Assessing Mathematics Student Teachers at Masters Level: an alternative to essays

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Traditional Masters level students are assessed using essays. This paper questions the appropriateness of essays in initial teacher education, particularly for mathematics students. Issues of reliability and validity are examined and alternative forms of assessment are explored, in particular the use of learning journals and web 2.0 technologies to support student teachers’ reflections on their own classroom practice. This paper also considers possibilities for future research into the use of alternative assessment methods.

Introduction

The purpose of this paper is to focus on issues of assessment in initial teacher education courses, in particular mathematics courses. Potential conflicts between traditional assessment methods often required by universities, typically academic writing assignments requiring students to critically engage with academic literature, and the expectations and professional standards relevant to the teaching profession are examined. The aims and consequent design of master’s level assessments and the difficulties that have been encountered by mathematics students writing these assignments and mathematics educators marking them are then explored. Finally, the question is raised as to whether
essays are the most appropriate method for assessing these students for masters accreditation and an alternative method is discussed, the use of reflective learning journals with web 2.0 technologies.

Most postgraduate initial teacher education courses are accredited by two organisations: the Teacher Development Agency (TDA) awarding Qualified Teacher Status (QTS); and the associated university awarding the postgraduate or professional certificate. Over the past four years many of these postgraduate courses are now being assessed by universities at Masters level. The exact nature of assessment differs between individual institutions but academic essays predominate. Teacher educators need to ensure that the quality of the professional education student teachers need is not compromised by the academic Masters level requirements but in fact contributes to the development of effective teachers.

It is a well-known phenomenon that students frequently define which aspects of course content are important to them by what is to be assessed. Consequently, intentionally or not, the course curriculum is shaped by the assessments. In initial teacher education, many students begin by focusing on gaining QTS and succeeding in school. What teacher educators choose to assess and how they assess it reflects what is valued by them (Knight, 1995). In particular teacher educators can use assessments as models of practice which student teachers can adopt in their classrooms. Essays are not often used by mathematics teachers as a form of assessment.

**Essay based assessment**

Essays are a traditional form of assessment and require students to not only be familiar with the ideas, concepts and relevant literature, but also to be able to reason with this content and develop an argument (Torrance, et al., 2000). Academic essays require time, reading, thought and planning, yet for many postgraduate student teachers time is in short supply as they deal with the pressures of teaching in schools. Consequently essays need to fall during the university based parts of the course, yet if they are to impact student teachers’ practice in schools they also need to occur after a significant amount of school experience, offering
opportunities for student teachers to make connections between the theoretical and practical components of the course. If the assigned essays are to reflect the objectives of the teacher education course, they need to provide opportunities for student teachers to engage with professional and academic literature and use this to support their reflections on their own practice in school. They also need to appear relevant as the extent to which the essay task is successful will always be restricted by an individual student’s engagement with the task.

For some subjects, specifically maths, science and ICT, many of the students have recently completed undergraduate degrees in mathematics, science, computer science or related subjects such as engineering. Many of these degrees do not use academic essays as a method of assessment. Additionally the qualifications taken in further education by these students rarely use essays as a method of assessment. Consequently, many students have gained little experience of writing essays in further education or higher education. Hartley and Chesworth found that 28% of students had difficulties knowing what was wanted by the tutors setting essays. 16% admitted to having difficulties knowing what to read. These skills are usually developed with experience over time, as students become more familiar with the literature and interpreting essay assignments. Yet maths, science and ICT students have often not had this experience. Teacher educators need to support student teachers in acquiring these skills in a relatively short and pressured space of time. Lahiff found that once students “felt they knew something of the requirements of writing an academic essay, they therefore felt able to ‘judge’ the extent to which they possessed these skills”. The same arguments apply to the student teachers’ understanding of the feedback they receive.

If we agree that teacher education is about creating a community of practice where participation enables our students to understand and develop the culture of practice, then of particular relevance is the practice of assessment within the practice of teaching. Teachers need to implement a range of assessment techniques including formative and diagnostic assessment, yet many have had little experience of these techniques as either learner or teacher. University regulations concerning assessment and submission of essays result in
these offering little in the way of supporting our students to develop techniques of self or peer assessment, yet we expect our students to support learners in schools in developing these skills. Peer assessment is particularly challenging. The reliability and validity of the assessment need to be re-examined but further issues of plagiarism and that attribution of material and allocation of marks to individuals become more contentious.

