FIRST- AND SECOND-GRADE PROSPECTIVE TEACHERS reconstructing A DEFINITION OF POLYGON DIAGONALS

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The study's purpose is to examine how prospective first- and second-grade mathematics teachers define the concept of polygon diagonals, how they reconstruct their definitions, and how their conceptual images change over time as they align them with the correct definition. Polygon diagonals were chosen due to their recognized complexity and importance. For this study, 23 prospective first- and second-grade teachers participated in a two-part intervention. During two 90-minute meetings, they analysed mathematical events that involved a conflict that could be resolved using a precise mathematical definition of the diagonal. Data was collected through prequestionnaires and postquestionnaires as well as observations of the class discussion during the two interventions. The researchers used a mixed-method approach and analysed how the participants’ concepts evolved based on Toulmin’s model (2003). The study findings indicated that, prior to the intervention, all participants provided incorrect definitions in the prequestionnaire (57% insufficient definition, 43% included noncritical attributes) because they relied on their conceptual image rather than their conceptual definition, leading them to include noncritical attributes. When the participants initially engaged with the mathematical events, which included identification examples and nonexamples of a diagonal, their claims highlighted their lack of awareness of the gap between the prototype example of the diagonal and the analytical aspect arising from the definition, despite the diagonal definition being provided. However, following the argumentative discourse that we monitored, the participants were able to successfully identify critical attributes and exclude irrelevant attributes. The postquestionnaire showed a significant improvement in the participants' understanding, with 87% able to correctly define whether it was minimal or nonminimal. Based on these findings, which align with prior research (e.g., Haj-Yahya, 2021), it is recommended that future research focus on analysing mathematical events using only definitions as the deciding factor in the identification of examples and nonexamples of geometric concepts.

References

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