Title: HIGH SCHOOL STUDENTS INTERPRETATIONS AND USE OF DIAGRAMS IN GEOMETRY PROOFS

In high school geometry, proving theorems and applying them to geometry problems is an expectation from high school students (CCSSI, 2010). Diagrams are considered as an essential part of the geometry proofs because diagrams are included in a typical geometric statement such as a claim or problem (Manders, 2008; Shin et al., 2001). This interview-based study investigated how high school students interpret and use diagrams during the process of proving geometric claims. Particular attention is given to the semiotic resources such as symbols, visuals, and gestures that students draw from the diagrams to develop their proving activities. Hence, the goal of the current study is to contribute to the mathematics education field by providing insights into the details of semiotic aspects of diagrammatic reasoning. Study participants were grade 10–12 high school students and data was collected through one-on-one task-based clinical interviews. In general, students focused on the figural properties of the diagrams more frequently than the conceptual properties of the diagrams in their proofs even when they produced a new diagram or multiple diagrams. Regarding the semiotic structure of students’ proving process, gesture resources were prominent in the semiotic structure of students’ proving process in diagram-given tasks. The findings also suggested that, in general, some visual resources such as drawing a new figure or multiple figures occurred regularly in particular tasks such as diagram-free tasks with non-diagrammatic register or truth-unknown features. Overall, the frameworks used in this study showed how important it is to consider the mathematics as multi-semiotic, understanding the role of gestures in students’ geometrical reasoning.