The Practicum as Context: Two Snapshots

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Practicum sessions allow student teachers to learn about the profession through participation in it. This paper uses Lave's notion of situated cognition, and argues that academics need to be aware both of changes that are taking place in school contexts and of how such changes are shaping student teachers' lived experience. The paper reports results from two surveys of students' observations of primary mathematics education—the first implemented in 1990 and the second a decade later. Some changes are noted, and it is proposed that these are worthy not only of discussion in tertiary classrooms but also of further research.

Teacher education (not only in the formal sense) is set in a community of practice that includes teacher education courses (pre-and post-graduate), school-based interactions, curriculum advice from many sources, parental expectations, teachers' and children's personal interests and beliefs, staffroom discussions, and many more factors. The traditions of institution-based learning are powerful, and achieving and then maintaining an image of a successful teacher means gradually taking on accepted ways of acting and thinking. This is first done in apprenticeship situations, with participants gradually taking more central roles in planning, teaching and evaluation of their own practice.

The relevant discourses, however, suffer learning discontinuities. It is assumed that theories presented in arenas that are divorced from school settings can be applied during practicum experience and in later teaching—but in fact the communities of studentship, scholarship and schooling often differ in important ways. In tertiary education, knowledge is frequently abstract: statements about teaching and learning and its underlying philosophies are proposed as if they are objective, unproblematic, rational and universally applicable; and teaching is often presented as a value-free and context-free enterprise. There is an assumption that knowledge and skills developed in one setting can be transported to other contexts. For example, separating foundation studies from curriculum studies presumes that later integration will be possible. Further, it is expected that tertiary students will be able to link group university-based experiences with their personal experiences as participants in schools; and hence will be able to take on new roles—as for example, "reflective practitioners" and "agents of change"—but in institutional contexts that may not support either of these initiatives. However, such expectations rely on participants being able to stand outside of processes that constituted their professional being in the first place—so we need to be cognisant of the elements of those processes.

The practicum allows student teachers to learn about teaching as an apprentice, with learning being situated in the practice of teaching. This paper explores some differences exposed by two snapshots of practicum experience in primary schools—one taken in 1990 and one a decade later in 2000. It draws on the theory of situated cognition, which recognises the dialectical development of individual knowledge through interactions in social contexts and focuses attention on how learners come to assimilate and re-generate the knowledge of the community itself. Knowledge, here, for the teaching community and its apprentices, is expressed as much in professional action as verbally; and perhaps more so, because cognition and articulation about practice are situated in, and are responses to, specific but constantly

evolving practical circumstances. Thus school experience can be thought of as "an integral part of generative social practice in the lived-in world" (Lave & Wenger, 1991, p. 35)

Situated Learning

Situated cognition pursues theorists such as Vico, Mead and Vygotsky and their rebellion against mind-body dualism. An influential author in this field in recent times is Jean Lave (and later Lave with Wenger), who stated that "Developing an identity as a member of a community and becoming knowledgeably skilful are part of the same process, with the former motivating, shaping and giving meaning to the latter, which it subsumes" (Lave, 1988, p. 65). The key idea in Lave's theory is *situated activity*, the term she uses for "a distributed form of cognition" (p.1). This is not a theory of learning, but a theory of social practice of which learning is only one dimension; a view that "generates interconnected views of perception, cognition, language, learning, agency, the social world, and their interrelations" (Lave, 1988, p. 66). In Lave's theory, (as in the Vygotskian tradition), development of knowledge, skills and roles results from participation in social activity, with participants being constituted by the socially constructed setting and the activity itself. Initially they participate on the periphery, but increasingly they take on roles and cooperate in ways that shape the setting and its activities. Thus reasoning and understanding are deeply bound in the activities through which learning takes place— "'understanding' appears to belong directly in the experienced world, in activity" (Lave, 1988, p. 170). The setting, with its institutional structures, norms, tools, ways of working and patterns of interaction, is paramount. Lave claims that "apprentices" contribute to, and hence re-construct, this setting; but do so in ways that are shaped by their perceptions of the context and its aims. As Adler (1998) noted, while shifting Lave's theory of learning mathematics through participation into school learning raises questions about what constitutes a community of practice, situated cognition is a powerfully theory for considering learning about teaching.

