

## Pre-Service Mathematics Teachers' Mental Construction in Solving Equations and Inequalities Using ACE Teaching Cycle

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**Abstract :** This study investigated ACE supported instruction and pre-service mathematics teachers' mental construction in solving equations and inequalities. A mixed approach with concurrent parallel design was employed. It was conducted on two intact groups of regular first-year pre-service mathematics teachers at Fiche College of Teachers' Education in which one group was assigned as an intervention group and the other group as a comparison group using the lottery method. There were 33 participants in the intervention and 32 participants in the comparison. Six pre-service mathematics teachers were selected for interview using purposive sampling based on pre-test results. An instruction supported with ACE cycle was given to the intervention group for two weeks duration of time. Written tasks, interviews, and observations were used to collect data. Data collected from written tasks were analyzed quantitatively using independent samples t-test and effect size. Data collected from interviews and observations were analyzed narratively. The findings of the study uncovered that ACE-supported instruction has a moderate effect on Pre-service Mathematics Teachers' levels of conceptualizations of action, process, object, and schema. Moreover, the ACE supported group out scored and performed better than the usual traditional method supported groups across the levels of conceptualization. The majority of pre-service mathematics teachers' levels of conceptualizations were at action and process levels and their levels of conceptualization were linked with genetic decomposition more at action and object levels than object and schema. The use of ACE supported instruction is recommended to improve pre-service mathematics teachers' mental construction.

**Keywords :** ACE teaching cycle, APOS theory, mental construction, genetic composition

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