THE INTERPLAY BETWEEN A VISUAL TASK AND ELEMENTARY STUDENTS' MATHEMATICAL DISCOURSE

Zachary Pearson
The Ohio State University
pearson.166@buckeyemail.osu.edu

Azita Manouchehri
The Ohio State University
manouchehri.1@osu.edu

This research was conducted by a fourth-grade teacher and doctoral student in mathematics education in conjunction with their advisor, a professor of mathematics education.

A growing body of research in mathematics education has highlighted the importance of recognizing mathematics learning as a socially mediated activity. Indeed, mathematics education researchers have increasingly focused on how classroom dialogue can facilitate students' creation of shared understandings. Aligned with this theoretical heritage, we recognize that human life and learning are inherently social and rooted in communication. We also recognize that student discourse is connected to student cognition and thus learning. Accordingly, this study relied on socio-cultural discourse analysis (Hennesy, et al., 2016, Mercer, 2010) both as a theoretical and a methodological tool to examine the nature of dialogue in one classroom in the context of students' collaborative work on one visual task. We ask, given the centrality of task selection to fostering discourse, how the use of a visual task, as an instructional tool, might affect students' peer-to-peer discourse practices?

Methods

The goal of this study was to identify specific discourse practices students utilized while collaborating on a visual mathematics task. A focus group of 4, fourth-grade students' interactions on one task was used as a data source for analysis.

The participants worked on a task (Boaler, 2017, p. 32) that asked them to work together to find patterns. Students were each nine to ten-years-old and represented a range of academic abilities. The group discussion was videotaped and transcribed.

Transcriptions were coded using Hennessy et al.'s Scheme for Educational Dialogue Analysis (SEDA) (Hennessy, et al., 2016). SEDA offers a scheme for analyzing discourse practices, specifically outlining different practices.

Findings

A total of 111 utterances were coded. Students most frequently conjectured and made their reasoning explicit by utilizing visual models presented in the task. Additionally, "Explicit reasoning" and "build on ideas of others" accounted for the majority of students' communicative acts during the discussions.

Group members exhibited different patterns of practice and adopted different roles. Despite differences in discourse moves, the majority of communicative acts consisted of students' conjectures and ensuing explanations using the task's visual models. Learners' comments frequently relied on the visuals with statements such as, "Look, (points to paper), there are triangles all over the place." Group members relied on the visual task as they considered proposed ideas, built on them, and utilized them in their own work.

References

Alexander, R. J. (2001). Culture and pedagogy: International comparisons in primary education. Oxford: Blackwell.

Hennessy, S., Rojas-Drummond, S., Higham, R., Márquez, A. M., Maine, F., Ríos, R. M. Barrera, M. J. (2016). Developing a coding scheme for analysing classroom dialogue across educational contexts. *Learning, Culture and Social Interaction*, 9, 16–44.

In: Sacristán, A.I., Cortés-Zavala, J.C. & Ruiz-Arias, P.M. (Eds.). (2020). *Mathematics Education Across Cultures: Proceedings of the 42nd Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*, Mexico. Cinvestav / AMIUTEM / PME-NA. https:/doi.org/10.51272/pmena.42.2020

Mercer, N. (2010) The analysis of classroom talk: Methods and methodologies. *British Journal of Educational Psychology*, 80, 1-14.

Rojas-Drummond, S., Torreblanca, O., Pedraza, H., Vélez, M., & Guzmán, K. (2013). 'dialogic scaffolding': Enhancing learning and understanding in collaborative contexts. *Learning, Culture and Social Interaction, 2*(1), 11-21. doi:10.1016/j.lcsi.2012.12.003.