There is a range of theoretical positions that link the development of professional knowledge with social experience. In one genre of interpretations identified by Rommetveit (1987), individual cognitive processing is seen to be occurring in a social world, but cognitive activity itself is not reconceptualised in social terms. A second point of view dissolves the individual-social duality, with the world arising from agents' constructions. Here, situatedness "is not located with physical locatedness in the world. It is not possible to walk into a situation. Instead, language use and, thus, meaning are situated in interested, intersubjectively negotiated social interaction" (Lave, 1991, pp. 66–67). However, Lave noted that both of these views, in their own ways, imply that the social world can be separated from individuals. Neither holds that "subjects are fundamentally constituted *in* their relations with and activities in that world" (p. 67). This latter assumption is the proposition that underpins a third guise, the position that Lave took: *situated social practice* (Lave 1985, 1988, 1993, 1996). According to this view, cognition and communication are situated in "the historical development of ongoing activity" (Lave & Wenger, 1991, p. 67). In Mousley, Zeegers and Herbert (in press), we use this latter genre to explore how our student teachers' development of self-concept is shaped by the ways in which they are constructed by others as "student teachers", as well as by the university and school experiences. However, here we focus only on a few more structured aspects of the context of their learning. Our inquiry is into some of the observable patterns in the community of practice—or at least what our students' perceptions of these are.

The Study

Motivation for the Study

A decade ago, one of us was involved in research that collated and summarised some perceptions of eighty second-year Education student teachers' experiences during one particular practicum (Mousley & Clements, 1990). The student teachers had been asked to complete a questionnaire with 25 questions about the mathematics lessons they had observed (but not taught) during the previous two weeks of school experience in primary schools in the Geelong, Victoria, area. The results of that research were presented at the 1990 conference of the Mathematical Association of Victoria. One member of the audience at that time agreed with the presenters' point that the geographical area may have led to conservatism. However, he was offered a copy of the questionnaire to implement with his own students in Melbourne, and was quite surprised to find that his results were almost identical—his students' perceptions of practicum learning contexts were, in fact, remarkably similar.

Since 1990, there have been some key changes in mathematics education: the introduction of national and state curriculum and standards frameworks, initiatives focusing on numeracy, broad-based testing programs, growth in the availability of electronic technologies, and increasing claims about (and professional development in) group work, co-operative learning, constructivist approaches, and so on.

Teacher educators need to be aware of these changes; and of whether and how they are perceived by student teachers. Thus we were interested, a decade later, to find out whether school-based contexts for teacher education have changed significantly. The big questions for us were whether school experience now sits more comfortably with the theories and examples presented in our university program than it did a decade ago, and whether the content of the university-based components sufficiently reflects changes taking place on school resources practices, and expectations.

Methodology

Even though questionnaires were used, and many of the items leant themselves to quantitative analysis, this is essentially an interpretive project, where the term refers not so much to interpretations made by researchers (for these are a necessary component of all research) but to what is collected during the research process. We aimed to capture the students' perceptions of school-based contexts in which they learn about teaching mathematics, so many of the questions were open-ended in order to gain insight into these interpretations. We recognise that these perceptions are just snapshots: each person's understanding is a picture resulting from individual synthesis of reality but is not a photograph of reality. It reflects an internal network of ideas that interacts with reality in a mutual transformation (Labinowicz, 1985, p. 5). Further these snapshots sit within similarly limited pictures—the previous and current questionnaires made no claims to wider applicability of results as no attempt was made to construct representative samples.

As in the previous study, the 37 students were second-year Education students, undertaking their first unit of mathematics education, and their second 10-day school experience round. Because the school experience was taken in a block this year, the average number of days attended (9.8) was higher than in 1990 (4.95), but the lower number of students involved (37:80) meant that the total of days that had been spend in schools was

similar (364:396). In 2000, nearly all observed at least five Maths lessons, and most saw more than seven, the mean being 7.8. It is pleasing to note that the upper grades in the classrooms observed this year nearly all have Maths every day. As an aside, the number of composite grades is now much higher (58% compared with 14% a decade ago) and these were clustered around the Years 2/3/4 level. In later discussions, the students questioned the wisdom of composite classes, because any straight grade already has a wide distribution of achievement levels in key learning areas and the composite classes seemed to exacerbate this, especially in cases where the grades were taught separately in key subject areas.

