



**LINKING TEACHER COURSEWORK TRAINING,
PEDAGOGIES, METHODOLOGIES AND PRACTICE
IN SCHOOLS FOR THE UNDERGRADUATE SCIENCE
EDUCATION STUDENT TEACHERS AT THE
NATIONAL UNIVERSITY OF LESOTHO**

**Maseqao Regina Mabejane¹ⁱ,
Konstantinos Ravanis²**

¹National University of Lesotho,
Lesotho

²University of Patras,
Greece

Abstract:

Most pre-service teacher training programs around the world conform to the traditional model in which student teachers undergo intensive theoretical coursework training on campus followed by an extended classroom practice in schools. In this qualitative research study, the National University of Lesotho science teacher training curriculum, pedagogies and methodologies employed on campus and in practice schools were explored. That was triggered by persistently reported observations of student teachers' inadequacy in classroom teaching during Teaching Practice. The thrust of the research question was the development of the student teachers in learning to teach. The directly involved people who were interviewed and provided their written reports included: two Teacher Educators for Year IV Curriculum Studies courses, ten Student Teachers from each course and their twenty Teaching Practice Tutors. The relevant documents complemented the primary data from the interviews and the produced written reports. The main findings revealed relevant teacher knowledge domains and their components dealt with in the preparation of student teachers for their work in schools. Four main findings that distinctly had a perceptible bearing on student teachers' learning and practice were the exclusion of assessment as a topic in the course content and teaching, the cross-cutting fragmentation, limited time and teacher educators' modeling. A limited follow-up study conducted introduced an intervention program targeting one area of fragmentation in the training program. It was implemented in one practice school with one student teacher and his mentor. That was done to explore the possible means of a collaborative rather than cooperative partnership based on the expectations of the Faculty of Education about the field learning experience for the student teacher. The intervention revealed some promising benefits for the student teacher and the tutor

ⁱ Correspondence: email ravanis@upatras.gr

that could inform program improvement as discussed and the recommendations made thereof. It was hoped that the results of the two studies would form the basis for or add to the research into other areas of teacher training and teacher education policies and practices that could curb the fragmentation in order to achieve the aspired beneficial and quality education.

Keywords: teacher training, school practice, training curriculum, pedagogies and methodologies

1. Introduction

The fragmentation in teacher training preparation has been identified as one probable factor that might cripple the intended impact of the programs on prospective teachers. Talking of the fragmentation, Ball (2000, p. 242) attests “...*teacher education throughout the 20th century has consistently been structured across a persistent divide between subject matter and pedagogy*”. Most pre-service teacher training programs around the world conform to the traditional model in which student teachers undergo intensive theoretical coursework training on campus followed by an extended classroom practice in schools (Allen, Ambrosetti & Turner, 2013; Shuls & Ritter, 2013). The same model is followed at the National University of Lesotho (NUL) for the undergraduate teacher training programs which inevitably is susceptible to some form of divide. Other mentioned forms of divide include those in institutional structures, universities and schools, domains of knowledge in teacher education curriculum, and academic disciplines corresponding to school subjects. With such chasms, it might be inevitable to suspect limited coordination that could hamper the achievement of the aspired result which is the teacher product possessing essential competencies, abilities and qualities enabling the success of their future learners. It is therefore argued that it is crucial to link all contributing factors in a teacher training program.

Teaching as a complex multitasking and multidimensional process that deals with varied intertwined factors requires deep knowledge and understanding of them and their interrelatedness (Ball & Forzani, 2009; Göran, 2009). As a result, there is a need for a sound and solid foundation at the pre-service stage. It was therefore found essential to explore the possibility of linking some attributes of the science teacher training program at NUL as a means to curtail fragmentation.

In this qualitative research study, the NUL science teacher training curriculum, pedagogies and methodologies employed on campus and in practice schools were explored. That was triggered by persistently reported observations of student teachers' inadequacy in classroom teaching during Teaching Practice (TP). The main study focused on identifying the Curriculum Studies courses content, the methodologies and the pedagogies employed by teacher educators (TEs) to help the student teachers (STs) learn how to teach and how they in turn employed the acquired knowledge and skills.

