about developing common assessments and benchmark tests around grade level expectations.

To summarize, the “Connect 4 Math” project provided professional development to 5th – 8th grade math teachers in the rural school districts in the Three Rivers Community College service area. These teachers increased their math knowledge and their pedagogical skills, developed more effective teaching strategies and learned to interpret MAP assessment data. Our Math Coach was in classrooms daily modeling effective teaching techniques and collaborating with teachers about the Show-Me Standards and Grade Level Expectations. Math instruction has improved in these six school districts and teachers have a better understanding of MAP assessment data due to “Connect 4 Math.”

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District and Participant Summary

Six school districts and 20 5th – 8th grade math teachers participated in the Connect 4 Math project. Table I shows the number of contact hours per month and workshops attended by district and by teacher. The average student pre/post test gain/loss is also indicated by district and teacher.

Looking at the third column in Table I, Average Number of Classroom Contact Hours per Month, you will see that most participating teachers were receptive to our Math Coach (Cindy) coming into their classrooms. On average, Cindy was in each district once a week. If you look at the fourth column, Average Student Percent Pre/Post Test Gain, you will see that the greatest gains were most often in those classrooms of participating teachers that had Cindy come into their classroom more frequently. For example, both Twin Rivers teachers had 4 contact hours per month and had double digit gains. One Ripley County R-III teacher who also had 4 contact hours per month had the greatest gain 26.8. One very positive showing was that all teachers but one had student gains. Another positive showing is that those participants who attended 7 or 8 workshops had an average student percent gain 12.0.

Note that 15 out of 20 teachers came to 6 or more workshops. This would indicate that the teachers wanted to be involved in the workshops and enjoyed the collaboration with colleagues.

TABLE I

Time period: August 2006 through May 2007

School District	Grades 4 – 8 Teacher Participant	Average Number of Classroom Contact Hours Per Month	Average Student Percent Pre/Post Gain	Number of Workshops Attended (6 hours each)
Doniphan R-I	Steve Ivy	3	+9.8	7
	Jan Cox	2	(6 th) -10.0 (7 th) -2.0 (8 th) +14.22	8
Ripley County R-III	Charissa Armstrong	2	+ 3.6	7
	Amanda Sisco	4	+ 26.8	7
Neelyville R-IV	Crystal Tripp	3	(5 th) + 3.5 (6 th) + 5	6
	Paula Wills	1	(Support staff : No data available)	2
Naylor R-II	Teresa Sopko	3	+ 21.5	8
	Misty White	3	(6 th) + 9.6	8
	S. Deckard	1	(6 th) - 1.0	8
	Cheri Woolard	8	(7 th) + 17.0 (8 th) + 9.8	6
	Mark Roach	4	(7 th) +10.0 (8 th) + 6.7	8
	Rodney Johnson	1	(Support staff: No data available)	3
Twin Rivers R-X	Nancy Sliger	4	(7 th) + 24.0 (8 th) + 16.0	8
	Tresa Lemarr	4	(5 th) + 20.0 (6 th) + 14.5	8
Poplar Bluff R-I	Melissa Taylor	1	+ 14.2	4
	Chris Wheat	2	+ 9.2	7
	Jake Holmes	1	+ 9.9	4
	Judy Russell	2	+ 10.0	4
	Ken Rowland	3	+16.6	8
	Bill Clanahan	1	+19.13	8

The data in Table I indicates two 6th grade teachers in Naylor R-II. Both of these teachers were first year teachers. Both were enthusiastic about Connect 4 Math and open to the techniques offered by the math coach. The teacher with the +9.6% gain taught in a classroom with a Smartboard which she used regularly. The second 6th grade teacher at Naylor showed a loss of -1.0 %. She taught in a classroom that was completely devoid of any technology. She had no Smartboard, no white board, and no overhead projector and screen. The chalkboard she had was so old that chalk writing was barely visible. There was no way to provide visual instruction; only verbal instruction could be provided. The use of technology likely contributed to the better performance in the classroom with a Smartboard.

Table I shows two other classroom with an average loss in Average Student Percent Pre/Post Gain. Both of these classrooms were taught by the same teacher in the Doniphan R-I school district. It should be noted that both of these classrooms were special needs classrooms with a majority of low functioning IEP students. The 3rd classroom taught by this same teacher was a regular classroom and showed a +14.22 % gain.