Both the 1990 and 2000 questionnaires were filled out during tutorial time so plenty of time was available, and replies were anonymous for both the students and the schools. Both questionnaires used a range of types of questions for different purposes. Forced choice or fill the gap style was used for collecting information where only a few possibilities were available (e.g., state/independent school, number of mathematics lessons observed, whether or not written work was usually corrected). Three-point scales were used to gather data on the frequency of use of texts, worksheets, calculators, and so on. Additionally, there were some relatively open questions, where, for example, students were asked to tick any terms that applied to the majority of Maths lessons observed and write a short description where applicable. Even more open questions were used to describe features of the classroom interaction, such as any general patterns that the lessons seemed to follow. Responses were collated and/or tallied under a number of headings, and trends noted. Percentages used in the results below have been rounded to the nearest whole number. No levels of significance were calculated or are claimed.

We had attended to some of the limitations of the first questionnaire by adding further questions and options as well as including more open questions. However, for the purposes of this paper we will restrict the reporting of results to only those questions that were asked in the first iteration. Again, a number of items and responses presented difficulties in interpretation, given the lack of common vocabularies and no opportunity for follow-up interviews.

Results

The majority of Maths lessons were held after morning recess. Only 10% of students reported that classes were held regularly before recess, although 21% students said Maths could be taught any time in the mornings. Only two students saw Maths classes in the afternoon; two others said Maths was taught at various times of the day; and all of these four students reported use of an integrated-curriculum approach. In 1990, most (85%) lessons were also held in the mornings, but many more (44% of the morning classes) were held before recess. From the students' written comments this year, it was clear that time allocated to "literacy" is a relevant factor here; and it was interesting to note frequent use of the term "block"—many respondents used this term. For example, the only student who reported seeing fewer than five Maths lessons wrote "The Numeracy block was interrupted by the Swimming block".

In 1990, it was reported that many teachers (38%) used textbooks as their main resource for planning lessons, 15% used school policies and year-level policies, and 12% used state guidelines. A disturbing outcome, in both 1990 and 2000, was the fact that more than 10% of the students did not know what resources their teachers used in planning the lessons.

However, 66% of those who answered this question said that teachers used "The CSF" (Victoria's Curriculum & Standards Framework), 35% used textbooks, and 33% worksheets from previous years. Again, there was a further variety of other resources mentioned and these were hard to categorise (e.g., "various books", and "the net"). We noted that the text most frequently mentioned advertises its congruence with the CSF overtly, and that in any case all of the texts and commercial worksheets mentioned are structured broadly on the CSF "learning outcomes".

In 35% of the current classrooms, textbooks were used extensively during seatwork (c.f. 31% in 1990). Of these, 5% said they were used in every lesson and 32% in some lessons (ranging fairly evenly from 25% to 75% of the time). The most frequent reason given by teachers for their use was that they "cover" all areas. We were interested to note a few students' comments about texts and worksheets being used only in Maths classes.

All current students reported that worksheets were used in Maths classes (c.f. 57% in 1990), and 59% said they were used in all lessons. The ratio of use in "all/most lessons" to "some lessons" was close to 1:1 at each grade level from Prep to Year 4, but 4:1 in Years 5 and 6. The majority of the worksheets (84% of those who reported their use) seemed to be commercially produced (54% in 1990). Some students commented that their teachers frequently download worksheets and other resources from the internet, and we classified these as "commercial".

Table 1
Modes of Communication

Mode of Communication	Teacher		Children		No Response	Year level differences
	1990	2000	1990	2000		
Explaining		75%		25%		Similar across all levels
Discussing		54%		46%		Diminishing in upper grades
Asking questions		65%		35%		Diminishing in upper grades
Responding to questions		42%		58%		Increasing in upper grades
(Total: "Teacher talk")*	80%	59%	8%	41%	12%	
Listening*	14%	31%	72%	54%	14%	Similar across all levels
Write		5%		95%		Diminishing in upper grades
Draw		54%		46%		Diminishing in upper grades
(Total: "Write and draw")*	8%	29%	82%	71%	10%	

*Only these questions were asked in 1990.

