

Researching the mentoring of primary school pre-service teachers

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Recent government initiatives and school inspection reports have placed school-based training in the spotlight, and the in-school mentoring of pre-service teachers has become a focus for improvement (e.g. Jones, 2013 and Department for Education, 2013). Research in the field of pre-service teachers' teaching of mathematics in primary school is our focus, and in this report we explore ways in which this important stage in the development of a primary school teacher can be researched. In particular, we centre our attention on the post-lesson discussions between mentors and pre-service teachers, since these are often the predominant form of interaction that a student teacher has in order to improve his/her teaching. Typically post-lesson discussions do not draw attention to subject-specific targets for the pre-service teacher (Ofsted, 2012 and Thwaites et al., 2005) despite the expectation that in-school mentors do this. We will conduct a mixed-method field study through observations, interviews and pupil assessments.

Keywords: teacher development; primary school; post-lesson discussion; mentoring; initial teacher education

Introduction

A current priority in mathematics education is the training and development of the primary school workforce. Some teacher education takes place in schools, both in university-based models of trainee teacher development (e.g. PGCE) and school-based models (e.g. School Direct). Both models include lesson observations and post-mathematics lesson discussions (PMLDs) involving the pre-service teacher and the mentor. It is this post-lesson discussion following primary school mathematics lessons that we believe holds the key to school-based teacher development, and in this paper we discuss why it is of such importance and how it may be researched.

The need to research primary school teaching of mathematics

At the Initial Teacher Education Thematic Dissemination Conference: Primary Mathematics, held in November 2013, Jane Jones, the lead HMI for mathematics, reported that the quality of school-based training varied and was too dependent on the calibre of the mentor, especially in terms of the mentor's knowledge of good practice and the insight or guidance provided by her/him; mentor feedback on teaching frequently did not contain enough mathematics-specific detail to promote improvement in trainees' subject knowledge and subject-specific pedagogy; and rarely was the feedback followed up in a timely way into the next observation (Jones, 2013). The post-lesson discussion between the mentor and the trainee is seen by us as crucial in terms of promoting the professional development of primary mathematics teachers. The Ofsted Report 'Mathematics: Made to Measure' (2012) highlights the

difficulties faced by headteachers in nurturing and developing newly qualified staff; it lists some of the strategies headteachers were trying to adopt to develop enthusiastic learning mentors to support the teaching of mathematics through a school-based training route. As shown by the work of Thwaites et al. (2005), more specific attention needs to be given to the mathematics teaching and learning in the PMLDs rather than what often happens, which is a focus on more generic issues such as classroom management.

Research of these aspects aligns with and addresses one of the Department for Education's research priorities: Teachers and Teaching (Department for Education, 2013). Identified is the need for research into how to "nurture and develop outstanding teachers" (p. 7) and consideration of "what are the most effective approaches to teachers' professional development" (p. 9). Research in this field will provide a framework for supporting and developing outstanding teachers of primary school mathematics through mentoring and post-lesson discussions.

Research into this field will also give us an understanding of how the post-lesson discussion impacts on a pre-service teacher's development to teach outstanding mathematics lessons in primary school, including her/his subject knowledge and subject-specific pedagogy. This understanding can inform the basis of a framework for the professional development of new primary school teachers. Currently such a framework does not exist.

The implications of researching this field on policy and practice are wide-ranging. Significantly, the DfE have identified the need for outstanding teachers of primary school mathematics and for an improvement in the mentoring of such teachers. Work in this area would feed directly into addressing that need, proposing a framework for supporting the development of new teachers which could be used on a national scale. The DfE identified this need in 2013, and so the particular need for the understanding and guidance that research in this area can bring is very relevant at the current time.

Current practice in primary school initial teacher education

Nationally, in-school mentors receive little guidance on how to lead the post-lesson discussion; what they do receive is typically paper-based advice rather than practical experience and guidance. Yet the PMLD is the predominant form of information that a trainee has to help improve her/his teaching.

