Beginning a career of learning about learning: a case study of student teachers in an initial teacher education programme in Ireland

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The concept of *teachers as lifelong learners* is a key component in considering teachers' life cycles, starting with their introduction to the profession via initial teacher education and continuing via professional development throughout their careers. The project reported in this paper addresses the first stage of the cycle: initial teacher education. It presents a case study of three groups of student teachers – one group of language students, one of music and one of mathematics – who during their teaching methodology courses experienced a novel aspect of their disciplines and were required to reflect on their experience. The findings suggest that, regardless of discipline, a learning experience together with reflection on it expands student teachers' metacognitive awareness of themselves as learners, and that this translates to a greater empathy with and greater accommodation of learners in their own classrooms.

Keywords: Initial teacher education, reflection on learning, experiential learning, disciplinary learning.

Introduction

The concept of *teachers as lifelong learners* is a key component in considering teachers' life cycles, starting with their introduction to the profession via initial teacher education (ITE) and continuing via professional development throughout their careers. The project reported in this paper addresses the first stage of the cycle: initial teacher education. It is based on three hypotheses drawn from research on student teachers' learning and reflection. First, the experience of being novice learners in their own discipline, and reflecting upon this, helps student teachers to develop the metacognitive skills necessary to explore their own learning

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and to understand themselves as learners; secondly, this can give them a broader practical understanding of other learners, particularly those in their own classrooms; and, thirdly, it may create a disposition towards lifelong learning in their own disciplines as well as with regard to teaching others.

The project addresses the education of secondary teachers, in particular of student teachers studying for their Postgraduate Diploma in Education (the professional teaching qualification for secondary teachers) in Ireland. It reports a case study of three groups of student teachers – one group of language students, one of music students and one of mathematics students – who during their teaching methodology ('pedagogy') courses experienced a novel aspect of their disciplines. The language teachers studied a language they had not previously encountered. The music teachers studied a genre in which they were not proficient. The mathematics teachers undertook an approach to problem solving with which they were not familiar. As part of their assessment, the students were required to report reflections on their experiences, indicating how these experiences might affect their future teaching.

The paper presents an analysis of the rich qualitative data obtained, focusing specifically the student teachers' insights into being learners, and on their reports of how these insights transferred or may transfer to their classrooms. It highlights comparisons and contrasts between reports from students in the three disciplines.

Theoretical framework

The theme of reflection underlies all of this work both theoretically and operationally. The focal point is an exploration of how reflection is an essential component of the moments of transformation which can constitute turning points for both learners and teachers. The general context assumes a notion of the teacher as reflective practitioner (Schön 1983), which is part of the code of practice for teachers in a number of jurisdictions, and is prominent in teacher education programmes in Ireland and elsewhere as a means of drawing

together theory and practice.

There is a large body of research on reflection in initial teacher education where student teachers learn through reflecting on their teaching (see Burton (2009) for an overview). The focus here is on the learning dimension of the teaching-learning process as expressed by Williams and Burden (1997, 5):

> The successful educator must be one who understands the complexities of the teaching-learning process and can draw upon this knowledge to act in ways which empower learners both within and beyond the classroom situation.

Fundamental to this paper is an exploration of how reflection on learning rather than teaching can inform student teachers' growing understanding of their impact on learners. Mayer-Smith and Mitchell (1997) note that the students' learning experiences are a good starting point in exploring their preconceptions about teaching. The literature in this area can broadly be divided between studies that look to the past and those that look to the present (learning on the ITE programme itself) as the source of reflection. A number of studies have used student autobiographies and narratives to explore the impact of the student teachers' past 'apprenticeship of observation' as Lortie (1975) terms it. Brookfield (1995) and Bailey and others (1996) argue for the learner autobiography as a tool for professional development which allows teachers at any point in their careers to explore their preconceptions about teaching and learning, while Greer (2001) explores the place of visual narratives in teacher education. There is a broad literature on fostering reflection on learning experiences during ITE (Hatton and Smith 1995; Moon 1999; Martin 2005). Students are supported in reflecting on different aspects of their learning about teaching during seminars, teaching practice and so forth, and are encouraged to develop insights that they can extrapolate to their own classes and which they can then adopt into their own practice. This is in effect an experiential learning meta-cycle (Kolb 1984), where the experience is *learning*; reflection and conceptualisation are on *learning*; and the application is to their own teaching. Korthagen and others (2006, 1026) emphasise that this reflection on their own learning experiences

'needs to be specifically linked to the learning of their students when they are in the role of the teacher' in order for student teachers to generalise from their experiences rather than discount them. Furthermore, they advocate an inductive approach to theory where students derive their own insights and theorise from these, since '[t]he kind of theory resulting from student teachers' own reflections on practical problems is much more linked to their own situations and concerns, and thus has much greater emotional significance for them' (Korthagen et al. 2006, 1027).