A limited follow-up study conducted introduced an intervention program targeting one area of fragmentation in the training program.

Both studies were conducted as a way of seeking the possibility of bridging the gap between a theoretical approach to the curriculum, teaching, assessment and the work in real classes. Connecting the themes through the perceptions of the involved parties was thought to be capable of shedding light for better understanding of what was involved in STs' learning to teach. It was believed that that would in turn enable identification of the shortfall(s) in the training process that ultimately surfaced during TP. It was hoped that the results of the two studies would form the basis for or add to the research into other areas of teacher training and teacher education policies and practices that could curb the fragmentation in order to achieve the aspired beneficial and quality education. The paper discusses the theoretical and methodological frameworks, the methodology followed in conducting the two studies and the obtained results, completing with conclusions and recommendations.

2. Theoretical Framework

The framework of this study was premised on the belief that the cornerstones of teacher's work were one's declarative and procedural knowledge (Gess-Newsome, 1999) comprising mainly of the subject matter/content knowledge (CK), general and specific pedagogical knowledge (PK) and pedagogical content knowledge (PCK) backed with educational theories. These three knowledge domains constitute teacher knowledge. PCK as a blend of content and pedagogy manifests itself in actual classroom teaching. PCK is a term introduced by Shulman (1986) who rightly considers it the special knowledge specific to teachers explaining it as "*.....that special amalgam of content and pedagogy that is uniquely the province of teachers, their own special form of professional understanding...*" (Shulman, 1987, p. 8). But the development of PCK has proved to be a complex process, highly specific to content, situation and an individual (Abell, 2008; Ball, Thames & Phelps, 2008; Loughran, Berry & Mulhall, 2008; Ravanis, 2010; Van Driel & Berry, 2012).

The assumption was that with the content and pedagogies offered in the teacher training courses STs could be able, to a considerable level of competency, enact those knowledge domains. PCK as a blend of the basic domains became one of the three underpinning theories for this study the components of which were adapted from those discussed by Magnusson, Krajcik & Borko (1999). Theory and practice as features of teaching and learning despite the awareness of the disparity between them that has afflicted teacher training programs over the years (Korthagen & Kessels, 1999) was another theory. The belief was that if practice and theory could be dialectic (Kirk, 1986), they could benefit the prospective teachers for their effective performance as teachers. The third was reflective practice which is considered a goal for teacher preparation programs (Hatton & Smith, 1995; Vellopoulou & Ravanis, 2010; Raikou, Karalis &

Ravanis, 2017) and a vehicle for ongoing professional development (Korthagen & Vasalos, 2005; Harford, & MacRuaric, 2008).

The epistemological stance was that the information about the actual content and pedagogical approaches in the training courses and the STs' enactment of the acquired knowledge and skills could best be obtained through direct interaction with the involved people which could best be achieved through qualitative research coupled with analysis of relevant documents. The gathered information through the study participants' perceptions, their "*perspectival understanding*" (Lee & Schallert, 2016) was believed to have a potential of helping with the establishment of the cause (s) of the shortfall with STs' classroom practice.

Several studies suggest that teaching experience needs to be combined with thoughtful reflection on instructional practice (Gelfuso & Dennis, 2014; Körkkö, Kyrö-Ämmälä & Turunen, 2016) the practice which is informed by the theoretical knowledge. Its inclusion helps to enhance the quality of classroom teaching and learning leading to the development of alternative pedagogical practices and abilities (Collier, 1999; Leavy & Hourigan, 2016). The NUL Handbook advocates learning from experience (National University of Lesotho, 2015) hence reflection being required at the end of every lesson the ST conducts.

