Increasing reform implementation and teacher efficacy through peer coaching

**Background and Purpose**

This study measured the effects of peer coaching and related mathematics in-service of twelve grade 3 and 6 teachers who participated in a brief but intensive professional learning program over six months. The program included in-service focused on standards-based pedagogy as well as peer coaching opportunities focused on goal setting, observations, and debriefing. We focused on observable shifts in instructional practice and teacher beliefs about instructional capacity to teach mathematics.

Teacher peer coaching is an intensive professional development activity in which teachers provide one another with feedback about their teaching. This model for professional learning can help overcome the isolated nature of classroom teaching by establishing a learning community in which teachers share in goal setting, classroom observations and reflection. It is important to recognize possible limitations of peer coaching, however, which has not been found to be universally successful, especially when peer coaching initiatives have lacked teacher support for specific types of communication required to share constructive feedback and/or content-specific pedagogy training.

Teacher efficacy is a type of self-efficacy. Self-efficacy is the belief “in one’s capabilities to organize and execute the courses of action required to produce given attainments” (Bandura, 1997, p. 2). Self-efficacy affects behavior by impacting goals, outcome expectations, affective states, and perceptions of socio-structural impediments and opportunities (Bandura, 2000). Individuals who feel that they will be successful on a given task are more likely to be so because they adopt challenging goals, try harder to achieve them, persist despite setbacks, and develop coping mechanisms for managing their emotional states. Those teachers who believe they have the ability to positively affect student learning and achievement are more willing to implement challenging strategies to achieve their goals with students. Teacher efficacy contributes to achievement because teachers with high efficacy: use effective classroom management strategies encouraging student autonomy; meet the needs of low ability students; and, positively influence student perceptions of their abilities (Ross, 1998). Teacher efficacy can be increased, first and foremost, through mastery experiences (successful first-hand experiences); less effective at affecting teacher efficacy are vicarious experiences (observations of peers of similar experience levels), social and verbal persuasion (such as encouragement), and physiological and emotional cues (how the teacher is feeling about teaching/learning situations) (See Bandura, 1997).
Our goal for this study was to document the effects of peer input and professional development promoting innovative instruction, on the implementation of standards-based teaching strategies and teacher efficacy.

Method
In this study, a four-session in-service series was designed to: 1. Direct peer attention to instructional decisions and enhance content related pedagogical practices; 2. Increase the implementation of reform-based mathematics teaching, and; 3. Enhance teacher perceptions of their ability to improve learning using a reform curriculum. Participants were four pairs of grade 3 teachers and two pairs of grade 6 teachers. The 12 teachers were volunteers and reflected a range of mathematics teaching styles from traditional to reform. The key challenges were reducing teacher isolation through peer coaching opportunities (funded by Ministry of Education grant money) and providing teachers with both the conceptual and strategic tools to move toward mathematics reform implementation as well as the skills to participate effectively as peer coaches. The two-pronged approach of providing peer coaching training and math pedagogy training required in-service that explicitly addressed each of these components. For example, each PD session began with training on peer coaching techniques and a debriefing of the between session peer coaching activity for each peer coaching pair. Later in the same PD session, discussion of a specific dimension of math teaching, such as student construction of mathematical ideas was introduced and followed by specific mathematics tasks that successfully illustrated how this dimension could be implemented with students.

The researchers drew on multiple data sources: (i) Teacher observations (48 observations in total with a focus on selection of mathematical tasks, student construction of mathematical knowledge, and support for student-student interaction); (ii) Online self-assessment (teachers completed an online assessment at the beginning and the end of the study); (iii) Peer coaching summaries (each teacher was observed by his/her peer on three occasions and summaries were generated); (iv) Pairs interviews (transcribed interviews at the conclusion of the study focused on teacher perceptions of change in practice, the identification of specific examples of teacher and student activity that illustrated reported changes in practice, and teacher rationales about which component(s) of the professional development program contributed to the change, and; (v) Field notes of PD sessions.

The first level of the analysis focused on descriptive questions: Was the treatment implemented? Did the treatment have an effect on teacher practice? Which elements of the treatment had the greatest impact on teachers’ instructional practice and beliefs about their capacity (teacher efficacy)? The second level of analysis used pattern matching (Mark, Henry, & Julnes, 2000) in which we compared hypothesized to observed events to test the claim that self-assessment contributes to professional
growth. Credibility of the qualitative findings was enhanced by 1) triangulating between data collection times (pre and post data collection) and interpreters (multiple observers and data analysts) (Creswell, 1998); 2) maintaining an audit trail by creating charts of relationships and counting instances (Miles & Hubberman, 1994); 3) searching for evidence of alternative theories; i.e., testing the alternate hypothesis that provision of pedagogical content knowledge is sufficient for teacher change (Mark, Henry, & Julnes, 2000). Although the number of cases was too small to make statistical significance tests meaningful, quantitative summaries contribute to the credibility of our cross-case claims.

