

Pre-service teachers undertaking classroom research: developing reflection and enquiry skills

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Abstract

This paper reports on the development of reflectiveness and research skills in eight pre-service teachers, through their participation in a funded research project to develop the handwriting of children with literacy problems. The project aimed to analyse the reflections of the trainee teachers participating in an authentic research study and to consider what this reflection on practice might offer to the education of teachers in the current UK training context.

The context for the paper was a project which engaged pre-service trainee teachers in researching the proposition that automaticity in handwriting plays a role in facilitating composing processes and that the automaticity of early writers can be trained. Some outcomes of the project for pupils are reported. Of the 39 children targeted in the project, 32 made significant progress in their performance on the handwriting automaticity test. The focus in the present paper is, however, on the participating trainee teachers and the paper suggests that conducting research was a significant learning event for these pre-service teachers and that, through working together, they were able to analyse their development as researchers and their learning during the research process.

At a time when the English government views teacher training as a method of school improvement and the effectiveness of training is measured through its immediate impact on pupil outcomes, this study offers an example of how shared research can offer positive learning outcomes for pupils, develop the reflective thinking of pre-service teachers through researching a real problem, and develop links across a range of school and university settings.

Keywords:

pre-service teachers, teacher education curriculum, reflective practice, student teachers, handwriting

Introduction

The role of research in the education of teachers has been conceptualised in a number of ways. At its most basic, the need for pre-service teachers to link theory and practice has been used as a rationale for personal engagement in classroom research. It is suggested that undertaking research can provide an authentic way for student teachers to increase their understanding of issues relating to the curriculum (Eraut et al, 2000). It has been argued that empirical research can complement and contextualise curriculum studies programmes of reading, lectures and seminars as means of delivering content knowledge (Palmer, 2007). However, other authors see the role of research in teacher development as much more profound, and claim that teacher education itself should be a research based activity (Toom et al., 2010). Indeed, Maaranen and Krokfors (2007) suggest that the success of Finnish education may be built upon an approach to teacher education that places an emphasis on enquiry based research into pedagogy in order to develop 'pedagogical thinking'. The involvement of pre-service teachers in research for this purpose is the focus of the project reported here and the paper aims to suggest a rationale for the participation of pre-service teachers in research.

We acknowledge the international consensus about the importance of practitioner enquiry as part of continuing professional development (Clayton et al. 2008, 73), largely based on the acceptance of an action research model. The impact on pupils and school improvement of teacher research through shared HEI and school led programmes has been documented. However, as Bailey and Sorenson (2013) note, in the pre-2011 initial teacher training setting in England (as described by McBeath, 2011), management teams and policy makers recruited the rhetoric of action research to narrow performative conceptions of school improvement.

Recent reforms of teacher education and training (DfE, 2011) have dictated that training of teachers, including practitioner research, will be school-led, and training courses will be judged on their impact on pupil outcomes in the short term. This has continued the narrowing of the school-based research agenda to the kind of performative goals discussed by Bailey and Sorenson (2013) and placed school based action research ever more firmly in the service of very narrow interpretations of school improvement. Such research may have what Reynolds (2011) calls a technical function, but does not begin to have any critical dimension and epitomises the ‘technical rationality’ which Schön (1983, 39) claimed dominated problem solving and ensured that more attention was given to refining means rather than to questioning ends.

The present paper seeks to offer an alternative example of research, which is outside the dominant action research tradition in schools. The research which formed the context for the argument presented in the paper offered positive learning outcomes for the children involved whilst enabling trainee teachers to research a concrete practical problem (Korthagen, 2010) in a real context. The paper presents an example of how this led students to engage in reflection which went beyond technical problem solving.

Research, reflection and pre-service teachers

For some years, educators have called for the systematic and continuous involvement of pre-service teachers in enquiry activities and stressed the importance of seeing the role of teachers as producers, and not just consumers, of research (e.g. Vialle et al., 1997). This is based on conceptualisations of the role of enquiry as the basis of the development of the ‘‘reflective practitioner’’ (Pollard, 2002), able to engage in ‘‘pedagogical thinking’’.