Marking essays raises more issues for teacher educators. Reducing variability, using the assessment criteria, providing helpful feedback and managing the time required (Brown, et al., 1997, p. 65) all need to be considered carefully. Summative assessments need to be as valid and reliable as possible, yet there is some research evidence questioning the reliability of essay-based assessments (Brown, et al., 1997; Gibbs, 1999). In contrast to many mathematics assessments, essays are subjective in nature, with no right or wrong answers, “a student selects and organises material in the way which seems most appropriate to him or her” (Brown, et al., 1997). Marking criteria can increase reliability (Brown, et al., 1997) yet academics’ understandings of the terms critically analyse, synthesise and evaluate vary considerably and are rarely articulated (Mistry, et al., 2006; Mitchell & Riddle). Masters level work is also far more theoretical than work at undergraduate level (Mistry, et al., 2006). In teacher education the dilemma of needing to judge an essay on both a professional level and an academic level can lead to a divergence in marks. It is also possible that poor use of the English language can disguise a good essay in terms of its content.

Providing helpful feedback is often challenging as markers often have a feel of what a good assignment is without being able to articulate the strengths and weaknesses to a student. Research points out the difficulties students have in interpreting academic language. Feedback in the form of percentages presents its own issues. In mathematics for example it is not unusual to award 100% or 0% because of the nature of the content, but essays rarely receive these marks. Students look for comments to help them improve (Brown, et al., 1997; Gibbs, 1999; Biggs, 1999) yet different students react in different ways to feedback, some focussing on the weaknesses, whilst others on the strengths. Timely feedback increases the
ability for students to understand how the marking criteria have been applied. There is research showing that the majority of students try to use comments for future assignments and that higher levels of achievement are attained when students have received feedback on drafts or plans. Yet the time pressures on teacher educators, or any academic, provide little incentive to give detailed feedback, particularly when any future impact occurs after the completion of the course. Students need time to reflect on any feedback given, particularly if they need to seek further clarification or advice to make changes in future work. In summary, essays are an established form of assessment at masters’ level and familiar to most learners and teachers, and the issues associated with reliability and marking are common to many types of assessment. The question remains as to whether they are the most appropriate form of assessment for some initial teacher education courses, particularly those where the students are not familiar with essays as a form of assessment.

Learning Journals

No method of assessment is without difficulties though some may offer additional benefits over those associated with essay-based assessment. Learning journals or portfolios are other methods which emphasise the importance of reflection and make the results of these reflections accessible to tutors (Lyon, et al., 2002) and peers. A portfolio or journal can be used to record and structure a student teacher’s thoughts and can support the writing of assignments. With the development of computer-based technologies, such as blogs, there is a wider range of methods for maintaining a journal or portfolio. There is plenty of research (Klenowski, et al., 2005) supporting the use of portfolios or learning journals by students in higher education, and the use of a blog-based journal as an assessment tool is discussed, including the issues raised by this form of assessment.

Reflection and critical reflection are terms that appear frequently in the literature concerning teacher education, yet these terms are often ill-defined and cover a wide variety of concepts. Within initial teacher education, reflection frequently refers to the deepening and broadening of the student teachers’ thinking about both teaching and learning. The seminal work by
Dewey views reflective thinking as a form of problem solving, drawing on knowledge and experiences and ordering them in order to solve a particular problem. In teaching, these problems are often complex and without easy answers as usually any possible answer is heavily dependent upon the context. Schön distinguishes between ‘reflection-on-action’ and ‘reflection-in-action’, where the latter applies to those reflections that take place in the moment, in the classroom and during the lesson whilst the former take place after the event. A learning journal is one tool specifically employed to support students with ‘reflection-in-action’. Simultaneous reflection and acting relies on a teacher being able to think consciously about what is happening, make choices between different reactions, drawing on previous experiences and educational theory and then act all in a split second. Learning journals encourage student teachers to describe, analyse and reflect upon their experiences in school and can include the collection of evidence to support these processes. These reflections could include thoughts on university-based sessions and lectures, pre- and post-reading accompanying these, other readings, experiences in school and experiences through self-study. Dewey describes ‘miseducative experiences’ where student teachers are heavily influenced by existing practices in classrooms encouraging mindless imitation and stresses the importance in these student teachers developing the habit of reflection before they enter the classroom to counteract this influence. Hence, it is important that initial teacher education courses to support student teachers in developing their reflection skills.