Patterns of communication seem to be much as they were in 1990 except for more use of children's talk. The results are difficult to compare because the data were collected differently; but nevertheless the results from each year (see Table 1) are of interest. By the way, we enjoyed and empathised with two responses where one student reported the teacher listening 25% of the time and the children 0%, and another claiming that the children did "lots of listening, but no active listening to the teacher".

One area where there is a noticeable difference in results is in reporting about group work and co-operative activities. Whereas in 1990, only 16% of the students had reported that children worked co-operatively with each other, 65% of this year's cohort saw this "regularly". In 1990, 35% of the students reported seeing group work, and this year the equivalent response was much higher, at 74%. In 2000 there was also a lot more "ability" grouping (42%, compared with 11% previously), but the increased number of composites may well have contributed to this result. There was less friendship grouping (18%—30%). This year's students reported that group work was most commonly used before Year 5.

In 2000, the most prevalent words used to describe the perceived "roles of the teacher" were categorised as giving support (30%—compared with 24% in 1990), giving instructions (22%—17%), and supervision (18%—13%). Of course how one sets up categories and allocates terms used to these affects the results and such details were no longer available from the earlier questionnaire, but the overall pattern of results was similar. Strangely, few students included the types of actions that we categorise as "teaching", such as introducing or explaining maths concepts; but perhaps students take such actions for granted and of course some of the "giving instructions" and "supervision" could have served these purposes. Teacher's planning and evaluation received little mention, but perhaps such a perception is understandable because these teacher actions are not so visible. It is worth noting that 27 of the 37 students thought that the mathematics lessons observed followed a definite pattern of teacher introduction/demonstration, then seatwork. In only some classes (7%) was this followed by sharing of solutions, discussion, etc., and this type of activity was mentioned rarely in higher levels. It seems still very common, and even more so, for lessons to start with "mental maths" sessions and quick games that emphasises speed, competition and rote learning (57% of current students mentioned this, and 38% in 1990).

The student teachers were asked to "Suggest up to ten words describing the atmosphere of the classroom". As for the previous questionnaire, the most frequently words were "busy", "quiet", "repetitive", and "boring". The 2000 questionnaire asked for the year level of each respondents' placement, so a grade-by-grade-level analysis was possible, and this yielded some interesting features. For example, it was noticeable that many more negative descriptors (such as frustration, uncomprehending, annoyed, despair) were used to describe classrooms from Years 2 to 4 than were evident in either early or senior grades. We believe that despite our small sample this phenomenon seemed so pronounced that whether it occurs (and possible reasons) would be worth researching further, through gathering data on children's and teachers' feeling, and using more focused observation techniques. The negative words used to describe the atmosphere upper grades were fewer in number, and also related less to affective matters and more to productivity (e.g., wasting time, passive, "busy but not productive"). Of course there were positive descriptors too, such as "supportive" and "active" but again the transition from emotional/affective descriptors to engagement descriptors was clear.

One obvious difference across the decade is in the amount of "use of children's ideas and experiences", reported by 32% of students in 2000 and 11% in 1990. This year, it is clear that

more teachers encourage children to use their own methods, as 54% of the students mentioned this (up from 6% in 1990), and many wrote comments like "sharing of methods used is an important aspect of many lessons". There now seems to be more integration across key learning areas and/or use of themes (22% compared with 6%). This year's students reported more use of contextual maths (54%:1%), with the majority of this being in Years 1 to 3. More activities were completed outdoors (16%:3%), but of course the weather may have been more conducive. In 1990 Mousley and Sullivan noted that despite encouragement for teachers to allow pupils to work out answers to sums and problems in their own ways, 93% of the observers who wrote about this felt that methods were imposed by teachers or textbooks.

