

AUTHENTIC LEARNING CONTEXTS AS AN INTERFACE FOR THEORY AND PRACTICE

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Our research over the past three years has explored the belief that authentic learning contexts in teacher education can provide an interface for theory and practice. We discuss key features in our teacher education program: constructivism, situated learning, and multiple authentic learning contexts. Data drawn from our research will be used to support our contention that the more authentic the contexts the more effective the learning.

Teacher education is in crisis in many countries of the world, with pressure to move to more school-based approaches an indication of the dissatisfaction with traditional approaches (Korthagen & Kessels, 1999). A major point of dissatisfaction is the apparent inability of beginning teachers to transfer the theory-based knowledge into classroom practice. This link—or lack of it—between theory and practice in teacher education is well documented (Richardson, 1996; Wubbels, Korthagen, & Brekelmans, 1997).

Research by Brouwer (in Korthagen et al. 1999) found that the degree to which teacher education programs integrated and alternated theory and practice was an important factor in determining the extent to which beginning teachers could translate their knowledge into practice. How educational programs and systems have tried to accommodate this factor into their courses has varied greatly. Few details pertaining to actual program structures is publicly available. However, our own experience within various institutions in Australia and contacts with other teacher educators indicates that programs most commonly try to achieve theory/practice integration via field-based assignments such as action research, by adopting realistic-based approaches such as constructivism, and the development of reflective skills. These approaches are not mutually exclusive, but implemented on an individual basis have not normally proved to be as successful as expected (Foss & Kleinsasser, 1996; Fuson, Carroll, & Drucek, 2000). For example, in response to the growing support for teaching mathematics from a constructivist perspective (Australian Education Council, 1990; Department of Employment, Education and Training, 1989), a number of teacher education programs adopted a constructivist approach in the way their courses were delivered. According to constructivist principles, this translated into establishing a learning environment in which students construct their own knowledge by linking prior experiences (including knowledge, beliefs and personal theories) to new knowledge (Jones & Vesilind, 1996), creating 'learning communities' in which students engage in rich discourse about important ideas (Putman & Borko, 2000) and using reflection as a vehicle for reconceptualising knowledge and beliefs (Beattie, 1997). It was anticipated that such modelling of a constructivist approach within teacher education programs would translate into

classroom practice. Unfortunately, accumulating evidence suggests that such initiatives have failed to strongly influence the practices of beginning teachers (Klein, 1999) and are often broken-down during practical experiences (Zeichner & Tabachnick, 1981).

The investigation reported here was undertaken after anecdotal evidence relating to the mathematics education courses taught by us directly contradicted the disappointing findings reported in the literature (e.g. Klein, 1999). Our research over the past three years has explored the belief that authentic learning contexts in teacher education can provide a theory/practice interface which will support graduates translate their knowledge into classroom practice. The following discussion describes the context for our study. It provides an introduction to the Master of Teaching program and outlines key features in the mathematics education component: constructivism, situated learning and multiple authentic learning contexts. Data drawn from our study will be used to support our contention that the more authentic the contexts the greater the integration of theory and practice. We also believe that multiple learning contexts will further enhance this interface.

CONTEXT OF THE STUDY

The Master of Teaching (MTeach) program within the Faculty of Education at the University of Sydney is a postgraduate initial teacher education course that adopts an inquiry and case-based approach. Such approaches typically provide students with opportunities to research their own teaching and learning. Generally, the students are mature-aged, have established careers in areas other than teaching and bring with them a variety of life experiences. Central to the MTeach program's philosophy is the importance of developing reflective practitioners.

Key features of the mathematics components

We have designed our primary mathematics education courses to integrate and encourage reflective practice within a constructivist approach to support the philosophy of the MTeach program. Inquiry into our own practices has led us to believe that adhering to constructivist principles in our teaching is a necessary but certainly not sufficient factor for engendering change in the way our graduates view and teach mathematics to primary school children. We now recognise the crucial role played by our use of multiple learning contexts, situated in a variety of environments.

A constructivist approach to teaching and learning recognises the importance of students' prior experiences and uses these experiences to build knowledge of the field. It aims to create a learning environment in which peer tutoring and collaborative learning is highly valued. Associated with this is the idea that students need to have opportunities to engage in rich discourse as they share and build their knowledge. Another vital aspect of such an approach, and central to the MTeach philosophy, is the emphasis placed on reflection. For us, reflection is seen as a vehicle by which students make connections between theory and practice.

A situated perspective on learning (Greeno, 1997) acknowledges that: all knowledge is situated, that some types of knowledge are best constructed in one context rather than another and that the more authentic the context, the more effective the interplay between theory and practice (Aldridge & Bobis, 2001). This fits within the constructivist paradigm and supports our use of multiple learning contexts.