Kansanen et al. (2000) describe pedagogical thinking as taking place at different levels of action, object theory and meta-theory and as a thinking, reflective and decision making process but they also recognise, as Dewey (1933) and Schön (1983) noted, that pragmatic thinking, theoretical thinking and practice cannot be separated, but exist in a reciprocal relationship. Although the work of Schön has been considered critically by a number of authors and the notion of reflection has been questioned (Gilroy 1993, Newman 1999), la Velle suggests that:

‘ the notion of reflective practice as a means of developing and improving critical and contextualised professionalism in education remains a defining characteristic of the culture of best practice in professional development.’ (la Velle, 2013, p.2)

In a review of the origins and developments of critical reflection, Reynolds (2011) notes that:

‘Reflection involves thinking about past or on-going experience of events, situations or actions so as to make sense of them, potentially with a view to informing future choices, decisions or actions. In so doing, we draw on existing ideas – our own or other people’s – and in applying them to our experience, may confirm these ideas or develop new ones’. (p.5).

Maaranen and Krokfors (2007) add an inter-personal dimension to such an intra-personal, individual process:

‘reflection is a shared mental structuring process that takes place in both individual and collective settings of learning and has a positive social impact on the learning possibilities in the future’ (p.361).

This emphasis on reflection through interaction and across individuals was the basis of the methods used in the present study, which focused on the shared research of a group of pre-

service teachers, and emphasised their interaction and reflection through discussion and written commentaries.

Models of reflection

Calderhead (1989) observed that reflection has been integrated into teacher preparation in a huge variety of ways with a diverse range of justifications. Not surprisingly, this means that the key elements of reflection are described differently by different authors, but with teacher learning and development always at the heart of the process (Huberman, 1992; Rolfe, et al, 2012). A range of models are summarised by Rolfe et al (2011). Each approach to reflection has its own underpinning model, but most begin by identifying the issue or problem to be considered, followed by the collection and organisation of information relating to the problem or issue prior to action, and then the collection of data showing that changes have taken place in thinking. At root, most models focus on the act of reflection in generating evidence of new understanding (for example: Bolton, 2005; Schön, 1983). In seeking to identify a model of reflection to analyse pre-service teachers' discussions in this project, it was perhaps inevitable that some of the earliest models would seem the most compelling, as they are implicated in newer, but less general approaches.

Rogers (2001), basing his work on Dewey (1933), identifies common features among some of the models of reflection, which he calls 'presence of experience, description of experience, analysis of experience and intelligent action/experimentation' (Rogers, 2001, p. 851). The latter two are conceptualised as being the reflection resulting in learning from experience, being critical of it and changing or modifying it. The ideas of these two theorists were the basis of the analysis used by Maaranen and Krokfors (2007) in their study of student

teachers' essays, and in the present study of student teachers' verbal reflections on their research. Other studies have attempted to identify measurable levels of reflectiveness (e.g. Brookfield, 1995; Kember et al, 1999) but, as Lambe (2011) notes, this approach remains contentious and the robustness and reliability of the levels uncertain and, for this reason, this paper does not attempt to 'level' reflection.

The provision of an opportunity for pre-service teachers to engage in a structured empirical research activity and to use a rigorous research process as a scaffold for developing early skills of reflection is recommended by most authors (e.g. Hatton & Smith, 1995; Zeichner, 1990). The work described in this paper centred around a project which provided pre-service teachers with a research opportunity to explore a proposition which was original not only to them as novice teachers, but nationally significant (results from the project have already been published and disseminated by the TDA (Wray, Medwell, & Crosson, 2009) and featured in a TV programme (Teachers TV, 2009)). The project enabled these pre-service teachers to engage with all aspects of the research process, from building a conceptual framework, planning interventions, administering tests and modifying methods. Moreover, by engaging in a collaborative research project, they were able to share, structure and support each other's reflections.

