Theory-practice dichotomy in Mathematics Teacher Education: An analysis of Practicum Supervision Practices at one Teachers' Training College in Zimbabwe

Michael Kainose Mhlolo

Central University of Technology (CUT) – Free State

South Africa

mmhlolo@cut.ac.za or mikemhlolo@yahoo.com

Cell: +27826960829 Tel: +27 51 507 4027

Abstract

While a symbiotic companionship is expected to exist between the theory courses and practicum experiences, traditional practices in primary teacher education continue to create dichotomous gaps in this relationship. Such practices needed to be investigated as they negatively affect teacher-self efficacy which in turn compromises both teacher quality and learner performance in mathematics. This paper draws from a case study which investigated the extent to which mathematics practicum experiences at one teachers' college in Zimbabwe were coordinated with methods courses. Structured reflective journals were used as a data collection tool where 47 trainee teachers documented their experiences of the practicum. A total of 226 reports were then analysed using an analytical tool that classified trainees' supervision experiences as either embedded or separated depending on whether the supervisor was a specialist or not. Results show that in 87.6% of the cases, practicum experiences were separated from the methods courses because they were supervised by non-specialist lecturers. Analysis of verbatim entries shows that teacher-self efficacy was generally negative. A number of recommendations are made to bridge this theory-practice gap.

Key words: primary mathematics, teacher self-efficacy, theory-practice tensions

Introduction

The mathematics crisis, which has always been measured and evidenced in terms of poor learner performances mainly at final or exit grades/levels in high schools, appears to be a global concern. However, more recent national evaluation tests show on the contrary that in many countries including Malawi (Kunje, Lewin & Stuart, 2003), Zimbabwe (Dhliwayo, Gudza, Ngaru, & Kilborn, 1996; Nziramasanga, 1999), South Africa (van der Berg, 2007),

Nigeria (Asuru & Odili, 2010), Eritrea (Suleman, Gebreab & David, 2008), China (Ma, 2010), Britain and the United States (Schoenfeld, 2005), this weak performance originates much earlier in the primary school. More specifically, teacher quality at primary school level has been problematised and consequently their training practices questioned. A number of researchers have argued that the single biggest obstacle to progress in mathematics within the African region was weakness in primary teacher education (Nziramasanga, 1999; Vithal & Volmink, 2005). Experts and researchers have recommended some changes in the way these primary school teachers were to be recruited and trained. One key recommendation was that field-based experiences had to be accorded a higher value than on campus taught courses, as it was hoped this would equip beginning teachers with strategic knowledge. According higher value to field-based experiences does not in any way suggest total neglect of the campus taught courses since experiences in the field needed to connect and balance between theory (propositional knowledge) and practice (performance knowledge). In fact Zeichner, (2002) warned that it was not enough simply to place a student teacher in a classroom setting because the quality of the setting and the supervision and support provided were also critical to the development of pre-service teachers. Hence Yayli (2008) recommended that the best teacher education programs have to provide pre-service teachers with field experiences which are consistent with theory.

The problem

Contrary to these recommendations, research however demonstrates that practicum supervision practices globally have not aligned with new reform goals hence researchers have argued that field experiences tend to socialize pre-service teachers into existing teacher education cultures and patterns that do not represent best practice (Ma, 2010; Darling-Hammond, Wei, & Johnson, 2011). In Sub-Saharan Africa, Cobbold (2011) posited that it appears no deliberate attempts are being made to link theory and practice in how the practicum is planned and administered. This lack of coherence among program elements, results in pre-service teachers rarely seeing the connection between the practicum and the theoretical components of teacher education that are undertaken in their colleges or universities. Consequently prospective teachers experience contradictions and inconsistencies among the major components of their programs. Goodlad (1994) makes an analogous analysis of the implications in terms of teacher preparation as he said in his wry fashion, "… even if the various parties involved in teacher education were to come together to assemble

the parts of the vehicle each has created, the composite result would not function well" (p. 25). Other researchers have described the theory-practice dichotomy in teacher education as a three-legged stool which is quite wobbly (Darling-Hammond, Wei, & Johnson, 2011). In order to have this three-legged stool firm and supportive, Cobbold (2011) recommended that the practicum should be driven by the same pedagogical philosophy that drives on-campus courses in curriculum and pedagogy.

