

**Proceedings of the
24th Annual Conference on
Research in Undergraduate
Mathematics Education**

Editors:

Shiv Smith Karunakaran

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Boston, Massachusetts

February 24 - February 26, 2022

Presented by

The Special Interest Group of the Mathematical Association of America
(SIGMAA) for Research in Undergraduate Mathematics Education

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CITATION: Karunakaran, S. S., & Higgins, A. (Eds.). (2022). *Proceedings of the 24th Annual Conference on Research in Undergraduate Mathematics Education*. Boston, MA.

ISSN: 2474-9346

A Sociocultural Perspective on Beginning Teachers Enacting Reasoning and Proving Practices

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Supported by NSF #1941720. The opinions expressed herein are those of the authors and do not necessarily reflect the views of the NSF.

Background

Teaching Mathematics via Reasoning and Proving (Buchbinder & McCrone, in press)

- Integration of reasoning and proving within the mathematics curriculum
- Emphasis on deductive reasoning for producing and validating mathematical results
- Use of precise mathematical language but within the conceptual reach of the students

- Capstone course *Mathematical Reasoning and Proving for Secondary Teachers*.
- Prospective Secondary Teachers (PSTs) can develop knowledge, dispositions and skills for teaching mathematics via reasoning and proving (Buchbinder & McCrone, 2020)
- Little is known about long-term development of beginning teachers' learning to teach mathematics via reasoning and proving, and what factors affect this development (Stylianides et al., 2017).
- Beginning teachers experience tensions between their commitments to the university, their cooperating teacher, and developing their own teaching styles (e.g., Smagorinsky et al., 2004)

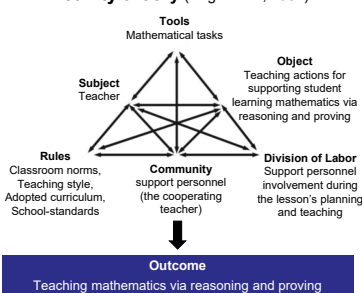
Goal: To examine how sociocultural contexts of the teacher preparation program and of the internship school, supported or inhibited teaching mathematics via reasoning and proving of beginning secondary mathematics teachers.

The Study

- Participant:**
Olive – a beginning teacher, interning in a local high school, supported by her cooperating teacher (CT). Olive participated in the capstone course, a year prior to the internship.
- Data sources:**
- PST: Four lessons: lesson plans, reflections
 - Intern: Two lessons: lessons plans, observations and follow-up interviews.

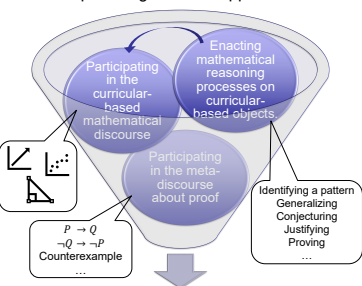
Theoretical frameworks

Activity theory (Engeström, 1987)



Commognitive theory (Sfard, 2008)

Teaching mathematics via reasoning and proving includes providing students opportunities for:

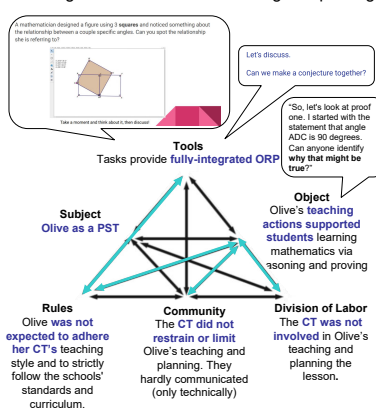


Data analysis:

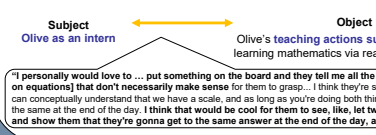
- Olive's teaching was examined by the activity system in two settings: as a PST and as an intern.
- Olive's tasks and teaching actions were analyzed regarding the opportunities provided to students to learn mathematics via reasoning and proving.
- Tensions between the activity system components were identified

Results

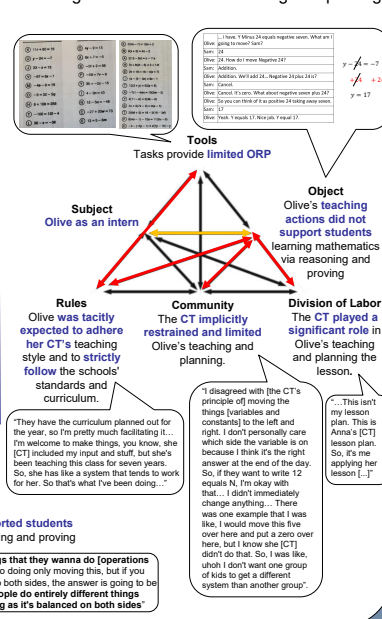
Olive's teaching as a PST
The sociocultural contexts **supported** teaching mathematics via reasoning and proving



Olive's imaginary teaching
Teaching mathematics via reasoning and proving



Olive's teaching as an intern
The sociocultural contexts **inhibited** teaching mathematics via reasoning and proving



Conclusions

- Beginning teachers implementing teaching mathematics via reasoning and proving needs to be examined while considering how teachers navigate the tensions between the proof-related teaching practices adopted during their teacher education program, their developing personal teaching styles, and the sociocultural components of learning/teaching environments.
- Contribution: developing theoretical and analytical tools for analyzing beginning teachers' learning how to teach mathematics via reasoning and proving.

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