The current study

This paper examines the ways in which the processes of engaging in a shared, funded research study stimulated eight student teachers' reflective capacities. The two key questions about their reflections were:

- (1) What kinds of reflective learning would be found in student teachers' reflections about the research processes in which they were involved?
- (2) How did these student teachers view their development as researchers and teachers during the research process?

The aim of the collaborative research in which this group of pre-service teachers/researchers was involved, and which forms the context for the present paper, was to examine the proposition that orthographic-motor integration (automaticity of letter production) in handwriting plays a role in facilitating composing processes (Medwell et al., 2007; 2009) and that developing the automaticity of early writers can enable them to compose more successfully (Christensen, 2005). This enquiry was part of a larger programme of research which offered these pre-service teachers an opportunity to work in partnership schools with pupils and teaching assistants. The pre-service teachers attended a lecture about the topic, read associated materials and met as a seminar group to discuss it. They were also introduced to some basic research methods and approaches and then were given the task of planning the research co-operatively, with guidance from their tutors as they required. They undertook all their field work in pairs, with each pair working with an experienced teaching assistant in the school over a six week period. All the pre-service teachers met fortnightly through the six week research period to review their progress and these meetings were videotaped. The research involved pre-service teachers in:

- Conducting an audit of current handwriting teaching in a University partnership school;
- Assessing and levelling children's writing as a baseline measure;
- Administering a short handwriting test as a baseline measure;

- Identifying (with a partner student teacher) children likely to benefit from handwriting intervention;
- Designing a programme of intervention designed to promote automatic letter production;
- Planning and monitoring a daily handwriting intervention by the Teaching Assistant, following the programme they had designed;
- Administering a final handwriting and writing test and reviewing outcomes with the children involved.

The aim was to develop and pilot a short handwriting intervention (six weeks in duration) that could improve the composing abilities of many young writers. The nature of such an intervention was extrapolated from the existing research (e.g. Berninger and Graham, 1998) and was based on developing a method whereby children practiced writing improbable combinations of letters under time pressure, cued by visual letters and aural phonemes and letter name presentation. There is no specific published programme that addresses this and the student teachers had an open, original proposition to investigate within a school setting with which they were familiar. All the participating pre-service teachers/researchers, teachers and teaching assistants were volunteers. Parental consent was sought for the children to participate in the project and full ethical clearance was given for the study by the University of Warwick Institute of Education ethics committee. Ethical clearance applied also to the participating pre-service teachers, who were clear that their participation was voluntary and not linked to any kind of assessment of them as part of their training course.

Study Methods

The research presented in this paper draws upon analysis of:

- A weekly review of each pre-service teacher's work with the group of target children and the teaching assistant (TA). These were maximum two page reflections around structured questions. Total: 31 reviews;
- Video recordings of the three fortnightly review and reflection meetings (one hour each) held during the six weeks of fieldwork, which included all eight pre-service teachers. Total: 3 hours discussion video;
- The final, written review of the project submitted by each pre-service teacher (of a maximum length of 3000 words). These reports did not form part of any assessment of performance on the teacher-training course. Total: 8 reports;
- The outcomes of the tests and assessments undertaken by each pre-service teacher with their target children. Total: 38 complete sets of tests.

Each weekly (written) review and fortnightly meeting asked the pre-service teachers to 'Critically analyse your research process and your development as a researcher'. As this was not assessed or compulsory work for these pre-service teachers, their incentive to participate was only the desire for self-improvement on their parts.

This small study was approached analytically and holistically (Stake, 2000) in order to identify the key thoughts and concepts which were discussed. The method used in the analysis of the study is a content analysis, in which the data (pre-service teachers' oral and written accounts) was analysed both inductively and deductively. NVivo 9 (QSR, 2010) was used to examine the video files and transcribe tagged notes. These were analysed from the viewpoints of the two research questions, with nodes created for the emerging categories of utterance. To identify the types of reflective processes in which the pre-service teachers

engaged, four steps of reflection were used as categories for analysis. These were based on analysis of the steps of reflection developed by Rogers (2001) and Schön (1983), and were: experience, describing the experience, analysing the experience and reflecting on the analysis. To answer the second research question about the pre-service teachers' professional and personal development, the data were analysed into six categories. This analysis structure was originally used by Maaranen and Krokfors (2007) to investigate pre-service teachers' reflections in essays and adapted by Lambe (2011) to investigate pre-service teachers' reflections on using WebCT.

