GECDSB – Mathematics Leadership Learning Project

Background

In April 2016, the Greater Essex County District School Board released a Math Task Force report. The report was a comprehensive review of system data as well as the current literature on mathematics education. The report also included recommendations that would serve to drive system planning of mathematics programming. One of the key considerations was to build the capacity of leaders. The development of school-based math leaders was also emphasized in the Renewed Math Strategy (RMS; Ministry of Education, 2016).

Mathematics leaders encompass a variety of roles in the system. They are central office personnel, Superintendents, Administrators, Program leaders, and under the RMS, Teacher Math Leads.

In September 2016, the GECDSB began supporting school-based math teams, which comprised of administrators, learning support teachers and classroom math leads. Through a variety of system-supported professional development opportunities, as well as structural and organizational supports, the goal of building capacity of lead-learners was put into action.

Building capacity of lead-learners included a professional development focus on three elements: mathematics content, mathematics pedagogy and mathematics leadership. Based on a research review, it was determined that these elements were the central skill sets needed by leaders to effectively lead mathematics learning in their schools and support student achievement. That presented the challenge, as the aspects of mathematics content, pedagogical, and leadership knowledges, and how they combine, were yet to be explored.

Given the current model for school support in the GECDSB, the role of school-based math leaders is critical in building sustainability, depth and spread of mathematics professional learning. More needed to be understood about their role, the levels of mathematics content, pedagogy and leadership knowledge necessary, and the structural supports required.

The Math Leadership Learning Project (MLLP) was designed to support the development of mathematics content-leadership at the school and system level.

Goals and Objectives of MLLP

This project aimed to support the work of Mathematics Leadership Learning Teams in 6 schools. The project goals included:

- Building mathematics content, pedagogy and leadership knowledge and skills of school-based math leaders
- Better understanding the supports needed for math leaders
- Improving student achievement in mathematics
- Informing system planning and supports.

Overview of MLLP

The Mathematics Leadership Learning Project (MLLP) is a project designed to support the GECDSB goals of building capacity of mathematics lead-learners and mobilizing them within schools in order to build expertise of all educators. Mathematics education leadership is an integral part of moving schools and systems forward and it is through the work of school-based leadership teams, that we build the pedagogical content knowledge of all educators.

In this project, school-based leadership teams consist of Administrator(s), classroom educators and learning support teacher.

Rationale

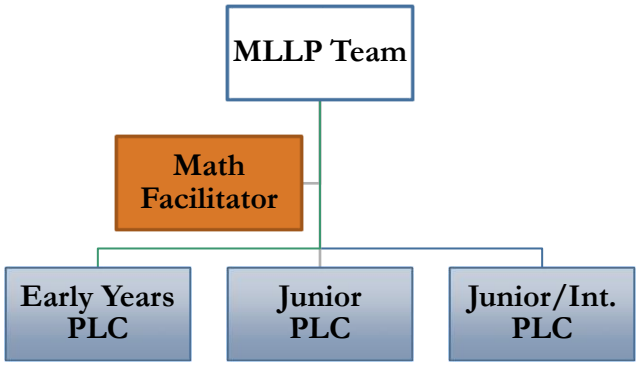
Lee Shulman (1986) first identified that an educator's pedagogical content knowledge is imperative to effectively support student learning. Since then, additional research has been done on Mathematics Knowledge for Teaching (Loewenberg-Ball, Thames, & Phelps, 2008) and Mathematics Knowledge for Leading (Stein & Nelson, 2003). Leveraging this research, this project aims to examine the role of school-based mathematics leadership teams that include administrators and teachers.

Building this capacity of all educators is part of the GECDSB Vision for mathematics and our current professional development plan. The GECDSB has a clear vision of and a goal for achieving mathematical proficiency among both educators and students. In order to enact this vision and enable it as a reality in every classroom, additional learning must be done on the implementation characteristics of school leadership of mathematics. This project continues to support school-based mathematics leadership and attempts to identify which structures best facilitate the spread of professional learning to every classroom in the system.

As an outcome, this project will help to identify a sustainable school-based structure that supports both educator professional learning and student achievement.

What is the MLLP?

The Math Leadership Learning project was designed to support leadership and school improvement in mathematics.



