

**Webcasts for Educators
Student Achievement Division**

Viewer's Guide

**Honouring Student Voice in
the Mathematics Classroom**

Multi-media resource for professional learning



reach every student



On this DVD you will find a Print and Video Resources folder which contains WMV files for PowerPoint presentations, this Viewer's Guide (PDF), and the LNS monographs *Communication in the Mathematics Classroom*, *Student Identity and Engagement in Elementary Schools* and *Learning Mathematics vs. Following "Rules": The Value of Student-Generated Methods*.

To order:

Webcasts for Educators — Honouring Student Voice in the Mathematics Classroom

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Funded by the Student Achievement Division, Ontario Ministry of Education.

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Overview

How might trust and respect become a very real part of the everyday work that students do?

This resource profiles a teacher and her Grade 5/6 class as they work through a three-part mathematics lesson. The students reflect on how they have supported each other as a community of learners in developing their understanding of the mathematics and, ultimately, how they are becoming competent student mathematicians.

“Reflecting on their own thinking and the thinking of others helps students make important connections and internalize a deeper understanding of the mathematical concepts involved.”

Ontario Ministry of Education – *The Ontario Curriculum, Grades 1–8, Mathematics*, p. 14

The students discuss the importance of perseverance and of learning from their mistakes. As they work, they question and challenge each others' thinking and clarify, explain and justify their solutions. They demonstrate how to listen, how to withhold judgment and how to disagree respectfully. They deepen their understanding of the mathematics through focused conversation. Constructive and meaningful working relationships have been developed, creating engaged and motivated learners who give voice to their individual and collective thinking.

This resource features practical approaches and ideas to foster the conditions for learning that promote student voice within the mathematics classroom. Viewers walk with the teacher and the students as they engage in a three-part problem-solving lesson that helps students to uncover understandings related to the planned learning goals.

“Learning from children's voices allows us to know a deeper level of who children are as learners and, because we have that knowledge, to expand and enrich our sense of what it means to teach.”

Oldfather, 1995

From Viewing to Action

As you watch the video, think about what explicit teaching enabled students to become the mathematicians they are. You may wish to record and share your ideas with others using the organizers depicted below.

Organizer #1 – Developing Student Voice

What did you notice that impacted on students developing into competent mathematicians?

<i>Student behaviour</i>	<i>Teacher behaviour</i>
<i>Classroom climate</i>	<i>Teaching/learning</i>

Organizer #2 – Conditions for Learning

What conditions for learning did you notice that supported students' learning?

<i>What do you notice about student-to-student communication?</i>	<i>What do you notice about teacher-student communication?</i>
<i>What observations do you make about the role of the teacher in each part of the lesson?</i>	<i>What instructional moves do you notice?</i>

Organizer #3 – Habits of Mind for the 21st Century

Think about the habits of mind of a successful 21st century citizen and indicate on the organizer below the evidence you noticed during your viewing of that quality being nurtured.

<i>21st century citizen habits of mind</i>	<i>Evidence I noticed</i>	<i>Relevance to my practice</i>
Open-mindedness		
Innovative thinking		
Perserverance		

**NOTE: Organizers #1, #2 and #3 are available in Word and in PDF in the Print Resources folder on the DVD.*

“Students develop, represent, and justify their mathematical and strategic thinking, deepening their conceptual understanding as they do so. In support of these learning processes, the role of the teacher becomes one of a ‘mathematical mediator’ who supports, probes, and negotiates valid mathematical thinking. Through questioning, the teacher aims to illuminate and clarify student thinking, and helps students identify any errors in reasoning while making sense of alternate strategies.”

The Working Group on Mathematics for Teaching, 2009

WEBCAST SEGMENTS

Plan for the Math by Doing the Math

(1:47)

Solving the problem featured in this resource is a critical step in laying the groundwork for active engagement with the mathematical ideas and conversations that thread their way through the segments. This segment shows the teacher introducing the problem to the class and asks viewers to pause the video to solve the problem themselves. Working through a problem and solving it in more than one way before the lesson helps educators to begin to decompress their own mathematical knowledge and understandings.

The students explore the relationship between volume and surface area as they solve the following problem:

As an eco school and a healthy school, we want to ensure we are eating healthy snacks, but we also want to think of ways we can reduce our footprint. We buy fruit (in boxes of 24) for our snack bins in boxes from the grocery store. (Show box with layers of fruit). One of the ways we could reduce our footprint is to work with stores that use the least amount of packaging.

I am wondering if you could help us to design some new boxes to ensure we use the least amount of cardboard. Remember, there are 24 pieces of fruit in each box.