Results

The results are presented in two sections, 'Reflective learning processes of pre-service teachers' and 'Pre-service teacher professional and personal development during the research process'. Categories and the numbers of utterances (spoken or written) produced in each category are presented in Table 1.

Table 1. Utterance categories derived from oral and written accounts of pre-service teachers/researchers in the study

Reflective learning Process category	Number of utterances in this category	Development during the research process category	Number of utterances in this category
Experience (1-E)	throughout	Personal growth (2-PG)	40
Description of experience (1-DE)	57	Developing research skills (2-RS)	28
Analysis of Experience (1-AE)	46	Developing new knowledge (2-NK)	22
Reflection on the analysis (1-RA)	50	Understanding research processes (2-PR)	18
		Learning from what has been done (2-LD)	34
		Dealing with difficulties (2-DD)	33
		Examining the implications of the research results for future practice (2-FP)	28

Reflective learning processes

The experiences section of the reflection process naturally reflects the media of those reflections. As this was based in notes and face to face discussion, the participants had a good deal of shared understanding of the actual experiences and discussed the problematic experiences or shared common experiences. Indeed, the degree of shared discussion on the video materials was such that the discussions under the heading of reflective learning experiences were not attributable to one individual but were described by a number of pre-service teachers/researchers collectively.

Describing the experience

This section included the detailed discussion of the activities undertaken and the sharing of particular things they had done to inform other group members. This is the first stage of the reflection process, termed ‘revisiting the experience’ by (Schön, 1983) or ‘looking back on the action’ (Korthagen, 2010), and it included:

- planning the programme,
- sharing the goals and methods of the research with parents, teaching assistants and children
- practical considerations in data collection (use of digital video recording)

Analysing the experience

The discussion in this section included reviewing records and a good deal of debate about analysis of the digital video for recording and reviewing sessions. The other focus topics were interactions with teaching assistants and outcomes of pupil tests. The focus of this analysis was usually on difficulties, encountered and resolved, or unresolved, a feature noted by Maaranen and Krokfors (2007), although the focus of the difficulties of the students in this study was different from those identified by Maaranen and Krokfors (2007). These pre-service teachers focused on difficulties in working with digital video recording, but most of all on working with Teaching Assistants.

‘I wanted her to do it just right and make it fun, but it’s really hard to explain. Like I didn’t expect it to be, either. I felt I didn’t have the, I don’t know, the authority. As a teacher, yeah, pedagogical authority, to be telling Lena (TA) all these things. But I had to.’ (1-AE)

The use of time was also a major focus for group discussion. Pre-service teachers asked each other to share ways to manage both the training of the TA and the input to children. The planning phase took a good deal of time but in discussing this phase, trainees focused on not having enough time, rather than on how much time things took. This subtle difference was interesting, reflecting frustrations with the more practical aspects which these trainees seemed to think they should be able to overcome. The planning phase, though, they recognised as a more legitimate use of time.

'I have got into this and wanted to read everything so it was not great to have to move on to planning. I could have done with more time before we even met.'(1-AE) and *'I've changed the way I approach the tasks to get the children to get there quickly and do the handwriting. I've learnt to make it seem exciting and sort of rushy. Add bit of pressure to do it. I can't believe how much time it takes to do short interactions, preparation, marking and all those things.'*(1-AE)

The trainees analysed their feelings a good deal (feelings of pressure or trepidation, pride in achievement, success in achieving goals), but usually coupled this with a particular experience, rather than feelings about the research overall. Where this was discussed it was usually in terms of personal development (see below).

