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Students' Development of The Relationship Between The Cartesian Product, Relation and The Definition of Function

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ABSTRACT

This study investigated the students' development of the relationship between the Cartesian Product, relation and the function concepts. Six 9th grade students in a private school participated in mathematics lessons, 4 hours per week for four consecutive weeks. Students were asked to engage in GeoGebra and non-GeoGebra Tasks through focused questioning. Data from the transcripts of the audiotapes of the classroom discussions and the teacher's reflections together with the written artifacts from the students were analyzed. Results revealed that students came to the understanding of the Cartesian Product between two sets as the matching of all elements in the sets. Results also indicated that students were able to detect why the elements of a Cartesian Product needs to be in ordered pairs. In addition, students were able to determine the graph of a function and a relation given a graph of a Cartesian Product and explain how they are related to each other. Data further pointed to some student difficulties in graphing a Cartesian Product defined on two finite and infinite sets and in considering equal sign as showing the output in terms of the input values. In this paper, we intend to contribute to the field by showing the kinds of students' reasoning on their development of the relationship between these concepts. Also, we propose a set of GeoGebra and non-GeoGebra tasks and problems developing and assessing such relationships.

Keywords:
Cartesian Product, alternative definitions of function, high school students, GeoGebraTasks

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