“Ontario” Bansho

- a Reinvention of Japanese Teaching for Ontario Contexts









presented by

Mary Lou Kestell and Kathy Kubota-Zarivnij, 2008

Background
- Components of Japanese Teaching

Blackboard is used to show the flow of the lesson process and to connect parts of the lesson coherently to build students' mathematical understanding.

- To keep a record of the lesson to help students remember what they need to do & think AND to help student see connections of different parts of the lesson and the lesson progression
- To contrast and discuss ideas students presented from their solutions
- To organize student thinking and develop new ideas

Bansho - means board writing – technical term created by Japanese teachers; rarely erase what they write on the blackboard … all recordings have a mathematical meaning and purpose

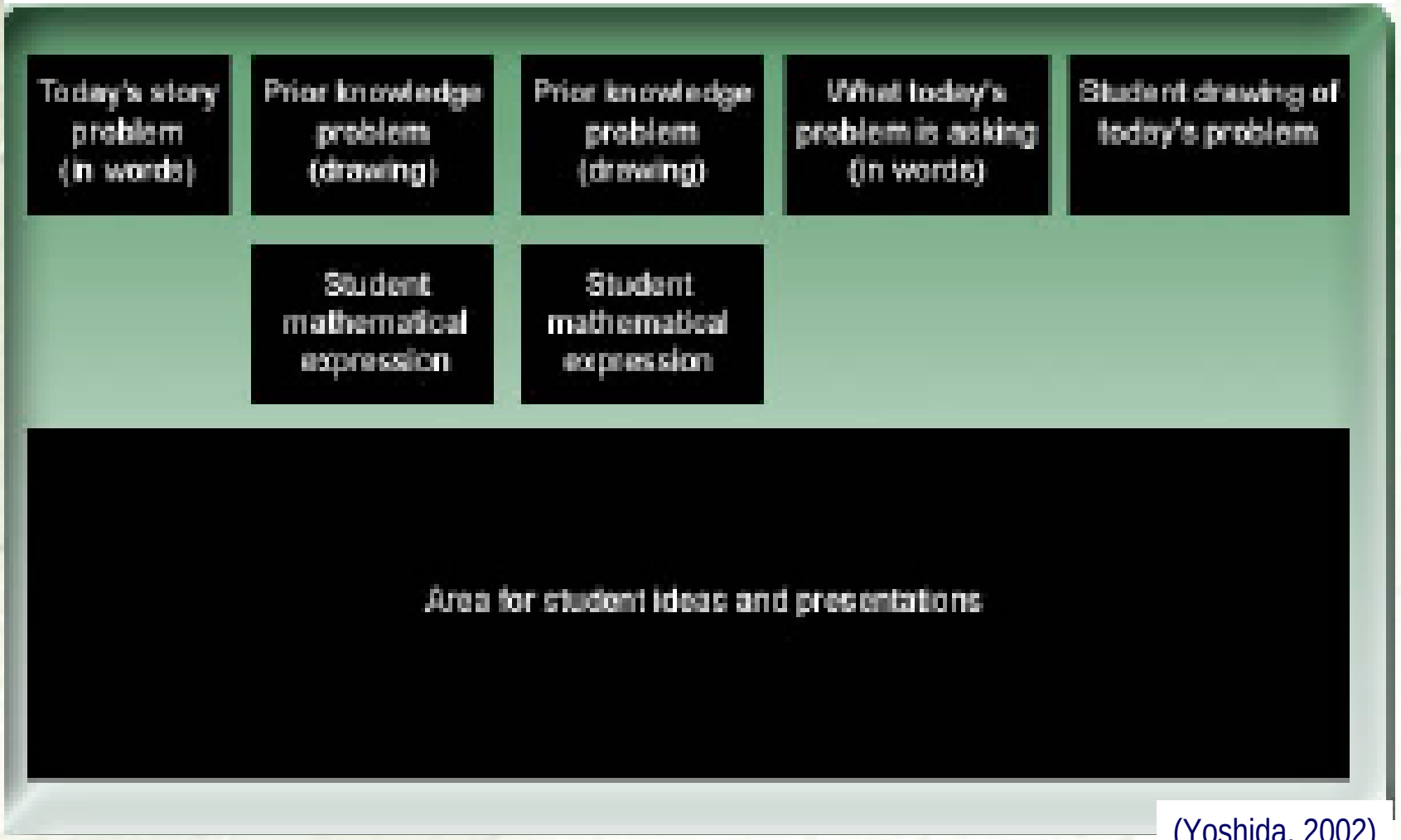
Neriage – teacher coordinating student sharing, analysis, and discussion