2.1. Teacher preparation

Teacher preparation sets a ground for teacher professional development starting with the initial teacher education, pre-service stage. The preparation programs afford prospective teachers the opportunities for the acquisition and development of the required teacher knowledge. The observed pervasive inadequacy with both pre-service and in-service teachers in classroom teaching still abounds despite the various efforts made in many countries to improve teacher education and preparation programs (Ball, 2000; Darling-Hammond, 2000; Boilevin & Ravanis, 2007; Zeichner, 2010).

The complexity of teacher learning requires one to be able to synthesise, integrate, and apply the acquired knowledge and skills in different situations (Hollins, 2011) which could therefore result in effective teaching. The root of the complexity could be attributed to a number of problems that teacher education is invariably faced with which according to Ball (2000, p. 242) are, "*...identifying the content knowledge that matters for teaching, ... understanding how such knowledge needs to be held, and ... what it takes to learn to use such knowledge in practice*". In other words, it is not just a matter for teachers knowing what to teach as may be given in course synopsis (for TE) or the school syllabus (for ST) and how to teach it, but it should be teaching what should be taught and how to beneficially handle that very knowledge in learning and in practice.

2.2. The research questions

The study investigated the area that according to Ben-Peretz (2011) has not been explicitly explored which is what actually comprises teacher training content and the impact of its learning on student teachers' classroom practice. The thrust of the study

research question was the development of the student teachers in learning to teach. The general research question was *“What the perceptions and opinions of the teacher educators, student teachers and teaching practice tutors were, concerning the subject Curriculum Studies courses and teaching practice with regard to student teachers’ development in learning how to professionally teach in their subjects”* mainly underpinned by PCK.

Basically, the focus was on two major aspects of science teachers’ preparation in the practicalities of teaching. Firstly, the content offered that STs later drew from and used in their classroom practice. Secondly, the methodologies and pedagogies employed in order to develop STs’ professional knowledge during face-to-face coursework training and during practice. The questions focused on: (1) the training content, (2) the methodologies and pedagogies, (3) student teachers’ enactment of the acquired knowledge, (4) the linking of theory and practice, and (5) the general views of the participants.

3. Study Methodology

3.1. The qualitative research paradigm

Qualitative paradigm is capable of exploring a wide range and levels of scenarios in order to develop a deeper insight into a matter or situation of concern (Cohen, Manion & Morrison (2011), also getting insiders' perspectives of their own situation (Mouton, 2001; De Vos, Strydom, Fouché & Delpont, 2011). The study site, teacher training institution and the practice schools with the directly involved people set boundaries of a collective case that led to purposive sampling, with a choice of who to work with in order to get rich information. That choice ultimately pointed to other aspects such as training courses, year of study and the number and categories of participants all creating a multiple data source. According to Cohen et al. (2011), a case study observes effect in real context and context determines causes and effects.

3.2. Research methods and participants

The directly involved people who were interviewed and also provided their written reports included: two Teacher Educators for Year IV Curriculum Studies courses, ten Student Teachers from each course and their twenty Teaching Practice Tutors. The relevant documents complemented the primary data from the interviews and produced written reports.

The follow-up study was implemented in one practice school with one student teacher and his mentor between February and end of March 2018. That was done to explore the possible means of a collaborative rather than cooperative partnership based on the expectations of the Faculty of Education about the field learning experience for the student teacher.

In the two studies, interviews coupled with the reports provided by STs and their teaching practice tutors (TPTs) were the primary sources of data complemented by

the existing documents as the secondary source. With the follow-up study the report incorporated the perception that TPT had about the intervention program.

The STs were drawn from the Year IV Biology and Physics Curriculum Studies courses (ten from each course) with the two concerned TEs at the time of research and the respective twenty TPTs in practice schools. The follow-up intervention study was conducted with one school hence one ST and his TPT. The seven step program employed comprised: (1) TPT written report on their interactions in the first three weeks of practice; (2) pre-intervention interview; (3) joined discussion of Faculty of Education (FED) expectations as stipulated in the TP Handbook; (4) researcher's demonstration of clinical supervision in observing ST; (5) researcher's observation of TPT in classroom observation a month after clinical supervision demonstration; (6) TPT written report on their interactions and effect of the program and (7) post-intervention interview.

