EMBODIED TEACHER ACTIONS TO PROMOTE STUDENTS' GENERALIZATION IN A VISUAL PATTERN TASK

Lizhen Chen
Ohio University
lizchen@ohio.edu

Allyson Hallman-Thrasher
Ohio University
hallman@ohio.edu

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Teachers often use visual pattern tasks to introduce generalization to young students. Although coordinating both numerical and figural structures in the tasks could be difficult (Radford, 2014), the presence of visuals is beneficial for students to strengthen their numerosity and generalization knowledge (Nathan & Kim, 2007). Teachers translate generalizing ideas between different representational spaces (e.g., visual, numeric, and algebraic spaces) (Hallman-Thrasher et al., 2022). There is little research on how the discursive and embodied perspectives collaborate to make teachers' generalizing promoting actions explicit to students. This study aims to investigate how preservice mathematics teachers enact generalizing promoting actions and translate generalizing thinking between discursive and gestural spaces.

We focus on a mathematics teacher candidate, Mr. Davidson, who enrolled in a year-long master's teacher preparation program. He completed pattern tasks as a learner, analyzed other teachers' videos of teaching pattern tasks and analyzed his own videos. He planned, taught, and reflected on a generalization lesson that focused on a visual pattern task. Our data analysis was guided by Ellis' (2011) seven categories of generalizing promoting actions and Strachota's (2020) three categories of priming actions. Here we only present three categories of teacher actions: 1) priming actions that prompt students to identify mathematical features situated in a specific picture but extendable to other pictures in the pattern task (e.g., a teacher focuses students' attention to numerosity in a picture, expecting them to extend the idea of numerosity to other pictures); 2) publicly revoicing a generalization or idea; 3) building on a previously shared generalization or idea and creating a better or new generalizing idea. We used double coding to capture some teacher actions that share features of more than one category. We divided the teaching video into chunks based on the instructional topics mentioned in their immediate contexts. We coded the teacher's gesture use for each teacher action code. Finally, we discussed and studied how teacher gestures contributed to students' generalizing in teacher actions.

We found that the teacher candidate kept asking students for accurate descriptions of the ways of drawing the fourth picture. He used various representational gestures to re-present students' explanations of what the fourth picture looked like. When the teacher revoiced or built on students' generalizing responses in front of the whole class, his embodiment acted as a resource for all students to comprehend better what was shared in the moment. Through the teacher-student interaction, the teacher candidate created opportunities for students to refine their language of location, space, and relevant geometric features of the boxes and the rows in the picture. As students' generalizing explanations became more accurate in the geometric features in the pattern task, the teacher candidate's embodied generalizing promoting actions became more targeting spatial relationships between boxes and between rows (i.e., next to each other, parallel, below). While facilitating students' spatial construction in a specific picture of the pattern task, the teacher candidate, in effect, supported students' discovery of a generalizable rule

for cases beyond hand afterwards. This support sheds light on a potential of eventually building such a teaching practice of embodied generalizing-promoting teacher actions.

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628