Description of project activities completed by participants

A cohort of 20 5th – 8th grade math teachers from six rural school districts in the Three Rivers Community College service area participated in a four-day institute in August, 2006. Teachers participated in the following activities:

- Participated in daily investigative math activities and problem solving aligned with the Missouri Mathematics Grade-Level Expectations (GLEs),
- Constructed Math GLE flip charts to use in their classrooms to direct instruction,
- Discussed 5th through 8th grade GLEs, clarified vocabulary, and examined sample questions were provided from the Mathematics Assessment Sampler published by the National Council of Teachers of Mathematics,
- Discussed how to align their textbooks with the GLEs,
- Viewed the Third International Mathematics and Science Study (TIMSS) video and participated in a group discussion contrasting the instructional approaches of Japanese and American educators,
- Completed an online questionnaire, an instructional practice questionnaire, and mathematics pre-test as required by our external evaluators from the Assessment Resource Center (ARC) at the University of Missouri-Columbia,
- Participated in a variety of different team building activities,
- Participated in interviews with Mark Elhert, our external evaluator from the ARC,
- Developed a list of web resources and games for classroom use,
- Registered for William Woods course credit,
- Completed end-of –day surveys evaluating daily activities.

This institute was followed by the Math Coach going to partner school district into the participant's classroom and working with the cohort member to model inquiry-based instruction, develop curriculum materials and lesson plans with the goal to improve pedagogical practices of the participants. Number and Operation grade-level assessments were developed by the Math Coach and administered by the participating teachers to their students. Participating teachers also administered the Stanford 9 to their students in three school districts.

The first of four follow-up (regroup) meetings was held on September 26, 2006, with Linda Null, the Southeast Regional Professional Development Center (RPDC) Math Consultant. Twenty-one Connect 4 Math participants were in attendance. Cohort members participated in investigative math activities aligned to the GLEs incorporating cooperative learning strategies used to help increase effective teaching practices. Teachers were given two Kagan Cooperative Learning cards outlining strategies for effective instruction. Teachers also used the computer lab to investigate math websites given to them by Linda Null.

The next follow-up meeting (regroup) was held on October 27, 2006. Joyce Penland, a Southeast RPDC MAP facilitator provided instruction in MAP data analysis, the use of assessment data to provide direction for curriculum development and classroom instruction, and developing common benchmark assessments to help monitor student progress. Using their own assessment data from their district, participating teachers disaggregated their student MAP scores and developed action steps to make curriculum decisions to direct instruction for future improvement. Participating teachers also worked collaboratively on Algebra activities, modeled by the Math coach, taken

from a National Council of Teachers of Mathematics (NCTM) E-Workshop. Teachers were provided copies of released MAP items, GLE examples, and Math Model Curriculum from the Department of Elementary and Secondary Education (DESE) website.

The third regroup meeting was held on January 16, 2006. Connect 4 Math teachers participated in more investigative math activities, presented by Linda Null from the RPDC, which were aligned to the GLEs. Linda also shared literature based math activities using children's books to show teachers how literature can be used to teach math. Teachers investigated manipulatives that had been purchased and were available in the lending library for them to check out for use in their classrooms. Our Math Coach created this lending library to provide manipulatives for classrooms in districts with limited budgets.

The fourth and final follow-up meeting was held on March 2, 2006. Teachers participated in the following activities:

- Participated in investigative math activities and problem solving, aligned to the GLEs, in grade specific groups,
- Completed an End of Project on-line questionnaire and mathematics post-test required by our external evaluators at the ARC,
- Participated in interviews with Mark Elhert from the ARC,
- Received school copies of *A Framework for Understanding Poverty* by Ruby Payne and *How to Teach Students Who Don't Look Like You* by Bonnie M. Davis,
- Investigated information on Depth-of-Knowledge and the newly released GLE examples on the WEB,
- Received copies of the NCTM Curriculum Focal Points and discussed changes in the GLEs for the 2008-2009 school year.