3.3. Interviews

Interviews were the main source of data collection for the in-depth, authentic and much information presenting participants' real experiences, conceptions, perceptions, beliefs, and opinions. The semi-structured one-on-one interviews were conducted. The STs were interviewed before TP to give their assumptions and anticipations about the upcoming classroom teaching based on what they had learned, and afterwards to give their actual experiences. Both TEs and TPTs had one interview except for the TPT in the follow-up study who was interviewed during and at the end of TP.

3.4. Observations

The observations of STs' classroom teaching were done by TPTs as that was their main role stipulated in the Teaching Practice Handbook (TP Handbook) designed by the Faculty of Education to guide the practice process. However, TPT in the intervention program was observed on observing ST's classroom teaching.

3.5. Existing documents

The identified documents included subject Curriculum Studies course synopses which stipulated topics for teaching; TEs' course outlines representing their teaching curriculum; TP Handbook as an aspect of the mechanism of linking coursework and practice; STs' TP reports and lesson plans and TPTs' reports on STs' classroom practice. Although Blömeke et al. (2016, p. 35) contend the self-reported data which is still common in teacher research saying: "...their reliability flaws are widely known" one could not reject outright the authenticity of such information source and the method itself since they nonetheless provide lived experiences of the participants.

3.6. Data analysis

Qualitative paradigm is capable of exploring a wide range and levels of scenarios in order to develop a deeper insight into a matter or situation of concern (Cohen, et al.,

2011), also getting insiders' perspectives of their own situation (Mouton, 2001; De Vos et al., 2011). Qualitative content analysis abides by some classical steps embodied in quantitative analysis (Kreuger & Neuman, 2006 referred to in De Vos et al., 2011) that include identification of patterns, similarities and differences in the comparison of data units and categories. The constant comparison analysis (Miles & Huberman, 1994) strategy is the most commonly used in conjunction with different analysis strategies (Leech & Onwuegbuzie, 2007) in which units of analysis, categories and codes from different sources are compared for merger or uniqueness as may be appropriate.

The data collected from the various sources were analyzed using template analysis coupled with constant comparison method. The data were collected from individual events and analyzed at that level and later related to similar category of participants, course, and data type and in the final analysis all events were consolidated to establish trends, agreement and divergence to get a comprehensive picture of the situation. Each identified document was analyzed on its own merits with the focus on teacher knowledge. The final documentary data material was subjected to template analysis (TA) which is a form of thematic analysis. As described by Brooks and King, (2012), it enables the researcher to put the themes in the text in order and being effective for analysis of large sets of qualitative data, finally developing a comprehensive coding template. Through constant comparison of units and codes, a comprehensive coding scheme was developed which was subjected to categorization into the domains of teacher knowledge including relevant emergent issues.

4. Results and Discussion

The research questions looked into the “what” and the “how” of the training and STs' enactment of the acquired knowledge and skills. They further explored the link between the theoretical (on-campus) and practical (in-school) learning, both advancing student teachers' learning and professional growth. Then finally, Participants' general views about the situation were elicited. Those aspects formed the framework for the presentation and discussion of the results.

4.1. The course content for training

Basically the teacher training content constituted conceptual and practical knowledge targeting the Lesotho high school curriculum that the STs were going to teach. They were informed about the prevailing circumstances in schools that they had to cope with and the methods of teaching underpinned by the learning theories, some of which were demonstrated. The basis for the content was the course synopsis which stipulated similar broad topics for the study courses embodying the main domains of teacher knowledge and their components with the omission of assessment though.