Reflecting on the analysis

The fourth step, reflecting on the analysis, consists of the students' criticism of their own research or of the research process. All the students mentioned things they would like to have

done differently in the research. This a key issue in reflection - taking intelligent action, or potentially doing so, if the research was to be done again, what Korthagen, (2010:415) calls 'creating alternative models of action'. One of the subcategories dealt with matters that had helped the students in the research process. The students discussed and recorded:

- planned and unplanned discussions and electronic contacts with peers within the group
- their reading of and reactions to the literature
- weekly reviews both of the teaching sessions on video and their written reviews
- previous teaching experiences.

Having the other members of the research group readily available was important.

'One time, Freda was going on about one of the articles and I realised I could maybe do the plan differently. I think that you can get stuck on one way of working things out so a different angle, perspective, just helped me put things together.' (1-RA)

Notably, the tutors involved, who were supposed to be guiding these students, were not mentioned and rarely consulted.

While all the students were critical about their research, three particularly mentioned their initial selection of pupils to participate in the research as something they would like to have done better, more efficiently or more precisely. Five of the students felt they would approach the work with TAs differently if they could repeat the exercise.

'I think...we sort of expected too much and didn't tell them enough and I think, talking to her, that she would have preferred me to tell her. But I would want to know why it might work but then, it's important to me, my research but not so important for her.' (1-RA/2-LD)

The students discussed what they had gained, personally, from the research. This included confidence and new ways of thinking.

'I have really contributed to new knowledge. It's made me think about that. How you do that all the time, I suppose, but having this as outside my teaching lessons it has made me think a lot more than I do when I am on the planning and evaluating lessons treadmill.' (2-NK)

'It has led me to think about when I can do research. To solve real problems, not just as an assignment. When I have my own class or a subject in school I can see that there are some problems to be solved and now I think I could do that.' (2-LD)

Such reflections are, we feel, quite important as they suggest that the views of these student-teachers towards research and, particularly, research into their own practice, may well be one step closer to being self-sustaining in their future professional lives.

The students all discussed the effect of conducting the research and this discussion was evident right from the first reflection meeting. There was a good deal of discussion, initially, about their pride in doing something 'extra' or 'different' but by the second meeting the discussion had turned to the importance of doing something really innovative and the realisation of their agency in changing children's abilities. The research process was discussed as a way of discovering how much they could affect children's progress by

working with others and the nature of the thinking which underpinned this. Naturally, each pre-service teacher emphasised different aspects of personal development but the main categories were:

- Growth of feelings of self-efficacy, in particular in making decisions, discussed by seven of the eight
- New insights into working with other adults
- A better understanding of the many issues which come between any idea and outcomes for learners.

Reflections about the results of the student research

This paper is about reflection as part of research carried out by pre-service teachers, who, since the changes in teacher education announced in 2011, have been cast in government publications (DfE, 2011) as primary vectors of school improvement and judged on their impact on pupil learning (Ofsted, 2012). Therefore, we believe it is important to note not only the processes but also the results of the students' research, because these were clearly hugely significant to the researchers and were linked with many of their reflective comments. Of the 39 children targeted in the project, 32 made significant progress in their performance on the alphabet test from the beginning to the end of the project. Our earlier studies (Medwell et al., 2007; 2009) had identified cut off scores on an alphabet test which indicated a high probability that children would not achieve the appropriate level in a national test of writing (SAT). These cut off scores were ≤ 12 letters per minute for Y2 children and ≤ 22 letters per minute for Y6 pupils. For the Y4 pupils in the present study, we extrapolated that a cut off score of ≤ 17 letters per minute would indicate children at risk in writing, and thus candidates for an intervention programme. In fact, the average score on the alphabet test of these 39

children was 13.2 letters per minute before the intervention. At the conclusion of the intervention, this average score had risen to 15.8 letters per minute, and 17 of the 39 children now scored greater than 17 letters per minute – that is, they had now surpassed the cut off score. These results are reported in detail in Wray, Medwell & Crosson (2009).

