

Session Title:

Using a Retrospective Pretest to Reveal the Effects of a Teacher-Leadership Development Project

MSP Project Name:

Mathematics Teacher Transformation Institutes

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Project Session**Strand 3****Summary:**

We evaluated a math teacher-leadership development project using a self-report pretest-posttest design including retrospective pretest ratings to control for response-shift bias. Math teachers from Cohort 1 took the pretest, posttest and gave retrospective pretest ratings. Pretest-posttest comparisons indicated that the project was not generally effective. However, a comparison of retrospective pretest ratings with posttest ratings indicated that the project significantly increased leadership development generally. Similar results were obtained when we used self-efficacy for teacher leadership as the dependent variable. This suggests that project effects were masked when only pretest-posttest comparisons were made. Self-efficacy change was the only predictor of increase in teacher-leadership activities. We outline changes in research and project design made for Cohort 2 based on these findings.

Section 1: Questions framing the session:

How do we define teacher leadership?

How do we assess change in teacher-leadership activities?

Which aspects of the MTTI program might account for change in teacher-leadership activities?

Section 2: Conceptual framework:

Lehman College's Mathematics Teacher Transformation Institutes (MTTI) is designed to support the development of teacher leaders to strengthen mathematics teaching and learning in Bronx, New York, middle and high schools. MTTI developed a three-year three-dimensional project that focuses on deepening participating teachers' content knowledge, broadening their pedagogical repertoire through the process of inquiry, and developing their leadership capacities across a number of domains. The MTTI project was designed to accommodate two cohorts of teachers consecutively. This

presentation contains findings relating to leadership development in Cohort 1. It also outlines how Cohort 2 implementation was modified following results from Cohort 1, as far as the leadership component of the project is concerned.

In their review of the then current literature on teacher-leadership, York-Barr and Duke (2004) noted that there were many and varied conceptualizations of teacher leadership and which elements of practice demonstrated teacher leadership. This posed a problem for us in terms of how to create an operational definition of teacher leadership. We decided to follow the model developed by Lord and Miller, 2000, and elaborated by the National Council of Supervisors of Mathematics [NCSM], 2008, that proposes that seven major types of leadership roles can be related to leadership development in mathematics. They seven types are as follows:

1. **Type 1 (T1): In-classroom support of individual teachers** - addressing the needs of individual teachers, feedback, modeling, team teaching;
2. **T2: Professional development activities for groups of teachers** – providing year-round workshops or institutes with follow-up in individual teachers’ classrooms;
3. **T3: Indirect support benefiting several classrooms** – performing service on standards and curriculum committees;
4. **T4: Crisis management**—responding to the unexpected;
5. **T5: Interactions with a larger educational community** - networking with math teachers from local schools, at district level, or nationwide;
6. **T6: Initiating extra-curricular mathematics activities** - initiating a mathematics or robotic team or creating other extracurricular activities; and
7. **T7: Initiating personal growth and professional development in mathematics** - refining own teaching practices, classroom research.

In order to develop a theory of action for teacher-leadership, we hypothesized that teacher-leadership activities could be increased by developing participants’ self-efficacy for teacher-leadership (Bandura, 1977; 1997). The concept of self-efficacy derives from Bandura’s social cognitive theory (Bandura, 1977; 1997). It is based on the notion that people expect that a particular set of actions in specific situations will lead to certain outcomes. If a person also believes that she or he can successfully perform the behavior required to bring about the particular outcome in a specific situation, then the person is said to have developed a positive self-efficacy expectation about his or her performance in that situation (Bandura, 1977).

Bandura asserted that a person’s decision to engage in a task and the amount of effort he or she will put into the task are related to a person’s confidence level in that specific domain (Bandura, 1993). For example, if people perceive themselves as capable of taking on a teacher leadership role, they will be more likely to play this role even in circumstances that might discourage the behavior (e.g. in a non-supportive school environment). This action will likely confirm their perceptions of themselves as teacher leaders, and their belief that they can bring about desirable environmental changes (Bandura, 1997).