Objectives of this paper

Premised on the view that trainee teachers experience contradictions when their theory and practicum were not well coordinated; this paper analysed reports mathematics trainee teachers wrote in their reflective-journals with regards the supervision of their practicum by their college-based tutors. Lock's (1977) long standing recommendation was that the types of concerns student teachers encountered should be given more attention to enable better preparation of new teachers and that the study of problems faced by student teachers was warranted. With specific reference to the practicum Swee-choo Goh and Mathews (2011) posited that the more known about the concerns faced by student teachers during their practicum, the greater the possibility of reducing stress and improving their success and maximizing the benefits of the practicum for them.

The analyses were propelled by the following research questions;

(1) To what extent are pre-service primary mathematics teachers' practicum experiences co-ordinated with the methods theory courses at the research site?

(2) What are some of the pre-service primary mathematics teachers' perceptions of college lecturers' supervision practices while on their practicums?

(3) To what extent is formative and summative assessment likely to be fair under the prevailing circumstances?

The South African response to concerns about teacher quality

Although this study took place in Zimbabwe, theory-practice dichotomy in primary mathematics teacher education is a global concern. The decision to briefly compare South Africa and Zimbabwe was driven by the fact that the researcher is a Zimbabwean national who is currently working in Teacher Education in South Africa and has had extensive experiences of both systems. Specifically, the researcher has developmental interests in both

systems and believes there are quite a number of commonalities and therefore lessons that can be shared between the two counterparts. For example in South Africa, a Teacher Development Summit was held in 2009 after concerns had been raised about the challenges being experienced in teacher education and development. It resulted in a 'Declaration' that called for the development of a new, strengthened, integrated national 'Plan' for teacher development which is articulated in a document entitled *Integrated Strategic Planning Framework for Teacher Education and Development 2011 – 2025* (Department of Basic Education & Higher education and Training, 2011). The primary outcome of the plan is to improve the quality of teacher education and development in order to improve the quality of teaching and learning. While the plan places teachers firmly at the centre of all efforts to improve the education system; Foundation Phase teacher development has been identified as an area needing urgent intervention. To enhance teacher quality, the plan proposes that more specific standards need to be developed that relate to the areas of expertise in which teachers need to specialise. In terms of subject/content prioritisation, the plan states that the development of the teacher knowledge and practice standards will take place using a phased approach, starting with identified priorities namely: numeracy (Foundation Phase FP), Mathematics, (Intermediate Phase, IP, Senior Phase SP, and Further Education and Training FET); Mathematical Literacy (FET), and English First Additional Language (FP, IP, SP and FET). According to this plan, Teacher Education Development (TED) programmes will be enhanced by the development of teacher knowledge and practice standards, which will inform curriculum and programme design, to ensure meaningful Work Integrated Learning (WIL). In pursuance of this vision, the resultant document entitled *Work Integrated Learning: Good Practice Guide* (Council on Higher Education, 2011) describes an approach to career focused education that is consistent with output 4.5 of the national plan which clearly states the need to strengthen the teaching practice/school experience component of teacher education programmes.

The Zimbabwean response to concerns about teacher quality

In the Zimbabwean case mathematics education was also problematized and consequently prioritised at primary school level. For example, the recommendations from the Nziramasanga Commission's (1999) enquiry were that primary teacher education had be improved with the hope that this would translate into better learner performances in mathematics. A specific recommendation of the commission was that all prospective primary

teacher trainees should have a pass in mathematics at Cambridge University Ordinary Level (O level) as an entry requirement to teacher training. Over and above this entry requirement, pre-service trainees were also required to choose one major subject from the 13 subjects taught in the primary school where they would do a curriculum depth study (CDS). In South Africa there is a similar expectation where more specific standards need to be developed that relate to the areas of expertise in which teachers need to specialise. This is also consistent with global trends where many teacher programs now require that prospective teachers major in an academic content area, rather than solely in education (Darling-Hammond, Wei and Johnson, 2011).

In Zimbabwe another major change aimed at enhancing the quality of teacher education was the adoption of a 2-5-2 model of teacher training. At many teachers' colleges including this particular research site, pre-service teacher trainees take a 3 year course where they spend **2** terms (1term is 4 months) of pre-service theory work at the college, **5** terms of teaching practice and then finally **2** terms of theory work at college leading to final examinations and certification – hence 2-5-2 model. Clearly this model has objectives similar to the South African work integrated learning which emphasises the strengthening of the teaching practice (school experience) component of teacher education programmes. This follows empirical evidence internationally that has shown that most successful professional development approaches privilege strategic knowledge which naturally tends to be embedded in teaching practice hence school-based programmes are most preferable for numeracy professional development initiatives (Askew, Brown, Rhodes, Johnson, & William, 1997; Ma, 2010). In the United Kingdom for example, McNamara (1992), also noted that 80 per cent of teachers' professional preparation was now taking place in school settings.