Our prospective primary school teachers experience four contexts whilst undertaking our mathematics education courses. The first context places students in workshops modelled on constructivist principles. A second context relates to in-school experiences associated with practice teaching. Students work in a school over an extended period (12-15 days) under the supervision of a practising teacher. This not only reflects the context in which they will ultimately work, but it is also a fairly typical experience provided by teacher education programs across various institutions.

Prior to undertaking their first traditional-style practical teaching experience we also provide our students with another vital context for learning—one that is not typically used by other institutions responsible for teacher education. This is best described as school-based small group teaching and is situated in schools (an authentic context) during normal tutorial timeslots. Students work in small groups (encouraging collaboration and reflection) with two or three children who are assigned to them for four weekly sessions. They individually assess the children, analyze the results and collaboratively prepare a program of work to build on each child's level of thinking. Our role is to facilitate the process by providing advice at each stage of the process. After each teaching episode, there is a debriefing session. This provides opportunities for rich discourse stimulated by attempts to connect their practice to theory. It provides them with an authentic context in which to situate their new knowledge prior to undertaking their first extended practice teaching experience.

The fourth context is situated at the University in a clinical setting. Students work twice a week over a six week period with children from local schools in a one-on-one situation. This experience provides another context in which students' learning is authentically situated. As facilitators in this context, we may model teaching if requested, or simply offer guidance and support students in their decision making. Students also work together to share ideas, discuss teaching strategies, team-teach and reflect upon the theory/practice integration.

DATA COLLECTION

Data was collected using two tools—concept mapping and semi-structured interviews. Concept mapping helped the students organise their knowledge and beliefs about mathematics and was used as a stimulus in the interviews to elicit explanations of their personal theories about mathematics and their teaching. Figures 1 and 2 were both constructed by the same preservice teacher, Cindy. While each participant's maps were unique, we have selected Cindy's as representative of an initial concept map and a map constructed at the third key point in the program. The

first concept map (see Figure 1) was undertaken prior to any courses in mathematics within the MTeach program and the second map was constructed after completing her first practice teaching experience. Each map provides a visual representation of how an individual's thinking about mathematics is organised at different points in the MTeach program. Key ideas are clearly identified for later discussion in semi-structured interviews.

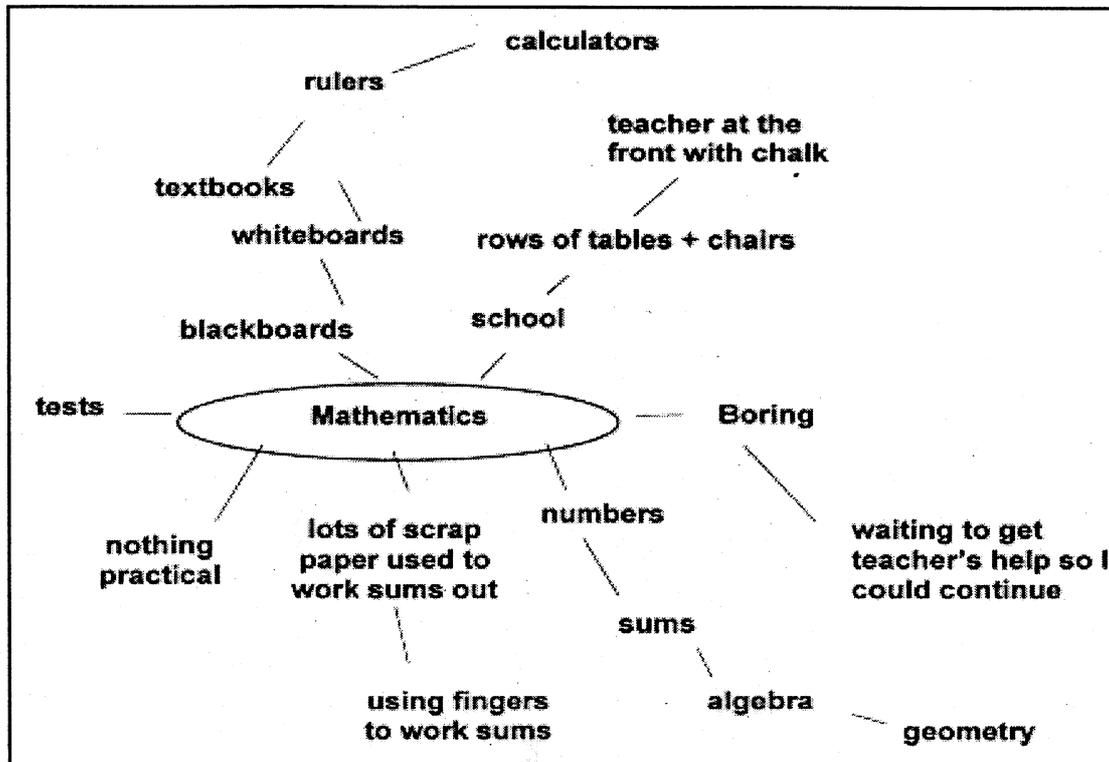


Figure 1. Cindy's first concept map, constructed prior to undertaking any mathematics education units of study.

