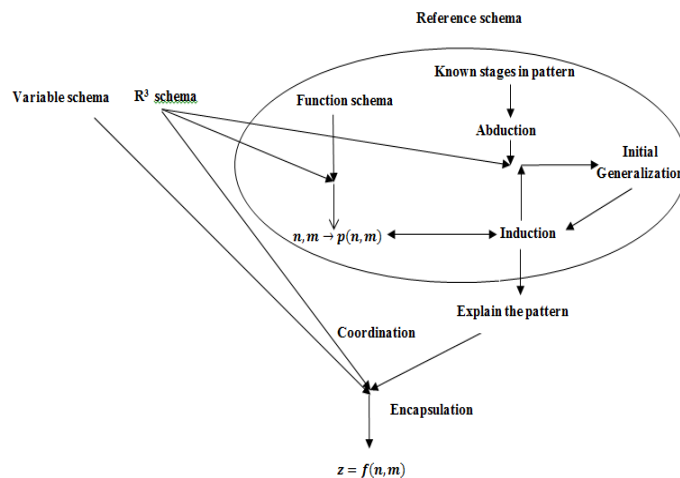


Enhancing functional thinking: Identifying the prior schemas of seventh grade students in generalization of two-variable figural patterns

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Abstract

The figural patterns have a unique capacity to enhance functional thinking. The aim of this study is to identifying the prior schemas in generalization of two-variable figural patterns. The data collection method was quantitative and qualitative. The statistical population of the study were consisted of 493 students from Malekan township (East Azerbaijan) that 220 students were selected as sample. Using the self-concept analysis, background and experiences of researcher, initial genetic decomposition was developed that including the prior schemas for generalization. Then, a test of 7 tasks was designed based on Action-Object-Process-Schema (APOS) framework. The validity of the test was confirmed by experts in mathematics education and experienced teachers. Using the analysis of students' responses to this test based on the APOS framework and doing three cycles of the research were conducted with the teaching method of Activity-Class discussion-Exercise (ACE), with 19 students, genetic decomposition was finalized in this way, and defects of student in reference schema, R^3 schema and variables schema as prior schemas in generalization of two-variable figural patterns were identified and encoded. Identifying the mental constructs of students in generalizing patterns, will make it easier to better teaching and learning.



Conclusions

This study has done for identifying and repairing mental constructs of 7th grade students in generalization of two variable figural patterns by using the APOS theory. The results of this research were as follow:

- 1- This research confirm that including two-variable figural patterns in curriculum has great value at developing functional thinking of students and can be taught and learned.
- 2- In this research genetic decomposition of two-variable figural pattern generalization was designed and defects of student in reference schema, R^3 schema and variables schema as prior schemas in generalization of two-variable figural patterns were identified and encoded.
- 3- The results of analysis of data indicated that identifying the mental constructs of students in patterns generalization, gave opportunity for researchers to repairing the mental constructs.