The leadership component of the MTTI project for Cohort 1 consisted of two blocks of leadership seminars. The Leadership Seminar 1 component began in February 2011; Leadership Seminar 2 began in May 2011. The Director of the New York City Mathematics Project (NYCMP), and the MTTI Director led the seminars. In Fall 2010,

they also met with the participants three times during the Classroom Inquiry component of the project which featured conducting action research. Because it was important to lay groundwork for further exploration of the Common Core State Learning Standards, the first meeting focused on the Standards. The other two meetings focused on levels of cognitive demand for mathematical tasks as well as case studies from *Implementing Standards-Based Mathematics Instruction: A Casebook for Professional Development* (Stein, 2000).

We attempted to assess the effect of the formal teacher-leadership component of the MTTI project on developing participants' roles as teacher leaders. We also attempted to examine the relationship between any changes in MTTI teachers' leadership roles and self-efficacy for teacher-leadership as a result of undertaking the formal teacher-leadership course. This was done using a "pretest-posttest" design. The comparison was made by using a self-report survey mostly taken from the instrument developed by Seashore Lewis et al. (2010) that was designed to determine the extent to which MTTI participants indicated that they practiced different types of leadership roles and responsibilities and how confident they felt that they had expertise as teacher leaders (self-efficacy).

However in using self-report measures, it is assumed that there is no change in a person's subjective standard for measurement of the dimension being rated from pretest to posttest (Cronbach & Furby, 1970). But it is possible that a person's standard of measurement may change from pretest to posttest, and that this change could be brought about by participating in the very program the effects of which are being assessed. Such a change in a person's standard of measurement has been referred to as a "response shift bias" (Howard & Dailey, 1979; Manthei, 1997; Nakonezny & Rodgers, 2005; Pratt, McGuigan, & Katzev, 2000; Rohs, Langone, & Coleman, 2001).

A response shift bias is a source of contamination of self-report measures that can result in inaccurate pretest ratings and consequently inaccurate assessment of program effects or lack thereof (Pohl, 1982, Sprangers & Hoogstraten, 1989; Rohs & Langone, 1997). In order to correct this, we asked at the time of the posttest to respond twice to each item on the self-report survey. The first response asked for their estimations of their behavior after completing the course (posttest), and the second asks them to rate their behavior prior to beginning the course. This second rating is often referred to as the "then test". The difference between the "then test" and the pretest indicates the amount of response shift bias.

The initial administration of the survey (Pretest) occurred in May, 2010. At that time the participants were taking graduate-level math content and pedagogical knowledge courses, but had not taken formal leadership courses. The follow-up administration (posttest and "then test") took place on June 1st, 2011 after they had taken the formal leadership component of the MTTI program.

At pretest, MTTI teachers were asked to rate on a six-point scale the extent to which they were responsible for taking on each of 41 leadership roles and their confidence level as a teacher leader (Item 42) (pretest). At the follow-up administration, participants recorded both their posttest responses and their "then test" ratings on the same survey form. For each survey item, respondents were first asked to indicate how much responsibility they had for carrying out a particular leadership role and their confidence level for leadership at present (posttest). Then, for the same item, they were

asked to indicate retrospectively how much responsibility they had for carrying out that particular leadership role and their leadership confidence in May 2010 (then test). Responses were compared across the six types of teacher leadership roles and activities identified earlier and for an overall mean rating of teacher leadership.

Section 3: Explanatory framework:

We found there was no significant difference between the ratings when the pretest was compared with the posttest. However, when the “then test” was compared with the posttest, posttest ratings were significantly higher than “then test” ratings. In addition, the “then test” ratings were significantly lower than those of the pretest. These results suggest that as far as the overall teacher-leadership activities ratings were concerned, response-shift bias had occurred from pretest to posttest, and that it was in the order of about two points, on average, on a six-point scale.