The Math coach worked daily with teachers and students modeling interactive and investigative math activities using technology and research-based instruction in their classrooms. Teachers administered the Number and Operations post-test to their students and teachers in three school districts administered the SAT 9 as a post-test. Copies of all activities along with a notebook and dividers were provided for each teacher to aid them in organizing the activities, collected from Connect 4 Math workshops and in-class activities, according to strands and GLEs. As a part of the completed notebook, teachers kept a log of activities their students participated in this year. As a final project for the graduate coursework, teachers supplied the math coach with a copy of their GLE-aligned activities log.

In addition to regular Connect 4 Math activities, five teachers in one high-needs school district were involved in the Southeast RPDC Mathematics Model Curriculum project along with the Math coach.

Description of any Substantive Modifications to the original Project

There was significant change from the original project submitted due to the sizable reduction in funds. Our original proposal was designed to serve 40 participants from 9 school districts, 35 of whom were from high-needs school districts using five math coaches over a period of three years. Our project was modified to include 20 participants from 6 school districts, 17 of whom were from high-needs districts with one math coach over a period of one year.

The Connect 4 Math project was approved for only one year instead of three years and for only half the requested amount for the year. Our advisory committee met to

consider the approved funding amount and to determine how to maximize our funding while still working toward our goals. The modifications made to the original project were simply to follow the original plan only on a much, much smaller scale reducing the number of schools districts, the number of participants, the number of math coaches and the amount of time the math coach spent in the classrooms.

Our original grant proposal called for doing two common assessments that all participating teachers would give to all students in all districts. We found it necessary to cut this back to one common assessment. The participating teachers felt that they were already so burdened with others tests and duties that they did not want to give up the time to do two common assessments. In addition, most of the small rural districts only had one section of each grade.

The one exception to the one common assessment was the Poplar Bluff School district which is significantly larger than the other participating districts. Participating teachers from the Poplar Bluff Jr. High did give four common assessments over the course of the year, one per quarter.

In our original grant proposal, it was our intention to have our Arts and Science higher education partner more involved. We found, however, that communication with their faculty member was difficult over the summer. He wanted to be involved with our Advisory Committee but he could not take the time from the classes he was teaching at their main campus to drive the 5-hour each way distance. Our next effort was to connect via ITV. Unfortunately, William Woods University has no ITV system. From this experience, we learned that specific dates and times for advisory meetings and participant workshops must be planned much earlier and must be communicated much earlier.

List of State Objectives and Additional Project Objectives

Project Objectives

- 1) Increase teachers' mathematical knowledge. Teachers will increase their background knowledge in mathematics by 25% as measured by pre and post test as part of the graduate class.
- 2) Increase effective teaching practices and strategies. Teachers will use 6 new (research based) teaching strategies per year as modeled by math coaches. Administrators will use "walk- throughs and evaluations" to document the variety of practices and strategies.
- 3) Improve the use of assessment data to monitor and strengthen instruction. Teachers will increase the number of common assessments used per grade by 33% per year as measured by data collected by math coaches.

State Objectives

1. Improve student achievement in mathematics and/or science
2. Increase teachers' knowledge and understanding of key mathematics and/or science concepts
3. Improve teachers' pedagogical knowledge and practices that utilize *scientifically-based research* findings and best practices in inquiry-based instruction
4. Enhance teachers' use of assessment to monitor the effectiveness of their instruction
5. Measurably impact the preparation of pre-service teachers through improvement to existing coursework or the design of new mathematics and/or science content and/or pedagogy courses.

Project Goals Met

Project Objective 1 was to increase teachers' mathematical knowledge. Our goal was to increase their background knowledge in mathematics by 25% as measured by pre and post tests as part of the graduate course.

The following table shows the increase in the participant's background knowledge. The average score on the pre-test was 71%. To reach the goal of increasing knowledge by 25%, the score would have to improve by 17% ($\frac{1}{4}$ th of 71). Only one teacher achieved this level of increased mathematical knowledge. Seven teachers had positive gains, with an average gain of 14.7%, one had no gain, and four had an average loss of 6%. There were twelve participating teachers who took the pre-post test on general knowledge. The pre-test was given Aug. 1, 2006, and the post test was given during our last regroup session in the spring.

The test consisted of twenty questions. Questions ranged from number sense, to measurement, and geometry. All questions were in essay form. Questions were gathered from the NCTM Addenda Series and off the DESE web site of MAP test questions.

