

USING PARTICIPATORY REFLECTION AND ACTION TO ENHANCE THE DEVELOPMENT OF THE PROFESSIONAL TEACHER IDENTITY OF PRE-SERVICE MATHEMATICS TEACHERS

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Abstract

The apprenticeship model of Teaching Practice (TP) perhaps does not support the development of student teachers in terms of their professional identity as teachers as well as it could do. It lacks specific opportunities to reflect in depth on the experience and the mentoring that occurs. One has to agree with authors such as Korthagen, Loughan and Russell (2006) and Leijen, Allas, Toom, Husu, Marcos, Meijer, Knezic, Pedaste and Krull (2014) that certain principles are fundamental to an effective teaching practice, such as quality mentoring and reflection. This paper reports on an intervention that implemented Participatory Reflection and Action (PRA) as the research and data collection strategy with the final year student teachers at a residential university in Pretoria, South Africa, in 2015. The students were undergoing their teaching practice at schools approved by the University. The research involved two phases: during the first phase, a workshop was held in which students were requested to reflect on their roles as subject and didactics experts. These roles are described in detail in the work of Beijaard, Verloop and Vermunt (2000). In the second phase, a teaching and learning workshop was arranged in which the students were specifically required to think about the values and shortcomings of the various teaching strategies that form part of didactics expertise such as problem solving, direct instruction, play, cooperative learning, enquiry-based teaching, and role play. The study reveals how the reflection and action phases of PRA could be used during the teaching and learning workshop to capture and address prominent shortcomings that the student teachers experienced within their own PTI during teaching practice. They were asked to suggest interventions through which the shortcomings could be addressed. These interventions were then implemented, and they were required to reflect and report on their experiences following the implementation of their interventions.

Keywords: Pre- service teachers, professional teacher identity: participatory reflection and action

Introduction

It is unimaginable to think of teacher education without linking the training to some form of supervised teaching practice: monitored and supervised teaching practice (TP) usually forms part of all such programmes. These 'apprenticeship' models involve novice student teachers being subjected to some form of work-integrated learning experiences during the course of their formal training. Many of these models relate to the triad association between the three dominant role players, namely, the

student teacher, the mentor lecturer (methodology lecturer), and the mentor teacher (subject teacher). There has always been conflict between these three partners (Boydell, 1986) as it has often been found that the mentor teacher has a much stronger influence on the student's learning than the supervisor or mentor lecturer. Boydell (1986) draws on the tension between the three major forces and explains that any two role players, for example, students and mentor teachers (classroom teachers), often form an alliance which may exclude the mentor lecturer. Feimann- Nemser and Buchmann (1985) speak of the two-worlds pitfall in which the university represents theory-in-the-distance, and the school is the current reality of practice (van Putten, 2011). A second observation that comes from Boydell's comments on teacher practice is that young, inexperienced student teachers are often more concerned with survival during those first months in the classroom with a stronger focus on self-orientation.

In addition to these general observations about TP, there are concerns in South Africa about the large number of student teachers who are placed in teaching practice annually, as well as the difficulty in finding enough mentor lecturers to supervise and assess these students on a regular basis. Arising from these concerns is further disquiet about the efficacy of TP in developing the professional identity of these pre-service teachers. Having to monitor students out on TP impacts academic staff's research productivity and their resultant research output rates. However, the South African Department of Higher Education and Training (2011) introduced a new set of teacher qualification standards in 2011, emphasizing the importance of *more* supervised TP experience in teacher training programmers. It is imperative that "more" also implies *effective* TP experience. And therein lies the problem: is TP effective?