When the data for each of the six teacher-leadership types were examined, a somewhat similar pattern emerged. There were no significant differences between pretest and posttest scores for any of the six types of teacher leadership. However, when the posttest was compared with the “then test”, the ratings on the posttest were significantly greater than those on the “then test” for five of the six leadership types.

The results for the self-efficacy ratings followed a similar pattern as those for the overall teacher leadership activities ratings. The posttest ratings were significantly higher than the “then test” ratings, but there was no significant difference between the pretest and posttest self-efficacy ratings. Thus it would appear that a response-shift bias occurred for teacher leadership self-efficacy just as it had for teacher-leadership activity rating from the beginning to the end of the leadership course.

There was a significant positive correlation between “then test” to posttest change scores for leadership activities and the “then test” to posttest change scores for leadership self-efficacy. We found that change in leadership self-efficacy was the only variable that significantly predicted change in leadership activity. In particular, we had found in a previous study that math content knowledge had increased following participation in the relevant math courses, but change in math content knowledge did not predict change in teacher-leadership activity.

Section 4: Discussion:

This study provides support for the view that response shift biases impact self-report ratings. It also furnishes evidence that the pretest-posttest method may mask the positive effects of an intervention program. For this reason we will continue to use the “pretest-posttest-then test” design for self-report surveys for Cohort 2.

Using this design we were able to report to the project leadership team that the leadership component of the project seems to have had a positive effect on developing leadership. For example, the aims of the MTTI leadership course were to deepen participants’ understanding of teacher leadership and encourage them to broaden their range of teacher-leadership activities. It appears from our results that at the beginning of the course participants’ concepts of teacher leadership were somewhat limited, but were considerably broader by its end. If that is the case, then that would account for them rating themselves reasonably highly as leaders at the beginning of the course, but at its

conclusion they understand on reflection that their initial level of functioning as a teacher leader was lower than they originally estimated.

As with the leadership roles ratings, the results suggest that for leadership self-efficacy MTTI participants changed their response criteria from the beginning to the end of the leadership course. At the beginning of the course they rated themselves as more efficacious than they did on reflection at the end of the course. It would appear that the teacher-leadership course had not only changed their thinking in regard to the extent and nature of the leadership roles they played, but also how efficacious they were in those roles.

One potential problem with the self-efficacy results is that there was only one item which assessed it, and this item was of a general nature. Therefore, the self-efficacy results might lack precision. Having only one item that assessed self-efficacy also meant that we did not have self-efficacy items which related to the six specific types of leadership activities that we report on. Yet Bandura's definition of self-efficacy is clear that self-efficacy is task and context specific. With only one general item to measure self-efficacy, we cannot say whether efficacy ratings would have followed a similar pattern if each of the six types of leadership activity was considered separately. For research with our second cohort, we have developed self-efficacy items that relate directly to the six types of teacher-leadership.

A general problem with using self-report surveys is their potential lack of validity. That is to say, respondents may not behave in practice in the ways or to the extent that they report on the survey form. In an attempt to increase the validity of the survey results of Cohort 2, we have designed logs for the MTTI teacher-consultants to complete after each visit with the MTTI teachers in their schools. These logs ask about the types and extent of leadership activities the MTTI teachers engage in at their schools and in the wider community.

Partly because of our findings, for Cohort 2, the leadership component of the project has been in operation throughout the lifetime of the project, rather than in one block towards the end of the project as was the case for Cohort 1. This gives the leadership element more prominence in the project, and it is hope even greater effectiveness than for Cohort

Section 5: How will you structure this session? What is your plan for participant interaction?

We will present the paper for fifteen minutes, and then ask for questions for the remainder of the session. If time remains, we will lead a discussion on operational definitions of teacher leadership, ways to assess teacher-leadership development, and ways of validating results from self-report surveys. We will also discuss ways to feed information back to project directors to make effective changes to the project.