The majority of research in teacher education focuses on the content and product of reflection, possibly because these attributes are more easily examined and measured. Reflection in a journal can be conceived as a mental process that takes place whilst the journal is being constructed and the range of mental activities that different student teachers engage in will be diverse. Student teachers need to make connections between their experiences, their beliefs and assumptions, and the context within which these experiences occur over a fixed period of time. Assessed journals ‘force’ student teachers to reflect on how they approach dilemmas they encounter during their professional placements and the
impact of their reactions on student learning. Using journals in this way enables student teachers to reflect on how their views and interpretations of their experiences have changed over time and what they consider to be important in teaching. Reflection in this sense is concerned with connecting different experiences over time so that there is an “unfolding of one’s understandings of teaching and learning”. Mansvelder-Longayroux et al. identify three different approaches to teacher reflection in the literature: the ‘deliberative approach’; the ‘personalist approach’ and the ‘critical approach’. The deliberative approach concerns teachers viewing practice from variety of perspectives, the personalist approach concerns teachers developing an awareness of their own identity, beliefs and development and the critical approach examines the social and political implications of practice. Learning journals support the personalist approach, with the use of blogs and peer comments offering additional support for a more deliberative or critical approach.

Reflective journals are one of many approaches for enabling and encouraging written reflection. Enabling student teachers to express their ideas through writing can help their sense-making, as well as providing a permanent record which allows for both collaboration with peers and tutors and consequent revisions (Davis, 2003; Hoover, 1994). Additionally, they allow tutors to catch a glimpse of the student teachers’ thinking. Preliminary research indicates that blogs promote reflective practice (Fiedler, 2003; Suzuki, 2004; West, et al., 2005). Lohnes refers to Weblogs as “living, reflective journal[s]”. Work is archived and readily available; students and instructors can read previous work and reflect on earlier entries. Research on the efficacy of reflection in electronic environments supports this practice (Bonk, et al., 2000; Barrett, 2002). As educators and other users post to their blogs, they are also, potentially, creating an on-line resource for their peers to refer to for guidance. Blog software often includes ways to link users together, so others can comment on a peer’s posts or even work together online to solve a shared problem. Blogs have an additional advantage in that geographical borders are non-existent and can help student teachers to overcome the geographical isolation they often experience whilst on professional
placement. Other advantages of using blogs as a tool for managing a learning journal include offering student teachers a voice they may not otherwise have, the disappearance of dominant participants that often occur in real-time conversations and they also offer a valid and effective tool for professional development and lifelong learning. Additionally blogs provide a public voice for addressing an unknown audience, and a private voice visible to known participants, whether that includes peers and tutors or not.

Research into blog use of qualified teachers has demonstrated their usefulness in promoting reflective practice and social and collaborative interaction. Rodger’s research found that the majority of teachers in the study demonstrated a ‘disposition’ for critically questioning what is going on in their classrooms. They used their blogs not only to think about their teaching, but also to assess their own performance as teachers. Rodger argues that this particular disposition is critical if teachers are to successfully integrate theory into practice. However, the research was conducted with teachers who were actively blogging before the research commenced and consequently were comfortable with the technology involved. Many student teachers have little or no experience reading or writing blogs, and using blogs as an assessment tool may introduce additional barriers to the quality of the student teachers’ journals. Arguably, teacher educators need to ensure that their student teachers are confident using a wide variety of technologies to support their teaching, and blogs are a useful tool to add to their repertoire.

However, blog-based learning journals are not without their disadvantages. The permanency of anything posted, even if later edited or removed requires a degree of professionalism and restraint when entering posts viewable by the wider world and students need to be made aware of this from the very beginning. Ethical consequences of discussing their placement schools and students also need to be taken into consideration. Additionally any learning journal used for assessment can be written with the tutor in mind, writing what they think the tutor wants to see which introduces a source of bias and consequently the benefits of the task are downplayed. Likewise, it could be perceived as just another assessment task, and
then benefits from review and feedback become inconsequential. Blogs written for a wider audience including peers can motivate students to spend more effort in the process and encourage them to be more professional in their comments. There is also a conflict between wishing student teachers to express their honest opinions and emotions whilst assessing the content. There are steps that could be taken to support students in this type of reflection, such as a list of questions or suggestions about what they can record. It is also important to make explicit the distinction between descriptive writing and reflective writing.

