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**Pre-Service Teachers Undertaking  
Classroom Research:  
Developing Reflection and  
Enquiry Skills**

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## **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 research project to develop the handwriting of children with literacy problems.

Recent research suggests that automaticity in handwriting plays a role in facilitating composing processes and that developing the automaticity of early writers can enable them to compose more successfully. This project engaged pre-service trainee teachers in researching this proposition and studied the handwriting outcomes for pupils and the development of reflection in pre-service teachers.

Outcomes from the project for both pupils and trainee teachers are reported. Of the 39 children targeted in the project, 32 made significant progress in their performance on the handwriting test. The results of this study suggest 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. Moreover, the shared nature of the research and the perceived positive outcomes for pupils was significant in developing the reflective thinking of these pre-service teachers.

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

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*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, Alderton, Cole, & Senker, 2000). At the same time it is 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 (2008), 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 and develops “pedagogical thinking”. The involvement of pre-service teachers in research to develop of this type of thinking is the focus of the project reported here.

*Research, reflection and pre-service teachers*

For some years, authors have called for systematic and continuous involvement in enquiry for pre-service teachers and stressed the importance of pre-service teachers as producers, and not just consumers, of research (Vialle et al, 1997; Lieberman and Miller, 1990). This is based on 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) which takes place at different levels, of action, object theory and meta-theory levels and as a thinking, reflection and decision making process. It is also recognised, as Schön (1982) noted, that pragmatic thinking, theoretical thinking and practice cannot be separated, but exist in a reciprocal relationship.

On this basis, we argue that the process of reflection, which is a major focus of this paper, can be viewed as a key element in teacher development. According to Wade and Yarbrough (1996, p. 64), reflection involves stepping back from past experience and developing new insights to (potentially) apply to future activities (1996, p. 64), a definition which is essentially individual. Maaranen and Krokfors, (2008) develop this idea of reflection, adding an inter personal dimension to what has often been conceptualised as 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 this study, which focused on shared research by a group of pre-service teachers, and emphasised their interaction and reflection through discussion and written commentaries.

*Models of reflection*

Calderhead (1989) notes 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, with learning and teacher development are always at the heart of the process (Wade and Yarborough, 1996; Dreyfus & Dreyfus, 1986). There is often also an element of ethical and attitudinal change (LaBoskey, 1993) or attention to the development of a sense of self (Valli, 1993). 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 (Bolton, 2005; Boud et al., 1985; Langer, 1989; Schön, 1983; Siebert & Daudelin, 1999). 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 seem to be most compelling, as they are implicated in newer, but less general approaches.

Rogers (2001) 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" (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 areas used by Maaranen and Krokfors, 2008, in their study of student teachers' essays, and in the present study of student teachers' verbal reflections on their research, which highlighted the cyclic nature of the reflection process. More recent studies have attempted to identify measurable levels of reflectiveness (Brookfield, 1995; Kember et al., 1999; Sparks- Langer et al., 1990; Van Manen, 1977) but, as Lambe (2011) notes, this approach remains contentious and the robustness and reliability of these levels uncertain.

The provision of an opportunity for pre-service teachers to engage in a structured empirical research activity and to use the rigours of the research process as a scaffold for developing early skills of reflection is recommended by most authors (Calderhead, 1993; Hatton & Smith, 1995; Pollard, 2002; Schön, 1983, 1987; Zeichner, 1990). This project 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 with the results published as a final report (Wray, Medwell, & Crosson, 2009) and (Teachers TV (2009)). The project enabled the pre-service teachers to carry out all aspects of the research process, from building a conceptual framework, planning interventions, administering tests and modifying methods. Moreover, by engaging in a co-operative research project, they were able to share, structure and support each other's reflections.