- *What do you see as the benefits of teachers doing the math prior to presenting the problem to students?*
- *Given that knowledge of mathematics varies among educators, how might you support teachers in your workplace with their professional learning?*

***NOTE:** The lesson plan outlining the complete three-part lesson, including lesson goals and possible success criteria, can be located in the Print Resources folder of this DVD.

Fostering a Community of Learners

What is a mathematician?

(2:51)

This segment sets the stage for this resource. Students respond to the question: What is a mathematician? They talk about the importance of taking risks, persevering through trial and error, learning from mistakes and misconceptions, building on the ideas of others and participating in the mathematical learning opportunities provided for them.

- *What classroom conditions do you believe would need to be present to support the type of mathematics learning described by the students?*
- *How might you use this clip with your own students?*
- *What questions would you ask your students to stretch their thinking?*

“Making sense is at the heart of mathematical literacy.”

Ontario Ministry of Education – *Teaching and Learning Mathematics*

It's ok to disagree!

(5:42)

The students and the teacher reflect on the importance of effective student-to-student and teacher-student communication. Observations and reflections about the importance of connecting, belonging and building respectful relationships within their classroom community are shared.

- *What challenges exist in terms of building a collaborative classroom culture?*
- *What classroom norms might be co-constructed with students that address these challenges?*
- *What strategies have been successful for you in supporting respectful student interactions and conversations?*

“It takes ongoing, intentional work to create and reinforce a safe, inclusive environment.”

Capacity Building Series – *Communication in the Mathematics Classroom*

How does this relate to me?

(1:07)

Engagement is essential for increased student involvement and achievement. How is engagement in the mathematics classroom cultivated and nurtured? What actions create an environment that honours individual student learning and personal growth in mathematics? In this segment, the Grade 5/6 teacher describes the importance of students seeing themselves – the issues and events of their lives – reflected in curriculum content.

- *The teacher notes the role of authentic contexts in supporting students' understanding of the mathematics. What type of experiences have your students found engaging and helpful for their mathematical learning? Why might this be?*
- *What actions might a teacher take in order to ensure that learning during a math class is engaging all students?*

“Holding high standards is not about making work ‘more difficult’ but about motivating through relevance and personalization.”

Capacity Building Series – Student Identity and Engagement in Elementary Schools

Do you understand what I did?

(3:42)

This segment focuses on the importance of embedding student-to-student talk in the daily life of the classroom. The teacher highlights accountable talk strategies that promote student thinking and interaction: turn and talk, communicating solutions with partners prior to Congress (math meetings), Thumbs Up/Down, and Gallery Walk. Students share and rehearse ideas and points of view using talk to clarify and explain their thinking.

- *A number of accountable talk strategies used in this mathematics classroom are shared. Which strategies have you found to be successful when promoting accountable talk as a frequent daily occurrence across the curriculum?*
- *What strategies support students' full engagement during time set aside for talk and interaction?*
- *What previous learning experiences do you think set these students up for success?*

- *What strategies described by the teacher might you want to investigate further?*
- *How do student conversations and thinking become resources for both student and teacher learning?*

“Teachers play an important role in assisting students to engage in high quality math talk.”

Bruce, 2007

Having a partner helps!

(4:55)

In this segment, students relate their experiences exploring mathematics with partners. They talk about how they benefit from working through challenging problems together, how working with different partners helps them to learn and to grow and what happens when they disagree with each other. The teacher describes the importance of being intentional when grouping students; depending on purpose and need, students work in similar or mixed ability partners or groups. Over time, students develop the flexibility to work constructively with all members of the class, extending their own thinking as well as the thinking of others. Together, they create a community of genuine math learners.

- *What factors need to be considered when grouping students?*
- *What classroom conditions might be fostered in order for partnerships and groupings to be most effective?*

“Create and re-create flexible and dynamic groupings that best meet student needs.”

Ontario Ministry of Education – *Guide to Effective Literacy Instruction*

“William (2007) emphasizes that simply sharing criteria with students is not enough because ‘the words do not have the meaning for the student that they have for the teacher.’”

Ontario Ministry of Education – *Assessment for Learning Video Series*

Student Voice and the Three-Part Lesson

Planning for Engagement

(4:56)

In this segment, the teacher presents her plan for engaging the students in the math. Starting with the Ontario Curriculum and the Guides to Effective Instruction, she emphasizes the importance of setting a meaningful context for the students that connects mathematical content and experiences to their lives. Differentiation, non-judgmental listening, and remaining open, flexible and responsive to the diversity of students' thinking are all discussed as ways to engage students. By reviewing the characteristics of effective partnerships with the class at the outset of the lesson, the teacher sets the stage for successful participation.