There is evidence that an emphasis on reflection too early in an initial teacher education course can cause later difficulties. At the beginning of their course, many student teachers can see reflection as theoretical and a distraction from the content knowledge and technical skills they see as important; to survive their first classroom experiences. There is also evidence that student teachers’ own personal beliefs about teaching and learning can be obstacles in encouraging reflection during the course.

Other possible obstacles include the emotional and moral factors involved in student teachers sharing their personal perceptions and beliefs with their peers. It is difficult for many students to firstly share their own views, but also difficult to then receive criticism, implicitly or explicitly, of these views. They may also feel that they are revealing perceived weaknesses in their own development as teachers. Collaborative approaches where student teachers work in small groups and develop critical friends offer one approach to counteract some of these more negative aspects. Von Wright stated that student teachers can focus on their activities as a teacher, but they can also focus on their own beliefs and that these are two completely different things. It does not automatically follow that when student teachers reflect on their own practice they will develop more awareness of their own beliefs and assumptions. An ability to reflect on your own beliefs and assumptions involves being able to distance yourself from your practice and see the impact of these beliefs on your own thinking and action. Kubler LaBoskey argued that the attitude of student teachers, including their openness to other viewpoints and their willingness to critically
evaluate themselves, and their ability to reflect were more decisive for the reflection they engaged in.

Learning journals offer a lot of potential in developing student teacher reflections on their practice, yet many of the disadvantages of essay-based assessments still apply. The content is still subjective and subject to interpretation and the need for marking criteria remains and may even need to be developed further to reflect the individuality of the reflections discussed in the journals. It is even more important when marking learning journals to distinguish between productive and unproductive reflection, where unproductive reflection is “mainly descriptive, without much analysis, and involves listing ideas rather than connecting them logically.”. The question also arises as to whether these journals would offer sufficient evidence of student teachers working at masters level. The requirement to analyse, critique and synthesise the literature is much harder to meet when the focus is on personal reflections and not the requirement itself.

**Implications for research**

There are two aspects of the use of blog-based learning journals which need to be researched further: the process of creating the learning journal and the product of the learning journal. Each of these gives rise to a multitude of research questions: what do student teachers’ focus on and emphasise when they are reflecting? How does this change during the course of constructing the learning journal? How are the student teachers’ attitudes and beliefs about teaching and learning affected?

Reflection itself is a mental process, exploring this process could involve a detailed interview process or using the student teachers themselves as researchers. Each would enable an exploration of the process of writing, why student teachers write, approaches to both reflection and writing and the student teachers’ perceived impact on their practice. Individual learning journals will vary considerably depending on author and context, the process of
writing is situated. These variations will also be present in the product of any student teacher research.

Analysing the content of learning journals would enable an exploration of the nature of the reflection that emerges from the journals. This would involve identifying themes that the student teachers focus on, such as interactions with their pupils, teaching methods they employed from the point of view of teaching mathematics but also for motivating and engaging their pupils. These could be analysed using pre-existing categories such as those outlined by Vermunt and Verloop (1999) or using a grounded theory approach the categories could evolve as the data analysis progresses.

**Conclusion**

In this paper I have explored learning journals as a possible alternative to masters level essay assessment in initial teacher education courses. Learning journals offer significant potential in achieving the aims of developing reflective teachers and support the linking of theory and practice, yet most of the difficulties encountered with essays remain in the use of learning journals. The same can be said of other alternative assessment methods, such as small research projects. Completing learning journals whilst on professional placement can make demonstrating masters level analysis more challenging, as the pressures of teaching allow little opportunity to read and engage with relevant literature and the issues that student teachers may discuss would be difficult to anticipate. Alternative methods also require teacher educators to offer additional support in terms of research training, ethics training and technological support. Yet, whilst these forms of assessment appear to require more time and support from tutors, the long-term learning opportunities for student teachers are numerous. Reflection is believed to be key to the improvement of teaching and learning and the skills developed through writing a reflective journal can support the long-term professional growth of teachers. Using reflective journals makes more explicit the value teacher educators place on reflection.
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Bibliography


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