An extension of this approach focuses on students' learning in their own discipline during ITE. Devitt and Czak's (1981) work on student language teachers' developing understanding of language learning and teaching during a language learning experience on an ITE programme is a precursor of the present study. They found that student teachers' sensitivity to pupils' problems in the classroom was heightened as a result of the course, as was their awareness of the role of the teacher in mitigating or exacerbating these problems, and some student teachers reported some changes to their practice as a result. Finney and Philpott (2010) take a related approach to embedding informal music learning in an ITE programme for music teachers. They stress the need for reflexive action (which they call 'excavating the learning') to draw out the value of the learning experience. A similar philosophy underpins work in mathematics education, in relation to implementing the intended focus on problem solving that is characteristic of many mathematics curricula since the 1980s. On the assumption that teachers are unlikely to implement problem-solving or allied approaches effectively unless they have experienced them as learners, student teachers are asked to undertake problem-solving activities and to reflect on their experience (Lester et al. 1994; Cooney 2001; Ponte 2001). In this context, Lester and others (1994), in particular, note the importance of engagement in reflective writing.

This paper builds on the work reported here in a shared approach across three disciplines, in order to open student teachers' 'apprenticeship of observation' to more reflective and critical scrutiny and to develop their understanding of what it means and how it feels to learn in their own discipline.

Methodology

As indicated above, the project was conducted across three subject disciplines, Modern Languages, Music and Mathematics, in an initial teacher education programme in Ireland. It is worth noting that the student teachers carry out their teaching practice alongside attending lectures for the full academic year and so the students' dual role as both teachers and learners is a consistent feature of the ITE programme. The approach taken is of a qualitative case-study where participant student teachers took part in a learning experience in their own discipline and completed reflections on that experience with respect to their own learning and their own teaching. The key element of the learning experience is that the students were asked to participate in learning some novel aspect of their major discipline that may encapsulate some of the essence of that discipline and/or of teaching and learning in that discipline. The main research questions identified for the study are the following:

- What do student teachers learn about themselves as learners during the experience of learning a novel area of their own discipline?
- Does the learning experience together with reflection on it transfer to their own classrooms by developing more insight into and empathy with their own pupils?
- Does the learning experience together with reflection on it make them more open to learning experiences in the future?

Approach

In total 38 student teachers participated in the research project in 2010-11. Owing to constraints of appropriateness and time, the study was conducted somewhat differently for each discipline, as outlined below. However, in all cases the reflections were semi-structured in that they allowed for free expression but also included targeted questions on particular topics, specifically, whether and how the experience impacted on the students' teaching or intentions regarding teaching. This model aimed to foster at least descriptive

reflection through open questions on the experience which called to a certain extent for a rationale, alternative viewpoints or evidence for statements made. Furthermore, the importance of time and distance for reflection was respected by building in a number of days between the experience and the completion of the written reflections. The latter in general constituted some of the students' assessment for their pedagogy courses (see Discussion). The researchers undertook a thematic analysis of the data collected, with an initial identification of material relevant to the three questions above being followed by an analysis of sub-themes that emerge within each area. The following sections outline the key characteristics of the project for each of the three disciplines.

Modern Languages

The language learning experience has been a component of the Modern Languages pedagogy course for a number of years. In this instance, the 14 participants completed a seven-week course in Chinese for beginners, with one two-hour session per week in the first semester. They were taught by a native speaker of Chinese; teaching was almost exclusively in and through the target language. The students completed weekly semi-structured reflective journals after each session with a short unstructured reflection some days later. In addition, the students completed a group reflective report based on their and others' journals after the course was completed. The goal of the group report is to encourage dialogic reflection between students in a non-competitive environment, and to foster some critical reflection by situating their learning and reflection within the broader context of the ITE course and through this the socio-political context of their chosen career.