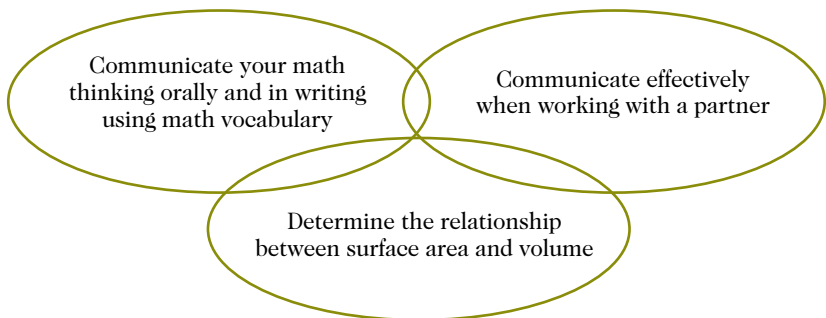
- *What might you consider when planning for student engagement with mathematics?*

Setting Learning Goals and Success Criteria

(10:06)

When planning lessons, educators identify learning goals and connected success criteria related to curriculum and process expectations and mathematical big ideas. The three interrelated learning goals identified by the teacher apply not only to the single lesson featured in this resource, but also to previous and future lessons.

Learning Goals



Success criteria, the finer attributes or more specific descriptions of learning goals, are also highlighted for the lesson within this video resource. Success criteria support learning when they emerge from meaningful problem-solving experiences and discussions. They are co-constructed with students and framed in student-friendly language.

Depending on students' understandings, some criteria the teacher has identified in the planning stage may emerge, and some may not. As well, additional criteria not considered by the teacher may also emerge.

Student thinking is honoured when learning goals and success criteria are developed in a manner that does not limit students' mathematical decision making, inquiry and reasoning.

Share your thinking, observations and questions about this segment in light of the above statement.

Minds On

(1:46)

The teacher discusses how she prepares her students cognitively for the mathematics they are about to experience. The students warm up by working with a string of numbers that are connected to the number they will encounter in the main problem. By highlighting the numerous strategies that the students generate, the teacher honours the collective mathematical thinking in the room.

- *What opportunities to collect authentic assessment information did you notice?*
- *What are the benefits of this activation for students?*
- *How would you make students aware of what they are learning during this Minds On time?*

“Effective classroom communication requires a supportive and respectful environment that makes all members of the class feel comfortable when they speak and when they question, react to, and elaborate on the statements of their classmates and the teacher.”

Ontario Ministry of Education – *The Ontario Curriculum, Grades 1–8, Mathematics*, p. 17

Solving the Problem

(15:52)

In this segment, the teacher presents the main problem to the class. After a student restates the important information related to the problem, we observe the students working in partners to create solutions. The teacher circulates, observes and interacts with the students, honouring the different strategies they have developed. She questions and prompts them to articulate and clarify their thinking, all the while keeping a clear focus on the learning goals of the lesson.

- *What is the relationship of the Minds On activity to the problem presented in this segment? In what ways might it have cognitively prepared students for the main problem of the lesson?*
- *Discuss the teacher's role and the students' role in this part of the lesson.*
- *What strategies, prompts and behaviours do you notice in terms of "making thinking visible"?*

**NOTE: Three formats for communication of student learning have been included in this resource – Gallery Walk, Congress and Ticket-Out-the-Door. Not all formats would necessarily be used in a single lesson. They have been included for demonstration purposes.*

“Learning from children's voices allows us to know a deeper level of who children are as learners and, because we have that knowledge, to expand and enrich our sense of what it means to teach.”

Oldfather, 1995

Gallery Walk

(5:16)

In this segment, the teacher describes how she uses Gallery Walk to engage students in meaningful, accountable discussion. Students remain with the same partners and examine the various strategies, thinking and solutions created by other students in the class. The opportunity to compare and contrast their own ideas with the ideas of others ultimately deepens individual understanding. By leaving reflective questions and comments as descriptive feedback, students learn with, for and from each other. This strategy also enables the teacher to gather additional information that can be used for “assessment for learning” purposes.

- How might a Gallery Walk strategy support or deepen student understanding of the learning goals identified for this lesson?
- What implications would this strategy have for student self-assessment?
- What prior student learning needs to precede the Gallery Walk experience for students to benefit fully from the strategy?

“Learning mathematics is about coming to understand the ideas of the mathematical community.”

Van de Walle & Lovin, 2006

Congress (11:11)

In this segment, students discuss the benefits of taking part in a Congress, or, as they describe it, a “math meeting.” They suggest that Congress gives them time to reflect, to ask questions, to learn new strategies, to state their opinions; in short, it is a time for students to gain clarity and to consolidate the learning that has taken place thus far. The teacher explains that she decides which students will share their work based on which solutions will move the thinking of the majority of the class forward.