In other aspects of the learning environment there had been less change in perceptions. In 1990, a little more than half thought the curriculum seemed "rigid", and the recent result was similar (43% thought that there was "flexibility"). Emphasis on speedy completion in 2000 was 22%, and 1990 was 15%. In 1990, only one observer believed the pupils had had any influence in decisions about the content of a lesson, and in 2000 no students saw evidence of this.

It seems that forms of feedback on students' written work have changed little. Most teachers still use ticks and crosses as the major form of feedback, although in an increased proportion of classrooms children corrected their own work (21% in 1999 and 37% in 2000) or peer-correction was used (10%:21%). Oral comments were also given (23%:14%), but neither questionnaire asked students to distinguish between individual and class feedback here.

In 1990, it was reported that 5% of the students saw calculators being used. In 2000, 40% saw calculators used (5% in every or most lessons, and 35% in some lessons), and 32% commented that they were freely available for use at any time. There was no question about computer availability or use in the 1990 questionnaire. In 2000, 29% saw computers used for activities requiring or developing mathematical knowledge, but none reported more than occasional use. The most common type of uses were "games" (seen by 35% of students) and "drill and practice" (16%). Some students noted that they had been encouraged to use these technologies even in classrooms where they were not observed to be used!

In Summary

The 2000 questionnaire was a broader and richer instrument than the original survey. For example, we collected data on the uses of electronic technologies and on whether (and how) the teaching experiences met the student teachers' expectations. It yielded far more data than we can report here, and we have a further cohort of students in schools as we write.

Like most research, however, it has also furnished more questions than answers. For example, it would be interesting to use broader and more controlled studies to find out if the following observations can be supported Australia wide, or even State wide, and if so to examine each one's effects on teaching and learning.

The 2000 students reported increasing:

- organisation of days into learning area "blocks";
- use of State curriculum documents in forward planning, with continuing reliance on textbooks for lesson planning and class work;
- "children talk", with lessening "teacher talk" and "child listening" (with investigation of the nature of that talk and listening necessary);
- group work and co-operative activities;

- use of composite classes but also more "ability grouping";
- "mental maths" sessions and number-fact games;
- use of children's ideas and experiences;
- encouragement for children to use their own methods;
- integration across key learning areas, especially with use of themes;
- use of commercial worksheets;
- self correction as well as correction by peers; and
- use (more varied use) of electronic technologies.

From the data we have available, some tentative hypotheses could be developed. It seems that the national framework agenda is having an impact on planning as well as timetabling. Perhaps the "constructivist" movement is leading to greater use of group work, co-operative activities, use of children's ideas and methods and discussion about these—and one could ask whether the consequent variety of methods and solutions necessitates more self- and peer-correction. A greater focus on numeracy and testing could be leading to wider use of ability groups and emphasis on number facts and speed.

There is need for further research on the effects of such changes, not only on achievement of learning objectives and mathematical understandings but also on teacher's and children's attitudes and beliefs. For example, increased availability of calculators and computer programs is undeniable, but we know little of the effects of this or of which mathematical ideas and processes are being privileged in both the teaching and the learning that takes place.

In summary, we all know that the contexts in which our students first practise teaching are changing. From the data collected, it seems that some of the aspects of our own student teachers' school experience now fit better with the ideas presented in lectures, tutorials and workshops—but then some do not.

Conclusion

To take Lave's position, student teachers are apprentices in a professional community, but are also agents in the perpetuation and reconstruction of the field and could be increasingly influential in this respect. However, this influence is framed by their perceptions of the context and its aims. Because the students themselves, as well as their knowledge of mathematics education, have been constructed within and through schooling over a period that includes the past decade, it is difficult for them to see mathematics pedagogy as a set of changing and problematic practices. As teacher educators, we need to find ways of helping them stand outside of the situation. Thus the above list of changes will be a rich resource for group discussions, assignment tasks, and further inquiry. We also maintain that this list raises questions worthy of further research.

Most importantly, student teachers need to become aware of, as well as develop the skills to analyse and critique, the various structural components and interactive features of the contexts where their learning about teaching takes place. They will then be more able to consider how aspects of school settings have framed, and continue to shape, their own pedagogical assumptions and practices.

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