

# EXPLORING EIGHTH GRADERS' SPATIAL STRUCTURING OF UNIT CUBES: VISUALIZATION ABILITIES IN SKETCHUP CONTEXT

Candas Uygan<sup>1</sup>, and Melih Turgut<sup>2</sup>

<sup>1</sup>Eskisehir Osmangazi University, Eskisehir, <sup>2</sup>NTNU–Norwegian University of Science and Technology, Trondheim

This qualitative research aims to explore eighth graders' visualization abilities while spatial structuring of unit cubes to create specific buildings. Visualization abilities (which are figure-ground perception, perceptual constancy, positions in space, spatial relationships, and visual discrimination) regarding spatial structuring of unit cubes were elaborated by Gutiérrez et al. (2018), following the seminal work of Del Grande (1990). In this paper, we acknowledge the theoretical framework of “visualization abilities” (Gutiérrez et al., 2018) in a modelling software context, specifically in the SketchUp environment. To explore students' steps and discuss the function of the framework, we focus on two eighth graders' spatial structuring process and consider the following research question: How do eighth graders' spatial structuring in SketchUp context occur within the lens of visualization abilities?

Data comes from a series of task-based interviews with two eighth graders (one boy and one girl, both were fourteen years old) from a public school located in central Turkey. Two participating students were familiar with the software. The interviews included five different tasks that were related to constructing buildings with unit cubes. First, top, front and right views of the building on the paper were proposed and then asked to construct the given building. Later, it was asked to consider a zero-gravity environment (that SketchUp provides) and construct the same building with fewer cubes. Video-recorded interviews and screen recordings were triangulated within the lens of visualization abilities (Gutiérrez et al., 2018). Our tentative analysis indicates the central role of figure-ground perception and position in space in students' visualization abilities within SketchUp context. Furthermore, we observe and discuss the synergy and dialects among different visualization abilities.

## References

- Del Grande, J.J. (1990). Spatial sense. *Arithmetic Teacher*, 36(7), 14-20.
- Gutiérrez, A., Ramírez, R., Benedicto, C., Beltrán-Meneu, M. J., & Jaime, A. (2018). Visualization abilities and complexity of reasoning in mathematically gifted students' collaborative solutions to a visualization task: A networked analysis. In K. S. Mix, & M.T. Battista (Eds.), *Visualizing mathematics: The role of spatial reasoning in mathematical thought* (pp. 309-337). Springer.