

Investigating the Development of Mathematics Teachers' Pedagogical Content Knowledge for Teaching Algebra: A Professional Development Program

D.D. Rupasinghe^{1*}, P. R. K. A. Vitharana², A. K. Amarasinghe³

¹*Amarasuriya Teachers' College, Unawatuna, Galle.*

²*Faculty of Humanities and social Sciences, University of Peradeniya, Peradeniya*

³*Faculty science, University of Peradeniya, Peradeniya*

**deepadayangani@gmail.com*

This study aims to examine the success of Professional Development (PD) program for developing the secondary level mathematics teachers' pedagogical content knowledge (PCK) in teaching algebra. The approach used is a mixed methods case study. The PD program was introduced to twenty (N=20) in-service mathematics teachers. The program included three stages based on its content. The nature of algebra, psychological foundation of teaching algebra and algebraic thinking were the components of the program. This PD program was conducted for two months continuously. The workshops included discussions and group activities. The participants' existing experiences were used to fine-tune the workshop objectives. A pre-test, post-test and interviews were conducted to collect data. A paired sample t-test was used to analyze the pre and post-test marks while thematic approach was used to analyze qualitative data collected from interviews. The results revealed that the mean values of the pre-test and the post-test were 31.10 and 65.60 for valid 20 of data for both tests respectively. It indicates an appreciable success of the PD program. A considerable variability was found with a standard deviation between 10.252 and 4.012. The result of the paired sample t-test was 0.345, which indicates a positive correlation between the pre-test marks and the post-test marks at the 5% significant level and the p-value was less than 0.05. Therefore, it is observed that the PD program had considerably supported the development of the teachers' PCK in teaching algebra. Interview results showed that teachers had acknowledged the abstract nature of algebra, selecting appropriate teaching strategies and designing creative activities with the help of improved algebraic thinking in them. The participants accepted that they have already applied less productive activities for teaching algebra. They asserted the lack of awareness of algebraic thinking as the cause. Hence, this study recommends similar PD programs for mathematics teachers.

Keywords: Algebra, Algebraic thinking, Nature of algebra, Pedagogical content knowledge, Professional development program