Music

Twelve participants – most of them classically trained – completed an eight-week course (half an hour per week) in the first semester, addressing a novel aspect of music: Irish traditional music, 'tin whistle for beginners'. This was the second time the course ran as part

of the Music pedagogy course. The participants' previous learning of classical music had involved individual instrumental tuition, which relied heavily on the replication and reproduction of a written score. Traditional music, on the other hand, is transmitted aurally in group situations, relying heavily on participation and collaboration. While classical music requires an incremental acquisition of theoretical knowledge and technical skills, traditional music encourages trial and error and facilitates learning in mixed ability groups.

Each week the participants were taught a new traditional tune on their tin whistles by a renowned Irish traditional tin whistle player. After each lesson the participants completed semi-structured reflective journals, in which they recorded their responses to the lesson and described the learning strategies they were using in relation to practising and learning the tune at home over the week. At the end of the eight-week session, each student completed an individual synthesis report on the experience. In addition, there was a group discussion, which probed their learning even more and attempted to extract their views and consolidate their thoughts on the experience, particularly in relation to what they learned about how others learned.

Mathematics

Twelve students specialising in mathematics participated in the mathematics element of the study. However, the Mathematics pedagogy lectures were attended also by a larger group of students for whom mathematics was their minor subject. To cater for their differing needs, the organisation was somewhat different from that for language and music.

The comparable work took place in the second semester. Over a period of four weeks – hence, during four two-hour lectures – the students undertook four problem-solving exercises of the genre known as 'investigations'. Investigations involve typically rather loosely formulated problems that not only can be solved in many ways (perhaps having a variety of acceptable solutions), but also can be extended, ideally in directions chosen by the students, to obtain more general results than those initially emerging. The activity reflects

the nature of 'real' mathematics, in that it focuses on the process of problem-solving and the generation of new results – new to those investigating, in any case – rather than on the routine execution of previously taught techniques. Such activities have been used in the Mathematics pedagogy course for many years, in line with the literature cited earlier, but previously the students were not asked to record their reflections in writing. In 2010-11, all the students wrote short reflections immediately after completing investigations, and the mathematics specialists submitted semi-structured reflective essays at the end of the second semester. Dialogue around the exercise related to discovery learning in the investigations, as contrasted with expository teaching.

Findings: the students' voices

The reflective writings contained many passages relevant to answering the three research questions. The findings are presented below in three sections, under headings that correspond broadly to the three questions. In each section, emerging themes are identified and illustrated by examples.

Students' metacognitive awareness of themselves as learners

Themes identified with regard to students' metacognitive awareness of themselves as learners include a focus on feelings or immediate reactions to the learning situation; insights into their own learning styles or other characteristics of their learning; and awareness of the extraneous factors that impinged on their learning or attitudes to learning in the sessions.

Firstly, many students' reports of their experiences illustrated their feelings or reactions, positive or negative and the two-way relationship this had with their learning.

> I really enjoyed this investigation. It was fun but surprisingly challenging at some instants. There was a nice competitive atmosphere between the members of my group…. [Mathematics; immediate reflection]

> … feeling a bit down about the whistle. I find playing by ear so challenging and pretty much from the minute the teacher left the class I forgot the entire tune. … I haven't been able to practise hardly at all. [Music; journal]

> I feel so enthused & motivated to learn. Initially, I wasn't very keen to learn Chinese. I feared it would be very difficult, especially in a class full of language students. I was afraid I wouldn't be able to keep up... I was pleasantly surprised at my own progress... I am looking forward to the next class. [Modern Languages (ML); journal]

Secondly, some students provided insights into their own learning styles and characteristics, and related these to their learning.

> I am hindered in investigative work by a relatively poor spatial awareness and am easily 'frustratable'…. Give me a set of instructions and I will prosper … otherwise, expect gnashing of teeth and bad language. [Mathematics; final reflection]

> I consider myself an active, visual and intuitive learner…. I enjoy discovery learning, and I like working in groups, as I find it a good opportunity to get different perspectives of the same problem…. I also like expository teaching, as I think the pace of the class is quicker … particularly if the concepts are not too difficult to grasp. [Mathematics; final reflection]

> Despite the fact that she did manage to remain engaged in Chinese classes, she discovered that her attentiveness and motivation to learn was higher in Russian classes, simply because there was more physical movement. [ML; group report]

Thirdly, students identified extraneous factors that impinged on their attempts to take part in the learning activity. In particular, many of the Mathematics students commented on the fact that they were tired when coming into the Mathematics Pedagogy lectures; these occupied a 'graveyard slot' from 4 p.m. to 6 p.m. on a day on which the students spend the morning teaching in their teaching practice schools and the earlier part of the afternoon attending other lectures in college. A typical example was the following:

> I would rate my enthusiasm for doing [investigations] as 9 [out of 10]. The one point lost is due primarily to the time of the day that our lectures take place. [Mathematics; final reflection]

For ML students in particular, the realisation of the degree to which extraneous factors could impinge on engagement was central in building empathy towards their own pupils as examples in the following section illustrate.