Self-efficacy and students' concerns

Despite field-based experiences having been accorded a higher value in teacher education, many studies indicated that both preservice and in-service elementary teachers perceive a lack of connection between the information provided in teacher preparation programs (theory) and the real classroom environment (Youseff, 2003, Zeichner, 2002, Tang, 2003). Those trainee teachers who self-defined their teaching experiences as failures attributed their experiences to a lack of preparation by their teacher education programs which according to Youseff, (2003), was a distinctive factor in causing stress. Tang, (2003), found that relative levels of challenge and support during practicums drove the development of a sense of self as

a teacher, adding that "student teachers are more likely to have productive learning experiences by making cross reference of their student teaching experiences with what they learn in the campus-based component of the teacher education program" (p. 496). Researchers have therefore recommended that the evaluation of an effective teacher preparation program in mathematics should include measurement of pre-service teachers' self-efficacy beliefs (McDonnough & Matkins, 2010). Self-efficacy beliefs are a teacher's judgement of her capability to bring out desired outcomes of student engagement and learning (Bandura, 1977; Tschannen-Moran & Hoy, 2001).

Given that studies have documented strong self-efficacy beliefs as being linked to high student achievement and increased student motivation (Henson, 2001), exploration of factors impacting preservice teachers' self-efficacy is critical to teacher preparation programs. It is in this context that this study examined pre-service teacher perceptions of their college lecturers' supervision practices while on their practicums.

Methodology

Research Design

This was a qualitative research design where a semi-structured reflective journal was used as the data collection instrument.

The participants

The participants to this study were 47 pre-service trainees who had opted to major in mathematics out of a total of 602 trainees in the whole group. Before these 47 students left for their schools of teaching practice, they were briefed on the realities of teaching practice as defined in terms of the four possible combinations in Table 1.

Reflective journals – data collection instrument

The trainees were then provided each with a semi-structured reflective journal which they had to complete each time they were supervised by a college lecturer during the 5 terms (20 months) they were on school experience. In each journal entry the students were specifically asked to write openly highlighting what they liked about the supervision, what they were not comfortable about and suggesting how they would have wished their experiences to have been improved on.

The recognition that reflection is an important aspect of developing practice can be traced back to Dewey (1933) who defined reflection as the purposeful discovery of facts. It is about moving teachers toward an awareness of factors impacting professional practice. The advantage of purposeful reflection is that it enables practitioners to be proactive rather than reactive when organizing learning environments hence researchers view it as mediative, collaborative and necessary (Ray & Coulter, 2008). The importance of reflective journals in a study like this one is further supported by Goodson and Sikes (2001) who posited that;

> *Not only is a document of this kind useful for providing factual information, it can also help with analysis and interpretation, in that it can jog memory and indicate patterns and trends which might have been lost if confined to the mind. (p. 32)*

Use of authentic, relevant, and real-time cases such as those assembled in preservice teachers' reflective journals has the potential to allow preservice teachers to identify examples of successful practice within the local setting as well as allowing for collaborative consideration of how to improve a real teaching situation (Davis & Yeager, 2005).

Analytical tool

With reference to the practicum component, the standard practice at this site, which is also common in many other institutions, is that any lecturer can supervise a trainee teaching any of the 13 subjects taught in the primary schools. If a college lecturer visits a trainee at a time when there is say music on the time-table, then s/he must observe and score the teacher trainee in that particular subject irrespective of the lecturer's area of specialisation. Four possible supervision combinations emerge from such practices and these have been coded as SS, sN, NS and NN as shown in Table 1 and elaborated below.

