Teacher Action Research as a Means for Improving Student Achievement:
A Case Study of the Teacher Education Model Program
(TEMP)

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Kentucky teachers are slowly approaching a crossroads. We realize that time is running out for all students to reach the state mandated level of proficiency set by lawmakers some 13 years ago. We also realize that judgment year, 2014, will determine whether our students are prepared and knowledgeable enough to meet expectations assessed by the Kentucky Core Content Tests. Schools have been diligently working towards this goal of proficiency and making improvements. Such changes as re-aligning curriculum, implementing motivational or good faith effort plans, and exposing teachers to new pedagogy have helped many reach their yearly growth index. However, are such efforts enough? Can educators continue to push students towards that pivotal mark of proficiency without further changes? For many teachers, the answer is no. As we stand at the crossroads, looking down each route, we realize that the superficial changes have carried us to this point, but what will propel us across? The answer can only be found in meaningful, sustained change.

True change can be an unknown entity with the potential impact being positive or negative. To seek change uninformed and unassisted is a choice no Kentucky teacher should have to make, but unfortunately, many do. From this need, a project emerged uniquely designed to help those teachers ready to traverse the crossroads; it is titled the Teacher Education Model Program (TEMP). Initiated by the University of Kentucky (UK), TEMP is a collaborative effort between the UK education and math departments and Fayette county elementary school teachers. Those teachers willing to participate did so through a professional development option in their school district. Led by Dr. Brennan of the Curriculum and Instruction department, participants spent over a semester analyzing their school's test data, identifying a need, studying available literature, consulting university faculty, and finally devising and implementing an action plan geared towards improving their students' achievement. As the first group of participants just recently completed their crossing with TEMP, we may look at their experiences and results to determine if TEMP served as a viable form of professional development and as an agent of change. Questions abound such as: "Did teacher knowledge increase?", "Did teaching practice strengthen?" and "Did student performance improve?" The answers to these questions shall be discussed through a case study of two of its participants, Beth and Karen.

Data Analyzed

The data used to determine the impact of TEMP consisted of video taped lessons, interviews, and final projects. The video tapes of both Beth and Karen showcased each participant conducting a lesson that incorporated lesson design and teaching methods

intentionally reshaped due to their action-research. Each tape was viewed by me a minimum of two times in which I first scribed teacher and student dialogue and then made notations pertaining to classroom characteristics and the teacher's usage of questioning. Personal interactions with Beth and Karen took place either at the celebration symposium held in May or through email correspondence. During the symposium, participant's thoughts and research were voiced in a presentation format and correspondence was used with Beth to clarify any questions I had and to obtain her overall impressions of the experience. Finally, individual project portfolios submitted at the end of TEMP were analyzed. Included in these was the participant's action-research report that explained the process used to identify a need in the teacher's classroom and the implementation plan devised to address it. Additionally, student work was included to substantiate the teacher's claims of level of achievement. By using three differing sources, I was able to use a "triangulation of data" in order to create a balanced and informed assessment of Beth's and Karen's experiences, action-research plans, and levels of success (Falk & Blumenreich, 2005).

Literature

Much literature exists on the topic of professional development. Aspects such as: how to design it, what content should be included and how will it impact student learning, are just three categories out of a myriad of possibilities that one must address when contemplating professional development. Fishman, Marx, Best, and Tal assert that teacher learning should always be at the heart of any well designed professional development (2003). Deliverers of professional development should strive for:

> Changes in the knowledge, beliefs, and attitudes
> Of teachers that lead to the acquisition of new
> skills, new concepts, and new processes.
> (Fishman et al., 2003)

However they warn that the expectations of major changes in pedagogy do require extended time. Similarly, Borko claims that "meaningful learning" can be slow and uncertain and that the level of change experienced by teachers will vary in its degrees (2004). Thus, professional development should focus first and foremost on the teacher, be extended over time and be cognizant of varying levels of impact.

A movement in professional development that is gaining more recognition is inquiry research conducted by teachers. Chandler-Olcott defines teacher research as a "systematic, intentional inquiry carried out by teachers" with multi-layered ramifications (2002). First and foremost, educational change can be initiated from the inner core rather than externally. Secondly, the self-perceived image of teachers can be elevated to that of professionals, not only able to contribute to the wealth of knowledge pertaining to teaching and learning but also able to serve as critics. Such teacher initiated research possesses an untapped power; that is, it potentially holds the answers to specific school, class or student related questions. Falk and Blumenreich view the true nature of teacher research as being "informed decisions that support our students' development" (2005). They go on to argue that every aspect of education needs to be questioned regularly and systematically in order to achieve quality teaching. Another characteristic that has proven to guide teachers towards this level is the creation of a learning community. Borko claims

that a teacher learning community adds to the level of communication and collaboration that occurs. As a result, teacher learning increases and instruction improves (2004). Conversely, those striving to research alone will be at a disadvantage and may experience less success. One example of teacher-directed collaboration is the Japanese Lesson Study described by Chokshi and Fernandez (2004). Through this process, teachers work as a team to identify a problem and alter their teaching practices to address it. They then observe each other offering constructive feedback pertaining to the lesson. This form of lesson study relies on the ability of teachers to share knowledge and expertise towards a similar goal. The strength of the collaborative effort ultimately determines the success of the group.