Comparing an individual's concept maps enabled us to see how each prospective teacher reconceptualised their knowledge during the course of the MTeach program. Figure 2 reflects a more complex understanding of mathematics and its teaching. This is evidenced by the increase in the number of concept 'nodes' and the links between separate branches of the map.

At four key points within the MTeach program, twelve preservice teachers undertook a concept mapping exercise followed by a semi-structured interview. These key points corresponded to the four different learning contexts within the mathematics education program. The results from the concept maps and the semi-structured interviews over the time of the project were combined and compared for analysis. Patterns in responses and changes in emphasis were also identified and coded for analysis.

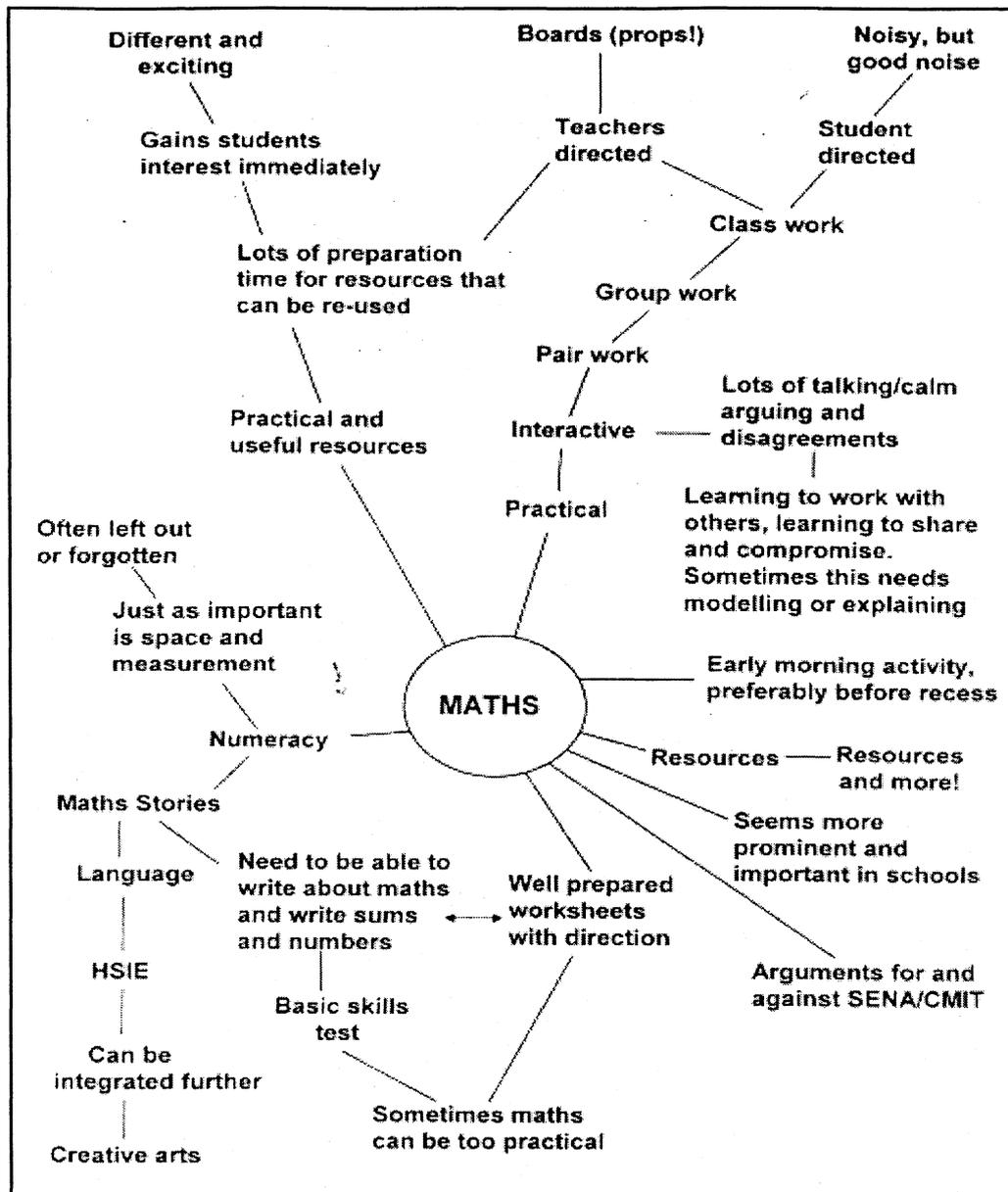


Figure 2. Cindy's third concept map, constructed after her first practice teaching experience.

