



Moderating Mathematics: A School-based Professional Learning Model¹

The recent focus across Ontario on improving student achievement in mathematics has driven school Boards to new innovations in professional development. Grounded on the principles of what is already known about effective professional learning, Moderating Mathematics is the GECDSB's approach to building the mathematical expertise of all educators, across all schools.

The GECDSB has engaged in several inquiries over the last few years, seeking to understand what model(s) of professional learning are most effective in supporting teachers in developing their mathematics content-pedagogy (Shulman, 1987). There are many models of professional learning that are reported to work and a close examination of research identifies that all have common elements. Mindful of these elements and the focus on mathematics, the GECDSB has developed a process of engaging in school-based mathematics professional learning that is focused on mathematics and is flexible to the context of each school's professional learning community.

A student learning need is an educator learning need, and it is through having insight into the mathematical thinking of students that educators develop their professional learning.

The process is:

- Embedded in the student learning experience;
- Connected to classroom instruction;
- School-based and system-supported;
- Connected to current research;
- Collaborative and safe for educators;
- Focused on developing the content knowledge, pedagogy, and professional culture of schools.

Moderating mathematics is initially lead by a Mathematics Facilitator, Coach, or Mathematics Lead. The goal of the Facilitator is to support the professional learning community (PLC) through the process until the group is confident enough to lead their own learning. Building educator efficacy and leadership is a central goal of this process and is what contributes to its sustainability over time.

The size of the PLC is typically a small group and it is beneficial if the initial process includes educators from across all grades. The meetings take place in schools and the selection of the content focus is ideally connected to the current or subsequent areas of study. This allows teachers to directly connect their learning to what is happening in their classrooms.

¹This protocol for professional development in mathematics was developed by the Program Office of the Greater Essex County District School Board for the Mathematics Leadership Community of Practice.

Part 1: Student Task

A whole school math task is selected and administered. The math task is selected based on the mathematics content and/or curriculum focus of the school. The task is typically visual, so as to allow greater access to the problem (i.e., low floor, high ceiling) or parallel tasks are constructed so that they can be simultaneously administered in grades K-8.

It is not necessary for all students in the school to complete the task, but it is important to have a viable cross-section that allows for analysis. It is also important to have a selection of solutions from across grades. At times, student thinking is documented by video or audio to allow for additional and deeper analysis. In addition, photos or other important artifacts are gathered for examination. This also enhances educator skills in using available technologies for data collection and analysis.

The student work is collected. At times, it may be appropriate for the Facilitator to examine the student work, prior to planning the professional learning. This may reduce and make more efficient the selection of professional resources that will be needed for the professional learning.

Part 2: Professional Learning Session: Doing the Math

Depending on the amount of time allotted, the steps in this process can be broken into smaller time allocations.

The learning session begins with teachers examining the math task, and identifying the big ideas and curriculum connections. These are typically posted and accessible for the rest of the learning session. It is important that professional resources and ministry documents are used to support teachers in identifying these big ideas.

Next, teachers complete the math task that was given to the students. Teachers are asked to solve the problem in as many ways as they can, using multiple representations. They are encouraged to work in pairs and post one solution at a time.

Then, teachers are asked to place their solutions along a developmental continuum. Facilitators might consider using the following language:

- Post your solutions from what you might see in Kindergarten through primary, to intermediate and secondary.
- Post your solutions on a continuum that we might see if we posted the student work.
- Post your solution under what you would expect to see at each grade/division.
- Post your solution under the appropriate set of curriculum expectations.

The idea is that the solutions are posted and demonstrate the development of the mathematical concept through grades, but also in its diversity, within a grade. There are many ways in which this path can be organized, but it is important that teachers are able to see the development. If it is difficult to see the development or if there are only a few representations, then likely the task did not elicit a wide enough range.

In successive learning sessions, the same task can be organized using a number of formats. In addition, the same task can be re-organized at a later session in order to highlight another learning focus.

Part 3: Reflecting on the Research

At this point in professional learning process, educators are invited to investigate a professional learning resource that is connected to their learning. The resource can be pre-selected by the facilitator or several resources may be examined by the groups. The resource should help teachers deepen their understanding of the mathematics represented in the task. It should also help teachers articulate what ideas are present in the mathematical solutions featured in Part 2, and which ones are missing.

Key ideas from the mathematics professional resources are identified and documented. At times, it may be appropriate to develop a schema, rubric, checklist, look fors, or other analysis tool to use while examining the student work in Part 4.

At this point, it may also be appropriate to revisit the task and solutions. Other representations or extended ideas may be found in the literature, so adding additional solutions may be appropriate.

Part 4: Moderating Student Work

Student work is distributed to the group. The student work is organized using the same structure as the educator solutions or it can be organized using another framework appropriate for the learning focus. Educators collectively reflect on what they notice about the collective body of student work.

Student responses can now be further analyzed. A selection of student work is chosen and an analysis is done using the tool developed through the professional reading in Part 3, or the work can be analyzed for the mathematical thinking that is present, the partial understandings, and the next educational moves.

Part 5: Consolidation

Key learnings/observations/noticings from the student work are posted and the pedagogical strategies that would support those noticings are identified. At this point, it may be appropriate to revisit the professional resources or allow time to develop new pedagogies.

These strategies ideally inform the next steps in classrooms and so they are attempted in the classroom and the results inform the next set of professional learning steps.

Part 6: Math Task Development

After consolidating the learning, a new math task should be developed by the collective group of teachers. The task will help teachers identify if the instructional strategies, that they developed and will attempt, have an impact on student learning.

Part 7: Classroom Learning

The classroom is the unit of learning. It is therefore vital that all learning connects back to the instruction that is happening in classrooms. The classroom learning site is the location for the last part of the Moderating Mathematics process and the most important one.

Recording student learning through observation and pedagogical documentation is a key part of moderation. It is the way in which educators are able to dig deeply into the student learning experience and which informs their pedagogical moves.

All professional learning should serve to support what is happening in the classroom and inform professional judgement. The process of moderating mathematics is a cyclical process and is centered on the student learning experience. As the students' mathematical thinking changes, so does the focus of the professional learning, and so this process evolves with it.

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