Action or Research? The purpose of action research projects in professional development.

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The use of student success data to inform and refine MSP work

Summary
The Arizona Teacher Institute is a three year part-time master's degree for middle school teachers, which includes courses in mathematics and education and two final projects, an action research project and a mathematics research activity. In this presentation we will discuss what teachers' work on action research projects reveals about how they define and measure student success, and how teachers' perceptions of student success compare with those of the STEM and education faculty who work with teachers in our program. We will also discuss how teachers' efforts to define and measure student success have led to improvements in their teaching practice.

1. Questions for dialogue at the MSP LNC

The goal of the action research project in our master's degree program is twofold. First, we expect that a teacher who completes the project will better understand the process, benefits, and ethical aspects of education research. Second, we hope that the project will enhance the teacher's awareness of what is happening in his or her classroom and provide opportunities to reflect upon and improve teaching practice. In order for these two goals to be achieved, a teacher must settle upon a notion of what student success means within the context of the project, and a plan for tracking students' progress towards specified goals. Based on observations over the course of the study, the teacher makes decisions to extend certain innovations into future practice. Thus the way the teacher carries out the action research project - both the plan for the study and the assessment of the results - provides a unique window into the teacher's beliefs about what student success towards specified goals means and how it can be measured. We therefore propose the following questions for dialogue:

What do teachers' choices in designing and evaluating action research projects tell us about how teachers define and measure student success?

How do practitioners' ideas about student success contrast with those of the "outsiders" who study and evaluate K-12 mathematics teaching?

2. Conceptual framework

The Arizona Teacher Institute is a three year part-time masters' degree for middle school teachers, which includes four 4-unit courses in mathematics, two courses in mathematics education and two final projects, an action research project and a mathematical problem-solving activity.

Action research is a reflective process which supports teachers in investigating problems of interest within their own classrooms. Often, teachers are seeking to improve instruction and thus student participation and achievement. Components of action research may include: (1) self-identified problems, (2) self-examination and assessment, and (3) collaborative inquiry (with other teachers, university faculty, or administrators (Watts, 1985). Essential to action research is the process of posing questions, gathering and analyzing data, and determining a new course of action. One of the sometimes implicit goals of the process is to develop the "reflective practitioner" (Schon, 1983), who approaches daily practice in similar ways to that of the action researcher. In addition, researchers have identified multiple potential benefits of action research for teachers including improvements in collegiality, communication, and networking (Little, 1981), opportunities to develop and demonstrate autonomy and professional judgement (Cochran-Smith & Lytle, 1993), and enhancement of teacher knowledge, instructional practice, and student learning (Cochran-Smith & Lytle, 1999; Hiebert, Gallimore, & Stigler, 2002; Shulman, 1987).

The only measure of student success that the project is collecting systematically is student course grades and test scores. However, teachers' projects define goals, and therefore measures of success, much more broadly. The teachers were interested in whole group math discussion, increased capacity to express mathematical thinking in writing, improved homework completion rates, more positive dispositions towards math, and improved sense of self-efficacy in mathematics.

3. Explanatory framework

Two cohorts of the Arizona Teacher Institute have now completed action research projects, for a total of 20 projects. In some cases these projects are valuable for teachers, bringing out lasting changes in practice. The projects require considerable investment of instructional resources, so it is important to have evidence of their effectiveness in improving teacher practice, in particular their effectiveness in developing the reflective practitioner described above.

In the projects that have been completed, we see many promising signs that the action research component of our program is producing teachers who are more reflective about their practice and more willing to try pedagogical innovations that enhance student success. Each action research paper concludes with a reflection on the results of the study the author has conducted; this reflection includes recommendations for the teacher's (and potentially other teachers') future practice. These recommendations frequently include teaching techniques that are consistent with mathematics reform pedagogy: asking students to reflect in writing on their own learning, assessing students' ability to communicate how they solve a problem rather than simply asking for a correct answer, emphasizing cooperative learning, using technology as a tool to help build students' understanding of concepts, *et cetera* We conjecture that the process of conducting an action research study, which for many teachers focused on particular reform-oriented pedagogical moves, such as facilitating whole group math discussions or using cooperative problem solving groups, helped teachers to better understand how to implement these pedagogical strategies effectively in their classrooms, and helped to convince them of the benefits of these instructional moves for their students' learning, dispositions and/or participation, potentially in ways that simply reading articles about the pedagogy or seeing the pedagogy modeled in a math content course for adults may not have achieved.

How ATI teachers define student success is a direct reflection of the goals they propose for their own

practice and for their study. For example, if their goal is student confidence, then the measure of student success would be a measure of student confidence. Other measures include:

- Students' ability to perform mathematical tasks, ranging from routine computations to complex problems
- Students' ability to articulate mathematical ideas and communicate how they solve a given problem
- Students' ability to work cooperatively with classmates and collectively arrive at a solution to a challenging problem
- Students' confidence in and comfort level with their ability to solve problems

In their projects, teachers use a variety of methods to assess how students are progressing according to these criteria, including student work samples, pre- and post-tests, student journals, observations recorded in teacher journals, and videotaped lessons and group interactions. Each teacher uses several data collection methods in his project; this careful attention to tracking student progress entails many collateral benefits for the teacher, such as better insight about which students are struggling and on what concepts, and understanding of how students respond to various components of a lesson.

In many ways, action research projects serve a purpose for in-service teachers similar to the purpose served by undergraduate research experiences for mathematics majors. The research itself is often not new, but the authentic experience engages students with the subject in a way that sustains their ability to apply the theoretical knowledge they have acquired in their courses in the practice conduct of their professions.

1. Bibliography

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