4.2. Teacher educator teaching curriculum

Teacher educators developed course outlines based on the synopsis for guiding their teaching. The different presentations and expressions reflected in them manifested the 'open and flexible' curriculum frameworks (Vellopoulou & Ravanis, 2012) influenced by their longstanding execution of the synopsis, interactions with schools and STs' reflections from TP, developing their practical personal perspectives (Vanassche & Kelchtermans, 2014). They also marked their understanding and perception of the situation and how they ought to act within it (Berry & Van Driel, 2013) what Vanassche & Kelchtermans, (2014) term "*subjective educational theory*". Shared knowledge and perception between TEs which was lacking in this case, could lead them to pursue a common vision of the aspired vibrant teacher. One would take the observed variation as one aspect of fragmentation (Ball & Forzani, 2009; Grossman, Hammerness & McDonald, 2009) of departmental effort.

Though TEs said they included assessment in their course outlines, they both admitted to have not given it the consideration and handling it deserved as a topic in their teaching. But for their teaching, they employed various assessment techniques. Assessment is not only a crucial skill but a powerful teaching-learning tool if properly and purposefully handled with feedback directed to the learning of students (Voerman, Korthagen, Meijer & Jan Simons, 2012). Its omission in the course synopsis resulted in the oversight by TEs one of them proclaiming: "*I haven't managed to create time for doing that, setting different test items and so on. I haven't had time to do that ... but it's an important aspect of testing for students' understanding... but I think I have to go back to it*".

Although the on-campus coursework training was theory laden, STs had some practice through peer teaching to prepare for actual practice in the school, incorporating collaborative reflection. The major impact of peer teaching was developing confidence, one area of teacher's expertise for which they drew lesson plans which is one crucial element for effective teaching. The practice done on and with peers does not resemble the practicalities of the actual school situation. Thus, micro/peer teaching and practice teaching in schools are considered as fragments of the practice experience confirmed by Ball (2000) in talking about the chasms in teacher education.

4.3. The methodologies and procedures in the training process

The general methodology employed by TEs was to create learning opportunities for STs through theoretical discourse and practical engagement. There was no common ground for how those constituents would be operated hence each TE employed what s/he deemed appropriate as a means to achieve the anticipated teacher product. In the theoretical discourse, they mostly employed discussion of concepts and practice through peer teaching. That offered varied and essential platforms within which there were multiple activity settings (Martin & Dismuke, 2015) engaging STs to develop their professional knowledge. However, there was no apparent indication that TEs either through theoretical discourse or practical involvement of STs consciously and formerly guided STs on the specific procedures to be followed in conducting a

discussion/classroom talk in teaching, drawing their attention to what the method actually involved. Arguing for the need for STs' engagement with the actual task, Ball & Forzani (2009, p. 503) attest, "*Learning to set up the task and to orchestrate a brief discussion of the children's work on it is different from designing or talking about the activity*". Experimentation though highly advocated as the best method of teaching in science was practically minimal.

4.4. Micro/peer teaching in teacher preparation

The evidence of the impact of micro-teaching in preparing prospective teachers in the teaching practices, developing their teaching capabilities and confidence is revealed in the work by several researchers through the views of TEs, STs and researchers' observations (Fernández, 2010; Ghanaguru, Nair & Yong, 2013). Considering the insufficiency of the practice and the limited number of topics the STs had been exposed to, there were chances for inadequacy in some areas of STs' knowledge. Ball & Forzani, (2009) share the same sentiment in their advocacy for practice-based curriculum which they characterize as the one that "*would emphasize repeated opportunities for novices to practice carrying out the interactive work of teaching and not just to talk about that work*" (p. 503). They go further to indicate the need for support in the learning of the aspects of the complex practices.

4.5. Practice teaching in schools

The need for and importance of in-school practice teaching has been emphasized in literature (Allen & Peach, 2007; Gürsoy, 2013) and by the subjects of these studies despite the inherent challenges in relation to STs' enactment of the acquired knowledge and the procedures involved (Sarıçoban, 2010; Ozdemir & Yildirim, 2012) together with ST-TPT interactions (Allen & Peach, 2007). The inevitable partnership between teacher training institution and practice schools has proved to have both benefits and challenges (Zeichner, 2010; Avalos, 2011).