The above concerns, and these words of Franzak (2002) inspired the thinking behind this study:

As teacher education programmes endeavour to prepare candidates who have the resources and knowledge to sustain a strong career, it would behove us to develop opportunities for student teachers to explore more fully what being a teacher is all about. (p. 278)

Thinking along these lines brought about a clarification of the effectiveness problem: the problem is in fact how TP facilitates the enhancement of Professional Teacher Identity (PTI). So how can TP facilitate the enhancement of PTI? Van Putten (2011) defines PTI as a social construct that goes with being part of the community of teachers, as opposed to engineers, for example. According to authors such as Beijaard, Verloop and Vermunt (2000), Korthagen, Loughan and Russell (2006) and Leijen, Allas, Toom, Husu, Marcos, Meijer, Knezic, Pedaste and Krull (2014), reflection is an important means of enhancing the professional development of teachers. Walkington (2005) observed that personal reflection should be regarded as a core activity for all teachers. In this study, reflection is implemented with pre-

service mathematics teachers, specifically with a view to promoting the development of their PTI.

Participatory Reflection and Action (PRA) (Chambers, 1994a; Chambers, 1994b; Duncan, Naidoo, Pillay & Roos, 2007; Ferreira & Ebersöhn, 2012; Von Maltzahn & van der Riet, 2006) was deemed to be ideal as the design principle of this study's methodology since it makes provision for both reflection and developmental action, particularly in small groups. Peer supported learning is upheld by such researchers as Korthagen, Loughran and Russell (2006) and Franzak's (2002), who point out that reflection in groups provides a comfortable and safe context in which to think.

In this study, the pre-service teachers were required to attend a workshop one month into their TP. This first workshop primarily served as a data collection strategy in terms of the students' perceptions of PTI, as they were asked to reflect on their TP experiences. The second workshop, held approximately three months later, saw them thinking about and discussing teaching strategies with specific reference to the problems encountered while on TP. They were then required to develop plans for a number of actions to address the shortcomings that emerged from the reflections. Finally, they were asked to submit a report on how the implemented actions had worked to their benefit.

Grounding Teacher Identity

The theoretical framework that was used in this study is based on the model developed by Beijaard, Verloop and Vermunt (2000) who state that "teachers derive their professional identity from the way they see themselves as subject matter experts, pedagogical experts, and didactical experts" (p. 751). Pedagogical expertise relates to nurturing or caring for the learner, while didactical expertise refers to skill in teaching and learning. These three aspects blend well with the four broad categories that are captured in the first secondary research question, as well as with the different educator roles that were specified by the Department of Higher Education and Training (2011). In this article, PTI is explored only in terms of two of its components: subject expertise and teaching-and-learning expertise. There are constructs that are associated with PTI namely, 'personal knowledge', 'self-evaluation' and 'self-image' (Beijaard, Verloop & Vermunt, 2000). The way in which teachers see themselves and 'feel professional' about a task or function, the experiences gained in the classroom, as well as those experiences that add value to extra-mural engagements eventually accumulate to the development of identity (Day & Kington, 2008). This identity is also influenced by the subject that is taught (Ernest, 1988).

Pre-service mathematics teachers are strongly influenced by their view of mathematics as a subject, its perceived rigid structure and exigencies, and its significance in the world of work. Researchers have found that these perceptions influence both the classroom practice of the teacher and their PTI (Cooney, 2003; Cross, 2009; Ernest, 1988; Thompson, 2009; van Putten, 2011). According to Adler and Davis (2006, p. 272) there is a "specificity to the way that teachers need to hold and use mathematics in order to teach mathematics – and this way of knowing and

using mathematics differs from the way mathematicians hold and use mathematics.” Skott (2001) speaks of these perceptions as “expressions of unique personal interpretations of and priorities in relation to mathematics, mathematics as a school subject, and the teaching and learning of mathematics in schools” (p. 6).

