

Evaluation of the Math & Science Teacher Leader Institute Professional Development Partnership¹

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End-of-Year External Evaluation Report
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Introduction

This report presents findings, analysis, and reflection questions based on the external evaluation of “*Developing CPS mathematics and science teacher leaders through University-District partnerships*,” a Teacher Leader Institute (TLI) funded by the Illinois State Board of Education’s Math and Science Partnership (IMSP). The TLI is a three-year professional development partnership between the CPS Office of Math and Science, the UIC Math Department and Loyola University’s Science Education Program. It aims to extend and deepen the professional development of mathematics and science teacher leaders by equipping teacher leaders to provide direct, job embedded assistance to middle school classroom teachers. Each year the TLI is offered to 30 CPS science and mathematics teacher leaders. In its initial year the 30 participants included 15 Citywide Specialists and 15 Math/Science Magnet Cluster Lead Teachers.

During the 2006-07 program year the Teacher Leader Institute aimed to provide an effective learning environment that would provide the opportunity for participants to:

- deepen content and pedagogical knowledge in math and science;
- enhance their effectiveness (roles) as teacher leaders (particularly at the middle grade level);
- develop a professional learning community of math and science teacher leaders/specialists;
- develop and carry out an action research project aimed to support participants in deepening their expertise, sharing new knowledge, and reflecting on their practice as teachers and teacher leaders.

External evaluation for the IMSP-TLI was undertaken by evaluators from the PRAIRIE Group, University of Illinois at Chicago, from July 2006 – June 2007. A data brief was prepared in August 2006 that presented evaluation findings from the summer portion of the Teacher Leader Institute, a two-week summer institute carried out from July 17 – 28, 2006.² This report focuses primarily on the year-long Teacher Leader Institute that took place from September, 2006 through June 5, 2007. During that time participating teacher leaders attended monthly professional development sessions and received training and support in developing and conducting an Action Research Project. While we do not systematically review findings from the Summer Institute

¹ For further information, contact Janise Hurtig, jhurtig@uic.edu, 312-413-3367. The conclusions drawn in this report reflect the viewpoints of the authors. While there are many potential viewpoints, these reflect a systematic analysis of data by external evaluators. The hope is that these findings can facilitate improvement of this and related programs through open discussion and consideration of data-driven understandings.

² The TLI Summer Math and Science Institute Report can be viewed at the following website: http://research.cps.k12.il.us/cps/accountweb/Evaluation/View_Evaluation_Reports/View_Evaluations_by_Office/View_Office_of_Mathematics_and_Science_Evaluations/Completed_Evaluations/

evaluation in this report, where relevant we do compare findings from that initial institute to the professional development activities of the fall and spring.

The purpose of this report is to provide formative feedback on the organization and delivery of professional development, as well as on the acquisition and use of new knowledge and development of professional roles by participants, such that Institute developers and instructors can continue to improve the Institute's structure and content. With this aim in mind, we have organized the report findings and analysis into five thematic sections, with questions for reflection at the end of each section. The sections are as follows: (1) Quality of the Institute, (2) Deepening of Participants' Content and Pedagogical Knowledge, (3) Role Development of Teacher Leaders in Math/Science, (4) Development of a Professional Learning Community, and (5) Organization and Value of the Action Research Project.

Evaluation Methodology

The evaluators collected qualitative data over the program year in order to address the following guiding themes and questions:

1. Quality of the Institute's Professional Development Sessions:
 - What was the quality of the institute organization and presentation?
 - Did the institute provide an effective learning environment for participants?
 - Was the Institute's organization and schedule effective in supporting the regular participation of teacher leaders?
 - How did the organization and presentation of the Mathematics Session (Fall 2006) compare to that of the Science Session (Spring 2007)?
2. Deepening of Participants' Content and Pedagogical Knowledge:
 - Did participants increase or improve their content knowledge and, if so, in what targeted areas?
 - Did participants increase/improve their pedagogical knowledge and, if so, in what ways?
 - Did participants begin to apply new content and pedagogical knowledge in their roles as teacher leaders and, if so, in what ways?
3. Developing Teacher Leaders in Math/Science (Roles):
 - How did the institute impact participants in their roles as teacher leaders and/or as classroom teachers?
 - How did the institute contribute to teacher leaders' ability to support math and science inquiry in schools and classrooms?
4. Developing a Professional Community:
 - Did participation in the Teacher Leader Institute contribute to building a professional community of math/science teacher leaders? If so, how did specific Institute activities contribute to building this community?
 - How did participants tap into this community in their roles as teacher leaders?
 - Did the Institute help develop a single professional community, or were there meaningful distinctions between the communities of Citywide Specialists and Magnet Cluster School Teacher Leaders?
5. The Action Research Project as a Component of the Teacher Leader Institute:
 - Was the Action Research component integrated effectively into the Institute?
 - Did participation in the Action Research Project contribute to the development of participants' expertise as math/science teacher leaders? If so, how?
 - Did participation in the Action Research Project contribute to the development of a professional community of math/science teacher leaders? If so, how?

The evaluators used the following data, collected from September 2006 – June 2007, in order to respond to these questions:

1. Observation of Fall and Spring Institute sessions--two science sessions, one math session, and one action research work session;
2. On-site shadows/interviews with two teacher leaders—one Citywide Specialist and one Math/Science Magnet Cluster lead teacher, and a phone interview with a second Magnet Cluster lead teacher (See Appendix C for the interview schedule);
3. Extended written reflections completed by participants during the penultimate week of the Institute (see Appendix A for Written Reflections Form). The written reflections were conducted by CPS internal evaluators and completed by 14 of the 30 participants (11 Citywide Specialists and 3 Math/Science Magnet Cluster lead teachers);
4. Focus group interviews with Institute participants, conducted during the final week of the Institute (see Appendix B for Focus Group protocol). Four focus groups were convened: three groups of Citywide Specialists (12 total) and one group of Math/Science Magnet Cluster lead teachers (6 total).

It bears noting that the lesser participation of school-based lead teachers in the written reflections and focus group discussions was due in part to challenges they faced in leaving their schools to attend Institute activities during the school day. (This issue is discussed in Section 1 of the Findings and Analysis below.)

Findings and Analysis

1. Quality of the Institute: Structure, Organization and Presentation

Overall, feedback from TLI participants was positive with regards to the structure, organization, and presentation of the fall/spring school-year professional development facet of the TLI. It is notable that for all components, participants particularly valued a structuring of the sessions in such a way that they were able to work in small groups together – whether they were engaged in mathematical problem-solving, hands-on science labs or problem solving, or sharing findings from Action Research Projects. This finding echoes feedback from participants at the end of the TLI Summer Institute, at which time they similarly commented on the value of small group work around hands-on activities, problem solving and discussion of classroom cases.

Beyond this common theme, the TLI participants' feedback on the Science, Mathematics and Action Research components of the Institute varied in significant ways that were corroborated by evaluators' observations of those sessions. Thus, we report on each of these sessions separately below.

Science Institute Sessions:

In written reflections, 5 of 14 responding teacher leaders expressed an overall satisfaction with the pedagogy of the Science sessions. Three respondents expressed appreciation for the instructors' knowledge and enthusiasm, 5 respondents identified as particularly effective the hands-on activities and/or lab work, while 1 teacher leaders indicated an appreciation of the group work opportunities. Four participants indicated that the pedagogy for the Science Institute sessions could have been improved through additional time engaged in “hands-on,” “inquiry-based” or “lab-type” activities. One respondent specified that such activities would be useful if they “addressed the concepts being presented.” Our observations of a sample of science sessions similarly showed that the value of the sessions could have been enhanced by greater reinforcement of the content/concepts provided during the lecture, via hands-on, small group activities.

During our observations of science professional development sessions, participants (during informal conversation) expressed a range of opinions to the evaluators regarding the overall quality of the sessions. For instance, several participants expressed being very engaged with the entire session, while two participants noted that they found the lecture section interesting but too long -- “especially for a Friday,” as one participant put it.