### *The aim of the study*

This paper examines how engaging in a shared, funded research study stimulated eight student teachers' reflective capacities. The two key questions about reflections were:

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

The aim of the cohort's collaborative research 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 the 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 planned the study co-operatively but 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 study period to review their progress and these meetings were videotaped. The study 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;
- Administering a final handwriting and writing test and reviewing outcomes with the children involved.

This small study aimed to develop and pilot a short handwriting intervention that could improve the composing abilities of many young writers. The nature of such an intervention was inferred from the existing research (Berninger and Graham, 1998) and was based on developing a method to practice 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 which 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 students, teachers and teaching assistants were volunteers. Parental consent was sought for the children and the study was approved by the University of Warwick ethics committee.

### *Study Methods*

The research presented in this article analyses:

- 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 (see appendix). 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. 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.

This was not assessed or compulsory work for these students. Each weekly (written) review and fortnightly meeting asked the pre-service teachers to “Critically analyse your research process and your development as a researcher”.

This small study was approached analytically and holistically (Stake, 2000). The method used in the analysis of the study is a content analysis, in which the data 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. The advantage of using software to do this is that transcription can be undertaken where necessary and additional nodes can be developed inductively. To identify the types of reflective processes the pre-service teachers engaged in, four steps of reflection were used as categories for analysis. These were based on analysis of the steps of reflection by Rogers (2001) and Schön (1983): experience, describing the experience, analysing the experience and reflecting on the analysis. To answer the second research question about the pre-service teachers’ own development, six categories (nodes) of data were formed. This analysis structure was originally used by Maaranen and Krokfors (2008) to investigate pre-service reflection in essays and adapted by Lambe in (2011) to investigate pre-service reflection using WebCT.

### *Results of the study*

The results are presented in two sections, ‘Reflective learning processes of pre-service teachers’ and ‘Pre-service teacher development during the research process’. The names of the categories and the units coded under each class are presented in Table 1.

Table 1 here

### *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 in the reflective learning experiences headings were not attributable to one individual but were described by a number of students collectively.

### *Describing the experience*

This section included detailed discussion of the activities undertaken and sharing 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) 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 discussion 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 (2008), although the focus of the difficulties of the students in this study was totally different. 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.'*

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 long 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.'* 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.'*

The trainees reflected a good deal on their feelings (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 (below)

### *Reflecting on the analysis*

The fourth step, reflecting on the analysis, consists of the students' criticism of their own research or of the 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 students do research again. 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
- reading 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 on the line 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.’ Notably, the tutors involved were not mentioned.

While all the students were critical about the 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.’*

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.’*

*‘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.’*

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 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 underpins 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. However, 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 the 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  $\leq 12$  letters per minute for Y2 children and  $\leq 22$  letters per minute for Y6 pupils. For the Y4 pupils in the present study, we extrapolated that a cut off score of  $\leq 17$  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 discussed above, 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 (2008) 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.’*

### *Conclusion*

This small project presents 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.

We believe that this small programme supports the move towards a process of teacher preparation which involves 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, and there is no requirement for teachers to engage in research for an award as part of initial training. However, many 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’. We 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. This project engaged pre-service teachers in addressing a particular topic and was externally funded by the Teacher Development Agency and as such, might be 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, as reflective communities. Niemi (2008, p.203) identifies a strong effort in Europe to raise the competence and status of teachers. She argues that the European Commission implies that ‘teacher education should be based on research and teachers’ work requires abilities to reflect 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, we would argue, the shared professional involvement with compelling outcomes for pupils which develops teachers as thinkers.

**Table 1. Results of the study**

<b>Reflective learning Process</b>	<b>Evidence nodes</b>	<b>Development during the research process</b>	<b>Evidence nodes</b>
Experience	throughout	Personal growth	40
Description of experience	57	Developing research skills	28
Analysis of Experience	46	Developing new knowledge	22
Reflection on the analysis	50	Understanding research processes	18
		Learning from what has been done	34
		Dealing with difficulties	33
		Examining the implications of the research results for future practice	28

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