1. Questions(s) or issue(s) for dialogue at Learning Network Conference session:

What are your projects key strategies for producing the desired outcomes? How are you documenting the adoption of those strategies and their relationship to outcomes?

What evidence is needed to promote sustainability of your project? How will you convince stakeholders that your work should be continued after your project ends?

2. Context of the work within the STEM education literature and within your MSP project:

As the Milwaukee Mathematics Partnership (MMP) enters into a new phase, substantive funding has shifted from the NSF to the State of Wisconsin. Specifically, the state has provided funding for many schools in the Milwaukee Public School District (MPS) to have a fully released Math Teacher Leader (MTL). Therefore, it will be important to continue to document and justify that schools’ participation in MMP activities, which we define as participating in MTL meetings and enrolling in courses at the University of Wisconsin - Milwaukee (UWM), is producing the desired results. Documentation of the importance of MMP involvement should also encourage reticent schools to increase (or even begin) participation in MMP activities.

3. Claim(s) or hypothesis(es) examined in the work (anticipating that veteran projects will have claims, newer projects will have hypotheses):

The MMP is a mature project that is now in its seventh year. As this partnership moves into a new phase of sustainability, as one that is financially supported by state and district funds, as well as NSF funds, as opposed to one that is only supported by NSF funds, it is important to continuously reinforce the claim that school-level involvement in the MMP is a critical factor for promoting student achievement gains. The current work examined the level of school involvement in key MMP-sponsored activities over a four year period and identified schools that had high, medium, low, and no involvement. MMP involvement was measured by adding two scores - one that quantified the attendance of the school’s MTL at monthly professional development meetings, and one that quantified staff participation in UWM courses designed to improve the teaching and learning of mathematics. Specifically, the first score was calculated by summing the percentage of MTL meetings that were attended by at least one representative from 2005 to 2008. The second score was created by summing the number of teachers at a school who took at least one course at UWM, the average number of courses taken per teacher at a
school, and the average credits earned by a teacher at a school. This computation resulted in higher scores for schools that had many teachers taking one course and lower scores for schools in which only a few teachers took many courses.

UWM mathematics educators and mathematicians were closely involved in all aspects of the development and presentation of both the MTL meetings and the UWM courses; this involvement was one of the factors which led us to hypothesize that student achievement growth over the four year period would be greater for schools that had higher MMP Involvement scores.

4. Evaluation and/or research design, data collection and analysis:

Existing data on student performance from all schools in MPS was utilized in the aspect of the evaluation that will be discussed at the conference. Specifically, MMP Involvement was expected to predict both student achievement growth over the period 2005-2008, and student proficiency in 2008.

As previously stated, MMP Involvement used two data sources—attendance records from MTL meetings and teacher enrollment in UWM-sponsored courses. MTL meeting attendance was expressed as the total percentage of meetings attended by at least one representative from a school. For example, a school attending 100% of all MTL meetings would receive a score of 4.0 because each year they would have received a score of 1.0, reflecting 100% participation in each year. Course enrollment was the sum of (a) unique teachers in a school that enrolled in at least one course, (b) the average number of enrollments for those teachers, and (c) the average credits earned by those teachers. For example, a school that had two teachers who each enrolled in a single 1-credit course received a score of 4.0 (2 teachers + 1 average enrollment + 1 average credit). These scores were then summed together to create a final MMP Involvement score. Scores were then normalized to classify schools’ involvement in MMP activities. Schools that had an MMP score that was one standard deviation below the mean were classified as having low involvement in MMP activities, schools that had an MMP score that was one standard deviation above the mean were classified as being highly involved in MMP activities, and schools that were within one standard deviation of the mean were classified as being moderately involved in MMP activities. Schools that never participated in MTL meetings and had no teachers enrolled in any UWM courses were classified as having no involvement in MMP activities.

Student proficiency in 2008 was measured by the state mandated standardized assessment, the Wisconsin Knowledge and Concepts Examination (WKCE). Student achievement growth reflected the change in the percent of students classified as proficient in 2008, as compared to 2005 as determined by the WKCE. For example, a school with 20% proficiency in 2005 and 35% proficiency in 2008 received a score of 15%. Student proficiency in 2008 was also utilized.

After the metrics were compiled, a one-factor ANalysis Of Variance (ANOVA) was conducted using MMP involvement as the grouping factor and either student proficiency in 2008 or student achievement growth as the dependent variable. Analyses were conducted across all grade levels, as well as individually for elementary grades (i.e. grades 3 through 5), middle schools (grades 6
through 8), and high schools (grades 9 through 12). These analyses were conducted using a Welch correction, as the assumption of homogeneous variance was found to be violated for the four different MMP involvement groups and were followed up with Tukey's HSD post hoc tests, to determine which groups differed statistically from each other. Results indicated that, when all grade levels were combined, schools with high MMP involvement demonstrated statistically significantly higher growth in student proficiency, on average, than schools with moderate, low, or no MMP involvement. Moreover, schools with high MMP involvement were also found to have a statistically higher percentage of students found to be proficient in 2008 than schools with low, or no MMP involvement. These results are depicted in Figures 1 and 2, respectively.

Figure 1. Relationship between MMP Involvement and Student Achievement Growth
5. **Key insights (retrospective for veteran projects, prospective for newer projects) that have value for the Learning Network:**

This work has highlighted the need for projects to clearly articulate their core strategies and activities, document and measure the impact of those strategies, and to develop evidence that those strategies lead to desired outcomes.

The MMP clearly articulated two primary professional development strategies—math teacher leader meetings and mathematics content courses for in-service teachers. While schools were not required to participate, all were encouraged to take advantage of these professional development opportunities with the promise that participation would lead to better student outcomes. Thus, documentation of participation over time and relating those results to student outcomes provides compelling evidence that the core professional development strategy has had a positive impact. This message is being carried forward to school principals, math teacher leaders, and district administrators as critical evidence for sustaining MMP efforts.