KEY ASPECTS FOR A THEORY/PRACTICE INTERFACE

Analysis of the concept maps and semi-structured interviews revealed the emergence of a number of themes. For the purpose of this paper we will focus on two key aspects. Both aspects have been identified in the literature as playing significant roles in the integration of theory and practice (Korthagen, 1999, Wubbels, Korthagen & Brekelmans, 1997) and are supported by our findings.

The first aspect that was identified in the majority of interviews was the value of the school-based context. Examples of students' comments reveal an awareness that this context provided a valuable link between the theory of the University-based work with their first practice teaching. For instance, Cindy commented in her third

interview that “we learnt it straight away, blew our minds, applied it and could see the benefits...that was a stepping stone and it wasn’t so daunting when we went into the classroom”. Similarly, Carmel remarked in her fourth interview that “the school experience was good because you get to use what you are learning”. She considered it influential because “when we go out there and have to do it...that is reality.” In her third interview, Carmel commented on the benefits of the course structure. She considered the change in contexts beneficial because they “required her to teach on a more complex scale” towards the end of program.

Comments from student teachers reflect what Brouwer (in Korthagen et al. 1999) describes as a teacher education curriculum that has an integrative design. This refers to the extent to which there is an alternation and integration between theory and practice within a program. Brouwer claims that programs designed in this way promote transfer from theory to practice.

A second theme to emerge from the interviews and supported in the concept maps was a reconceptualisation of mathematics and the teaching of mathematics. For example, Cindy’s first concept map (see Figure 1) reflects an emphasis on mathematics as content based (e.g. numbers, sums, algebra, geometry), a transmissive model of teaching and an attitude to mathematics that can be described as negative (e.g. boring). Cindy’s third concept map (see Figure 2) shows a much broader view of mathematics and reflects a growing awareness of her own personal theory about how to teach and how children learn mathematics.

One aspect of this reconceptualisation relevant to the current discussion involves the change in participants’ attitudes and beliefs about mathematics (see Aldridge & Bobis, 2001). Changing attitudes and beliefs is recognised as a vital aspect in a person’s ability to transfer theory to practice (Corporal cited in Korthagen et al. 1999). This is particularly important because student teachers begin their courses with a history that corresponds to their initial personal theories. Often this theory contains notions about mathematics and its teaching that are very different from the theories espoused in the University-based context. The need to acknowledge the student teacher’s history and construct a teacher education theory that builds on and challenges this is seen as important if transfer between theory and practice is to take place.

A NEW PARADIGM FOR TEACHER EDUCATION

Evidence provided in this paper supports our contention that the utilisation of a multiplicity of authentic learning contexts, combined with a constructivist perspective can provide a vehicle for connecting theory and practice in teacher education programs. Such a theoretical base is akin to the ‘realistic approach’ to teacher education characteristic of the program at Utrecht University (Koetsier, Wubbels, & Korthagen, 1997) and represents a paradigm shift in teacher education. However, such an approach not only requires that the types of contexts be thoughtfully considered, it also has organisational implications for the program

administrators. For example, to alternate between university-based and school-based contexts requires close co-operation between institutions. Flexibility in time-tabling, the proximity and suitability of the school-based setting, as well as the mutual benefits from such arrangements must all be considered.

Another element we consider important is our own credibility. To feel 'comfortable' in both school-based and university-based contexts our own knowledge and experience must be credible in our student teachers' eyes.

The paradigm shift in teacher education has benefits to us as teacher educators. For example, researching and reflecting on our own practice has enabled us to anticipate barriers to the successful integration of theory and practice and has allowed us to deal with such obstacles prior to them surfacing in practical situations. For example, the reliance on mathematics textbooks in Australian primary classrooms is perceived to be an obstacle for the translation of theory into practice by our students.

In addition, utilising authentic learning situations allows us to "stay in-touch" with the realities of the school context and with the needs and concerns of our prospective teachers. Implications of such an approach extend beyond initial teacher education and have ramifications for the professional development of all teachers.

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