Students' metacognitive awareness related to developing understanding of their own students

Three themes were particularly noticeable. These are: identification of extraneous factors that impact on learning; recognition of the fact that learning can be overwhelming and difficult; and awareness that learners differ from each other.

One theme emerging was the way in which extraneous factors not only affected the student teachers during the sessions (as noted above), but also alerted them to the way in which their students' lives might impact on their learning, making it easy for the students to disengage.

> We now understand we cannot expect students to study methodically for each and every lesson that we teach. Other factors intervene in one's life which we have to take into account. [ML; group report]

> … this was the most valuable and frightening conclusion. Before entering the classroom there are real-world factors which affect a student … we can now relate to and empathise more with our own pupils… they too get tired, distracted, overwhelmed. [ML; group report]

> I was very annoyed during the lesson with my peers who did not practice. … I found I was totally frustrated during the lesson. The reality is we will all have students … who will not practice... We cannot sacrifice their enthusiasm for the hope that we will re-

> engage the less focused students… I want to be the teacher who finds ways to re-engage those students but at the same time keeps the enthusiasm of the rest of the students. [Music; journal]

Secondly, several of the reports linked the students' experiences of the learning activity, in particular their negative experiences of learning as overwhelming, with their developing understanding of their own students and their engagement or disengagement with learning.

> … the feeling of finding Chinese overwhelming. At the beginning it was enjoyable … [but it] became progressively more difficult… we each found that we shut off if we couldn't engage in or relate to what was going on in class. Our motivation wavered. We became frustrated…. It is an aspect we are much more conscious of now that we have experienced those feelings at firsthand. [ML; group report]

> We used the target language only … [this] led us to mirroring our own students' blank faces. When asked to exercise the target language orally, we froze. We felt embarrassed to speak aloud in front of our peers… As a result we have more of an insight into how and why our students are often reluctant to engage in oral communication. [ML; group report]

> It is interesting to realise that there may be students in the classes I teach who like me are disengaged from the learning process but stay quiet and appear to be getting on with their work. It would be so easy to miss the fact that they are not learning effectively because they may give no obvious sign of this. [Music; journal]

Thirdly, the group reports from the language students reveal insights in particular into the fact that learners are not a homogeneous group but in fact all learn differently, and that they (the student teachers) would need to make provision for this in their own classrooms.

> …it made us aware of the diverse response of students to the same learning experience … we hope that we will now tailor our lessons to suit the different [needs]…. [ML; group report]

> The learning experience here has made us more aware of the multiple variables in a classroom (and making accommodation for them). We realised that our views of the possible challenges our students would encounter were mostly/often based on our own skills... We must be aware of the many levels of ability and the different types of learner in a class. [ML; group report]

> … all language learners learn differently… In our group we discussed some of the classes we felt we learned well or not well in and they often differed from each other. We decided that this meant there were not necessarily any bad teaching methods in our classes, only methods which suited some of us more than others. [ML; group report]

Reported changes to practice based on insights

Some reports not only recognised insights such as those described above, but also revealed that the students had already tried to implement these in their own classrooms. The implementation often related to specific methods but sometimes to more general approaches.

The first instance builds on the previous set of examples; it comes from students who have registered the importance of recognising students' differing needs, and have reported that they are already trying to cater for them during their teaching practice.

> The most salient finding was that every student learns in a very different and distinctive way… We had never before been so aware of all the different needs that must be catered for… This is something we have … brought into our own classroom and consider on a daily basis when planning classes and devising creative approaches. [ML; group report]

A second theme illustrated that the students were engaging profoundly with the nature of their subjects and/or of learning these subjects and were endeavouring to bring their understanding into their classrooms. In the three examples that follow, key phrases on the nature of the subjects are underlined.