**Findings**

The coaching reports indicated that the teaching pairs implemented the main steps of peer coaching successfully during the three peer coaching opportunities. Participants observed their peer teaching mathematics, gave feedback to their partner on the observed lesson, received feedback from their partner on their own teaching, helped their peer set mathematics teaching goals, and, were given help setting their own goals. Three key findings of the study reported in this paper are: first, teachers moved their practice toward standards-based methods; second, the professional development program had positive effects on teacher efficacy; and third, peer coaching caused participants to reflect more explicitly.

**Finding 1: Teachers changed their practice**

The main finding of the study is that teachers shifted their mathematics teaching practices. The observational data found that the 12 participants moved toward a more constructivist (student-directed, manipulatives-based, and conceptually-focused learning) approach in their abilities to facilitate student-student interaction. By the end of the PD program, teachers were also more likely to assign open-ended and engaging student tasks that encouraged multiple solutions. Teacher reports of increased attempts to encourage student construction of mathematical meaning were explicitly detailed in peer interviews. In interviews, participants attributed these changes in their practice to peer coaching and to the mathematics pedagogy training provided. It was not an either-or situation where one component was clearly more powerful than the other. The two prongs of the professional development program reinforced each other. The professional development and peer coaching strategies caused four complementary effects: 1) the peer coaching process awakened a desire for change; 2) the in-service presentations provided explicit and effective models of alternate practices; 3) the between session goal-focused activities provided opportunities for experimentation, and 4) the debriefing conversations provided teachers with opportunities to understand how to integrate new practices into their existing styles.

**Finding 2: Teacher efficacy increases due to multiple sources of feedback**

The second main finding of the study was that the professional development program had positive effects on teacher beliefs about their capacity as mathematics teachers. At the beginning of the in-service, some
teachers experienced depressed confidence in response to the peer coaching and in-service program. This phenomenon of depressed efficacy at the onset of efforts to shift practice has been documented by other researchers (such as Woolfolk Hoy, 2000). However, by the end of the professional development program, teachers reported that they felt more confident and capable of teaching mathematics with an emphasis on conceptual understanding. This was attributed to the fact that several sources of efficacy-building feedback were simultaneously and readily available in the peer coaching context – mastery and vicarious experiences, social and verbal persuasion, and physiological and emotional cues.

Finding 3: Intense reflection may be habit forming
A less anticipated third finding was that participants were led to self-reflect more frequently and explicitly due to the interaction with their coaching peers. The peer coaching process removed the norm of isolation by providing a structured forum for teachers to share their interpretations of teaching experiences and receive feedback.

Implications
The professional development program had a positive impact on teacher efficacy and on teacher implementation of standards-based teaching. The combination of content specific pedagogical training and peer coaching proved to be effective in supporting teachers in their implementation of innovative strategies. Teacher judgments about their abilities to influence student learning were affected by the combination of information sources. Not only did teachers have positive mastery experiences using standards-based mathematics teaching and learning strategies, but they also received information about their success through peer interaction and observing models of teaching (social and verbal persuasion, vicarious experience and physiological and emotional cues). The nexus of efficacy information sources reinforced one another to provide the participants with strong positive messages about their teaching, which in turn encouraged further risk-taking and implementation of challenging strategies.

These findings allowed researchers to revise and expand a model of teacher change, which further enhances our understanding of the reciprocal relationships created during the professional development process. Peer input influenced teacher efficacy and innovative instruction as predicted, but equally powerful was the influence of innovative instruction and teacher efficacy on peer input. That is, as teachers implemented standards-based mathematics teaching and increased their efficacy, the quality and importance of peer feedback was also increased. The revised model acknowledges the strong reciprocal links between peer input, teacher use of innovative strategies and teacher efficacy. This study emphasizes the potential of peer coaching to foster teacher and student learning in mathematics when it is accompanied by additional content-specific support and structures and training
are provided for teachers to give meaningful feedback. The study also led researchers to consider recommendations for future peer coaching initiatives that would further strengthen this model, including: implementing a whole-school approach that pairs same grade teachers within the same school; linking the peer coaching process to the school plan; extending the number of peer coaching sessions from three to five to see teachers well beyond the confidence dip.

References
About this summary

This research summary was developed from the study:


This summary reflects findings from this study only and is not necessarily representative of the broader body of literature on this subject. Please consult the original document for complete details about this research. In case of any disagreement, the original document should be understood as authoritative.

Key Words

Math, Learning communities, Professional development for teachers, PLCs, Teachers / Educators, Teaching and learning / pedagogy