

Editorial

Professional Learning in Different Contexts of Mathematics Teacher Education

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Papers in this fifth volume of the journal encompass a number of different technologies as they address aspects of professional education of both pre-service primary teachers and practicing primary and secondary teachers.

The three papers by Cavanagh and Mitchelmore, Schuck, and Chinnappan all relate to the role that different technologies played in mathematics teacher education. The first of these is the graphics calculator that was used in a professional development activity with practicing secondary mathematics teachers in New South Wales. In the second paper, a web-based electronic Question and Answer discussion forum was incorporated into a mathematics education subject for first year primary pre-service teachers at an Australian university. In the third paper, a piece of computer software was incorporated into an investigation of teacher knowledge building during an undergraduate teacher education course at another Australian university.

Cavanagh and Mitchelmore report on a two-day workshop with 12 secondary teachers that concentrated on educating them in the use of a graphics calculator, identifying technical limitations of the calculator, and exploring students' misconceptions and graphics calculator errors. This professional development program was based on the principles of Cognitively Guided Instruction (CGI) that aimed to promote development of the teachers' own subject matter knowledge and, simultaneously, their awareness of how students acquire that same knowledge and the types of errors that they make. The teachers were observed in subsequent lessons that were taught using graphics calculators and a sample of their students were interviewed to assess their learning and skills developed from the lessons. The authors found that informing the teachers about student misconceptions assisted the teachers in their planning and classroom instruction and that this impacted favourably on the student's ability to use the technology effectively.

Schuck investigated how first year primary teacher education students used a computer-mediated conferencing tool in the form of a Question and Answer forum as part of a Discussion Board within a mathematics education subject. Data for this study were comprised of the content of students' responses in the Question and Answer forum, students' likes and dislikes as indicated by their written responses in a mid-semester evaluation of the subject, and students' written reflections in a journal that was a subject requirement. Schuck found that students fell into three groups, namely, those who did not use the forum at all, those who used it but did

not see its value for a number of different reasons, and those who used it and found it a valuable learning tool that allowed them to interact with their peers without the necessity of being on campus. Examples of how the lecturer and students used the forum comprise part of this paper. Issues related to requiring this form of interaction for all students with differing needs and varied learning styles are discussed.

The third paper involved the computer software package, *ANUGraph*. In it Chinnappan sought to explore the content knowledge and pedagogical content knowledge being acquired by a secondary pre-service teacher in his course. The pre-service teacher was questioned about his knowledge and understanding of linear functions and how he would use *ANUGraph* to teach linear functions to a group of secondary school students he had observed in a previous practicum placement. He was asked to anticipate the types of difficulties the students would encounter in learning about linear functions via the software. The data from this exploration were examined to identify links between content knowledge and pedagogical content knowledge and gaps in these areas. It was found that the pre-service teacher did not appear to have a well-developed and well-organised set of schemas from which to draw in planning classroom learning experiences for this hypothetical situation.

The paper by Mau and D'Ambrosio discusses how, as mathematics teacher educators in the USA, they were challenged to listen to their students' solutions to the *Tower of Hanoi* problem and to make sense of these solutions which differed from small group to small group within their class. As well as showing the variety of solutions that were produced, the authors describe the different layers of collaboration that occurred within the class between the students in small groups and in the whole class. Furthermore, the authors discuss the professional growth that they experienced through collaboration as they planned and taught the course together and as they listened to and made sense of their students' solutions and explanations.

The final paper by Atweh and Hierdsfield addresses the induction of beginning primary mathematics teachers who were located in schools separated by great distances from normal support structures. As university mathematics educators responsible for the pre-service training of primary teachers, the authors worked with three volunteer teachers to form a collaborative action research network that involved regular teleconferences, email conversations, and reflective journals that each teacher completed about their teaching with particular focus on inclusive mathematics. The voices of the teachers are heard as they report on: their growth in confidence as teachers of mathematics, their development of a sense of critical reflection on their practice, and the benefits of the professional network with their peers.