“The goal of instruction is to support each student as a mathematician, not fix the math.”

Mason & Johnston-Wilder, 2004

Share your thinking of the above statement in relation to a Congress you have experienced.

- In preparation for the consolidation phase of the three-part lesson, what must the teacher understand and be able to do?

Visible thinking is intentional and manifests itself within classrooms in multiple ways:

Students orally articulate their thinking

Students listen to other students articulate their thinking

Students engage in discussions while forming their understandings

Student thinking becomes visible when teaching practices:

Make students aware of their own thoughts and thought processes

Make sharing of mathematical ideas an integral part of the lesson

Make communication both verbal and written

Make student thinking visible in classroom discussions of all kinds

Hull, Balka & Harben-Miles, 2011

Comment on the above quote as it relates to what you noticed in the video and as it relates to your own practice.

Assessment for Learning

(6:37)

In this segment, the teacher talks about how she manages assessment in the mathematics classroom. She stresses the importance of gaining information through observing, listening, questioning and conversing with students. In this way, the teacher makes informed decisions about next steps for the class. The students comment on how their interactions with their teacher support their learning.

Ticket-Out-the-Door is discussed as an assessment/communication strategy in which students reflect on what they learned that day and discuss how to improve their learning.

The teacher stresses the importance of students demonstrating their learning independently, after having had time to work and learn together, in order to assess each student's understanding.

- *How might the assessment strategies featured in this segment provide the teacher with a window into students' thinking?*
- *What effective strategies for teachers have you seen that help them hold on to their observations and thinking as they engage in ongoing assessment?*
- *The teacher concludes that planning must remain flexible in light of students' response to problems and understandings relative to learning goals. What does 'remaining flexible' mean in the context of teaching and assessment?*

Resources and Related Reading

Bruce, C. D. (2007). Student interaction in the math classroom: Stealing ideas or building understanding. *What Works? Research into Practice 1*.

Bruce, C.D. & Ross, J.A. (2010). *External review of collaborative inquiry and learning in mathematics*. Final report submitted to the Ontario Ministry of Education. Peterborough, ON: Trent University.

Hull, T.H., Balka, D.S. & Harben-Miles, R. (2011). *Visible thinking in the K-8 classroom*. Thousand Oaks, CA: Corwin.

MacMath, S., Wallace, J., & Chi, X. (2009). Problem-based learning in mathematics: A tool for developing students' conceptual knowledge, *What Works? Research into Practice 22*.

Mason J., & Johnston-Wilder, S. (2004). *Fundamental constructs in mathematics education*. New York: Routledge Falmer.

Oldfather, P. (1995). Learning from student voices, *Theory into Practice 43(2)*.

Ontario Ministry of Education's Capacity Building Series

<http://www.edu.gov.on.ca/eng/literacynumeracy/inspire/research/capacityBuilding.html>

Student Identity and Engagement in Elementary Schools (2011)

Grand Conversations in Primary Classrooms (2011)

Bansho (Board Writing) (2011)

Communication in the Mathematics Classroom (2010)

Let's Talk about Listening (2009)

Differentiating Mathematics Instruction (2008)

Student Self-Assessment (2007)

Ontario Ministry of Education (2008). *A guide to effective instruction in mathematics, Kindergarten to Grade 6, measurement, grades 4 to 6*. Toronto: Queen's Printer for Ontario.

Ontario Ministry of Education (2006). *A guide to effective instruction in mathematics, Kindergarten to Grade 6 – Volume 2, problem solving and communication*. Toronto: Queen's Printer for Ontario.

Ontario Ministry of Education (2008). *A guide to effective literacy instruction, Grades 4 to 6 – Volume 4, oral language*. Toronto: Queen's Printer for Ontario.

Ontario Ministry of Education (2006). *A guide to effective literacy instruction, Grades 4 to 6 – Volume 1, foundations of literacy instruction for the junior learner*. Toronto: Queen's Printer for Ontario.

Ontario Ministry of Education (2010). *Assessment for learning video series self-assessment viewing guide: A resource to support the implementation of growing success assessment, evaluation and reporting in Ontario schools, first edition, covering grades 1 to 12*. Toronto: Queen's Printer for Ontario.

Ontario Ministry of Education (2010). *Growing success: assessment, evaluation and reporting in Ontario schools, first edition, covering grades 1 to 12*. Toronto: Queen's Printer for Ontario.