Math Institute Sessions:

The overall response to the Mathematics Sessions was consistently positive. Eight respondents indicated overall satisfaction with the pedagogy of the math sessions. More than one respondent expressed appreciation for each of the following: the use of and modeling of effective questioning, the inclusion of group discussion, the opportunity to do problem solving and see how others solved the same problems, and the depth with which they led the group in exploring math concepts. Feedback from the end-of-year written reflections corroborated the informal feedback provided by participants during sessions the evaluators observed, in emphasizing the effective balance of review of case studies followed by small group work, followed by whole group discussion. “I loved having time to work the case problems alone . . . then sharing my thoughts and reasoning with my tablemates. Finally hearing and seeing how others solved the same problems.”

Several respondents to the written reflections questions expressed particular appreciation for the case studies. While similar appreciation was expressed in one focus group discussion, in another focus group it was suggested that it would be useful to review cases that resembled more closely “the real world of the schools we work in.” A similar comment was made on one written reflection form, in which the teacher leader noted that “the problems given in the training are not necessarily the problems given to elementary school children.” However, feedback from participants did not include concrete suggestions as to what such “real world” cases might consist of.

Action Research Component:

In contrast to their responses to the science and mathematics units, Institute participants -- both Citywide Specialists and Math/Science Magnet Cluster lead teachers -- expressed a mixture of positive comments, reservations and criticisms about the structure, organization, and presentation of the Action Research Project.

The most salient areas of organization participants addressed were as follows:

- Lack of clarity about the nature of the project. Several participants suggested that it would have been useful to have reviewed a sample Action Research project beforehand.
- Poor pacing. Participants wished they could have started earlier in order to collect and analyze data more gradually. Instead it felt rushed at the end.
- Uneven and at times inadequate guidance or assistance from the facilitator. While the participants seemed to enjoy working with the facilitator, and several expressed appreciation of the content of his feedback, a few participants noted that the feedback at times came too late, and there was speculation in the focus groups that perhaps the facilitator was “spread too thin” to be able to offer the kind of initial guidance they needed in framing their topics and the later guidance they needed in responding to challenges as they collected data for their research.

Summary:

It bears noting that participants’ feedback on the structure and organization of these three components are generally consistent with their responses to these components as they were carried out during the Summer Institute, in which there was generally high satisfaction with both

science and mathematics sessions but greater satisfaction with the mathematics session, both in terms of organization and instructor presentation of content. Also, feedback about the Action Research projects was similar after both Summer and Fall/Spring TLI sessions: participants expressed concern about a lack of clarity of the project's form and process as well as concern about the pacing of the project, and whether they would be able to dedicate sufficient time to accomplish the tasks at hand. (It should also be noted that the external evaluators were not able to draw upon daily CPDU (Continuing Professional Development Units) feedback for the fall/spring professional development sessions as they did for the Summer Institute.)

However, the organization of the fall and spring professional development sessions were different in one way that was specifically problematic for the Math/Science Magnet Cluster lead teachers, and that was the convening of the sessions not only during school hours on Fridays, but also occasionally on additional days toward the end of the school year as the Action Research Projects were being wrapped up and presented. During the focus group discussions the Magnet Cluster lead teachers identified the conflict they experienced around having to choose between being in the school on Fridays or attending a TLI meeting. The comments of one lead teacher suggested that the requirements of the TLI to attend four meetings prior to the ISATs (Illinois State Achievement Tests) conflicted with District policies that included limits to the number of off-site meetings teachers were supposed to attend, and with the needs of their school which was on probation. Two Math/Science Magnet Cluster lead teachers specifically contrasted the significance of Friday attendance for them to the Citywide Specialists, noting that while for lead teachers it is the worst day to get pulled out, "for the specialists it's a treat." While this sentiment was not expressed by any of the Citywide Specialists themselves, the comment on the part of the Magnet Cluster lead teacher, which others in the focus group discussion echoed, is significant in that it signals a perceived distinction between the two groups that may have inhibited the formation of a cross-role professional community of math/science teacher leaders.