The limited time for coursework practice and snap teaching in schools coupled with uninformed TPTs gave no room for repeated opportunities and clinical support. In the intervention study, there was significant directed support to the ST amidst some challenges. The intervention resulted in improved teacher performance for both ST and TPT, driven by sense of responsibility for own and other's work as they both attested. Collaboration between TEs and TPTs could help to continuously afford STs the effective learning settings. Its lack jeopardizes effective partnership (Villers & Mackisack, 2011) and the triad interaction with its proved effectiveness (Mason, 1999; Goodnough, et al. 2009; Mtika, Robsonm& Fitzpatrick, 2014).

4.6. Student teacher classroom practice and teaching practice tutor support

Although the STs performed reasonably well during TP despite the omission of assessment and limited and out-of-context practice on campus, their outstanding shortfalls were with lesson planning, reflecting on the lesson taught and designing the

means for improvement, explaining and handling the content and employment of a variety of teaching strategies. Research shows that STs' prior beliefs about and experiences with teaching and learning influence their acquisition and interpretation of what they learn in teacher training courses (Miller & Shifflet, 2016). Likewise, pedagogical approaches on campus influenced study subjects' practice in schools that mostly employed the discussion method and assigning students to find more information on the concepts dealt with which they observed from their TEs which served as the pointer for their teaching (Koster, Brekelmans, Korthagen & Wubbels, 2016).

With the reported insufficiency with STs' assessment, one attribute of which is asking questions, one wonders how well they could facilitate the discussion as a complex task requiring time to learn to do (Grossman et al., 2009). Having not observed and practiced the use of the advocated teaching methods or strategies confirms Magnusson et al. (1999) in saying that telling student teachers what to do and not to do does not help their learning to teach and employing the methods. Even though they used some of the encouraged teaching strategies, it was quite unlikely that they used them effectively. The recall questions that they asked were to ensure that the students could remember what they taught, confirming Gess-Newsome, (1999) assertion about novice teachers that they equate learning with remembering information.

The impact of the missing assessment learning was revealed in STs' enactment confirmed by STs themselves, TPTs and TEs. TPTs assisted STs to design test items. Their focus was on students' knowledge of the technical subject matter that would be required in the national external examinations. For STs and TPTs, their idea of assessment was mainly testing students' factual knowledge, merely regurgitating the learned content, clear indication of the shortfall with their understanding of what assessment entailed. This marks yet another divide between the knowledge and practice with assessment for TEs and TPTs. The assessment form in the TP Handbook was the attractive part to the STs as it presented the expected aspects of practice required from them. Its omission in training was a critical oversight when assessment is considered one of the vehicles for learning (Sarivan, 2011; Edwards, 2013).

The other learning area that TPTs assisted the STs in was with the practicalities of handling the classroom environment familiarizing them with the world of work. They all did not know what was expected of them in mentoring the STs as they were never approached by the NUL staff even on school visits. One of them asserted, "...when you have come, try to tell me what it is you have found from the student teacher so that... I should follow up". That was echoed by TPT in the intervention study saying, "After observing your demonstration I became aware of a number of issues which otherwise I would not consider in my observations and I was able to look into the issues you pointed out in my observations afterwards". This denotes a grave fragmentation that is bound to impact negatively on STs with their trainers' pragmatic practices. The concern for lack of collaboration between NUL staff and practice school counterparts expressed by the TPT further confirms the need for both on campus and in schools

teacher trainers to interactively engage in some evident collaboration in order to provide sound support and guidance to the student teacher (Mabejane, Nyabanyaba, Koliopoulos & Ravanis, 2017).

