

PME 37 Discussion Group Report 5: Building a Thinking Classroom

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The discussion group on Building a Thinking Classroom was something that began as a conversation between the two organizers at PME 32 in Morelia, Mexico. The conversation continued through the years until PME 36 in Taipei, Taiwan when the decision was made to act on it.

Considerable work on thinking (e.g., Dreyfus, Hershkowitz, & Schwarz, 2001), collaboration, classroom discourse (e.g., Cobb, Wood, Yackel, & McNeal, 1992), classroom norms, mathematical norms (Yackel, 2001), and relational understandings developing through such activities has been undertaken in mathematics education. This work has illuminated the nature of mathematical thinking, the value of collaboration in fostering such thinking, and research into associations between the nature of discourse and developing mathematical understanding is ongoing.

All this work is predicated on mathematics lessons being a context in which thinking, collaboration, and discourse are already part of normative classroom behaviours. What is missing is a clear sense of how to create those classroom cultures that enable mathematical thinking to flourish. Given this gap we felt it appropriate to harness the combined knowledge of interested PME participants through conversations on Building Thinking Classrooms within the context of a discussion group.

Day 1 began with a thought experiment. The 70 or so participants that were present were asked to imagine a thinking classroom using whatever understanding of thinking classroom they had access to. They were also asked to imagine a non-thinking classroom, again using whatever understanding of this that was available to them. They were then asked to organize themselves into semi-random groups and discuss what differentiated the two classrooms in the thought experiment. From this they were asked to produce a list of characteristics of a thinking classroom.

These lists were written down on giant post-it note papers and put up on the walls around the room. A gallery walk followed with opportunities for participants to view the lists of other groups. After this, each group had an opportunity to extend their lists and then a whole group discussion ensued with the intention of positing the most important attributes of a thinking classroom. Some of the characteristics that emerged were:

- students needed to be challenged with a problem while feeling comfortable and motivated to meet that challenge;
- there need to be multiple student to student and student to teacher (focused and intense) interactions;
- there needs to be communication for creating new ideas, an openness to these ideas, and a taken-as-shared understanding of the goal of the communication;
- there needs to be teamwork and the building of a shared mathematical identity;
- and there needs to be time sufficient enough to achieve these aforementioned characteristics.

After this discussion groups were asked to continue their work – this time crafting a definition of a thinking classroom. These definitions were again written down on post-it notes, posted on the walls, and a gallery walk ensued. Day 1 ended with a sharing of some of these definitions.

Day 2 began with review of what had happened during Day 1. The 50 participants who returned for this session were then asked to discuss in their groups some possible strategies for either building thinking classrooms of their own, or helping teachers to build thinking classrooms. These strategies were, again, recorded and posted, followed by a gallery walk and whole group discussion.

The final activity for the groups was to posit possible researchable questions for those interested in pursuing an evidence-based inquiry focused around Building Thinking Classrooms. It became apparent that groups were not yet ready to focus on such research questions. Group conversations continued to focus instead around the previous three activities. It was clear from these discussion choices, and comments from various participants, that another discussion group session at PME 38 is warranted before a research agenda is developed.

This discussion group should be around the aspects of building thinking classrooms we want to know more about and what research designs could be appropriate. As a result, the plan is for the organizers to submit a proposal to for PME 38 called Building Thinking Classrooms: Shifting from Practice to Research.

Cobb, P., Wood, T., Yackel, E., & McNeal, B. (1992). Characteristics of classroom mathematics traditions: An interaction analysis. *American Educational Research Journal*, 29(3), 573-604.

Dreyfus, T., Hershkowitz, R., & Schwarz, B. (2001b). The construction of abstract knowledge in interaction. In M. van den Heuvel-Panhuizen (Ed.), *Proceedings of the 25th conference of the International Group for the Psychology of Mathematics Education* (Vol. 2, pp. 377-384). Utrecht, The Netherlands: PME.

Yackel, E. (2001). Explanation, justification and argumentation in mathematics classrooms. In M. van den Heuvel-Panhuizen (Ed.), *Proceedings of the 25th conference of the International Group for the Psychology of Mathematics Education* (Vol. 1, pp. 9-24). Utrecht, The Netherlands: PME.