Some research approaches

Research into the development of beginning teachers has followed a number of avenues. For example, research has included observing the pre-service teacher in practice, defining the desirable qualities in an in-school mentor to support early development and characterising the typology of pre-service teachers. We briefly illustrate these below.

Primary school teacher observation

Observing a beginning teacher allows researchers to understand how teachers develop their practice. In mathematics education the Knowledge Quartet (Rowland et al., 2009) is a four-dimension framework which acts as a tool of support for primary school teachers in developing their mathematics teaching. The subject knowledge of a mathematics teacher is essential for quality teaching of mathematics; the Knowledge Quartet focuses on four areas of mathematics knowledge: foundation, transformation,

connection and contingency. These four dimensions can be briefly explained as follows: the foundation dimension relates to a teacher's theoretical background; the transformation dimension refers to how a teacher translates their knowledge in ways that help a learner understand the knowledge; the connection dimension refers to how a lesson or sequence of lessons connects different areas of mathematics; and the contingency dimension relates to how a teacher responds to unexpected events in a lesson. These four categories are each sub-categorised to give a total of 24 categories of teacher mathematical knowledge. Good performance across these categories is a strong indication of quality mathematics teaching.

Another tool to research the interactions between pre-service teachers and pupils is the Communicative Approach framework developed by Mortimer and Scott (2003). In relation to this Communicative Approach, Mercer et al. (2009) emphasise the importance of the use of dialogic talk in teaching and learning in primary school classrooms, as does Alexander (2008):

Dialogic teaching harnesses the power of talk to stimulate and extend pupils' thinking and advance their learning and understanding. It helps the teacher more precisely to diagnose pupils' needs, frame their learning tasks and assess their progress (p. 3).

Therefore, although based on work with secondary school science teachers, Mortimer and Scott's framework is relevant to the study of pre-service teachers and complements the dimensions of the Knowledge Quartet. There are four classes of communicative approach in the Mortimer and Scott framework; any sequence of classroom talk can be located on two continua, on the one hand between interactive and non-interactive talk and on the other between dialogic and authoritative. This links well with the Knowledge Quartet, since the latter emphasises the importance of making mathematical connections and of allowing for unexpected pupil responses or ideas. The Communicative Approaches taken by trainees in their lessons contribute significantly to how successful trainee teachers are at operating within the Knowledge Quartet dimensions; two are particularly significant – making connections and contingency.

Characteristics of a 'good' mentor

In the past ten years, researchers have begun to identify what constitutes a "good" mentor. This has mainly been researched through interviewing and surveying pre-service teachers and identifying what characteristics they considered helpful. For example, Hudson (2004, 2007), working with primary science and mathematics beginning teachers and mentors in Australia, identified a five-factor model of effective primary school science and mathematics mentors: pedagogical knowledge; system requirements; feedback; personal attributes; and modelling. Here the term "feedback" is used, though we prefer the term "discussion", since "feedback" implies information transfer one way – from mentor to pre-service teacher – rather than a two-way discussion, which is clearly more beneficial for development.

Techniques drawn from the medical field and from research into the relationship between counsellors and clients can also be usefully applied to the research into the relationship between mentors and beginning teachers. For example, Heron's (1976) work focuses on how a client-counsellor relationship can be categorised into one of six forms – confronting, supportive, cathartic, catalytic, informative and prescriptive – and we believe this can be applied to a teacher-mentor post-mathematics lesson discussion setting, identifying the most effective ways for mentors to communicate with teachers in order to support development. Surveys

based on Heron's work have previously been utilised in secondary school mathematics education (e.g. Yürekli, 2013) and such utilisation of Heron's work allows researchers to establish teachers' preferences when interacting with someone who has observed the lesson.

Characteristics of primary pre-service teachers

Research in this area has focused on characteristics such as age, gender and prior experience, in addition to motivation and beliefs. The focus here is on why someone chooses to become a teacher and what has influenced her/him. A teacher's background has been shown to correlate with a number of outcomes, such as whether the person is more or less likely to be successful on an initial teaching education course, or remain in teaching for a set period of time.