By contrast, none of the Citywide Specialists identified the Friday meetings *per se* as conflicting or competing with their roles. (Some Citywide Specialists identified the TLI more generally as both supporting and competing with the demands of their positions, a point we discuss in Section 3 below.)

2. Deepening of Participants' Content and Pedagogical Knowledge

Review of institute participants' feedback on the contribution of the Institute to their content and pedagogical knowledge indicates certain trends across the Science and Mathematics sessions, as well as certain differences between them. In each section below we first report and reflect on common themes and then report on responses that were specific to the Science and Math sessions.

(a) Increasing content knowledge in mathematics and science

Common themes: Several participants related the value of the knowledge they acquired to their existing areas of expertise. One participant expressed in written reflections a general satisfaction with the "relationship of the [science] content with our level of understanding." In most cases participants found value in the subject area in which they had less expertise; in other words, those who felt they were more knowledgeable about math, valued what they learned in TLI about science, and vice versa. However, two teacher leaders wrote in their written reflections that the Institute content was useful in their area of expertise because it refreshed their existing knowledge. Similar reflections were offered by the Citywide Specialist and the math/science cluster magnet lead teacher who we observed and shadowed. For instance, the cluster magnet lead teacher noted that even though s/he has a math and science background, the content of the TLI "refreshed my knowledge and interest" (see also Section (c) below).

The one criticism of the content that was made about both the Mathematics and the Science Sessions came from a small number of teacher leaders who felt that the level of expertise needed to understand the content taught was too high, and that, as one respondent put it, “at times there was a notion that we were ‘mathematicians’ rather than math teachers.” Similarly, one participant commented about the Science Sessions in their written reflections that he/she was “very resistant to needing to know as much as a meteorologist.” In contrast to this critique of the Institute content for expecting too much expertise in the subject matter, another teacher leader expressed an interest in a more in-depth look at mathematics. This range of feedback attests to the challenge of providing professional development with participants of varied backgrounds. It indicates the value of structuring the professional development sessions in ways that optimize the ability of participants to build on areas of strength while enhancing areas in which they are less developed. It is quite possible that participants’ enthusiasm for the small group work and sharing is due in part to the fact that cooperative learning activities are well suited to professional development targeting participants with diverse backgrounds and interests.

Another issue that arose during focus group discussions was that of the potential relationship of math and science which, a few participants claimed, was not adequately addressed during the TLI. “Math and science content are supposed to be integrated across disciplines, but the TLI presents the different subject areas in isolation,” commented one specialist. As two Magnet Cluster lead teachers put it during a focus group discussion,

Lead Teacher #1: We never had a cross curricular presentation. Somebody from Loyola, somebody from UIC. ...

Lead Teacher #2: A math person [and] a science person teaching one lesson and showing how they can be integrated. Hello? Never did that happen. It [math instruction and science instruction] was separate buildings, separate days and we are trying to integrate it [math and science]. But we are learning it in isolation.

The range of participants’ responses to the content knowledge taught indicated how challenging it was to provide professional development that satisfied all participants when their backgrounds and role development varied considerably. It also attested to the range of ways in which teacher leaders thought about and used deeper knowledge and understanding of the subject matter in supporting teachers, as is discussed in the Section 3.

Science Content: The majority of participants expressed satisfaction with the content of the Science portion of the TLI. In written reflections, focus group discussions, and informal discussions with teacher leaders during and after our observations of Science sessions, some participants expressed regret that the content covered by the Science Institute was not more inclusive of “other strands of science.” Specific content areas of interest included “life sciences,” “biology,” and “the human body.”

Math Content: The majority of participants expressed satisfaction with the content of the Mathematics portion of the TLI. There were two content areas that some participants identified as lacking (in written reflections and during focus group discussion). One was some attention to the lower grades, as a way to provide a context for the middle grades emphasis of the content presented. Another, related area that two participants wished had been attended to, was the connection between the learning of math K-5 with learning in the middle grades. While participants represented this as a shortcoming in the pedagogy of the Math session, we understand this to be an expression of a desire for attention to a particular kind of pedagogical content area that those participants felt was not adequately addressed.