Table 1 Possible Supervision Combinations

Code	Lecturer	Trainee	Condition
SS	Specialist	Specialist	Embedded (strong)
sN	Specialist	Non-specialist	Embedded (weak)
NS	Non-specialist	Specialist	Separate (weak)

NN	Non-specialist	Non-specialist	Separate (strong)

So in this paper the double letter codes denote a supervisor/supervisee combination in that order. Since the focus was on pre-service teacher trainees whose major subject was mathematics, I need to elaborate how the terms specialist, embedded and separate are being used. A specialist lecturer is one who was recruited by the college to teach that particular subject and in this paper (S) denotes specialist mathematics lecturer, (s) denotes specialist lecturer in a non-mathematics subject and (N) denotes a non-specialist. A trainee is specialist when seen teaching mathematics and non-specialist when seen teaching any other subject. With reference to the last column headed 'condition', McDonnough and Matkins (2010) have shown the extent to which differences in the field experiences, impact pre-service teachers' self-efficacy and their ability to connect theory to practice. This difference is marked by the involvement of the subject specialist or non-specialist. In this sense McDonnough & Matkins defined field experiences as 'embedded' to indicate an experience coordinated with the subject methods course and supervised by the subject methods instructor (specialist). They defined field experiences as 'separate' to indicate an experience unconnected to the subject methods course and supervised by a non-specialist. While these definitions were used in the context of science education, it is reasonable to suggest that the concepts 'embedded' or 'separated' are transferrable and therefore equally applicable in any other subject area. So (SS) denotes a field experience where a mathematics lecturer (specialist) supervises a mathematics student (specialist) while teaching mathematics i.e. both are specialists. Code (sN) denotes a field experience where the lecturer is a specialist in a non-mathematics subject (say English or Shona) and he/she supervises a trainee majoring in mathematics while teaching that non-mathematics subject. Code (NS) denotes a field experience where a non-mathematics lecturer supervises a trainee majoring in mathematics while teaching mathematics. The last code (NN) denotes a situation where a trainee majoring in mathematics is supervised teaching a non-mathematics subject in which the lecturer is also non-specialist. The embeddedness is strongest when both supervisor and supervisee are specialists and the separation is also strongest when both are not. This (Table 1) is how the analytical tool for this study was conceptualised and I now show how the trainee journal reports were placed under the respective categories.

Results and Discussion

Of the 47 trainees that took part during this 20 months period of study, 40 teacher trainees were visited by college lecturers 5 times each, 5 trainees were visited 4 times each and 2 trainees were visited 3 times, giving a total of 226 visits resulting in the same number of journal reports that this paper analyses. Let us recall that three research questions were raised in this study. The first research question had to do with the extent to which practicum experiences were coordinated with the subject methods course. The second research question had to do with trainee teachers' perceptions of their practicum experiences and the third research question concerned the extent to which supervisors' formative and summative assessments were likely to be fair. The first question will be addressed through a summary of the results as shown in Table 2. The second question will be addressed through journal excerpts 1 – 4 which documented how trainees perceived their practicum experiences. The third question will be addressed in follow up discussions for both question 1 and 2.

As articulated in the analytical tool, the extent to which the practicum experiences at this site were coordinated is marked by the involvement of the subject specialist or non-specialist in the supervision process hence two themes 'embedded supervision' and 'separate supervision' emerged respectively for this paper. Table 2 shows the distribution of the trainee responses into these two broad themes.

Table 2 Distribution of journal reports (n = 226)

Code	No of reports	Condition	%	Total %
SS	9	Embedded (strong)	4	12.4
sN	19	Embedded (weak)	8.4	
NS	36	Separate (weak)	15.9	87.6
NN	162	Separate (strong)	71.7	

The results in Table 2 show that the practicum practices prevailing in the teacher training college under the spot light were 'embedded' in only 12. 4% of the cases. Let us recall that the ideal practicum supervision would be this 'embedded' one which is marked by an

experience that is coordinated with the subject methods course and supervised by the subject methods instructor (specialist). It is strongest when both the supervisor and the supervisee are specialists as described in the analytical tool. Such an experience has potential to positively impact pre-service teachers' self-efficacy and their ability to connect theory to practice. Table 2 shows that there was potential for such a strong embedded experience in only 4% of the cases. An experience is also embedded in cases where the lecturer is a specialist but the trainee is not (sN). The embeddedness is however considered weak in that the specialist lecturer might give expert advice and support thereby enhancing the trainee's ability to connect theory to practice but the trainee's perception about the subject might not be as strong as it is for his/her major subject (see excerpt 2 as evidence).

The same table 2 shows that in this particular college field experiences were separated or unconnected to the subject methods course in 87.6% of the cases. This suggests that in the majority of cases students were being supervised by non-specialist lecturers while doing their practicums. The separation was strong in 71.7% of the cases when both the lecturer and the trainee were non-specialists. Generally the results show that the potential for teacher self-efficacy might have been negatively affected in most of the supervision experiences that trainees endured during this period.