The MLLP team consists of the Principal, Vice Principal as well as a Kindergarten, Primary, Junior, Intermediate teachers, and Special Education teachers (see Figure 1).

The mandate of the team was to lead math learning in their school and the role of each member of the team was to support and lead a Professional Learning Community (PLC) in the school.

Figure 1. The make of a MLLP team—consisting of school personnel, supported by a central staff member.

The Math Facilitator was responsible for supporting the development of content-pedagogy and leadership of the MLLP team through the half-day PD sessions which were scheduled approximately every 6 weeks. The content and focus of the session was co-planned by the team and Facilitator. The sessions were designed to support the MLLP team with content-pedagogy and facilitation skills necessary to lead their PLC.

Setting Direction

School data helped to determine the goals and the initial meeting included a visioning exercise where the educators articulated what it would look, sound and feel like once the goal was achieved.

The 6-Week Cycle

Early in the project, teams articulated that the overall goals were too broad, making it difficult to visualize a path forward. Although overarching goals were necessary for general planning and monitoring, setting smaller goals made the process more manageable. Teams found that short cycles of learning, that included the staff and students, were helpful in making the project manageable and achievable.

The Whole-School Approach

Improving mathematics teaching across an entire school requires a common focus and common strategies. It also requires differentiated entry points. Schools chose an overarching content area focus to help contain their work (e.g., fractions). We found *tools* (e.g., manipulatives, technology) and *representations* (e. g., numeric, geometric, algebraic, graphical, pictorial, and onscreen dynamic) to be a means of unifying the focus for a 6-week cycle across the entire school.

Data Collection

Understanding that there are constraints in any district (e.g., time, money, personnel, systems), this project aimed to understand which learning experiences had the most impact on members of the MLLP teams. The following data were gathered in the MLLP schools:

- From MLLP teams:
  - Feedback via surveys
  - Interviews
  - Pre- and Post- Math Leadership Efficacy Survey
- From students: PRIME Mathematics Assessment.

Results: What experiences propelled leaders forward?

Those that participated in the project identified common experiences that impacted their leadership. The following is a description of these experiences.

1. Math leaders report that learning mathematics through conceptual tasks has had an impact on their understanding of mathematics, their attitudes and their confidence to communicate ideas and messages to colleagues and staff. Across all of responses of those interviewed, Math leaders articulated that learning mathematics through conceptual tasks had immense impact on their learning and leadership. This idea had an important impact on school and system decisions as it indicated that all professional learning should include mathematics content, focused on building the proficiency of the educators.

   Implications:

   - Include doing mathematics in all professional learning activities
   - Provide resources that include thoughtfully selected mathematics tasks
   - Include doing mathematics in school meetings/learning opportunities.

2. Planning professional learning within a culture of mathematics discourse[1] was another experience that leaders identified as impactful. Math leaders report that their leadership was enhanced when they planned and delivered professional learning with a team and/or facilitator who acted as a critical friend and provocateur. They articulated that deep professional discourse helped to improve the quality, precision, engagement and integrity of the learning. Leaders also identified that the deep talk, rich conversation and productive tensions—that were part of the planning—helped them to produce well-constructed, meaningful professional learning.

[1] Mathematics discourse includes explaining concepts and actions, questioning—using a range of cognitively demanding questions to promote thinking, challenging assumptions, relating concepts and procedures, conjecturing—creating evidence-based hypotheses, justifying thinking and actions, and generalizing (see e.g., Asking Effective Questions).

Implications:

- Leverage structures like the ALT (Administrative Learning Team) that support discourse
- Develop the skills of facilitators and coaches to aid discourse
- Provide leaders with protocols[2] that encourage mathematics discourse
- Investigate and use levels of talk/discourse.

3. Math leaders, especially Principals and Vice-Principals report that teaching mathematics helped them build credibility with colleagues and staff, and consolidate professional learning by building understanding of mathematics content-pedagogy. The act of planning lessons, understanding the mathematics and pedagogy, supported and directed many leadership moves.

   Implications:

   - Encourage Principals and Vice Principals to teach tasks and lessons
   - Seek out opportunities in system learning to try and share back teaching experiences.

