MATH...

MATH HAPPENS IN KINDERGARTEN

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OVERVIEW

Math Happens in Kindergarten is a video divided into multiple segments which captures a conversation with world-renowned mathematics educator, Dr. Douglas Clements. Dr. Clements discusses what he has learned about mathematics in Kindergarten through many years of research, and shares ideas from the current research about what we need to do to create opportunities for powerful mathematics in the early years.

We also asked a variety of educators from across the province about their thoughts and captured their classrooms and their children engaged in mathematics.

This video was filmed in many Kindergarten classrooms over several years by ETFO, beginning before the implementation of full-day Kindergarten in Ontario and continuing into its implementation. The educators and their children who you will meet in the video opened their doors to our cameras, so what you will see are classrooms in action dealing with the realities you face every day. You will see Kindergarten teachers, designated early childhood educators, student teachers, educational assistants, and parent volunteers learning with and alongside children.

The video explores the following big ideas:

How can educators mathematize their classroom environment for children to see the mathematics around them?

How can educators create rich opportunities for children to develop their understanding of mathematics?

What is the role of the educator in empowering children to be young mathematicians, and how do we value and act upon their thinking?

CONTEXT FOR THE VIEWER

The impetus for this video came from our teachers and designated early childhood educators who wanted to know more about how to make math happen in their Kindergarten classrooms.

The video learning series and accompanying facilitation guide are intended to support our members' professional learning. It responds and answers the many questions asked by educators about mathematics in the Kindergarten context, such as: What does math look like in a Kindergarten classroom? How do I create an environment where I can make mathematics happen? What is my role as an educator?

It won't provide you with every answer, but it gives you some questions to consider, points to reflect upon, ways to think about your classroom and how you can create a mathematically rich environment for your children.

This facilitator's guide is provided for educator teams, individuals and teacher leaders to use as a guide for discussion and reflection.

Each section of this facilitation guide corresponds to a brief video segment in the series.

Before viewing the video segments, look over the questions and prompts in ***"What to Look for?"***, to activate your thinking as you watch.

After watching the video segment, the questions and ideas in ***"Think about and Discuss"*** provide focal points for your reflections and/or discussions.

Look to ***"Actions and Next Steps to Try"*** for ideas and inspiration to inform your future programming decisions and professional learning.

CREATING AN ENVIRONMENT WHERE YOU BUMP INTO MATH

In this segment, Doug Clements invites us to think about what mathematics looks like in the Kindergarten classroom, and the importance of designing an environment where "kids bump into mathematics at every turn" so that they frequently encounter mathematical spaces and ideas through play, manipulatives, literature and small group activities.

What to Look For?

- What mathematics can you see happening in the play?
- What is the role of the materials available to the children in promoting mathematical experiences?
- Notice the level of engagement the children are showing in the activities.
- Why is it easy for students to bump into mathematics in these classrooms?
- What is the role of the educator in this context?

Think About and Discuss …

- Children are innately curious as they develop theories about their world. How do we, as educators, intentionally offer materials that invite exploration and the opportunity to "play" with concepts and test theories? How does this affect our understandings of the potential of the environment as third teacher?
- Think about some situations where you have encouraged students to "bump into mathematics", or times when you have co-created the environment with the children for mathematics to naturally occur.
- What do the educators intentionally place in the classroom so they can observe children interacting with mathematical ideas, and see the ways in which they "bump" into the mathematics in the environment?
- Children can use manipulatives for a variety of reasons. Talk about the selection of manipulatives you see and the kinds of mathematical concepts they are eliciting.
- What is the role of the educators in highlighting the potential of the mathematics in the materials?
- How might an educator's view of the child and the goals of the program influence the creation of the learning environment?
- Consider this quote, from *"The Third Teacher: Designing the Learning Environment for Mathematics and Literacy, K to 8"* (Ontario Ministry of Education, 2012a):

The mathematics learning environment should reflect the beauty and creativity that is at the heart of mathematics (Clements & Sarama, 2009, p. 7); it should also support what the National Research Council describes as "a productive disposition" to the subject. The classroom learning environment, if properly structured, can be a third teacher that over time instills "the habitual inclination to see mathematics as sensible, useful and worthwhile, coupled with a belief in diligence and ones' own efficacy. (Kilpatrick, Swafford, & Findell, 2001)

- How might the intentional design of the learning environment build student efficacy while fostering a "productive disposition" towards mathematics?

Actions and Next Steps to Try:

- In your classroom consider how your children can see themselves as mathematicians. What can you put in place for that to happen? What have you already put in place for that to happen?
- Consciously set aside time to observe, take notice and think about your learning environment. Consider changes or tweaks you could make to your learning environment to act on the idea that “all spaces can be mathematical spaces”.
- How can you make mathematics visible to your children and their families?
- Observe and document interactions between the children and their environment. Then invite conversation about materials and their potential uses. What other materials and experiences are your students interested in that would further their mathematical learning?
- Consider if there are any “perceived” barriers that are preventing depth of learning for the children, or that are limiting the children’s opportunities to “bump into mathematics”. (For example, do children perceive that they can only use manipulatives in the math centre?)

PLAY ... CHILDREN SEEING THE WORLD THROUGH MATHEMATICAL EYES

In this segment, Dr. Doug Clements explains the surprising depth of mathematical ideas present in children’s play, and the important role of the educator in bringing those ideas to the surface.

What to Look For?

- Notice children engaging in mathematical play.
- Notice how the environment is designed to promote mathematical play.

Think About and Discuss ...

- Think about how you have used play experiences in your classroom to bring out mathematical thinking.
- Discuss the following quote:

Teachers' most important role with respect to mathematics should be finding frequent opportunities to help children reflect on and extend the mathematics that arises in their everyday activities, conversations, and play, as well as structuring environments that support such activities. Teachers should be proactive as well in introducing mathematical concepts, methods, and vocabulary. (Clements, 2004 p. 59)

- Reflect on the ways that you currently structure the environment: to support children's mathematical play; help bring children's playful mathematical ideas to the surface; and, introduce new mathematical ideas. Are there changes in these areas of your practice that would even further foster children's mathematical thinking?
- What are some of the challenges involved in making students' mathematical thinking visible? What are some ways that you could anticipate and address these challenges?
- Are there some learning centres that lend themselves to mathematical play more than others? Why is that? How, then, can children bump into math in all the learning areas and centres of a Kindergarten classroom?
- What would the children in your class have to believe to become mathematicians (e.g., mathematicians are curious about their world and try to notice patterns)? How can you support them in this belief? What other beliefs might help students see themselves as mathematicians (e.g., mathematicians use tools such as graphs to collect data and organize information)?

Actions and Next Steps to Try:

- Once the children have finished a large block of learning time, sit as a whole class and ask them what math they were doing in their play. You may want to encourage children during their play and point out what you are observing, take pictures and share those as a class or provide other documentation as a starting point for the conversation.
- For further viewing visit *Snapshots of Effective Practice. Doug Clements: Early Mathematics* and view the section on Intentional Play-based Learning. (Ontario Ministry of Education, 2012c) Available at: http://resources.curriculum.org/secretariat/snapshots/doug.html