With regards the extent to which formative and summative assessments were likely to be fair under such field-based practices, results in Table 2 already point to an anomaly where 87.6% of the cases were supervised by non-specialists. Questions could then be raised about the validity of an evaluation of say a mathematics lesson by a music lecturer, the evaluation of a physical education lesson by a mathematics lecturer and many other possible combinations under such a system. In the case of primary teacher education in Zimbabwe this validity issue is further compounded by an observation made by Kilborn et al., (1996) that;

> *…. all the teacher trainers we met were themselves secondary school teachers, with no experience in primary school teaching. Almost none of them knew anything about what really happens in the primary school teaching. Yet the teacher trainers are probably the most important group of all, to effect change and improve the mathematics teaching.*

It is Lingam's (2002), argument that such lacunae in practice teaching assessment are likely to have a negative bearing on the quality of teachers produced pointing to the need to

interrogate such practices and more so to understand the discomfort they might cause on the pre-service teacher trainees' self-efficacy. Similar concerns were raised in the Eritrean system (Suleman, Gebreab & David, 2008), and in the Malawian system (Kunje, Lewin & Stewart, 2003).

I now present some of the trainees written excerpts from their journal reports to answer the second research question then follow each one of them with a brief discussion to again answer the third research question.

Excerpt 1 (coded NS)

> *On this particular morning I was supervised by a non-mathematics lecturer while teaching a Grade 4 class. My lesson was on multiplication by 10. I was telling the learners that when a number is multiplied by 10 the digits move one place to the left i.e. 43 x 10 = 430 where 4 has moved from the tens column to become 4 hundreds, 3 units now become 3 tens and a 0 is then placed in the units column as a place holder to show that there are no units left after this operation. This is basically what we learn in our theory lessons at college. However the lecturer literally accused me of mystifying mathematics and making it look difficult for the learners. The lecturer contented that when a number is multiplied by 10 you simply add a 0. He then gave me a mark of 60 but I'm sure I deserved far more than this and would have got what I deserved if only I had been supervised by a Mathematics Lecturer.*

McDonnough & Matkins (2010) described this as 'separated' suggesting that this experience is unconnected to the methods course at campus. Evidence of a disconnection between theory and practice can be seen when the student points to what trainees learn in their theory lectures at college but which this particular lecturer sees as mystifying mathematics. According to Youseff, (2003), such a contradiction was a distinctive factor in causing stress. In this case the trainee perceives this supervision negatively as he feels he deserved far more than the 60% that was awarded.

There is also empirical evidence to support the argument that many lecturers in the primary teachers training institutions lack sound mathematical understanding and skill (Ball, et al., 2005), and this is evidenced in this case. With specific reference to the formative function of assessment, the question that might be raised then is what kind of formative feedback can preservice teachers get from college lecturers who tell them something contradictory to what

they have learned in their theory at college? It is Biggs'(2003) contention that such a system would be lacking in constructive alignment. According to Biggs feedback is most useful if it is understood by students and contributes to their learning or closing the gap between what they know and what they need to know. If it has to close the knowledge gap then it only follows that it must not contradict what has been taught and that it has to come from somebody who is knowledgeable or experienced in the discipline or subject area. In their research on science and mathematics teachers, Judson and Lawson (2007), observed that possession of expertise is often considered of greater value than the occupation of formal position of power (e.g. that of lecturer) and they contend that;

> *Being a credible source of advice on instructional matters, wherein one's expertise is acknowledged, has led to the individual being sought out for guidance more frequently than would be expected by virtue of formal position (p. 501).*

With regards summative function of assessment, a good assessment must be able to provide accurate and credible information about the student's learning and performance. It must have both validity and reliability. Validity is the extent to which the inferences, deductions, decisions made on the basis of the results of the assessment are true or accurate. It is highly unlikely that the 60% awarded here would have such validity and reliability.

