

Encouraging Mathematical Thinking: Discourse around a Rich Problem

Bridging Research and Practice Group

The Math Forum

Summary

Encouraging Mathematical Thinking: Discourse around a Rich Problem is an online tool that provides video, text, and tasks for teachers to use to engage students in mathematical discussions. This tool is unique in that it takes a mathematical problem context and provides grade level appropriate lesson plans for elementary through advanced high school mathematics classes.

Purpose

Teachers need resources both text and video images that characterize mathematical classrooms where talking and thinking mathematically is routine. This tool is for pre-service and in-service teachers of grades K-12⁺.

Tool Description

This online tool highlights specific strategies teachers used to help their students engage in mathematical inquiry and take more responsibility in their learning. The tool includes video clips from teachers' classroom along with the task used to engage students in a problem that explores changes in surface area and volume of a cylinder constructed from an 8.5" by 11" sheet of paper. The tool includes multiple lesson plans using the cylinder problem to make it accessible and challenging for elementary, middle, high school, and advanced mathematics courses. Each lesson plan provides extensions and challenges appropriate for each target grade level. The site also provides ideas for using the cylinder problem with technology (e.g., spreadsheets, Geometer's Sketchpad).

Background

A group of teacher practitioners and the Math Forum staff collaborated to report on findings from discussions of research articles and chapters, classroom practice, and videotapes of classroom teaching to reflect an attempt to integrate research and practice. Each of the teacher participants worked with his or her students on a non-routine mathematical problem that provided an opportunity for rich discourse and reflection on ways teachers used the task. Linkages are made between the findings and research on student learning and instruction. The Math Forum's Bridging Research and Practice Group include: Jon Basden, Susan Boone, Annie Fetter, Judith Koenig, Cynthia Lanius, Art Mabbott, John McKinstry, K. Ann Renninger, Roya Salehi, Susan Stein, Jody Underwood, and Stephen Weimar.

The materials

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Using the tool

Teachers and leaders may engage in a web-based inquiry by choosing a variation of the task that is appropriate for a specific grade level. Teachers new to using mathematical talk to promote student learning will find it useful to read and interact with Section C, *The Teacher's Role in Encouraging Discourse* first. The teacher interventions describe strategies for engaging students in productive mathematical talk and include video clips to illustrate the strategy. Guidance is given for getting started in the classroom. The web pages are organized for easy navigation between sections. Teachers are invited to join the discussion to share ideas and experiences and post questions with a larger mathematical community.

Availability

Visit <http://mathforum.org/brap/wrap/index.html> the Math Forum website.

Strengths

- Lesson plans provided for multiple grade levels using variations of the same problem
- Strategies used to engage students in mathematical inquiry are noted
- Includes use of technology that enhances student learning and exploration
- Video clips include transcripts

Likely challenges

- The video clips are short but may take a long time to download