Our research direction: the role of the mentor

We believe that research into the role of the mentor in a beginning teacher's development can reveal a previously uncovered wealth of knowledge. In further understanding this crucial role of the mentor, in-school mentors, schools and institutional providers will be able to support beginning teachers more effectively. In the next section we will focus on the role of the mentor and how this can be researched.

The role of the mentor in development

In-school mentors undertake a variety of roles to effectively support pre-service teachers on placement, all of which can lead to an effective developmental environment for the beginning teacher. One example of an activity that a mentor undertakes is the overall administration of the placement to ensure the teacher receives a wide range of opportunities, such as experience of teaching different subjects and observing different teaching styles. It can also include different types of activities for the student teacher to engage in, such as lesson study with an experienced teacher or other pre-service teachers. A second role is to set targets each week to encourage the teacher to focus on specific aspects of their practice. Third, weekly meetings allow both the mentor and the student teacher time to discuss and reflect on development. Fourth, weekly lesson observations and post-lesson discussions provide opportunities for the teacher's development to be observed in practice. Fifth, the mentor acts as a key role model in such areas as conduct within the school, dealing with colleagues and parents, and teaching practice. Within this range of mentor roles, we will focus on the post-mathematics lesson discussion.

Post-lesson discussions

Why research this area?

From a student teacher's perspective this is the predominant source of information for supporting and improving teaching practice. It provides an ongoing opportunity for the pre-service teacher to take advantage of and to learn from an expert's insight. In addition, there are different models of mentor development in this area, and so research into these and their effect would be beneficial. For example, some mentors observe the teacher's lesson, then provide directed feedback detailing how the lesson could have been improved or suggesting alternative ways of approaching something

(what Heron (1976) would define as “informative” or “prescriptive”). Other mentors work in partnership with a local educational provider where “joint observations” occur. In this latter case, there is no standard practice; “joint observation” can mean an array of practices. These practices can range from providers observing mentors leading post-lesson discussions to ensure effectiveness, consistency and parity of experience across the partnership, to institutional tutors never observing mentors, instead providing directed feedback to the pre-service teachers themselves.

Methodological issues when researching post-lesson discussions

When researching post-lesson discussions, there are methodological issues to address. First, the pre-service teacher’s lesson would need to be observed in addition to the post-lesson discussion in order for areas of development to be identified. Second, these identified areas of development need to be somehow tracked throughout the pre-service teacher’s school placement and practice to observe how they change in future and whether they change in relation to what is discussed in the post-lesson discussion. Third, we feel that it would be unfair to research post-lesson discussions without providing support to mentors on how to effectively talk about lessons, if they do not already have this guidance from their local institutional provider. Therefore, support would need to be put into place where necessary (based on Heron’s and Rowland et al.’s work).

Measuring impact

Consideration of the “impact” of any research is of great importance these days; we feel there are a variety of ways to gauge the impact of research on PMLDs, including confidence and changes over the course of the pre-service teacher’s placement/initial education period.

One way to measure impact would be to focus on the mentor’s confidence in identifying mathematics-specific areas for development in the pre-service teacher’s practice. Many primary school teachers are not confident in their own understanding and teaching of mathematics; therefore they are reluctant to identify areas of development for a new teacher in subject-specific terms, instead focusing on general issues such as behaviour management. A second way would be to focus on the beginning teacher’s confidence in teaching mathematics, as this changes throughout their placement and/or initial teacher education programme.

Impact can also be measured by analysing documentation produced over the course of the initial teacher education period. The education of pre-service teachers produces a vast amount of documentation for the placement school and the institutional provider, much of which can be — and is — used to identify the pre-service teacher’s development. These documents — already in existence — can be used to support the analysis of the impact of this type of research.

Summary

This report has highlighted the current need for research into the development of pre-service primary school teachers and their mathematics teaching. We have provided an overview of some of the ways in which this important field is already being researched, and endeavoured to provide some insights into further potential avenues of research, specifically the post-mathematics lesson discussion.

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