(b) Increasing pedagogical knowledge in mathematics and science

The principal way in which participants described acquiring new pedagogical knowledge in both mathematics and science was through learning from the instructional/pedagogical practices of the Institute instructors themselves. Participants were particularly enthusiastic about the time spent in groups solving problems or engaged in hands-on activities, followed by report-back to the whole group. (Evaluators' observations of PD sessions suggest that these pedagogical practices were key to the effectiveness of the TLI in contributing to the development of professional learning community among participants.)

Beyond these similarities across math and science, the kind of pedagogical knowledge participants most frequently identified as acquiring through the modeling of the Institute instructors differed for the two subject areas.

Science pedagogical knowledge: The new or important pedagogical practices teacher leaders identified most frequently were:

- hands-on
- exploratory activities such as doing labs,
- engaging in inquiry based activities
- group work

In an individual interview, one teacher leader noted that group work was particularly important in working with middle grades teachers, who this teacher leader characterized as tending to move away from more engaged learning and toward whole-group instruction.

Mathematics pedagogical knowledge: The areas of newly acquired pedagogical knowledge most frequently identified by participants were:

- effective questioning
- encouraging multiple strategies for solving problems

(c) Applying new content and pedagogical knowledge to roles as teacher leaders

Participants expressed a range of views as to **whether** and **how** instruction from TLI sessions facilitated their use of new content and pedagogical knowledge in their roles as teacher leaders.

In written reflections in particular, and to a lesser extent during focus group interviews and the on-site interview with a Cluster Magnet lead teacher, Institute participants identified several ways in which the content and pedagogy presented during the Institute supported their roles as teacher leaders:

- As a result of deepening, enriching or refreshing the teacher leader's knowledge, they were better able to explain material to the teachers they supported.
- As a result of the instructors modeling instructional practices, the teacher leaders were able to present or model these practices more effectively to the teachers they supported. For instance, in written reflections and in individual post-shadow interviews, teacher leaders described the ways they modeled small group work in ways that drew upon the small group work of the Institute.
- As a result of acquiring new knowledge or understanding, they were better able to support teachers. Teacher leaders referred to several kinds of new knowledge/understanding that they were able to draw on in their support of teachers:
 - New content knowledge in an area of science
 - New ideas about how to solve mathematical problems, that they could pass on to teachers
 - Greater understanding of the role of hands-on activities in science

Four respondents to the written reflections form commented that the Institute had assisted them in their use of CMSI materials, in particular the science curricula. Only one respondent identified in their written reflections a limitation in the transfer of knowledge to their roles as teacher leaders: namely, that the content did not help them mentor teachers in the CMSI materials. However, during focus group discussions several Institute participants described limitations in the Institute in terms of this transfer. For instance, three Cluster Magnet lead teachers commented that while there was a lot of new content presented, “there was not a lot of information about how to use it with our teachers.”

3. Role Development of Teacher Leaders in Math/Science

In the written reflections and focus group discussions, the term that teacher leaders used regularly to describe their roles was that of “**support.**” There were several kinds of support participants identified as having learned about in the course of TLI:

- Working with teacher groups. Some participants commented that the TLI gave them good ideas about how to work with grade level groups, or made them appreciate how important that was. That said, others indicated that TLI did not provide them with knowledge about how to take the group work they were doing at TLI and bring it into the school with teacher groups.
- Working across grade levels. In debriefs with a participating Citywide Specialist, this was an area of support s/he identified as having come to recognize as important as a result of participation in TLI.
- Providing more focus on instructional delivery, rather than exclusively on the curriculum. This shift in focus was noted by the teacher leaders we shadowed and interviewed. The Magnet Cluster lead teacher commented that “they [TLI] work with the curriculum, but the key is really delivery and how it’s taught.” The Citywide Specialist noted on a few occasions having learned through TLI ways of supporting teachers that pertained more to instruction than curriculum: the importance of not criticizing the way they approach teaching, and of supporting the ideas that they come up with for instruction, for instance.
- Modeling effective questioning. This area of support was mentioned by several participants in their written reflections and by two participants in focus group discussion. The most elaborate response came from one participant who wrote in their written reflection that s/he has “tried to encourage, model, and use effective questioning to bring out enriched discussions of math with/for the teachers I support.”