Teacher Participant Research Procedures

In order to begin the process of identifying their research questions, each school's TEMP participants met with an identified school based mentor and UK faculty. Student results from the 2003-2004 Kentucky Core Content Test were analyzed in order to determine areas of need. Throughout the participating schools, a common theme was identified. There existed a discrepancy between student scores on multiple choice questions versus scores for open response. A logical assumption was made that the students possessed adequate knowledge of core content but were hindered when required to express their answers in writing. From there, each participant diverged into a specific, meaningful topic that fit his/her students' needs as well as ones own.

Beth

Beth's group of 4th grade students was motivated and possessed a high aptitude in math. For her, the focus of her research question became, "How can students' abilities to express mathematical concepts in writing be increased?" With the help of her principal and a professor of math from UK, she broke her research question down into sub-questions or goals. They were:

> 1) How to expose students to meaningful math experiences and
> 2) How to provide students with opportunities to orally discuss their thinking.

Beth felt that the implementation of these two goals would allow her students to better transfer their mathematical thoughts to writing.

The first step that Beth took to address her goals was to evaluate the material that she used each day in her teaching, Everyday Mathematics. Through doing so, she discovered that this program provided for "meaningful math experiences but lacked opportunities for dialog and writing" (TEMP Project Report). After self-reflection and observing other teachers, Beth realized that her questioning techniques could be carefully constructed so that her students would be required to express themselves orally in math. She intentionally focused on using higher-order thinking words, such as "how" and "why" to create a learning environment promoting mathematical discourse. Starting with whole class discussions in which she modeled and sought answers that expressed orally the mathematical concepts, she then provided group work for students to try our their new skill. From there, students transferred their thought to writing using relevant open response questions.

Karen

Karen's 4th grade class consisted of mixed ability students with little enthusiasm towards reading and a low tolerance for frustration. At the beginning of the school year, only 42% of her students read on grade level with the remaining being one to two levels behind. The research question Karen decided to address focused on how to improve her students' reading and writing abilities. Thus, the identified problem was similar to Beth's but focused on reading rather than math. With the help of a mentor, Karen identified two actions that would better inform her as to how to she could begin to approach her goal. The first action she undertook was to observe three district colleagues who had been identified as effective teachers as per reading instruction. Her second action entailed working with her mentor to collect open response (OR) questions that would be used to assess her students' reading and writing abilities. In addition, they worked together to analyze student work and developed a list of materials that would be beneficial to Karen's instruction.

With her newly acquired information, Karen then identified one of her sub-questions- "How to implement effective teaching strategies for reading and writing?" Her plan consisted of a weekly rotation of differing genres of literature followed by a correlating OR. Students began each week by answering an OR in a simulated testing environment, thus, no clarification was given to students about the reading or the OR question. On day two, the scoring rubric for that particular question was gone over in detail to insure student comprehension. Then, student answers were displayed and Karen guided them through actual application of the rubric to their own writing in order to determine a score. Much modeling and teacher led discussion was used to guide the students in their discussions and to help them create proficient level OR answers out of their classmates' writings. Day three involved a lesson specifically addressing the genre of the literature used in that week's reading selection. Finally, on day four, the students retried that week's OR until they scored proficient.

Unlike Beth, Karen experienced a need to formulate a second sub-question due to her teaching. As the reading assignments continued, her students became increasingly negative and frustrated. Thus, Karen's question became, "How can student negative behavior be altered"? To combat the complaints and refusal to work, she began to build student confidence by recognizing positive behaviors. A bulletin board was created, with the help of the students, where Karen logged positive student actions and they displayed encouraging posters. To combat frustration, the class also helped make a chart that encompassed ideas of how to channel negative behavior and reminders of what unacceptable behavior looked like. Thus, Karen relied on building student confidence and self-monitoring strategies to lessen the negative behaviors that she believed held her students back from high achievement.