Van Putten’s (2011) analysis of these perceptions, according to the components of professional identity as described by Beijaard et al. (2000), reveals that pre-service teachers, in general, and preservice mathematics teachers, in particular, believe that **sound content knowledge**, i.e. being a mathematics expert, is fundamental to teaching the subject. Their belief is that learners cannot learn what is not understood by the teacher and would therefore not be able to achieve the outcomes that are required. At the same time, such expertise would lead to learners having greater respect for their teacher, which, in turn, would lead to better discipline in the class. Pertinent to this is the flexibility in teaching that is afforded by the depth of mathematical knowledge, as well as the ability to comfortably link mathematical theory to the real world. This, in fact, links directly to the importance of being a **teaching-and-learning expert** – this would provide one with the necessary strategies for making the connection between classroom mathematics and the real world, making it easier to deal with diversity, implement strategies according to the needs of the classroom, and ultimately promote understanding.

Questions that brought together TP, the aspects of PTI described above, as well as the PRA design were generated to guide this study. The aim of this research was to find out how PTI could be enhanced during TP – could reflection be the key? The primary question that guided this research was: How can Participatory Reflection and Action (PRA) contribute to the development of Professional Teacher Identity (PTI) during teaching practice?

Secondary questions were required to unpack this question; these are:

1. What are mathematics student teachers’ perceptions of professional teacher identity in terms of (a) subject expertise, and (b) teaching-and-learning (didactics) expertise?
2. How do students in general, and mathematics student teachers in particular value specific teaching strategies?
3. How can students in general, and mathematics student teachers in particular, strengthen their PTI?
4. What was the participants’ perception of PRA as a learning strategy?

Research Method

The Model and Design

In this qualitative case study conducted within the pragmatic paradigm, Participatory Reflection and Action (PRA), as developed and adapted by Chambers (1994a and 1994b), Duncan, Naidoo, Pillay and Roos (2007), Von Maltzahn and Van der Riet (2006), and Ferreira and Ebersöhn (2012), was used as the framework. The study is vested in Wenger’s (1998) ‘Community of Practice’ with the practical application of Work-Integrated Learning (WIL) and the Activity Theory of Engeström (2000), as

developed by Leontiev (1981). Given that students teachers and teachers are part of a community in which identity is negotiated (Franzak, 2002), this method provided the opportunity to groups of students to negotiate, construct and revise their opinions about themselves, and in so doing, to develop their professional identities. In order to do so, two workshops were held during the TP in the final year of teacher training. In the first workshop, the pre-service teachers worked in groups that were homogeneous in terms of the phase they were teaching (Foundation – Grades 1-3/ Intermediate – Grades 4-6/ Senior- Grades 7-9/ Further Education and Training – Grades 10-12). This workshop was designed to access their perceptions of PTI – what makes a teacher good in terms of Beijaard et al's (2000) three aspects – with specific reference to their experiences in TP. This workshop was held after one month in the field. The second workshop was arranged approximately three months later. The participants had the opportunity to evaluate teaching strategies and to plan actions that would address the shortcomings that emerged from their reflections. A final written report required the students to provide feedback on the success of the implemented activities in their experience. In each workshop, the participants were required to brainstorm and to write down their thinking as a poster or matrix.

Research Sample and Unit of Analysis

Seven hundred and thirteen (713) fourth year (final-year) undergraduate BEd- students were enrolled for the compulsory TP component of the teacher training programme in 2015. All students had to complete their six-month teaching practice during the second and third quarters of 2015. This was their first TP. Approximately 325 pre-service teachers, known as Block B students, took part in this specific PRA intervention. Block B students were supervised by their mentor teachers during the second quarter of 2015, and by their mentor lecturers or methodology lecturers during the third quarter of 2015. The 120 pre-service mathematics teachers represented the sub-sample.

Ethical Considerations

Permission to engage these pre-service teachers in the PRA workshops was granted by the Ethics Committee of the Faculty of Education, as well as by the Dean of the Faculty of Education. Because the interventions took place during the TP period of time, school principals and participants had to be informed well in advance about the intention with the workshops, as well as the time and place where the workshops would take place. All participants were briefed regarding the workshop procedures. Consent was also obtained in writing from the participants prior to the start of the activities.