Matome – teacher summarizing key mathematical ideas from the lesson

(Yoshida, 2003; Shimizu, 2005)

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Background
- Japanese Blackboard Plan



(Yoshida, 2002)

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Background
- Japanese Blackboard and Bansho



(Takahashi, 2006)

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Background
- Japanese Blackboard and Bansho



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"Ontario" Bansho - Instructional Strategy to Strategically Coordinate Discussion

Preparation – Teacher:

- cleared black board space
- chose lesson problem based on grade-specific expectations
- solve the problem prior to the lesson to anticipate a range of solutions, to decide on the math tools students need, to identify the key mathematical aspects of solutions
- prepare mathematical labels for categories of the solutions
- provide square grid chart paper (in eighths), markers so that solutions are visible to students

Actions – Teacher:

- activate student knowledge and experience at start of lesson
- circulate among the students as they are solving a problem to discern the range of the solutions and the mathematical connections between solutions
- prompt sort and classify their solutions (like a concrete graph) according to mathematical criteria related to learning goal of lesson
- select which students will share their solutions first, 2nd, 3rd, so that mathematics knowledge is being collective built through analysis and discussion

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Bansho Reinvented for Ontario Classrooms - “Ontario” Bansho

- a **mathematics instructional strategy** that provokes students’ mathematical thinking to be explicit when solving problems through the organization and annotation of student work samples and classroom discourse
- a **classroom artefact** produced collectively by students and teacher that publicly displays the mathematical relationship among students’ solutions; could be used as a mathematics landscape for learning or as a mathematics anchor chart
- an **assessment for learning strategy** to discern the range and mathematical relationships between ideas, strategies, and models of representation used to solve a problem by students
- a **professional learning strategy** that develops teacher’s knowledge of mathematics *for teaching,* to construct a mathematics landscape evoked through the solving of problems

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“Ontario” Bansho - As a Classroom Artefact

- The flow of three-part lesson (e.g., problems, key words, strategies) are posted on the blackboard, from left to right
- Student solutions to lesson problem are categorized and labelled like a concrete graph (from 4 solutions to all solutions
- Student solutions are mathematically annotated to highlight key concepts, representations, strategies, vocabulary, and symbols
- Student work samples and ideas from previous lessons are posted to revisit prior mathematical ideas and strategies



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"Ontario Bansho" as Assessment for Learning

Let's Do Math - Legs Problem

There are 44 legs in the room. People are sitting on stools around one table with no empty stools. One stool has 3 legs. One table has 4 legs.

a) How many people are around the table?

b) Show 2 different solutions.

c) How does the range of solutions show the relationship between arithmetic and algebra?



Arithmetic to algebra as a *recursive elaboration*

From arithmetic to algebra mathematics landscape

How might the solutions be organized for bansho? What is the mathematical criteria for sorting?

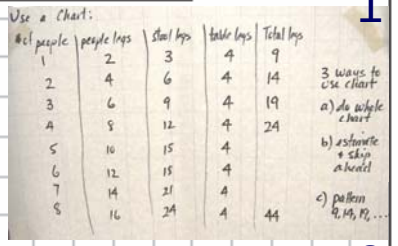
Teacher	Grade	Assessment For Learning Observation & Interview	Term	Year
Unit of Study		Date		

Mathematics Lesson Task/Problem	Learning Goal/Curriculum Expectations	Possible Solutions
Lesson problem	Grade specific curriculum expectations	

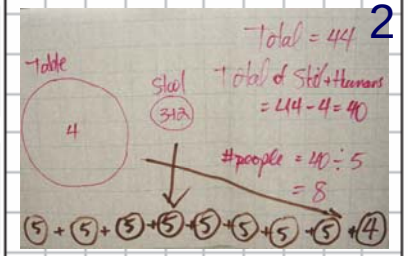
John 2,3	Ker 1	Ravi 2
Jen 5	Pia 3,4	Tye 1,5

Questions about student learning...

