

Pedagogical System for Teaching Mathematics - Pre-Session Video Transcript

Introduction

Envision learning environments where students and their teachers are engaged to interact in profound and meaningful ways--ways that...

- help students to seeing "...themselves as powerful mathematics [learners]" (Anthony & Walshaw, 2009a); and
- growing teachers' and leaders' confidence that a better prescription for student success in mathematics is one that's grounded in occasioning students' thinking.

Welcome to this pre-session video on *The Pedagogical System for Teaching Mathematics.*

In this video, the characteristics of *The Pedagogical System* (SIM K-12, 2017) are explained and questions are asked to engage you, your colleagues and students in thinking about how this system might better frame the teaching and learning that goes on in your class and school each and every day.

I'd also like to draw your attention to the following: You'll not only find the framework described in this video as being effective in supporting mathematics teaching and learning, but also as having the potential to influence teaching and learning in other subject areas and aspects of school life.

Take it from me: Having explored these principles--alongside many educators, students occasioning thinking, and complexed with other pedagogies--has been transformational for my own teaching and student learning, as well as that of my colleagues.

As you continue with the video, consider framing your thinking against our session goals:

- (*Teacher Focus*) How might this system deepen your understanding of practices that engage students with differences in backgrounds, learning strengths, needs and interests?
- (*Leadership Focus*) How might this system inform your next best moves to supporting the growth of individual and collective teacher learning and practice.

Background

The Pedagogical System is a framework that provokes us to consider how teaching and learning needs to be...less about telling...less about prescriptive moves and responses. Really, it calls us to shift our mindset about teaching, leading, and learning to one that gives more value to student thinking. This philosophy, grown out of mathematical, educational research, is mirrored through several references and resources. Some suggested reading and resources are included in the transcript to this video, which can be located on the session website.



This stance is one that depends on each and every one of us. Students, teachers and leaders all have a role to play in improving the conditions for student engagement, achievement and well-being.

Consolidated and adapted from the work of Anthony & Walshaw (2009a), *System Implementation & Monitoring-K to 12* in Ontario (2017) has produced summary graphics and tools to help inform and guide educators as they inquire towards improving teaching and student learning.

The system (or framework) consists of four, interrelated components. This is so important to recognize and identify: none of the parts work in isolation of the others. These components include:

The Pedagogical System-The Four Domains

The system (or framework) consists of four, interrelated components. It's important to make this distinction--none of the parts work in isolation of the others.

These components include:

- 1-Worthwhile Mathematical Tasks,
- 2-Tools & Representations,
- 3-A Non-Threatening Classroom Environment, and
- 4-Classroom Discourse

Let's consider descriptions for each of these components in the form of reflective questions.

- *Worthwhile Mathematical Tasks*
 - Do the tasks students engage in support how mathematics is viewed; how it can be understood through thinking and reasoning; and how it can be used?
- *Tools & Representations*
 - How are students making their thinking visible? Are tools being used to organize thinking? Are multiple representations used, and are they connected for building a deepened understanding of mathematical concepts?
- *A Non-Threatening Classroom Environment*
 - Does the classroom community encourage each of its members to think and reason, communicate ideas, and receive, provide, and take action on feedback?
- *Classroom Discourse*
 - Do students value mistakes? Does the classroom community look forward to and honor the explanations of all students? What are the characteristics of productive, accountable discourse?

Already you can get a sense of some criteria that you could use for monitoring inquiries into building communities of learners and a coherent school culture, where students see themselves and others as empowered learners of mathematics.



Let's take a moment to look more closely at the first component.

Worthwhile Mathematical Tasks

Given that the components of the system are interdependent, I think you'll find that if the problems or tasks you assign are not rich enough (or worthwhile), the remaining components--those that account for mathematical modeling and exchange of ideas--won't be nearly as accessible to you and your students.

Your classroom community, characterized by individuals thinking individually and collectively to building knowledge, is best supported by these types of tasks.

So what defines a task as being rich or worthwhile?

Problem-Based Teaching & Worthwhile Mathematical Tasks

The premise to problem-based teaching in mathematics is that students are able to meaningfully construct their knowledge by engaging in a variety of problem solving strategies. Coincident with developing their understanding, students also build procedural fluency since many of the concepts provide opportunities for students to work with numbers and expressions.

Ultimately, basing one's approach to teaching and learning, in this way, moves us away from seeing mathematics as being about the right answer and/or getting to an answer TO seeing mathematics as valuable and connected to the real world.

