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Developing a Conjecturing-centered Mathematical Instruction module - Taking
“Linear Equations” for Example

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Abstract

The objective of this research was to develop a conjecturing-centered mathematical instructional module for algebraic equations, to discuss the difficulties that might arise during the developing phase and the corresponding coping strategies, and to examine students' demonstration of mathematical proficiency during their learning processes. The study made use of developmental research approach to construct instructional module through the cycle consisting of design, teaching experiment, reflection and correction. The research built a preliminary instructional module based on the theories of Realistic Mathematics Education [RME] and mathematics conjecturing, with the hypothetical learning trajectories of students taken into consideration. Afterwards, by means of the collaborative teaching experiments carried out by three in-service teachers, the researcher hoped that by way of repeatedly going through the cycle composed of design, teaching experiment, reflection and correction, the refinement of the module could be attained. The research results showed that in the initial phase of developing the instructional module, the main obstacles include: (1) hard to choose appropriate materials to entitle the unit; (2) difficult to arrange succession of the contexts; (3) determining standards for evaluating the module; (4) terms and expressions used should be considered from students' point of view. From the teaching experiments, it is also found that using questions related to real life contexts can better help students engage in the learning activity and think outside the box to produce diverse ideas. Besides, through group work, idea sharing among students, and the conjecturing process of brainstorming, verifying, and refuting, mathematical proficiency can be elevated. It is finally discovered that via the cycle of design, teaching experiment, reflection and correction, obstacles to developing the module can be effectively resolved, and the optimization of the module can be better achieved.

Key words : Conjecturing; Instructional module; Linear equations;
Mathematical proficiency; RME