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

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The study's purpose is to examine how prospective mathematics teachers of first and second grades define the polygon diagonals concept, how they reconstruct their definition, and how their concept image changes over time which is in line with the concept definition. The choice of polygon diagonals is due to its recognized complexity and importance. The study involved 23 first and second grade prospective teachers who participated in a two-part intervention consisting of two 90-minute meetings. The intervention involved analysing mathematical events that presented a conflict relevant to diagonal concept, which could be resolved through a precise mathematical definition of diagonal; that provided an opportunity for discussion and argumentation. Data was collected through pre- and post-questionnaires, as well as class discussion observations during the two intervention meetings. The researchers used a mixed method, and they analysed participants’ evolving diagonal concept based on Toulmin’s model (2003). The study findings indicated that prior to the intervention, all participants provided incorrect definitions in the pre-questionnaire (57% insufficient definition, 43% based non-critical attributes). This was because they relied on their concept image rather than their concept definition, leading them to include non-critical attributes incorrectly. At the beginning of the participants' engagement with mathematical events that included identification examples and non-examples of diagonal, and the claims they provided 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 presented to them. However, during the argumentative discourse in claims that arose, the evidence supporting these claims, and the reasoning connecting the claims and the evidence that we monitored using Toulmin's model (2003); the participants succeeded in identifying the critical attributes of the diagonal and excluding those that were irrelevant. The participants' improved understanding was evident in the significant improvement in the post-questionnaire, as they were now able to provide correct definitions whether it was minimal or non-minimal (87%). Based on these findings which are in the same direction of other researches (e.g. Haj-Yahya, 2021), it is recommended that future research focus on analysing mathematical events using only definitions as the deciding factor in identification of examples-and non-examples of other geometric concepts.

**References**

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