According to Anthony & Walshaw (2009a), some of the characteristics of problems and tasks that are rich (or worthwhile) include the following.

They tend to...

- Have a focus on original thinking;
- Provide opportunities for productive struggle;
- Be designed and presented at an appropriate level
 - E.g., Low-floor for entry and a high ceiling for extending (Boaler, 2016);
- Be open-ended;
- Include contextually-based problems that invite students to make sense of mathematics; and
- Provide opportunities for students to develop procedural fluency in meaningful ways.

Leading Through the Pedagogical System

Previously mentioned, you might have made some connections to criteria that you could use for monitoring inquiries into building communities of learners and a coherent school culture.

Linked to the resources for this pre-session activity, you'll find a leadership-related tool with a variety of criteria for effective mathematics teaching. All of them are related to *The Pedagogical System* and connected through formative assessment--both assessment FOR and AS learning (Anthony & Walshaw, 2009b).



Whether you're conducting classroom walkthroughs, facilitating collaborative team learning, or observing and providing feedback to lessons, you might find these criteria essential to guiding discussions around effective practice and having discussions with students about their learning.

In your conversations and inquiries, consider how these criteria could allow you to better uncover and understand the hidden skills and talents of the educators in your school and your students.

Conclusion

In closing, I'd like to thank you for watching this video and moving further into the "Before You Arrive" activities.

Leading up to our session, here are a few post-video suggestions to continue your learning:

1: **Delve into the suggested resources** linked alongside this video--you can find them either below the video on YouTube or, here, on the [session website](#).

2: Continuously **connect to the learning goals** mentioned in the introduction.

3: As a starting point, **incorporate** some of the **aspects of this system** into your teaching and/or leadership. Allow them to be starting points for discussion about effective practices for teaching and learning.

4: **Visit** and participate in **a colleague's classroom** to experience how the aspects are built into their practice and student learning.

5: **Share your learning** with someone else--e.g., a colleague, your administrator, a network, or your PLC.

6: As you stretch your thinking and learning, you might also consider **making connections from** the other *Learning Activities to The Pedagogical System for Teaching Mathematics*.

Note that each of these "Learning Activities" can be found on the session website:

- Formative Assessment: "[Learning Activity - Option 1](#)"
- Thinking Classrooms: "[Learning Activity - Option 2](#)"
- Flipped Learning: "[Learning Activity - Option 3](#)"
- Global Competencies: "[Learning Activity - Option 4](#)"

Final Remarks

Lastly, I'm looking forward to working alongside each of you, as we seek to co-create conditions that can give life to equity in the teaching and learning we do with students and one another each and every day.



If at any time, you have questions or comments, please feel free to reach out to me at *Flipping the Focus* using the “Contact” button (email: flippingthefocus@gmail.com) provided on the session website.

Sincerely,

Chris Stewart
Educational Leader at *Flipping the Focus*

References

Anthony, G., & Walshaw, M. (2009a). *Characteristics of Effective Teaching of Mathematics: A View from the West*. *Journal of Mathematics Education*, 2(2), 147-164.

Anthony, G. and Walshaw, M. (2009b). *Effective Pedagogy in Mathematics*.
http://www.iaoed.org/downloads/EdPractices_19.pdf

Anthony, G. and Walshaw, M. (2009b). *Characteristics of Effective Teaching of Mathematics: A View from the West*. http://www.educationforatoz.org/images/_9734_12_Glenda_Anthony.pdf

Boaler, J. (2016). *Mathematical Mindsets: Unleashing Students Potential Through Creative Math, Inspiring Messages, and Innovative Teaching*. San Francisco, CA: Jossey-Bass & Pfeiffer Imprints.

System Implementation & Monitoring K - 12. (2017, February 23). *The Pedagogical System with Reflective Questions*. Retrieved from
<https://sim.thelearningexchange.ca/tag/the-pedagogical-system/>

Suggested Reading & Resources

EduGAINS. (n.d.). *Guides to Effective Instruction*. Retrieved from
http://www.edugains.ca/newsite/math/guides_effective_instruction.html

EduGAINS. (n.d.). *Targeted Implementation and Planning Supports for Mathematics (TIPS4M)*. Retrieved from <http://www.edugains.ca/newsite/math/tips.html>

Ontario Ministry of Education. (2018). *Focusing on the Fundamentals of Math: A Teacher's Guide*. Retrieved from <https://math.thelearningexchange.ca/>

Principles to Actions: Ensuring Mathematical Success for All. (2014). Reston, VA: NCTM, National Council of Teachers of Mathematics.