In the future, we plan to make the questions multiple choice. This year's pre/post test was very time consuming to grade. Further, we plan to make a better effort of getting all participants to complete both the pre and post tests. As you can see from Table II, eight teachers did not take either the pre or post test.

Table II

Name	Pre-Test	Post-Test	Gain/Loss
577		0.570	
748	0.820	0.960	14%
1174	0.680	0.820	14%
1444	0.680	0.790	11%
1959	0.540	0.680	14%
2486	0.500	0.820	32%
3043		0.680	
3466	0.640		
3689	0.790	0.750	-4%
4963	0.750		
5089	0.750	0.890	14%
5224		0.680	
5611		0.790	
6106	0.540	0.540	0%
6398	0.610		
7121	0.750	0.680	-7%
7670	0.890	0.790	-10%
8109	0.710		
8536		0.750	
9002	0.820	0.860	4%
9265	0.820	0.790	-3%
	0.114947	0.108289	7%
	71%	76%	

Effect Size (Standardized Gain) = $7\%/11\% = .64$ Standard Deviation

Project Objective 2 was to increase effective teacher practices and strategies. Participating teachers were to use six new research-based teaching strategies per year as modeled by our math coach. The six new strategies were cooperative learning strategies connected to the GLEs, literature based math activities using children's books, hands-on activities using manipulatives, grade-specific problem solving aligned to the GLEs, differentiated instructional teaching strategies based on analysis of MAP assessment data, and investigative math activities using technology. Our math coach modeled these

strategies and observed the participants teaching in their classrooms using these strategies.

The math coach made weekly visits, modeled activities and strategies, and provided support as teachers presented activities using research based strategies in the classrooms. Teachers kept a portfolio of all activities and a log of activities and strategies they used throughout the year as part of their William Woods graduate course portfolio. These documents were the beginning of a revised curriculum. Professional development was provided at eight workshops that focused on presenting activities aligned to the GLEs and Kagan cooperative learning strategies that could be used with their students. Resources for the activities came from the Missouri Math Academy, the National Council of Teachers of Mathematics, and various mathematics conferences. Some Kagan strategies that were presented and used in the classroom were:

- Guess My Rule
- Find Someone Who
- Numbered Heads Together
- Showdown
- Think Pair Share
- Logic Line Up
- Visual Graphic Organizer
- Memory Jingles
- Four Corners
- Spot the Fiction

- Mix and Match
- Team Sort

Administrators evaluated teachers and did walk throughs; however we do not have that data due to teacher confidentiality. The coach assessed the effectiveness of the activities through classroom observation, coach – teacher discussion, and coach – student discussion. Teachers also kept a post-activity reflection as part of their log.

Project Objective 3 was to improve the use of assessment data to monitor and strengthen instruction. Participating teachers were to increase the number of common assessments used per grade by 33% per year as measured by data collected by the math coach.

Connect 4 Math did not fully meet this goal. In the Poplar Bluff School District, participating teachers gave 4 common assessments over the course of the year, one per quarter. However, in all other districts common assessment was a new assessment technique. In most of these small districts, there was only one section per grade, precluding common assessment across sections. Therefore, we chose to use the SAT9 across 3 districts and the pre/post test across all districts.

During the second regroup in October, 2006, participants were provided instruction in MAP data analysis, the use of assessment data to provide direction for curriculum development and classroom instruction, and developing benchmark assessments to help monitor student progress. For districts with more than one classroom per grade, common benchmark assessments were developed.

Teachers disaggregated their student MAP data and developed action steps to make curriculum decisions to direct instruction for future improvement. Grouped by

districts, participating teachers analyzed MAP data to determine areas of weakness. Once they had determined the specific GLE where the weakness was, they then brainstormed possible ways to improve student understanding. Teachers used the results to direct instruction in their classrooms throughout the year.

State Objective 1 was to improve student achievement in mathematics and/or science. All Connect 4 Math project activities were explicitly linked to the impact on student achievement.

The Number and Operations pre-/post-test was developed by the math coach and our co-director using a computer program that is aligned to the GLEs provided by the Poplar Bluff School District. This pre/post test was administered by the participating teachers at the end of August and in April. We chose Number and Operations because we believed this is the one area that all teachers do cover.