4. All of the mathematics leaders interviewed identified that leading learning with colleagues inspired them to deepen their own understanding and clearly communicate beliefs, practices, and experiences with teaching and learning mathematics. Leaders discussed how these opportunities were significant in their learning journey and in all cases changed the trajectory of their leadership. This included *teachers* presenting to peers at school and system learning, as well as *Principals* presenting to other *administrators* through various forms.

   Implications:

   - Identify and leverage opportunities for leaders to lead learning with peers
   - Include leaders in system planning and PD delivery.

5. Math leaders reported that engaging in the moderation of student work along a developmental continuum helped them to better understand how children develop as mathematics learners. This served to inform their assessment and instructional practices. It also served to support the mathematics leadership by helping leaders develop an understanding of the development or trajectories of mathematical concepts.

   Implications:

   - Include moderation of student work in system PD
   - Develop a protocol and exemplars of school-based learning of mathematical continuums based on those found in research
   - Support moderation as a part of school-based professional learning.

6. Math leaders report that engaging in the classroom observation when supported in professional noticing helped them to not only identify best practices, but support staff in their instruction.

   Implications:

   - Support leaders in developing skills of professional noticing
   - Include specific criteria for observation as part of school assessment process.

[2] For example: (1) the Reform-Oriented Teaching Observation Protocol (RTOP); (2) the Instructional Quality Assessment (IQA) in Mathematics; and (3) the Mathematical Quality of Instruction (MQI), see how they compare.

Results: Conditions for Success

Through this study we were able to identify conditions for successful capacity building of lead-learners of mathematics. These include: having a committed and invested team, allowing time for learning, creating short cycles of professional learning, providing a dedicated math facilitator, and using data in decision making.

Committed and Invested Team

Our data indicated that a committed and invested Administrator, in partnership with a cross-divisional team helps to support success:

- The team makes a commitment to lead learning in the school
- The team is committed to on-going professional learning
- The team is committed to lead professional learning in their school (and beyond).

All members of the school-based team are key

Time to Learn

As part of the MLLP, schools received 16 additional days of learning. This time, in addition to embedded professional learning time and Board-supported school-based learning, allowed for teams to meet regularly:

- Clear objectives set at all meetings
- Meeting time embedded into the school timetable
- Timetable aligned with the system learning schedule.

Regularly schedule meetings

Short Cycles of Professional Learning

Although overarching goals guide the work, short cycles of learning include measureable goals and monitoring strategies. The MLLP schools have found great success using tools and representations as an entry into school improvement. Each cycle of professional learning:

- Emphasizes mathematics Task, Tools and Models
- Designs observable and measurable activities
- Involves all educators in K-8 learning
- Centers on a unifying focus.

Math Facilitator

Access to a mathematics facilitator who is knowledgeable of mathematics content and experienced in professional learning, supports improvement and growth. The survey and interview data demonstrated that facilitators played an integral role in supporting the MLLP structure and overall goals of the project. Leaders identified that facilitators were important peripheral members of the team, often in the role of advisor or critical friend. The following is feedback gathered from survey data indicating the behaviors and characteristics that leaders found helpful in a mathematics facilitator:

- Asks thought-provoking questions
- Knowledgeable about math content
- Good listener
- Available and approachable
- Guides (but not overpowers) professional discussion
- Understands school improvement process
- Understands aspects of organizational change
- Open to learning.

Using Data

Another condition for success is the use of data to inform and monitor progress. Data are used to answer overarching questions, monitor growth, and set goals. In addition, the use of data builds efficacy of teachers and leaders.

Using data to inform and monitor progress builds efficacy of educators.

Conclusions and Connections

The MLLP Model has great potential in supporting mathematics leadership and school improvement. Compared to other models of coaching or consulting, this model is low cost and effective in building the capacity of school-based and system leaders. The project serves to:

- Support distributive leadership
- Build the leadership capacity of teachers
- Build cross-divisional collaboration
- Support the development of content-pedagogy of educators
- Demonstrate student achievement gains (PRIME)
- Support mathematics leadership efficacy of teachers and Principals
- Potentially support sustainability because the team leads the work.

Longitudinal study of the project will help to determine sustainability of the model and the change over time.

References

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