

Problem-Based Mathematics Instruction: Characteristics of a Lesson Launch



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Background Information

- **Problem-Based (PB) Instruction:** inquiry-based approach to mathematics teaching and learning
- **Components of a PB Lesson:**
 - Launch, Explore, Summarize
- **Launch:** introductory lesson segment where a teacher introduces the mathematical task
- **Explore:** a teacher monitors how groups of students solve the task
- **Summarize:** concluding segment where a teacher orchestrates class discussion to consolidate students' learning

Research Questions

What are the characteristics of a problem-based lesson launch?

What aspects of a lesson launch do teachers find difficult while planning the PB lesson?

Methods

- Qualitative analysis of 32 videos of PB lessons
- Identified the launch segment of each lesson
 - Coded for the ideas teacher addressed during lesson launch
 - Examined common launch characteristics across the lessons

Methods Continued

Qualitative analysis of 26 audio interviews with teachers about the lesson launch

- Coded for the aspects of lesson launch difficult for teachers to plan
- Examined commonalities across launch aspects that were difficult to plan

Results

Characteristics of a PB Lesson Launch

Motivation

- A teacher stimulates students' interest in **mathematics** and the **context of the task**

Prior Knowledge

- A teacher activates students' prior **mathematical** and **contextual knowledge**

Expectations

- A teacher establishes **mathematical goals** and **how students will work on the task**

Interactions

- **Style** of teacher-student interactions might affect task **cognitive demand**

Results Continued

Aspects of a PB Lesson Launch Difficult for Teachers to Accomplish

- Judging the minimum amount of information students need in order to move on successfully
- Anticipating students' mathematical prior knowledge
- Finding an interesting problem that has a solution relevant to students' lives

Conclusions

- Overall lesson success depends on the effectiveness of the lesson launch
- When planning lesson launch, teachers should consider how to:
 1. Motivate mathematics of the lesson and motivate the need for solving the task
 2. Set clear expectations for students' work
 3. Elicit students' prior knowledge of mathematics and task context
 4. Interact with students to promote students' high cognitive engagement

References

Jackson, K. J., Shahan E. C., Gibbons, L. K., & Cobb, P. A. (2012). Launching complex tasks. *Mathematics Teaching in the Middle School*. 18(1), 24-29.