CERME 14

Teacher's actions in class discussions after solving a Fermi problem

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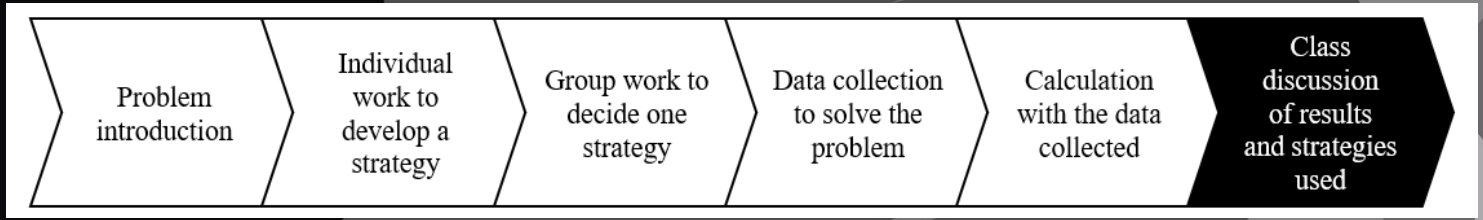
Context and Research Questions

Growing interest in mathematical modelling in primary education.

Fermi problems as tools to link mathematics with real-world contexts.

Activity structured in several phases.

Focus on how *models* are spread



Research Questions:

RQ1: What types of actions does the teacher perform during class discussions?

RQ2: How do these actions impact student participation and engagement?

Analysis – Teacher Actions Framework

Analysis based on **Drageset's (2014) categories**:

Redirecting actions: Correcting or suggesting alternative strategies. Includes: putting aside students' comments, advising new strategy, and correcting questions.

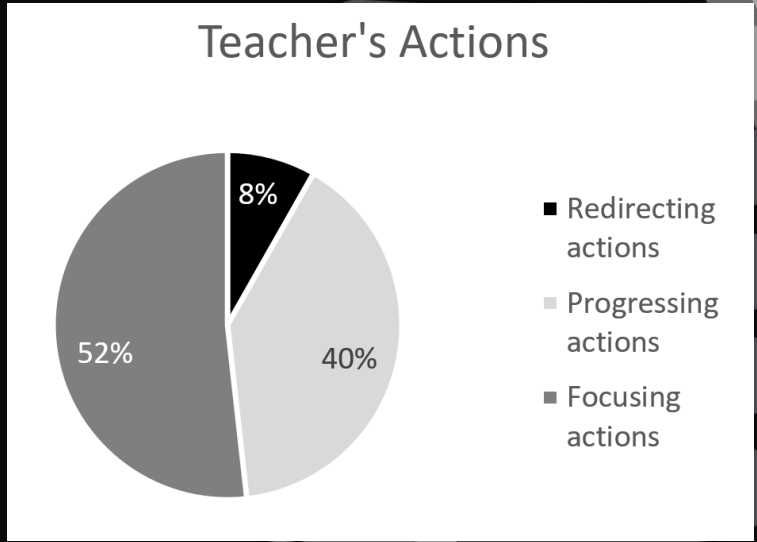
Progressing actions: Ensuring progress toward a solution. Includes: demonstration, simplification, closed progress details, and open progress initiatives.

Focusing actions: Emphasizing key elements of problem-solving. Includes: requests for student input (enlightening details of the solution process, justifying the reasoning behind the methods used, or applying it to similar problems, and requesting peer-assessment) and pointing out (recap, and notice).

Added Category: *Classroom management actions*.

Results

Category	Subcategories		Teacher actions
Redirecting	Put aside		2
	Advising new strategy		2
	Correcting questions		3
Progressing	Demonstration		5
	Simplification		2
	Closed progress details		16
	Open progress initiatives		11
Focusing	Request students' input	Enlighten details	3
		Justification	8
		Apply to similar problems	3
		Request peer-assessment	4
	Pointing out	Recap	19
		Notice	7
Actions of classroom management			9



Answer to RQ

RQ1: What types of actions does the teacher perform during class discussions?

Predominance of focusing actions (recap, justification, noticing key details).

Frequent use of progressing actions (closed progress details, open progress initiatives).

Less frequent use of redirecting actions (correcting and suggesting alternative strategies).

Recap Actions:

Most frequent → summarize and clarify student contributions.

Consistency with Franke et al. (2007) on making mathematical thinking explicit.

RQ2: How do these actions impact student participation and engagement?

Dominance of the IRE pattern (Cazden, 2001): Initiation-Response-Evaluation.

Limited student initiative.

Balancing engagement and effective questioning:

Closed progress actions → More student involvement but less reflection.

Open progress initiatives → Deeper reasoning but fewer voices involved.

Key findings and Conclusions

Teacher plays a significant role in guiding the discussion.
Emphasis on summarizing and clarifying student contributions to ensure collective understanding.
The balance between open and closed progress actions influenced both participation breadth and reasoning depth.

Pedagogical implications:
Teachers should provide structure while allowing space for students to explain and justify their thinking.
Focusing actions, such as recapping and asking for justification, help clarify mathematical ideas.

Limitations and Future Directions:
Small sample size and focus on teacher actions.
Further studies should explore student contributions and broader classroom contexts.

References

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