These results were interesting as a contribution to investigating the wider proposition around which the project was based – that of the relationship between handwriting and composing, but they were also very important to the pre-service teachers. Many of their reflections in the categories above involved examining the outcomes of the project for children, schools and the topic of handwriting teaching. We have created a category of these responses because we believe, as Maaranen and Krokfors (2007) state, that this is a cyclic process, but one which is not content free. As Mott (1996) points out, the researchers have a vested interest in the product. The comment below underlines that reflection is bound up in outcomes, potential activity and feelings.

‘For four of my children, doing this research has definitely improved their writing automaticity and may help their composing. It is big. I think research can be, like, almost using the children for your own plans, but this project has made a difference for them. I feel the impact of that theory in University for my children which I never would have thought about. I think getting results, if only for some of them, has changed learning to be a teacher this year for me. Not the basics, but the thinking and the urgency.’(2-FP/2-LD))

That this is such an important part of the reflection by these students is evident in the figures above in Table 1. However, this category shows that these trainee teachers were concerned about children’s learning in a longer term and more profound way than could be judged

during an Ofsted inspection, where the impact of one lesson is estimated to evaluate the success of the trainee.

This has been.. really nagging at me. I 've been picking away at it and I can't leave it alone. But look at the group?(children) We worked it out and made a difference. It might be a tipping point for some of them. I did that! (2-LD)

Conclusion

This paper has reported the study of a self-selecting group of pre-service teachers/researchers engaging in pedagogical thinking which led them to wrestle with some very technical and abstract theoretical papers about handwriting and transform them into a relatively successful programme of automaticity training for children, and to reflect critically with colleagues throughout the process. Unlike earlier studies (Borko et al., 1997) these pre-service teachers were critical but overwhelmingly positive about the experience of doing the research. This may well reflect the voluntary nature of this experience.

This project considered written reflections and spoken interactions at meetings, none of which involved assessed work. This approach aimed to avoid the issue of the reliability of findings which derive from projects where written assignments are analysed, in which authors' writing may be distorted by the need to achieve high marks (Hatton and Smith, 1995). There remains, however, the possibility that the shared nature of the spoken reflection may have shaped the discussion and been influenced by the way each pre-service teacher wished to appear to his/her colleagues.

The evidence from this small study supports a model of teacher preparation which involves novice teachers in original research, as well as the call for an inquiry focused model of teacher education such as has been developed in Finland (Toom, 2010). The teacher preparation context in England is one where pre-service teachers may train to teach without any requirement for assessed academic study (DfE, 2011), and where Training Schools are being called to lead both initial teacher preparation and further professional development (DfE, 2011a). The involvement of HEIs is being reduced through government pressures (DfE, 2011a). Many pre-service trainees choose to do award bearing courses involving research through initial teacher education (PGCE) or masters and doctoral awards and develop their research skills in this way. Moran and Dallat (1995, p. 25) described how the process of encouraging reflection in pre-service teachers should be ‘... focused, systematic and structured’. The authors would argue that this project is an example of how engagement in research does not need to involve a formal assessment in order to develop pedagogical thinking, and a wider, shared, research project offers the support and models to enable pre-service teachers to develop their own research skills and criticality. It fits, we would argue, the model of ‘informed and actively engaged’ professional development put forward by Bates (2005)

This project engaged pre-service teachers in addressing a particular topic and was externally funded by the Training and Development Agency for Schools (TDA) and as such, might seem to limit the research focus for participants. Alternatively, it might be that engagement in shared projects allows individual teachers to develop their own thinking in ways which are profoundly social. The experience of reflection and discussion about a shared topic has the potential to develop pedagogical thinking and a profound concern for the results and impact of research. This is precisely the type of reflection that we would hope to see in schools.

Niemi (2008, p.203) argues that the European Commission implies that ‘teacher education should be based on research and teachers’ work requires abilities to reflect on the evidence on which they base their practice’. This project is an example of evidence-based practice, which identified that it is the creation of the evidence which is important and, this paper argues, the shared professional involvement with compelling outcomes for pupils which develops teachers as thinkers, not simply technicians. A project of this type can create communities of practice (Wenger 1998) which support high quality reflection, fuelled by a focus on pupil outcomes beyond those discernible in individual lessons.

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