Excerpt 2 (coded sN)

> *Today I had my final teaching practice crit whoops what a sigh of relief and concern at the same time. The lesson was on environmental science and fine it was supervised by an environmental science lecturer and I feel the 62% that I got was fair considering that I was never quite comfortable with science during my high school days anyway. My concern however, is that throughout my teaching practice, I was never assessed teaching my CDS which is mathematics and I feel very strongly about it coz it has a bearing on my final mark for teaching practice. I feel more comfortable teaching mathematics than any other subject and I'm sure I would have scored much higher had I been given an opportunity to teach mathematics.*

Although the student perceives this supervision positively because it was conducted by a specialist, the trainee's self-efficacy is low in that he was never quite comfortable with science during his high school days anyway. With regards the credibility that can be attached to an assessment system researchers are of the view that the success of any system of

assessment can be judged by (a) the extent to which the methods it employs constitute an effective model of valued performance and an effective model of educational practice (b) the adequacy of its methods in monitoring these valued performances through the provision of adequate opportunities for all students to display their capabilities in forms that can be documented and (c) the effectiveness with which assessment informs the actions of all interested parties and (d) its development based on coherent and consistent application of theory (Clarke & Stephens, 1996). It is the provision of adequate opportunities for all students to display their capabilities that appears to be questionable in this situation. Research has shown that teacher effectiveness is subject-specific and that in the case of pre-service teachers, maximum potential can only be demonstrated in a situation where trainees are highly motivated which happens to be in subjects of their specialisation (Haigh, Pinder, & McDonald, 2006). Consistent with this view, an important principle of fair assessment is that when a student is being assessed especially for summative purposes s/he must be given a chance to demonstrate the best or maximum potential in him/her. It is doubtful whether students could be accorded such opportunities in a situation where they get assessed teaching in any of the 13 subjects on the primary school curriculum by any of the college lecturers. Biggs (2003) argued that a grade or certificate of competence is only as good as the assessment upon which it is based. So by issuing a preservice teacher with a certificate showing certain marks/grades, the assumption made is that the trainee has acquired that particular grade level of applied competences/skills but how confident can society be about the competence levels of a mathematics specialist who was never seen teaching mathematics during his/her training years?

Excerpt 3 (coded NN)

> *I don't know where to start, but I feel at times the college makes a mockery of teaching practice. Today on my time-table I was supposed to be teaching Shona when the college lecturers arrived but decided I would change since the lecturer who came to see me is a Ndebele lecturer. To my surprise he insisted that I teach Shona but I know him well he cannot speak Shona fluently. Anyway the lesson was on "Tsumo nemadimikira" (clever/hidden ways of saying something). I feel the 56% that I got was the worst I have ever got on teaching practice. To me this is totally unfair considering that during the post lesson discussion he could not say what I did right, where I needed to improve but decided to focus on more technical and social issues*

like I organised and managed my groups well, how is the school, do we have water problems etc. And when I genuinely requested for an explanation of the word "mharapatsatsatsa" which was used in a sentence by one child, and which I was meeting for the first time, he just threw it back to me and said I needed to research on it. To me this 56 looks like it's just a gentleman's mark which was just thrown to me but I think I could have got more had I been supervised by a Shona lecturer because Shona is my L1 and how honestly can I get 56 in a language that I was born speaking.

In this case there is also evidence of a negative perception on the part of the trainee as he/she feels that college makes a mockery of teaching practice. Certainly there is a disconnection between theory and practice here and evidence of low self-efficacy on the part of the trainee. Given the circumstances under which this score of 56 was generated it might be argued that it had potential for weak validity and reliability. The lecturer does not teach this subject, could not speak this language, could not offer productive feedback and could not justify the 56.

Excerpt 4 (coded SS)

I'm beating myself on the head as I write today's reflective journal. How could I make such silly mistakes, perhaps it's just that I was too nervous. This is the problem of being supervised by a specialist. I was supervised by a mathematics lecturer while I was teaching prime factorisation so I defined a prime number very well. Somehow when I asked the learners to give the prime numbers between 1 and 10 one learner said 9 but somehow I don't know how I missed it, I just listed it on the board but the lecturer picked it. However, during the post lesson discussion the lecturer must have noticed that it must have been a slip of the mind, acknowledged that I could have been nervous but advised me to watch out for such slip-ups as they might lead to learner-misconceptions. My concern is not so much on the fairness of the score 65, which I do not doubt because the lecturer's comments were quite detailed, showed where my lesson went well and where I needed to improve. But it takes time to develop confidence when you are being supervised by a specialist, you are aware of his subject knowledge and so you cannot afford any slight mistake and this makes you nervous at times and then you get confused even by the simplest thing.