> Materials that were current and relevant to us were valuable in our learning… We are constantly being told in the Modern Languages pedagogy lectures that staying relevant and a teacher's 'with-it-ness' are important and we now understand why! …. The language enters your world and you can engage with it in a genuine way. We were surprised to discover that many of the famous people we had previously referenced were not relevant to our young students. [ML; group report]

> I was excited about teaching investigations…. I found that the students were very much focused on what is the right answer and not on the process. I myself need to get more practice at leading this type of class. [Mathematics; final reflection]

> Since beginning the [Postgraduate Diploma in Education] course in September, my views on mathematics have changed greatly. Throughout my schooling, mathematics was always presented to us as an unrelated set of rules…. Mathematics was seen as a finished product…. Mathematics should be seen as a continuingly unfolding area of human question, where the invention of new creative ideas is central. To help students reach this view of mathematics, they should be challenged to think and reason … [and] should be actively involved with complex situations, by formulating their own meaning of the content. [Mathematics; final reflection]

The latter student tried an investigation in her class 'and found it to be very successful.'

Discussion and conclusions

These findings suggest that, regardless of discipline, a learning experience together with reflection on it does expand student teachers' metacognitive awareness of themselves as learners, and that this does translate to a greater empathy with and greater accommodation

of learners in their own classrooms. With regard to the research questions above, all groups reported evidence that the students had reflected on their own learning, whether gaining new insights into their own learning or applying existing insights to the situation. Very many students noted how these insights could be generalised to learners in their own classrooms and some indicated intended or actual efforts to change their practice in order to accommodate these insights. As regards the final research question regarding developing a positive disposition towards learning, some music students expressed in informal discussions a desire to learn other musical genres. However, it would be premature to judge whether this experience resulted in a more positive disposition towards learning in the long term. Nonetheless, the fact that a number of students reported implementing changes to their practice as a result of their learning on this course may suggest an open attitude towards learning.

A common thread that runs through the findings above and previous studies is the notion of *transformation*, where in some contexts, for some students, the experience of learning and reflecting on it result in a transformative learning experience (Mezirow 1978; Mezirow and Taylor 2009) with regard to their understanding of teaching and learning. Among the most 'epiphanic' moments were those relating to the Modern Language student teachers: they radically changed their view of the varied nature of learning. This was largely driven by the collaborative group report which involved providing a synthesis of individual reflections. The mathematics student who wrote the final quotation above also seems to have experienced an epiphany with regard to her changed view of the nature of her subject. Transformative learning is 'predicated on the idea that students are seriously challenged to assess their value system and worldview and are subsequently changed by the experience' (Quinnan 1997, 42). This work aims to foster the conditions in which students are genuinely challenged, and troublesome concepts that are fundamental to teaching in their discipline, such as how different learners can be, emerge from their own experiences and reflection in an inductive fashion. The degree of common points of learning for students and the depth of their reaction to the experience and this learning across the three disciplines have led us to

consider this experience as a means of exploring and enumerating *threshold concepts* for learning in teacher education (Meyer et al. 2010). The students grappled with concepts which are troublesome, transformative and to a certain degree irreversible, and these can be said to be common across the disciplines.

A further point to note is the impact of the tools on the findings. Firstly, the kinds of reflections the students completed varied both within and across the disciplines. While all tools provided some support for descriptive reflection, they differed as to degree to which they made an attempt to promote dialogic and critical reflection. For this reason, the reflections quoted above could be positioned at quite different points on a continuum, from descriptive, personalised accounts to critical reconceptualisations of issues. The potentially transformative nature of the experience for students relies on depth and criticality of reflection in which students engage, and this will vary across individuals. However, in this study it may also vary due to the tools used. A case in point is the more frequent moments of epiphany in the Modern Languages group reports, which called for dialogic reflection between critical peers. This aspect of study design is something that we need to address in future iterations of the project. A second issue regarding the tools arises in all three disciplines where the reflections were part of the student teachers' assessment for the year. This presents a number of problems, not least the good respondent problem or what Schumann and Presser (1981) term the 'acquiescence quagmire'. In an attempt to offset the effects of students responding for assessment rather than as they genuinely feel, the questions asked for evidence of examples from the lessons or their own teaching to support statements of effects or insights from the course. Assessment is however an open issue and one that will require careful management.