Ontario Ministry of Education (2004). *Teaching and learning mathematics: The report of the expert panel in mathematics in grades 4 to 6 in Ontario*. Toronto: Queen's Printer for Ontario.

Ontario Ministry of Education (2006). *The Ontario Curriculum, Grades 1 to 8: Language*. Toronto: Queen's Printer for Ontario.

Ontario Ministry of Education (2005). *The Ontario Curriculum, Grades 1 to 8: Mathematics*. Toronto: Queen's Printer for Ontario.

The Working Group on Mathematics for Teaching (2009). Kajander, A. & Jarvis, D. (Eds.). *Canadian Mathematics Education Forum*, Vancouver: Simon Fraser University.

Van de Walle, J. A., & Lovin, L. H. (2006). *Teaching student-centred mathematics*. Boston: Pearson.

Technical Instructions

How to Access the Print and Video Resources

To access the Print and Video Resources folder in Windows, insert the DVD into the DVD drive of your computer and:

1. Click on the Start menu.
2. Select My Computer.
3. Right-click the mouse on the DVD icon titled HONOURING_STUDENT_VOICE_DVD to open a drop-down options list.
4. From the drop-down list, select and click on the Open option.
5. Double-click on the folder titled Print and Video Resources to access the files. Ignore the folders titled Audio_TS and Video_TS.
6. Select the resources you wish to use directly from this folder, OR Copy onto the Desktop and open files from the Desktop.

Alternatively, when the DVD is inserted and the options box opens:

1. Select the option Open Folder to View Files.
2. Click on the Print and Video Resources folder.
3. Select the files you wish to use directly from this folder, OR Copy the files onto the Desktop and open them from the Desktop.

To access the Print and Video Resources folder in Mac OS X, insert the DVD into the DVD drive of your computer and:

1. Exit from the DVD player (which typically opens automatically when a DVD is inserted in the drive).
2. Double-click on the DVD icon titled HONOURING_STUDENT_VOICE_DVD
3. Select the files you wish to use directly from this folder, OR
4. Copy the files onto the Desktop and open them from the Desktop.

How to Save the Video Files to Your Computer

The video files can all be copied and saved to your computer using either of the following methods for copying and pasting files.



Method 1

1. Right-click on the file and choose the Copy option.
2. Right-click within any computer folder into which you would like to save the file, and choose the Paste option.

Method 2

1. Left-click the mouse on the file you want to save, so that the file is highlighted.
2. Simultaneously press the Ctrl and C keys (or, for Macintosh users, the Command and C keys) to copy the file.
3. Left-click within any computer folder in which you would like to save the file, and simultaneously press the Ctrl and V keys (or, for Macintosh users, the Command and V keys) to paste the file there.

For Macintosh users, the Command key is the one with the following

symbol:  symbol: 

NOTE: If you want to insert video files into a PowerPoint presentation, you must save these video files in the same folder that contains your PowerPoint file. If you save a PowerPoint presentation to another location (e.g., a memory stick, CD-ROM, etc.), you must also save the video files in the same location in order for the video to play. So, if you transfer the presentation to another computer, you must also transfer the video files with it, or else the video will not link to the PowerPoint presentation.

How to Insert Video Clips (WMV files) into a PowerPoint Presentation

On this DVD, you will find WMV versions of all segments of the webcast. To insert a clip into a PowerPoint presentation, follow the directions below:

1. Open your PowerPoint program.
2. Create a new PowerPoint presentation OR open an existing PowerPoint presentation, and within it, open the slide on which you would like to add the video.
3. Insert the webcast DVD into the DVD drive of your computer.

4. If a new window opens asking how you would like to view the files on the disk, choose the option Open Folder to View Files; OR

If a new window does not open, open the My Computer window from the Start menu. In the My Computer window, double-click on the icon that is shaped like a disk, which will likely be labelled D: or E:.

5. Save the video segment that you want to insert in a PowerPoint into the same folder that contains your PowerPoint presentation.

NOTE: Video files that have been saved to your computer can be cropped and edited into smaller segments using Movie Maker (free on PCs) or iMovie (free on Macintosh).

6. Open the PowerPoint slide on which you would like to insert the video, and click on the Insert menu in the PowerPoint menu bar.
7. From the Insert menu, select Movies and Sounds, and click on the Movie from File option.
8. A window opens, prompting you to select the video file that you would like to add. Find and select the video file that you saved in step 5.
9. Once you have chosen the video file you need, another window opens and asks whether you want your movie to play either automatically when you enter the slide, or only when it is clicked. Choose your preference. (You will notice that the starting image of your movie is not displayed on the slide.)



Printed on recycled paper
ISBN 978-1-4435-7276-7
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