Let us recall that McDonnough and Matkins (2010) showed how the involvement of the subject specialist impacted positively (embedded) on the pre-service teachers' self-efficacy

and their ability to connect theory to practice. Here we can see evidence of this as the trainee teacher does not doubt the fairness of the score 65 that was awarded and followed with comments that were detailed showing strengths and weaknesses. One would have expected this to happen given that this is one example of an embedded experience where the same lecturers who teach mathematics in the theory component follow the students for teaching practice. Such experts are able to give constructive feedback which has an impact not only on the teaching/learning process but which also gives messages to students about their effectiveness and worth – their self-esteem (Gipps, 1994).

In terms of fairness of assessment it can be argued the mark 65 had the potential of being fair both formatively and summatively. It is Elton's (1992) argument that the validity of an assessment can only be gauged by appropriate experts or connoisseurs. Connoisseurs are persons who through training and experience can make expert and reliable judgements in their specialist fields. Their judgement is accepted, because it is seen as both expert and reliable, and should therefore provide assessment standards.

Recommendations

This paper makes the following recommendations:

- that teacher educators need to see effective teaching as being subject-specific - primary school teachers can never be equally effective in all the 13 subjects they teach in the primary school
- that when trainee teachers are on their practicum, they be supervised and assessed by tutors or lectures who are specialists in those subject areas
- that trainee teachers should be assessed by specialists while teaching subjects of their specialisation especially for summative purposes
- that in teacher education each subject area should be tasked to design its own teaching practice outcomes as well as its own supervision rubric which enables the critical subject specific skills to be developed and assessed
- that teacher preparation programs also question the reliability and validity of the supervisor's scores which is another factor that is likely to undermine the integrity of field experiences – currently this is not happening

Conclusion

In conclusion, this paper argues that certification of elementary mathematics specialists can be a strong predictor of teacher quality only in teacher preparation programs where content knowledge as well as pedagogy is linked to teaching practice and student teachers are provided with real world opportunities to integrate and use what they learn on campus in well-supervised practical settings.

References

Askew, M., Brown, M., Rhodes, V., Johnson, D., & William, D. (1997). *Effective teachers of numeracy*. London: King's College.

Asuru, A. V., & Odili, G. A. (2010). Primary school teachers' mastery of primary school Mathematics content. *Journal of Science and Technology Education Research, 1*(3), 55 - 61.

Ball, D. L., Hill, H. C., & Bass, H. (2005). Knowing Mathematics for Teaching - Who knows mathematics well enough to teach third grade, and how can we decide? *American Educator, Fall*, 14 -26.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioural change. *Psychological Review, 84*, 191 - 215.

Biggs, J. (1999). *Teaching for Quality Learning at University*. Buckingham: SRHE and Open University Press.

Clarke, D. J., & Stephens, W. M. (1996). 'The ripple effects': The instructional impact of the systemic introduction of performance assessment in mathematics In M. Birenbaum & F. Dochy (Eds.), *Alternatives in assessment of achievements, learning processes and prior knowledge*. Dordrecht: Kluwer Academic Publishers.

Cobbold, C. (2011). Improving the Practical Aspect of Pre-Service Teacher Education in Sub-Saharan Africa: Issues of conceptualization, planning and management. *Academic Leadership, 9*(1), 1 - 6.

Council on Higher Education (2011). Work-Integrated Learning: Good Practice Guide. Pretoria, Council on Higher Education.

Darling-Hammond, L., Wei, R. C., & Johnson, C. M. (2011). *Teacher Preparation and Teacher Learning.* Paper presented at the Teacher Preparation Summit, California State University.

Davis, O. L., & Yeager, E. (2005). *Wise practice in the social studies classroom*. Greenwich, CT: Information Age Press.

Dewey, J. (1933). *How we think: A restatement of the relation of reflective thinking to the educative process* Chicago: DC: Heath.

Dhliwayo, N. E., Gudza, E., Ngaru, M., & Kilborn, W. (1996). *A study of the state of Mathematics Education in the Zimbabwean Primary Schools*. Harare: Curriculum Development Unit.

Elton, L. (1992). Quality Enhancement and Academic Professionalism. *The New Acdemic, 1*(2), 3 - 5.

Ferrini-Mundy, J., Burrill, G., & Schmidt, W. H. (2007). Building teacher capacity for implementing curricular coherence: mathematics teacher professional development tasks. *Journal of Mathematics Teacher Education, 10,* 311 - 324.

Goodlad, J. (1994). *Educational renewal: Better teachers, better schools*. San Francisco: Jossey-Bass.

Goodson, I., & Sikes, P. (2001). *Life history research in educational settings:learning from lives*. London: OUP.