Data Collection

All students from Block B returned to campus on two Saturdays, three months apart, to participate in a three-hour workshop in which they shared their thoughts and experiences on four matrices (posters). At the end of each activity, one

representative from each group provided feedback on the main reflections that were captured in each matrix.

Activity 1 - Matrix 1 – Mapping Teacher Expert Roles: Working in groups, student teachers had to discuss how they saw specific expert roles performed by teachers in the classroom, i.e. what makes a good teacher in terms of subject expertise, didactics and pedagogical expertise. We also requested them to rank the importance of these roles in terms of their expectations. Data collected through this matrix were used to answer sub-question 1.

Activity 2 - Matrix 2 – Mapping teaching-and-learning: groups were given a short list of traditional teaching strategies ranging from transmission, role play, play, and cooperative learning, to inquiry and problem solving. They were then requested to discuss any four strategies, reflecting on the challenges or problems experienced in each of the four strategies during the course of their TP. This matrix was designed to answer sub-question 2.

Activity 3 - Matrix 3 – Mapping Action Plans: Each group had to devise two simple action plans or activities that they had to introduce during the last month of their TP. These activities were supposed to strengthen the participants' under-developed competences within their own PTI, as was required in sub-question 3. The student teachers then returned to school and introduced or implemented the suggested action plans.

Activity 4 - Matrix 4 – Feedback on the Implemented Action: in the last workshop, they reflected in groups on how they had benefitted from the introduced activities and from the PRA workshops. This matrix provided information to answer both sub-questions 3 and 4.

All of the participants submitted a short research report at the end of the fourth quarter and the data collected during the teaching practice formed the core of these reports. They were therefore requested to capture the completed matrices on camera as they would need the data to finalise the reports.

The matrices were transcribed in tabular format and they and the reports were coded according to the themes that were identified in relation to the research questions. Thus, a deductive analysis technique was applied: the data was studied through the lens provided by the research questions. Reliability and validity were ensured through subjecting the coding to expert judgement from colleagues in the Faculty, in particular, the methodology lecturers and the specialist researchers on TP.

Results

The data collected from matrices 1 and 2 are summarised according to the relevant codes and pointers in Table 1. The codes were deductively generated within the confines of the theoretical framework i.e. Subject and Teaching-and-Learning

expertise. Notions about the subject mathematics and the exigencies of teaching are observable. The participants were very aware of the importance of knowing and understanding the content of the lessons, without which the learners would not be able to learn. Key to this was planning of the lessons. The students also became aware of the diversity of ability and understanding within the mathematics classroom and the necessity of adapting their teaching to accommodate this diversity. This implied the use of suitable additional resources that would link the mathematics classroom to the real world; this was thus also an important consideration in their assessment strategies.

Table 1: Pre-service teachers' perceptions of PTI in terms of subject and teaching-and-learning expertise

Subject expertise	Curriculum and thorough subject content knowledge, important roles. Conduct planning in accordance with curriculum. Strong networks with expert teachers with whom information could be exchanged important.	Pointers: 'outstanding subject content know-ledge', 'better', 'well', 'improve', 'involve', 'continuous', and 'crucial'.
Teaching-and-learning expertise	Adapt teaching and learning to fit different learners. Draw links between teaching strategies, learner abilities and lesson aim. Use additional resources for better teaching.	Pointers: 'inquiry', 'interaction', 'rules', 'discipline', 'distractions', 'disruptions', 'uncomfortable', 'dis-order', 'arguments', and 'inclusivity'.
	Different techniques stimulate different senses. Research important for best use of support materials. Understand the predicament of poorly resourced schools. Call for creative applications.	Visual stimulation an asset. Explore learners' abilities. Broaden ways of thinking Link real world to learning environment.
	Know taxonomies and diagnostic value of continuous assessment. Link assessment strategies to learner diversity. Rely on theoretical knowledge. Understand test validity and reliability and build on classroom observations and experiences.	Pointers: 'regular', 'feedback', 'critical', 'different', 'right circumstances', and 'deadlines'.

