

Leveraging Student Voice: Principle-based practices to support student success in math

Jason Frenza

St. Mary Catholic Elementary School/Halton Catholic District School Board

frenzaj@hcdsb.org

My/Our Authentic Problem/Challenge:

I wanted to extend my work with Knowledge Building into a new subject area. I had started off my Knowledge Building journey with a focus on the science curriculum. This year, I wanted to try to apply some of the ideas and practices I had developed with my junior students but switch the content area to math. I wanted to do this because I wanted to create opportunities for students to explore mathematical problem solving through hands on and “minds on” learning. I wanted to create a learning environment that allowed students to deepen mathematical thinking skills while creating theories that connect directly to the big ideas in the mathematics curriculum. Developing rich math tasks that support “democratizing knowledge” and “idea diversity” would encourage students to take more risks in the classroom, and to build upon each other’s ideas in a safe space where their own ideas and problem-solving strategies are welcomed. I wanted to design a classroom where students would openly and respectfully challenge the mathematical ideas of their classmates. My challenge was to create a learning environment that shifted from traditional teaching to giving students “epistemic agency” in the math classroom, and facilitate students in exchanging ideas and sharing knowledge that would benefit everyone.

Major Goals:

My main goal was to provide students with new and innovative ways to learn math. It was my hope that I could help to build a classroom structure that honours student voice which would ultimately increase student’s achievement in math. I also wanted to create a classroom culture that truly challenged students to think differently about mathematics. I wanted my students to like math and wanted them to feel that they can create theories and strategies to solve complex problems that relate to their everyday life in ways that are meaningful to them. I also wanted to students to hear the ideas of their peers and to facilitate classroom discussions that allowed them to share mathematical ideas with one another, engage more in math talk while building their self-esteem and changing their own personal views about how they learn math. Ultimately, I wanted to make learning math fun and support students in becoming the drivers of their own learning.

Promising Practices:

In my Knowledge Building classroom, there are three different practices that are used to support students in deepening their math knowledge.

1 - The Table of Creating Knowledge is used to enhance and support the learning that is taking place in the classroom. Students pose ideas and theories, and use math manipulates to support their understanding of the learning goal. At this table, students come together and share and discuss problem solving strategies, while making models and drawing diagrams to enhance and build upon each others’ ideas. The work that students engage in at this table is driven by their theories and prior knowledge. As students hear and learn from each other, their voices lead the discussion. The Table of Creating Knowledge helps to bring to life the KB principle of “democratizing knowledge”. Students advance their mathematical knowledge by evaluating and assessing each other’s ideas, and either confirming or denying their theories.

2 - Knowledge Building Circles are created when students have gathered research and mathematical ideas that help them to prove their theories. Students gather in a circle and discuss mathematical processes that

help them to deepen problem solving skills. The principle “Knowledge Building discourse” supports KB circles as students are using the KB scaffolds to challenge their peers’ ideas and move beyond idea sharing to idea building.

3 - The Improvable Ideas Wall is utilized to make learning visible in the classroom. The central focus of this wall is to allow students to create theories, improve ideas and to consolidate their learning. Students first create their initial theory that directly relates to the big idea coming from the Ontario Math curriculum. Through out the unit, students select a peer’s card and improve the ideas that are developed over time. The Improvable Ideas Wall connects directly to the KB Principle “improvable ideas”. The ideas and theories students build upon supports equity by promoting the active participation of all students and by clearly identifying the knowledge and skills students are expected to demonstrate.

Advances and Challenges:

KB is used in my classroom to help students develop automaticity while learning and mastering the processes and fundamentals of Mathematics. It creates and sustains a culture of learning as it supports and enhances collaboration, critical thinking and problem solving.

Students attitude towards math has vastly improved as our Knowledge Building class continues to evolve. Student achievement has increased as students are developing a greater repertoire of strategies that help them to justify and prove their mathematical understanding as it relates to their every day life. Students are feeling more confident in their ability to try new and innovative ways to solve mathematical questions and they are not afraid to make a mistake. Students want to collaborate and engage in opportunities to gather research that supports their theories.

Students see themselves as the drivers of their own learning and through the safe and nurturing classroom culture, they view my role as a mentor to guide the learning. The ongoing challenge is having enough time to cover all the curriculum expectations. Letting go of traditional teaching and learning that is driven by teacher directed learning goals and a backwards design, has been the greatest challenge. However, hearing students share their love of learning math while deepening their natural curiosity about mathematics has helped to overcome both challenges.

Reflections and Next Steps:

Creating a Knowledge Building classroom with a focus on Mathematics has helped to improve the well-being of my students. As students are constantly improving their mathematical knowledge, they are no longer afraid to make mistakes. They have come to understand that that taking risks and collaborating with their peers helps them to develop more than one solution to a mathematical problem. As students are sharing knowledge, they come to realize that they can develop in depth, sophisticated formulations to a problem.

I have three major next steps:

1 - Take the learning to a higher a level and introduce Knowledge Forum as a tool to help students engage in KB discourse.

2 - Continue to explore ways I can increase parent engagement and provide opportunities for parents and students to share in the learning that is taking place in the classroom.

3 - Continue to build capacity at my current school and support teachers in creating and implementing Knowledge Building practices in their classroom.

References

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