Haigh, M., Pinder, H., & McDonald, L. (2006). *Practicum's contribution to students' learning to teach.* Paper presented at the British Educational Research Association Annual Conference, University of Warwick.

Henson, R. (2001). *Teacher self-efficacy: Substantive implications and measurement dilemmas.* Paper presented at the Annual meeting of Educational Research Exchange, College Station, Texas.

Judson, E., & Lawson, A. E. (2007). What is the role of constructivist teachers within faculty communication networks? *Journal of Research in Science Teaching, 44*(3), 490 - 505.

Kilborn, W., Dhliwayo, N., Gudza, E., & Ngaru, M. (1996). *A study of the state of mathematics education in the Zimbabwe primary schools*. Harare: Curriculum Development Unit [CDU].

Kunje D, Lewin K M and Stuart J S (2003). Primary Teacher Education in Malawi: Insights into Practice and Policy DFID Research Series. Sussex, Centre for International Education.

Lingam, G. I. (2002). Practicum component: Preparation of teachers for the real world of work. *Directions: Journal of Educational Studies 24*(1), 47 - 61.

Lock, C. R. (1977). Problems of secondary school student teachers. *The Teacher Educators, 13*(1), 30 - 40.

Ma, L. (2010). *Knowing and Teaching Elementary Mathematics: Teachers ' understanding of fundamental mathematics in China and the United States*. Mahwah, N. J.: Lawrence Erlbaum Associates.

McDonnough, J. T., & Matkins, J. J. (2010). The role of field experience in elementary preservice teachers' self-efficacy and ability to connect research to practice. *School Science and Mathematics, 110*(1), 13 - 23.

McNamara, D. (1992). The reform of teacher education in England and Wales. Teacher comptetence: panacea or rhetoric. *Journal of Education for Teaching, 18*, 273 - 275.

Nziramasanga, T. C. (1999). *Report of the Presidential Commission of Inquiry into Education and Training*. Harare: Government Printers.

Porter, A. C. (2002). Measuring the content of instruction: Uses in research and practice. *Educational Researcher, 31*(7), 3 - 14.

Ray, B. B., & Coulter, G. A. (2008). Reflective practices among language arts teachers: The use of weblogs. *Contemporary Issues in Technology and Teacher Education, 8*(1), 6 - 26.

Schoenfeld, A. H. (2005). The Math Wars. *Educational Policy, 18*(1), 235 - 286.

Smith, K. (2007). Empowering School-and-University-Based Teacher Educators as Assessors: A school university cooperation. *Educational Research and Evaluation, 13*(3), 279 - 293.

Suleman, A., Gebreab, F. & David, R. G. (2008). The effect of teacher training outcomes in Eritrean elementary schools. *Malawi Journal of Education and Development, 2, 15 - 37.*

Swee-choo Goh, P., & Matthews, B. (2011). Listening to the concerns of student teachers in Malaysia during teaching practice. *Australian Journal of Teacher Education, 36*(2), 92 - 103.

Tang, S. Y. F. (2003). Challenge and support: The dynamics of student teachers' professional learning in the field experience. *Teaching and Teacher Education, 19*, 483 - 498.

Taras, M. (2002). Using assessment for learning and learning for assessment. *Assessment & Evaluation in Higher Education, 27*(6), 501 - 510.

Tschannen-Moran, M., & Hoy, A. W. (2001). Teacher efficacy: Capturing an elusive construct. *Teaching and Teacher Education, 17*, 783 - 805.

van der Berg, S. (2007). Apartheid's enduring legacy: Inequalities in Education *Journal of African Economies, 16*(5), 849 - 880.

Vithal, R., & Volmink, J. (2005). Mathematics curriculum research: roots, reforms, reconciliation and relevance. In R. Vithal, J. Adler & C. Keitel (Eds.), *Researching mathematics education in South Africa* (pp. 3 - 27). Cape Town: Human Sciences Research Council.

Yayli, D. (2008). Theory-practice dichotomy inquiry: Meanings and pre-service teacher-mentor-teacher tension inTurkish literacy classrooms. *Teacher and Teacher Education, 24*, 889 - 900.

Youseff, G. (2003). *An investigation into the influences of teachers' classroom management beliefs and practices on classroom procedures.* Paper presented at the Association for Research in Education.

Zeichner, K. (2002). Beyond traditional structures of student teaching. *Teacher Education Quarterly, 29*(2), 59 - 64.