Table 2 presents the action plans suggested by the students in matrix 3. Apart from the plans that are generic to any classroom, what is specifically of significance to the

mathematics classroom are the suggestions that 'WhatsApp' groups be established - which allows problem sums to be dealt with outside of the classroom; finding out how learners best solve problems – which, given the nature of mathematics, is vitally important; and how problem-solving activities can be structured. Teaching mathematics requires the organisation of both formal and informal problem-solving opportunities so that learners can develop the necessary competencies to achieve success in this field.

Table 2: Action plans suggested by pre-service teachers

ACTION PLANS THE STUDENT TEACHERS SUGGESTED

- Observe how teachers perform certain teaching strategies.
- Interview mentor teachers on unique classroom problems.
- Inquire about effective ways to introduce e-learning.
- Set up 'WhatsApp' groups to share and exchange ideas.
- Incorporate multiple intelligences in class.
- Conduct more research on classroom-related aspects.
- Formulate model lessons with perfect balance.
- Master instructional technologies.
- Standardise resources (for example assessment tasks).
- Determine learners' interests.
- Determine how learners solve problems best.
- Inquire about discipline strategies.
- Find out how to improve parental involvement in schools.
- Find out how to incorporate cooperative learning.
- Master problem-solving activities.
- Master basic computer skills.
- Inquire how to implement role play as a teaching strategy.
- Find out how to bring technology into the classroom.
- Master reading strategies.
- Assess the most important (effective) teaching strategies

When the students were requested to summarise their feedback and the way forward in matrix 4, they indicated that the teaching practice was highly beneficial and that their own professional identities were enhanced through mentorship. They claimed that they had learnt more during this time than during the preceding three years at university. They also pointed out that they had come to realise the importance of being receptive to new knowledge and self-reflection through the PRA workshops. The way forward, as they saw it, is summarized in point form below:

- Become subject specialists,
- Draw on own personal experiences,
- Include parents, teachers and peers in discussions,

- Create a teacher blog and interact with other teachers,
- Master different methodologies,
- Accommodate different learning styles in class,
- Have regular reflection sessions with learners,
- Share success stories with peers,
- Get feedback from learners to improve own practice,
- Build relationships and networks with fellow teachers,
- Instil good behaviour in learners,
- Make teaching fun and find joy in creative teaching,
- Fight for good resources,
- Inspire creativity and the fire within learners to learn,
- Take control of the curriculum and assess regularly, and
- Focus on technologies that create more learning space.

Discussion

Teaching practice is often an isolating experience due to limited contact with fellow students and mentor lecturers. Students are often also subjected to heavy teaching loads, comprehensive daily preparations and compulsory extramural activities with little time to talk about problems, find solutions to such problems and engage with supervisors and mentor teachers during the course of the TP. One of the advantages of this project was that it provided students with the opportunity to reflect both individually and corporately and to concretise their thinking.

The reflections gave a good indication of the opinions of these pre-service teachers regarding their teacher roles and functions. Many addressed 'best practices', while others were more pragmatic and reflected on how they applied certain activities in class. The participants could relate to the minimum entry requirements expected from students who stand on the verge of entering the teaching profession, particularly in terms of the content and didactic knowledge required to teach mathematics, as well as the other subjects students offered as a second choice.

Conclusion

As a teaching strategy, PRA gave the participants the opportunity to actively engage with fellow students professionally. They soon became aware of the value of networking as a unique strategy to exchange ideas. The groups reflected positively on the value of social networking and suggested the development of social platforms to interact with peers, parents and fellow teachers. They also became aware of the importance of reflection as an indispensable component of teacher education. PRA therefore proved to be important in enhancing the effectiveness of pre-service teacher education programmes while student teachers took agency in addressing the shortcomings that they encountered during their TP.

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