Videos

The videos made of both Beth and Karen exhibited teaching that not only directly related to each ones individual goals but also possessed qualities recognizable as best

practices. For Beth, her lesson started with a bell ringer activity pertaining to the day's topic that students began as soon as they entered the room. The activity required students to use a math manipulative (fake money), work with a partner and talk out their answers. After several minutes, Beth then led a class discussion to check their answers and their thinking. Logically and consistently, she asked students questions that were framed with "how" and "why". Students were repetitively urged to engage in discourse to further their understanding and bridge the connection between mathematical problem solving and writing. Afterwards, practice activities that replicated real life scenarios were assigned. Students were required to talk out their answers with partners and a few groups even chose to use role-playing as a means of doing so. Throughout the thirty minute lesson, Beth incorporated three different situations where students were repetitively urged to engage in discourse that addressed her goal of bridging the connection between conceptualizing math and putting it in writing.

Similarly, Karen also incorporated strong teaching practices that focused on her goal of increasing reading and writing. To start her hour and a half lesson, she introduced a term, "qualities", that she felt inhibited her students from fully understanding the previous day's reading passage and OR question. After leading the class through a discussion of its meaning, she then asked them to come up with qualities that fit real life people. Next, she moved on to a detailed analysis of the OR question and the rubric used to score it. In order to increase student self-confidence and the ability to self-assess ones own OR answer, Karen modeled scoring a student's answer by thinking out loud as she assessed it. Then, she included students to think with her by asking questions that scaffolded in difficulty; the most challenging of which demanded students to answer "why" or "what else could". Through repetitive and systematic teaching, Karen provided her students reading practice while also giving them the skills to answer OR questions.

Level of Success

The effectiveness of the TEMP project can be judged in two ways. First, by whether the teachers involved believed they were successful at achieving their goals and secondly by whether I, an outside reviewer, agree. Respectfully, both Beth and Karen felt their projects were successful. In her final report, Beth included data and examples of student work that claimed an increase occurred in her students' math OR scores. At the start of TEMP, she documented that 62% of her students scored a novice, 12.5% an apprentice, 25% a proficient and 0% earned a distinguished. After one month of emphasizing teacher and student usage of dialogue in her instruction, the next OR indicated considerable improvement in her students' scores. Only 12.5% earned a novice, 0% an apprentice, 37.5% a proficient, and 50% a distinguished.

Such dramatic increases in open response scores are impressive to say the least; one may even think they are too good to be true. At the end-of-the-project symposium, Beth presented her goals and findings to her colleagues. During that time, she explained that her first OR was extremely challenging due to the numerous steps that students had to complete. To compensate for that, the next open response that she chose was less complicated, in fact "too easy" in her own words. Thus, her claim that student achievement increased based solely on the comparison of two sets of scores from dissimilar open responses appears invalid. Unfortunately, no other documented data or

observation on her part existed to substantiate her claim that student improvement did occur as a result of her action-research. Telling though is a suggestion that Beth emailed in response to my question, "Do you feel like the changes you made were effective enough to truly increase your students' abilities?" She responded with, "I do feel like the changes were effective, but they weren't effective enough simply because of time". Perhaps if Beth had just one more month to continue her study, she would have obtained the data she needed to feel confident about her outcome.

On the other hand, Karen's final repot and student work samples clearly supported her claim that her goal to improve reading OR questions was met. Included were two differing forms of data. The first provided the results of an end of TEMP reading placement exam. Her students had improved to 100% reading at the 5th grade level. Not only did their reading skills improve enough to allow them potential success on the KCCT but they were prepared to enter the next grade the following school year. The second form of data that Karen included was a detailed mapping of her class' OR scores. Over roughly a six week span, Karen practiced and scored six OR questions with her class. Student scores progressed from an average of 1.83 (out of 4) to a 2.75 by the last OR; this included 75% of her class scoring in the proficient range or higher. I believe that like Beth, Karen made a concerted effort to change her instruction. Her focus on reading improvement and student self-monitoring provided her students with the skills they needed to become more successful on reading open responses. Yet, Karen's ability to collect enough substantiating data helped prove her students truly benefited from the TEMP project. As a future concern, Karen included in her final report that she believes her continuous emphasis on reading open response questions might have created the impression for her students that multiple choice questions were insignificant during testing. She noticed students rushing through the multiple choice section in order to arrive at the OR question located after them. Next year, she plans to find a balance between the two.

TEMP

As a form of professional development for Kentucky teachers, I believe TEMP is a well-timed answer that holds the key to sustained and systemic change, not only in teaching practice but also in student achievement. Too many conscientious teachers are approaching the crossroads of change and unsure of how or where to cross. For Beth, the TEMP project provided "a deliberate process of improving…instruction with a well formed support system to help…every step of the way". And Karen felt pride in her students' progress, even sharing that with them as a form of motivation. What these two teachers experienced and learned from this professional development project is truly unparalleled. It gave them the means and knowledge to continue making changes and to be life-long researchers. Unquestionably, TEMP served as the ultimate guide to the way of change.

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