Conceptual Understanding, Procedural Fluency and Mathematical Mindset at the Grade 2 Level

Report

Project description.

This endeavour was undertaken for the third year at the NFSB. In the first two years the teachers produced documents correlating the JUMPmath lesson to the Progression of Learning, while embedding selected activities, application questions, and Gizmos. As there are no Gizmos targeting Elementary Cycle 1 content, no such correlation was needed for the cycle within this document. It was the third time this PDIG was undertaken at the New Frontiers School Board. There were three primary goals that drove this project: streamlining the JUMP approach, clarifying the processes of conceptual development and procedural fluency, and introducing teachers to the notion of mathematical mindsets. For the third year of our project, we continued to establish the Essential Learnings of both grade levels of the cycle, grades 1 and 2. We also imbedded the application questions for both grade levels.

By establishing the Essential Learnings for both grades 1 and 2 we believed that it would distribute the responsibility for deeper learning to both grade levels, and not leave the burden of mastery all up to the grade 2 teachers . That activity went very well as teachers were finding common ground and understanding on what should be prioritized for which grade level. The act of collating the information also went well. Several teachers were new to the Google Doc service, but all enjoyed the collaborative process that ensued. Activities surrounding conceptual understanding were selected from JUMP and other sources. Finally, a greater understanding of the need to develop a positive mathematical mindset was presented. Teachers were appreciative of the opportunity to share and discuss their understanding of the development of mathematical mindsets, at times challenging their own preconceived notions, at times simply corroborating them. Similar to the previous year, the idea that "all students can be good at math" supported by John Mighton in JUMP and reinforced by Jo Boaler in *Mathematical Mindset* seemed to be most challenging for some of the participating teachers.

We began our first day with a Concept Attainment activity that aimed to make them rediscover (or discover) the difference between conceptual understanding and procedural fluency. The next activity served to challenge their own conceptual versus procedural understanding of dividing a whole by a fraction. Both of these served to underline the importance of conceptual understanding, along with the need for procedural fluency, to attain mathematical proficiency. A parallel was later established with JUMP and how the activities found in the teacher guides, help to promote deeper understanding. Later, each teacher received a copy of *Mathematical* Mindset by Jo Boaler, and a reading schedule was established.

From this point on, every day started with a discussion of the chapters assigned. To surface significant ideas the teachers were asked to highlight a quote or passage that

spoke most to them. Good conversations followed that challenged teachers in their understanding and the importance of Conceptual Understanding in the learning of mathematics. Teachers were also asked to perform selected activities from *Mathematical Mindset*, which served to further support the importance of conceptual understanding and the need for simple but engaging activities. As we prepared the process of collating the JUMP lessons, and other selected activities to the Progression of Learning, teachers were shown how to access the Google docs. The organisation of the resources in one document was completed over the next 3 days, and a review of the document followed on the final day such that the project came to an end on April 26th.

Project goals and outcomes

Our project consisted of five distinct goals: to align the JUMP content to the PoL; to identify the components of the lesson plans that enhance conceptual understanding and integrate DNA math activities; to identify and select the activities that best promote conceptual understanding; to identify the differences between conceptual understanding and procedural fluency, and use that knowledge to guide students in their learning; to develop a greater awareness as to how a mathematical mindset can be developed in elementary school children.

The document produced through Google docs is the end product of the first three goals of our PDIG. However, no DNA activities were integrated as teachers did not have the time to properly identify activities and limited their search to the JUMP material. This document will be distributed to all members of the NFSB grade 4 community. The document produced will also be shared with the greater anglophone community through the LCEEQ.

The 4th and 5th goals, identifying the differences between conceptual understanding and procedural fluency, and how to develop a mathematical mindset in elementary school children, are elements that are less tangible to evaluate. Nonetheless, teachers clearly showed their appreciation for the opportunity to share among peers and to gain more guidance through the production of this guiding material. These goals appear to have been met due to the feedback provided by members throughout the PDIG. Consultant support will be essential in maintaining teachers motivated and, as such, frequent class visits were offered to the teachers.

Reinvestment

The document produced uses the progression of learning as its foundation. First, it divides the curriculum into Essential Learnings according to the two grade levels targeted, grade 1 and grade 2. Teachers then correlated the JUMPmath lessons to the progression. This serves to identify any gaps that exist between the Progression and the material provided through the JUMPmath approach, and enables teachers to clearly see where, if any, supplemental teaching resources are required to cover the curriculum. The teachers also correlated the Application Questions provided through MaST to the lessons and the Progression for both grades. Finally, a list of activities found within the JUMP

lessons was added to enable the teachers to have quick access to greater conceptual development activities.

This document can be used by the greater anglophone community even if they do not use JUMPmath. All JUMPmath lessons are freely accessible to the public through their website and consequently, so are their activities. Should they use another approach, it would be possible for them to erase the content of the column labeled JUMP to incorporate their own material. The rest of the content of the document, given that the Progression of Learning is its foundation, could be used by any teacher teaching math in the province.

As mentioned earlier, this was the third and final PDIG that targeted the correlation of JUMP to the Progression of Learning. Unfortunately, as JUMP has modified their lessons for grades 5 and 6, that correlation will have to be revisited for that particular cycle. Discussions have already begun to undertake the process with cycle 3 teachers and any document produced will again be shared with the greater Anglophone community.