In one focus group discussion, a teacher leader identified the TLI as “supposedly” having a “dual purpose”: “on the one hand to deepen our knowledge as math/science experts but also to help us improve our ability to be facilitators for math/science teachers.” So in general participants felt as though they were being challenged in the area of content knowledge (sometimes overly challenged), but they were not being supported in thinking about how they could use that content knowledge to better support teachers in the schools. However, a few participants did indicate ways in which they anticipated being able to do so, at an abstract level.

4. Development of a Professional Learning Community

Evaluators’ observations of the professional development sessions indicate a high level of cooperative learning and sharing of knowledge among participants. The commonality of this practice during the Institute sessions corroborates participants’ enthusiastic comments about the value of sharing ideas and learning from the group—in particular around new ways to solve problems. Participants’ focus on the usefulness of sharing knowledge was further reiterated in their comments about the value they found in sharing Action Research findings. This emphasis on

shared learning from the group suggests that participation in the Institute supported the development of a professional community of teacher leaders. The comments of several participants during focus group discussions and shadowing debriefs indicates participants' interest in the exchange of knowledge extending beyond the period of the Institute. As one Cluster Magnet lead teacher put it during a focus group discussion, ". . . now we can call on each other for assistance and that is what we do and so I think this program did was made our bond a lot stronger." In the course of an on-site interview one Cluster Magnet lead teacher described this community as a "brain trust that has developed," praising the "think tank model" that the TLI has supported. This lead teacher also expressed concern about how their first cohort of TLI participants could remain in contact once the Institute was over, since they would not have institutionalized ongoing meetings.

During focus group discussions and individual on-site interviews, several Citywide Specialists indicated that they already were a professional community by virtue of their base office at CPS' Medill Professional Center and their regular contact together in their shared role. For these TLI participants it was difficult to discern what aspects of their professional community were due to TLI and what were due to other experiences and sharing of knowledge they engage in because of their common base and time shared at Medill. This perspective is consistent with the feedback provided by three different Citywide Specialists during focus groups or interviews. Each of these teacher leaders commented that it was difficult to determine which of their new knowledge and practices were the results specifically of TLI, since through their roles as Citywide Specialists they were exposed to a range of inputs into their practices and thinking as teacher leaders. At the same time, none of the Citywide Specialists conveyed a sense that the information and knowledge acquired during the TLI was made superfluous by their other professional development activities.

While none of the Citywide Specialists compared themselves to the Magnet Cluster lead teachers, the differences in their professional situations and contexts was a point of discussion in the Magnet Cluster focus group discussion. There was a sense among these participants that the two groups "occupy different universes" – the implication being that the professional learning community being formed through TLI did not span the two groups.

5. Contribution of the Action Research Project Component to Participants' Development as Math/Science Teacher Leaders

The purported purpose of incorporating an Action Research Project within the TLI was to contribute to participants' deepening expertise, sharing new knowledge, and reflecting on their practice as teachers and teacher leaders." The internal evaluators have reported in detail on the mixed and ambivalent perspectives that teacher leaders expressed in the written reflections about the usefulness of the Action Research projects. Here we draw on participants' feedback, to note three facets to the implementation of the Action Research Project that impeded its ability to contribute to these Institute goals:

- *Nature of the topics investigated.* Finding a feasible and compelling topic was a challenge identified by several participants. Some teacher leaders had to change topics mid-stream, either because they realized they could not collect adequate data for the topic they initially chose, or because they learned part way into the project that they were supposed to work in groups and had to abandon an individual project.
- *Difficulties collecting data.* Numerous participants reported on several occasions that they did not have enough time in the schools or with the teacher or teachers who were their research subjects to collect the data they needed for their projects. Citywide specialists commented

about the stresses that the projects put on them because were not in any one school more than one time per month.