In conclusion, this iteration of the research study has produced promising results with regard to the impact on students' insights and practice. We aim to explore this further in a focus group interview during the summer but also with a further analysis of the journal and report data according to Hatton and Smith's (1994) and/or Mezirow's (Mezirow and Taylor 2009) criteria for the recognition of different types of reflective writing. Further analysis would

explore the depth and quality of reflection engaged in across the reflective toolsets used in the three disciplines in order to crystallise findings but also to optimise future iterations of the project.

References

Bailey, K. M., B. Bergthold, B. Braunstein, N. Jagodzinski Fleischman, M. P. Holbrook, J. Tuman, X. Waissbluth, and L. J. Zamboet al. 1996. The language learner's autobiography: Examining the 'Apprenticeship of Observation'. In *Teacher Learning in Language Teaching*, ed. D. Freeman and J. C. Richards, 11-29. Cambridge: Cambridge University Press.

Brookfield, S. D. 1995. *Becoming a critically reflective teacher*. San Francisco, CA: Jossey-Bass.

Burton, J. 2009. Reflective Practice. In *The Cambridge Guide to Second Language Teacher Education*, ed. A. Burns and J. C. Richards, 298-307. Cambridge: Cambridge University Press.

Cooney, T. J. 2001. Considering the paradoxes, perils and purposes of conceptualizing teacher development. In *Making sense of mathematics teacher education*, ed. F.-L. Lin and T. Cooney, 9-31. Dordrecht: Kluwer.

Devitt, S., and I. V. Czak. 1981. An experiment in the teaching of Russian to future language teachers (Republished by ERIC as EJ253874). *Canadian Modern Language Review / La Revue canadienne des langues vivantes* 38, no. 1: 43- 57.

Finney, J., and C. Philpott. 2010. Informal learning and meta-pedagogy in initial teacher education in England. *British Journal of Music Education* 27, no. 1: 7-19.

Greer, C. J. 2001. A cautionary tale: A dialogic re-reading of a student teacher's visual narrative. *Narrative Inquiry* 11, no. 2: 451-478.

Hatton, N., and D. Smith. 1995. Reflection in teacher education: Towards definition and implementation. *Teaching and Teacher Education* 11, no. 1: 33-49.

Kolb, D. 1984. *Experiential learning.* Englewood Cliffs, NJ: Prentice-Hall.

Korthagen, F., J. Loughran and T. Russell. 2006. Developing fundamental principles for teacher education programs and practices. *Teaching and Teacher Education* 22: 1020-1041.

Lester, F. K. Jr., J. O. Masingila, S.T. Mau, D.V. Lambdin, V.M. dos Santon, and A. M. Raymond. 1994. Learning how to teach via problem solving. In *Professional development for teachers of mathematics*, ed. D. B. Aichele and A. F. Coxford, 152-166. Reston, VA: NCTM.

Lortie, D. 1975. *Schoolteacher: A sociological study*. Chicago: University of Chicago Press.

Martin, M. 2005. Reflection in teacher education: How can it be supported? *Educational Action Research* 13, no. 4: 525-542.

Mayer-Smith, J. A., and I. J. Mitchell. 1997. Teaching about constructivism: Using methods informed by constructivism. In *Constructivist Teacher Education: Building a World of New Understandings*, ed. V. Richardson, 129-153. London: Taylor and Francis.

Meyer, J. H. F., R. Land and C. Bailie. 2010. *Threshold concepts and transformational learning*. Rotterdam and Taipei: Sense Publishers.

Mezirow, J. 1978. *Education for perspective transformation: Women's reentry programs in community college.* New York: Center for Adult Education, Teachers College, Columbia University.

Mezirow, J., and E. Taylor, eds. 2009. *Transformative learning in practice*. San Francisco: Jossey-Bass.

Moon, J. 1999. *Reflection in learning and professional development*. London: Kogan Page.

Ponte, J. P. 2001. Investigating mathematics and learning to teach mathematics. In *Making sense of mathematics teacher education*, ed. F.-L. Lin and T. Cooney, 53-72. Dordrecht: Kluwer.

Quinnan, T. 1997. *Adult students 'at risk': Culture bias in higher education*. Westport, CT: Bergin and Garvey.

Schön, D. A. 1983. *The reflective practitioner: How professionals think in action.* New York: Basic Books.

Schumann, H., and S. Presser. 1981. *Questions and answers in attitude surveys: Experiments on question form, wording and context.* New York, NY: New York Academic Press.

Williams, M., and R. L. Burden. 1997. *Psychology for language teachers: a social constructivist approach*. Cambridge: Cambridge University Press.