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ANALYSIS OF PRE-SERVICE TEACHERS' GENERALIZATION AND JUSTIFYING STRATEGIES IN SOLUTIONS TO PATTERN-GENERALIZATION TASKS

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Findings from research with pre-service teachers (PSTs) document that PSTs have difficulties generalizing and justifying pattern generalizations, particularly for far generalization tasks (Hallagan, Rule, & Carlson, 2009). In order to help their future students learn about, analyze, generalize, and justify pattern generalizations, they need substantial learning to overcome their own difficulties in this area.

We analyzed 37 PSTs' written solutions to four figural pattern generalization tasks, video recordings of class discussions, and audio-recordings of problem-based interviews during which the PSTs were asked to solve one pattern generalization task, to answer the following research questions. (1) *What relationships and structural aspects of a figural pattern do PSTs build upon to formulate pattern generalization?* (2) *How do they utilize uncovered relationships and structural aspects of a figural pattern to justify their general rules?*

The results revealed that PSTs generalized by building on the structural aspects of a figural pattern or by using numerical information they collected about the task. With respect to the structural aspects of a figural pattern, PSTs focused on the changing or invariant pattern characteristics. We classified the generalizations that were developed with attention to the figural pattern structure as (a) holistic analysis of change in pattern structure, (b) decompositions of pattern structure into chunks and analysis of change in structural chunks, (c) holistic analysis of invariant and changing aspects of pattern structure, and (d) decompositions of pattern structure into chunks with a focus on their invariant and changing aspects. At the beginning of the semester, 37% of PSTs generalized patterns by drawing on their understanding of figural pattern structure compared to 67% of PSTs who generalized patterns in this manner at the end of the semester. The higher proportion of PSTs who analyzed pattern structure to develop their rules at the end of the semester was statistically significant at the 0.05 level; $z = 2.602$. Across analyses of PSTs' written solutions to all figural pattern tasks, the PSTs' ability to justify their general rules was highly correlated with their understanding of the pattern structure; $r = 0.766$, $p < 0.01$. This study contributes to the ongoing discussion about ways of supporting grades 1-8 PSTs' ability to generalize and justify.

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References

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