Comparing Student and Instructor Perspectives of Teaching Actions to Foster Creativity

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Research Question/Background Literature/Methods

Do students and instructors perceive teacher actions to foster creativity in the same way? Zepke et al. (2013) found that tertiary students and teachers similarly valued particular teacher classroom behaviors such as providing feedback, enthusiasm, and encouraging critical thinking, while Fitzgerald et al. (2020) noted that teachers' perceptions of teaching tend to be more positive than students' perceptions of teaching or teaching actions. We define teacher actions to foster creativity to include acknowledged actions (in or out of class) from the teacher that made a student feel creative (Satyam et al., 2022; Tang et al., 2022). These actions may be intended by the instructor, but may not be perceived as such - this is the impetus of our study.

Structured interviews were conducted via Zoom with two groups of Calculus 1 instructors: those who participated in a professional development series focusing on fostering creativity in the classroom (PD) and a group who received no such direction (Non-PD). Instructors were asked questions regarding their approach to teaching through the lens of fostering creativity, reflections on specific classroom interactions, and the effectiveness of their approaches. Interviews were also conducted with students from the instructors' classes. Students were asked about creativity in the classroom and the instructor's actions in fostering creativity. Transcripts were coded for instances of teacher actions reported to foster creativity identified in Satyam et. al (2022). Transcripts received multiple coding passes in order to reach agreement. Once coding was complete, counts were aggregated and organized by individual instructor for analysis.

Results/Discussion/Acknowledgments

Instructors from PD and Non-PD cohorts reported a similar number of creativity-fostering teaching actions (an average of 20.29 for PD instructors and 19 for Non-PD instructors), but students of PD instructors reported higher actions (8.83) than their Non-PD counterparts (5.92). Standard deviation in responses from PD students was higher (7.08) than the standard deviation from the Non-PD students (5.31).

We believe the findings suggest two pertinent things: that instructors and students do perceive creativity-fostering teacher actions differently; and that when instructors are intentional about creativity practices, students acknowledge and recognize the attempts through the higher total actions. However, the difference in standard deviations suggests that students who experience intentionally creative practices from the PD instructors perceive a larger range of creativity-fostering actions than those students who see similar but unintentionally creativity-fostering practices from Non-PD instructors. This is consistent with the findings of Lew et al. (2016) - without cues, students have trouble identifying the key elements that teachers intend to convey. Future research might focus on persistence of students' perceptions of creativity in future math classes.

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Research Question

Do students and instructors perceive teacher actions to foster creativity in the same way?

Introduction

Zepke et al. (2013) found that tertiary students and teachers similarly valued specific teacher classroom behaviors such as providing feedback, enthusiasm, and encouraging critical thinking, while Fitzgerald et al. (2020) noted that teachers' perceptions of teaching tend to be more positive than students' perceptions of teaching or teaching actions.

We define **teacher actions to foster creativity** to include acknowledged actions (in or out of class) from the teacher that made a student feel creative (Satyam et al., 2022; Tang et al., 2022). These actions may be intended by the instructor, but may not be perceived as such.

What is Mathematical Creativity?

We situate creativity following Satyam et al. (2022): "if any item (process or product) is new to the student then that is an act of creativity." We believe creativity to be relative to the student rather than oriented toward the mathematical community and that creativity can be developed and fostered.

Data Collection/Methods

Structured interviews were conducted via Zoom with two groups of Calculus 1 instructors: those who participated in a professional development series focusing on fostering creativity in the classroom (PD) and a group who received no such direction (Non-PD). Instructors were asked questions regarding their approach to teaching through the lens of fostering creativity, reflections on specific classroom interactions, and the effectiveness of their approaches.

Interviews were also conducted with students from the instructors' classes. Students were asked about creativity in the classroom and the instructor's actions in fostering creativity. Transcripts were coded for instances of teacher actions reported to foster creativity identified in Satyam et. al (2022). Transcripts received multiple coding passes in order to reach agreement. Once coding was complete, counts were aggregated and organized by individual instructor for analysis.

Teacher Actions

Satyam et al. (2022) grouped teaching actions which foster creativity into four themes. An action is coded as:

Task-Related
Properties of a mathematical content task that were (re)designed, evaluated, or assessed by the instructor

Active Learning
action that is student-centered, including inquiry-oriented (or -based) instruction (Kuster et al., 2018; Shultz & Herbst, 2020)

Holistic Teaching
actions that do not require a response from students, yet psychologically build an environment for fostering creativity

Teacher-Centered
action that involves instructor input with little to no student feedback, whether it be verifying correctness or connecting topics

Results

Average Code Counts for Teachers and Students

Standard Deviation of Code Counts for Teachers and Students

PD Teacher Codes (by Action Type)				
	Task-Related (n=52)	Teacher-Centered (n=12)	Inquiry Teaching (n=35)	Holistic Teaching (n=43)
Average	7.43	1.71	5	6.14

PD Student Codes (by Action Type)				
	Task-Related (n=74)	Teacher-Centered (n=12)	Inquiry Teaching (n=59)	Holistic Teaching (n=65)
Average	3.08	0.5	2.46	2.71

Non-PD Teacher Codes (by Action Type)				
	Task-Related (n=20)	Teacher-Centered (n=9)	Inquiry Teaching (n=22)	Holistic Teaching (n=25)
Average	5	2.25	5.5	6.25

Non-PD Student Codes (by Action Type)				
	Task-Related (n=17)	Teacher-Centered (n=9)	Inquiry Teaching (n=21)	Holistic Teaching (n=31)
Average	1.31	0.69	1.62	2.38

Discussion and Future Work

We conclude that **students and instructors do perceive teacher actions to foster creativity differently**, and the difference is independent of participation in PD.

- When instructors are intentional about creativity practices, students acknowledge and recognize the instructor's attempts.
- PD students perceive a larger range of creativity-fostering actions than Non-PD students. This is consistent with the findings of Lew et al. (2016) - without cues, students have trouble identifying the key elements that teachers intend to convey.

Future work might investigate:

- Persistence of student perceptions of creativity in future classes
- Differences in perceptions of teaching actions between instructors at different stages of their careers or between contingent/non-contingent faculty
- Longitudinal data on math attitude beliefs for students whose mathematical creativity is encouraged and fostered

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