Looking at Table III below, you can see most teachers had a positive gain. Some of the teachers that had Cindy come to their classroom the most had very good gains, specifically in the Twin Rivers District. We included four teachers that were non-participating to have some sort of a control group.

The SAT9 was also administered as a common assessment in some districts. This test data for the Naylor, Neelyville, and Doniphan school districts is also available; however, the results have not yet been received from our external evaluators.

Table III

Numbers and Operations pre-/post-test data are as follows:

Teacher and Grade	Number of items on the Test	Number of Students	Pre-test (Average % correct)	Standard Deviation Pre-test	Post-test (Average % correct)	Standard Gain Score
Doniphan						
Ivy - 5	10	109	30	12.87	39.8	.7615
Cox - 6	10	2	50	14.14	40	-.7072
Cox-7	13	7	25	14.26	23	-.1403
Cox-8	9	2	16.5	7.78	22	.7069
Gatewood						
Armstrong - 5	10	11	43	19.5	46.6	.1846
Sisco - 6	10	11	35	11.28	61.8	2.376
** Davis - 7	13	12	40	16.15	71	1.9195
** Gargac - 8	9	13	28	10.64	58	2.8195
Neelyville						
Tripp - 5	10	54	37	13.98	40.5	.2504
Tripp - 6	10	40	44	17.16	49	.2914
** Rich - 7	13	46	16	18.43	57	2.2246
** Rich - 8	9	38	28	12.00	33.5	.4583
Naylor						
Sopko - 5	10	26	40	15.75	61.5	1.3651
Deckard - 6	10	19	41	17.15	40	-.0583
White - 6	10	18	51	18.62	60.6	.5156
Roach - 7	13	11	36	17.64	46	.5669
Woolard - 7	13	13	49	20.34	41.8	-.3539
Roach - 8	9	16	24	14.19	30.7	.4722
Woolard - 8	9	9	32	20.60	41.8	.4757
Twin Rivers						
Lemarr - 5	10	26	38	13.27	68	2.2779
Lemarr - 6	10	29	47	16.32	61.5	.8885
Sliger - 7	13	33	39	18.28	63	1.3129
Sliger - 8	9	36	26	16.68	42	.9592
Poplar Bluff						
Clanahan - 7	13	94	50	18.43	69.1	1.0364
Rowland - 7	13	92	43	18.64	59.6	.8906
Russell - 7	13	101	47	17.32	57	.5774
Holmes - 8	9	102	38	20.83	47.9	.4753
Taylor - 8	9	100	35	20.07	49.2	.7075
Wheat - 8	9	96	30	17.35	39.2	.5303

** Non-participating teacher

State Objective 2 was to increase teachers' knowledge and understanding of key mathematics and/or science concepts. This goal was met by Project Objective 1 and was previously explained.

State Objective 3 was to improve teachers' pedagogical knowledge and practices that utilize *scientifically-based research* findings and best practices in inquiry-based instruction. This goal was met by Projective 2 and was previously explained. All pedagogical practices presented by our Math Coach were research-based.

State Objective 4 was to enhance teachers' use of assessment to monitor the effectiveness of their instruction. This goal was met by Project Objective 3 and was previously explained.

State Objective 5 was to measurably impact the preparation of pre-service teachers through improvement to existing coursework or the design of new mathematics and/or science content and/or pedagogy courses. One mathematics pedagogy course is taught at Three Rivers Community. That course, MATH 131 Math for Elementary Teachers, is taught by our co-director Kevin Wheeler. The use of hands-on activities and manipulatives are embedded in that course. MATH 231 Math for Elementary Teachers II has been requested by 2 of our transfer institutions and is under development at this time. Pedagogy gathered throughout this year will be added to both courses to strengthen pre-service teachers' preparation.

Connected to specific Show-Me Standards and Grade-Level Expectations

The Missouri Grade-Level Expectations (GLEs) was the foundational document for our project. During the institute in August 2006, participating teachers constructed Math Grade-Level Expectation flip charts to use in their classrooms to direct their instruction. The focus of the four-day workshop was 5th through 8th GLEs. The five strands, Algebra, Geometry, Number and Operations, Measurement, Data and Probability were presented, examples were given, group discussions were grade specific, vocabulary was defined, and sample questions were provided using the Mathematics Assessment Sampler published by the National Council of Teachers of Mathematics.