- *Conflicts between participants' roles as teacher leaders and as researchers:* While several teacher leaders – both Citywide Specialists and Magnet Cluster lead teachers -- identified various ways in which participation in TLI conflicted or interfered with their roles as teacher leaders simply by virtue of the time demands put on them in terms of participation, this conflict manifest itself in several ways through the Action Research project. Most generally, participants were ambivalent about the amount of time they were required to devote to the Action Research Project because it took time away from their support work as teacher leaders. The irony of this conflict is apparent in the comments of one specialist, who noted that it was unfair to other teachers to focus on one particular teacher who was subject of the Action Research study, especially since it was a school that was in its first year of implementing new math curricula.

Questions for Reflection

1. Regarding the quality of the Institute:³

- Given the highly positive response to the mathematics session in particular, are there ways in which the balanced approach taken by the mathematics instructors can be drawn upon as a model for increasing the effectiveness of the Science and Action Research components?
- An issue of concern for many teacher leaders is the relevance of the content and pedagogy to the real worlds in which they teach. Are there ways in which the organization of the professional development can be modified to more directly incorporate real classroom situations encountered by participants into each, or some, instructional unit(s)?
- Given the significance of the issue of scheduling for Math/Science Magnet Cluster lead teachers in particular, and given that next year's TLI will be attended exclusively by Magnet Cluster lead teachers, are there ways in which the partners can minimize conflicting demands and expectations of TLI and schools?

2. Regarding the relevance of content knowledge:

Not surprisingly, participants had a range of opinions about the value of the content and pedagogical knowledge presented during the Institute, depending on their existing areas of expertise and interest. However, one of the reasons for the generally positive assessment of the Mathematics session was that the content presented seemed to integrate concepts, content, and problem-solving methods/strategies that could be used across the curriculum.

- Are there ways in which a similar balance can be struck in developing the content of the Science session?
- Given several teachers expressed interest in developing knowledge connections across the grade levels, can an effective balance between and integration of concepts, content, and problem-solving methods be maintained during the professional development sessions while also providing teacher leaders with greater understanding of the connections and continuities from one grade level to the next?

3. Regarding the development of teacher leader roles:

An area of challenge that surfaced through data collection during the fall and spring sessions (and was also raised by participants during the Summer TLI) is that of applying content or pedagogical

³ The evaluators suggest that the readers review the questions for reflection presented in the Summer Institute report, as they are pertinent to thinking about the overall Institute's organization, not only the Summer session.

lessons learned as a teacher to the leadership role. This is an area that participants continued to feel was not sufficiently addressed directly during the fall and spring professional development.

- Are there ways in which future sessions can include activities – such as role playing or watching video clips showing the interactions between the leader and the teacher – in order to address this area of professional development more directly?
- Given a pervasive sense on the part of both Citywide Specialists and Cluster Magnet lead teachers that there is a gap between the content of the professional development and the real life contexts in which they attempt to apply the knowledge they are acquiring, are there ways in which the real life situations and challenges that participants face in their roles as teacher leaders can be more formally incorporated into the organization of the Institute?

4. Regarding the Action Research Projects

It is evident from the feedback on the Action Research Projects that revision of the structure and organization of that activity will have to be considered if it is to be more effectively incorporated into the Institute. Here we would like to address some of the substantive aspects of the Action Research Project as they relate to Institute goals of supporting the development of Math/Science teacher leaders:

- Is it appropriate and/or effective to frame the Action Research Projects as research aimed at affecting school policies and practices, as it was presented during the Summer Institute? Or might it be a more meaningful and rewarding exercise for participants if the focus of their projects were more narrowly on their own practices as teacher leaders, for instance?
- Participants were guided through a process of scientific investigation for their projects that was based in identification of independent and dependent variables, hypothesis testing, etcetera. While this may be somewhat appropriate to the Institute in that it exposes participants to the process of scientific investigation. However, the limited time and resources available for data collection, and the complications some participants encountered with their research subjects (as in the case of one participant whose research subject went on maternity leave during the research process) made it difficult for them to follow through systematically on all stages of research. Given these exigencies, might it be possible to consider a range of research approaches that accommodate the interests and experiences of the teacher leaders – including qualitative approaches such as case studies and life histories?