The lesson plan is a crucial but difficult skill for student teachers to grasp (Gafoor & Farooque, 2010) which if already insufficient so might be its implementation. The limited practice with lesson planning on campus could have contributed, confirmed by the study by Schmidt, Cogan & Houang (2011) referred to in Youngs & Qian (2013) who discovered that the intensity of subject matter and practical experiences on campus have a direct bearing on teacher knowledge reflected in teaching. Although the analysis of STs' lesson plans revealed great inadequacy, the TPTs were satisfied with the planning which they claimed they checked to ensure the scope of the concepts covered.

The descriptive nature of STs' reflection has been noted as common in the early stages of the reflection process (Körkkö et al., 2016). Leavy & Hourigan (2016, p. 162) posit that, "*Reflecting on practice is a complex task requiring observation and reflective skills*" which therefore reasonably requires guidance for one's successful engagement with it. None of the TPTs alluded to lesson reflection so inevitably could not assist STs with it. With limited practice on campus and no further learning of it in practice with resultant deficit in teaching confirms that a skill is better developed through regular, organized, guided and comprehensive practice.

The reported shortcomings in this study portray the weakness in linking the learned theory with practice hence aligning with the attested limitation with the traditional mode of training in which student teachers are expected to effectively transform and incorporate the acquired knowledge in their teaching (Korthagen & Kessels, 1999). With some countries such as Finland which has "*the most successful education systems in the world*" (Lanas & Kelchtermans, 2015, p. 22), Australia (Allen & Peach, 2007), Israel (Ben-Peretz & Rumney, 1991) and Germany (Kleickmann et al. 2013) in addition to the relatively prolonged practice teaching towards the end of training, it is injected throughout the years of training. In Germany, it even extends into the first year of normal teaching.

4.7. Linking on-campus and in-school training

The exploration of the interrelationship between on-campus and in-school learning for STs was through analyzing the content taught in the Curriculum Studies courses and the learning opportunities through the mechanisms provided to link the two phases. The STs' study and use of the contemporary school syllabuses and textbooks were highly appreciated by STs as having contributed effectively to their successful teaching during TP. TEs' knowledge of the school environment informed the STs of what prevailed and the possible means to cope therein just as did the once-off TP Orientation Workshop held before STs went out to schools.

The timing for The TP Handbook dissemination in that workshop lacked the intensity, practicality and regularity that have proved to impact positively on STs' learning. If it was consciously considered a linking tool between theory and practice, it

could have been disseminated earlier and to all concerned people for them to act from and on a common ground. Similar to all TPTs the one involved in the intervention study had not seen it until it was discussed in the process. That therefore resulted in the idiosyncratic operations with no common ground and goal to nurture STs' thoughts, feelings, knowledge and actions involved in learning to teach (Lee & Schallet, 2016). Those chasms marked fragmentation resulting in lack of the necessary distinct, coherent and common base (Caena, 2014).

The major drawback of training was the theoretical explanatory nature which made it a remote undertaking despite its reported effects by the study subjects. That was therefore defeating the case for making practice core for teacher-learning (Ball & Forzani, 2009; Grossman et al. 2009), disabling learning in and from practice during coursework training. That threatened the need to afford STs to learn teaching in the "*meaningful and supportive contexts*" (Magnusson et al., 1999, p. 124) in which they were exposed to actual situations and provided the essential guidance and assistance. Almost all study subjects wished for practice with actual school students, with the exception of TEs who did not mention that need.

Another momentous mechanism of bridging the theoretically acquired knowledge with practice was through the visits by the FED staff that was reasonably following on what they had offered the STs. The two visits were far too few to be of much benefit to STs. The scarce interactions could not possibly meet the requirements of the clinical supervision that require time before and after the observation (National University of Lesotho, 2015), fulfilling the value of guided field experiences emphasized in literature (Allen et al., 2013; Gürsoy, 2013; Benedict-Chambers, 2016). Also aggravating the already insufficient visits was the arrangement of TEs outside the ST's subject area visiting. One could equate them to "*casual observer*" according to Lewin (2007) referred to in Ball & Forzani (2009). Such TE could observe general issues pertaining to classroom teaching, but the subject specific issues might not be obvious as though they were "*invisible*".