During one workshop teachers received instruction on aligning their textbooks with the GLEs. Each teacher brought their own textbooks to align. Participants were grouped by district for one project and by grade level for another. They collaborated about the relationship of their current curriculum to the strands and grade level expectations. In another workshop teachers were provided with copies of released MAP items. They were placed into grade level groups where they discussed strategies related to improving student performance on specific GLEs for that grade level, GLE example strategies for explaining how to do each problem, and Math Model Curriculum from the Department of Elementary and Secondary Education (DESE) website.

During another workshop teachers focused on GLEs as they disaggregated their MAP data and wrote action steps to provide direction for improvement. Grouped by district, teachers looked for common weaknesses and brainstormed possible strategies to increase student understanding. An example of an action step for a Geometry GLE might be use of supplemental materials for instruction if the district adopted textbook did not cover that GLE, or it might be changing when during the school year that GLE is taught or possibly changing the instructional strategy to an investigative activity using cooperative learning strategies instead of lecture.

During all workshops teachers participated in activities aligned to grade appropriate GLEs using an interactive approach to problem solving. Activities presented by the math coach during classroom visits were also aligned with the GLEs. Copies of

all activities along with a notebook divided into strands were provided for every teacher to aid them in organizing activities according to their GLEs. As a final project, teachers supplied the math coach with a log of GLE aligned activities their students participated in during this school year.

Dissemination of project information

Co-Director Kevin Wheeler and Math Coach Cindy Tanner will make a presentation at the Central Regional Conference of the National Council of Teachers of Mathematics (NCTM) in Kansas City on October 26, 2007. This meeting is one of three regional conferences held every fall by NCTM. Kevin and Cindy will share with participants what led to forming the grant, what went on during the grant cycle, conclusions drawn from the grant project and suggestions on the use of math coaches in a variety of different rural school district settings.

Three Rivers Community College will be conducting another summer institute to be held August 2 – 3, 2007, as a continuation of the Connect 4 Project. During that workshop, participating teachers will receive feedback on data collected during the 2006-2007 school year. Brainstorming sessions will allow teachers to again write action plans for continuing student improvement.

The local paper ran an article about the project. A photographer came out and took pictures of teachers actively engaged in activities. She did some interviews and wrote up a very nice article that appeared on the front page. See Attachment 1.

Conclusion

The Connect 4 Math Project provided professional development in math instruction for teachers in small rural districts. Many of these teachers had received little to no professional development in this area over the course of their careers in teaching.

Connect 4 Math further provided the opportunity for collaboration across 6 small rural districts. Although these districts all border each other, there is no regular communication between them outside of sports activities. Connect 4 Math teachers were able to form a network of colleagues with which to communicate and share new teaching strategies.

Many lessons were learned during this one year project. Increased diligence over data collection of participant mathematical knowledge will be a focus in future grant proposals. We need to make sure that all participants take both the pre and the post tests. The complexity of writing a pre/post test to measure increased participant mathematical knowledge became apparent very early. These assessment measures need to reflect the curriculum being taught across all the districts. In future projects, more research will take place earlier in the grant to develop a more effective assessment instrument.

Communication with participants was difficult since many of them do not read their e-mail. To overcome this difficulty, our Math Coach set up a weekly schedule for visiting the classrooms. The teacher then knew exactly when the math coach would be in their building. Coach and teacher were able to discuss curriculum plans for the following week. The math coach was able to prepare an innovative activity for the next week's lessons. This process maximized the learning for coach, participating teacher and middle school student.

A strength of the workshop format was that participants were able to experience the hands-on activities themselves prior to delivering that lesson in their classroom. The participating teachers had very little to no planning time within their school day, so the presentation of the new teaching strategies and the opportunity to practice the activity as their students would was a valuable experience.

Due to the continued need for math professional development in our rural school districts, Three Rivers Community College will continue providing professional development to 22 middle school math teachers in these same districts during the 2007 – 2008 school year. Our co-director, Kevin Wheeler, will coordinate a two-day summer institute and 4 regroups throughout the year. Project goals will be a continuation of the goals from the Connect 4 Math Improving Teacher Quality grant.