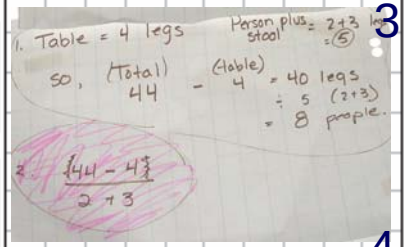
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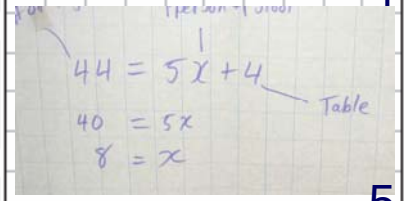
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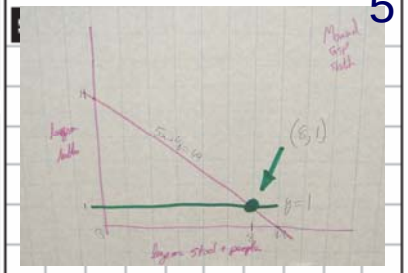
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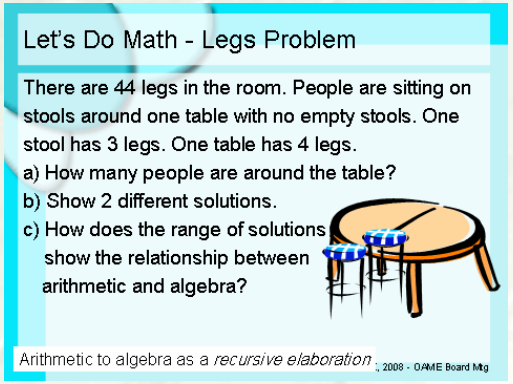
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"Ontario" Bansho as a Mathematics Professional Learning Strategy

- In preparation for teaching mathematics, solve a mathematics problem in different ways with colleagues.
- Organize the solutions to show the mathematical relationship between the solutions, often in a mathematical developmental continuum
- Use this artefact to construct a mathematics landscape (often across strands) to explain the range of mathematical ideas, strategies, and models used to solve a problem





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LNS Resources Highlighting Bansho

LNS Webcasts – www.curriculum.org

- March 2007 - Making Mathematics Accessible for all Students
- June 2007 - Coaching for Student Success

LNS Facilitator Handbooks
At www.curriculum.org (Coaching Institute – Numeracy Resources)

- Addition and Subtraction
- Teaching Through Problem Solving



OAME 2008 – www.oame.on.ca. May 8-10, 2008 in Richmond Hill
Ontario Association for Mathematics Education provincial conference

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Articles and Books to Read ...

Mathematics for Teaching

- Ball, D. (2000). Bridging practices: intertwining content and pedagogy in teaching and learning to teach. *Journal of Teacher Education (51)*3, pp. 241-247. (attached)
- Ball, D. Hill, H., and Bass, H. (2005). Knowing Mathematics for Teaching: Who knows mathematics well enough to teach third grade, and how can we decide? American Educator, pp. 14, 16, 17, 20-22, 43-46. (attached)
- Ma, Liping. (1999). Knowing and teaching elementary mathematics. NJ: Lawrence Erlbaum Associates, Inc.

Collective Knowledge Production

- Davis, B. (2005). Teacher as Consciousness of the Collective. *Complicity: An International Journal of Complexity and Education,* 2(1), pp. 85–88. At www.complexityandeducation.ca (attached)
- Surowiecki, J. (2004). The wisdom of crowds: Why the many are smarter than the few and how collective wisdom shapes business, economies, societies, and nations. NY: Doubleday.
- Tapscott, D. and Williams, A. (2006). Wikinomics: How mass collaboration changes everything. NY: Penguin Group.

Comparative Mathematics Education Study

- Stigler, J. and Hiebert, J. (1999). The Teaching Gap. NY: The Free Press.
- Clarke, D., Keitel, C., and Shimizu, Y. (Ed.) Mathematics Classrooms in Twelve Countries: The Insider's Perspective (Paperback). Netherlands, Sense Publishers.

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GREAT to WORK with YOU!

- Let me know how it goes when you begin to implement bansho in your classrooms and as a professional learning strategy.



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