

A contributing framework for improving the quality of mathematics teaching and learning in Indonesia

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General overview

A mathematically challenging and social interaction-rich learning environment was implemented with six Indonesian prospective teachers to increase student engagement in active learning principles. A vital component of the intervention was problem-posing, extended by implementing their problems in real-life teaching situations and reflecting on their teaching. The entire procedure is based on continuous peer feedback and control.

Background

It is widely acknowledged that a mathematically rich teaching environment could increase student engagement and, consequently, learning quality. The following statement by a Hungarian scholar is worth noting. It is essential to provide open-ended situations in teaching mathematics, in which students recognize and formulate the mathematical problem, more often different ones, given that life does not present us with textbook-style mathematical problems, but rather situations (Varga, 1987).

The rich environment implies that the student's role should not be that of a passive listener and note-taker but rather that of participating in cognitively demanding learning activities such as discussion, review, and evaluation. In addition, some researchers, including Chico (2019), also emphasized social interaction in the classroom. What has been mentioned above follows what Gogus (2012) considered active learning principles, with collaborative learning as a subset.

The active learning principles and collaborative learning were considered to arrange an intervention for Indonesian prospective teachers. Currently, the Indonesian curriculum's cornerstone places students at the center of learning to collaborate and share ideas (Kepmendikbudristek, 2022), and Indonesian education has made immense progress (World Bank, 2020). The intervention aims to support the current curriculum's implementation and as a small-scale path to continuously move toward infinite improvement in mathematics teaching and learning. It involved prospective teachers as an educational asset for the future. Accordingly, this poster presents the active learning-based intervention and its impact on prospective mathematics teachers' pedagogical and mathematical skills.

Approach and results

A study group of six prospective teachers from private and public universities in Surabaya was formed. At first, prospective teachers from a classroom at each university were offered to join the intervention voluntarily. Those who were interested and taught non-formal classes to reinforce the lessons given at school were selected as study group members. The activity during the intervention

is referred to the active learning by Edwards (2015), which involves intellectual, social, and physical activities. These activities should emerge as their empirical knowledge, which they can, in turn, reflect on and apply to their students in the future.

Given that problem posing is one approach that contributes to active learning, they were given a situation and directed to pose a task individually as an intellectual activity. Before giving the task to their students, they discussed it collaboratively to encourage intellectual and social activities as they considered the reasonableness and aptness of the task for the students. Implementing the task with students is deemed a cognitive and social activity as they engage with students and cope with unexpected situations or questions. Taking into account that the intervention aimed to address pedagogical aspects, the participants reflected and shared their implementations with their peers in a meeting after teaching implementation.

The findings confirm that the intervention helped prospective mathematics teachers develop their pedagogical and mathematical skills, which include problem-posing, problem-solving, critical thinking, and teaching practice. In particular, this poster focuses on problem-posing activity, which led them to discuss the problem aptness and the pseudo-real-life problem.

Pedagogical implications

The key point emerging from the current study results is that this intervention's design would be beneficial if incorporated into teacher training programs that involve more prospective teachers. The design of the intervention appears as an opportunity for the prospective teachers to provide problems closer to their students' real-life situations than the problems in the textbooks. These problems will make learning engaging and meaningful for the students.

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