Even the lesson plan which is considered a means to link theory and practice (Korthagen, 2001), with the required reflection at the end of each lesson taught, the tutors were not conversant with them hence rendering their insufficiency in their random and undirected support. That indicated a dire need for tutors to be well informed about what was expected of them in supporting the STs (Villers & Mackisack, 2011; Hoffman et al., 2015) causing disparity between theory and practice and thus again fragmenting the teaching experience.

The TPT involved in the intervention acknowledged the importance of being informed about the expectations of FED which triggered reflecting on own practices. TPT noted their developed sense of responsibility since they were both clear about what was expected of them. She insisted that TPTs had to be well informed and involved during TEs' visits for them to learn and be able to professionally and effectively carry on with their expected guidance and support.

4.8. The participants' general perceptions of the training process

All study participants acknowledged the impact of the training program in developing STs in teacher professional knowledge in line with the view expressed by Darling-Hammond (2000) that teacher training is important. However, the time, lack of collaboration and disorganized procedures came out as the major constraints impinging on specific activities that ultimately jeopardized the desired outcomes. All TPTs wished for joint observations of STs' classroom teaching and post-observation conference to inform the three parties about the progress and the means to carry on in the specific focal areas. Lack of collaboration at the different levels in the education system (Mabejane, 2015) proves to be a threat to the effectiveness of the teacher training for NUL student teachers.

5. Conclusion & Recommendations

The main research question sought the revelation of the nature of the training afforded the science STs in the selected courses. The perceptions of the study participants served as the lens through which an insight into the situation was developed. The content and procedures for the training of prospective science teachers at NUL catered for the development of teacher knowledge and qualities through creating the learning opportunities for STs' acquisition and development of theoretical and practical knowledge. However, there were significant impinging factors that perpetrated the continuing limitations observed and reported in their classroom teaching which were observed even with the study group.

Time and procedures for the program and courses had the attributes such as the frequency and duration and out of context peer teaching sessions and limited time for field experience, omission of assessment in the course synopses, disparities in teacher educators' teaching practices, organization and running of TP, FED staff visits, TE-TPT collaboration, and lack of meaningful guidance of and by TPTs. The major factor was fragmentation in faculty/departmental operations and practices, university and practice schools partnership that markedly resulted in lack of coherence and collaboration in the training program. It further led to various disparities such as idiosyncratic practices and uncoordinated operations at different levels.

It is reasonable that the amalgamation of those fragments could never be easy, but there should be a move to gradually closing the chasms. Otherwise, the situation is destined to produce a teacher who might be 'half-done' in almost all areas required for a teacher. The best means could be cooperation and collaboration at all levels guided by clear policies.

5.1. The main findings

The main findings revealed relevant teacher knowledge domains and their components dealt with in the preparation of student teachers for their work in schools. The intervention revealed some promising benefits for the student teacher and tutor that

could inform program improvement as discussed and recommendations made thereof. With no accessible research in this regard in Lesotho, it is hoped that the results of the two studies would form the basis for the research into other areas of teacher training and teacher education policies and practices that could curb the fragmentation in order to achieve the aspired beneficial and quality education. The four main findings that distinctly had a perceptible bearing on student teachers' learning and practice were the exclusion of assessment as a topic in the course content and teaching, the cross-cutting fragmentation, limited time and teacher educators' modeling.

With the educational policy development underway in Lesotho, there is clearly no guidance to teacher education at the moment. There is definitely a need for finely tuned policies at all levels as the needed resources transect all levels from national to individuals. Within the Science Education Department, the individuals develop STs' as they deem appropriate. The teacher training institution and practice schools exist as cooperating entities than dialectic partners. The feeling is that there needs to be clear and comprehensive intra and inter liaison. Time controls the design and implementation of the teacher training programs therefore influencing their outcomes. Hence, the time at which the Curriculum Studies are offered in the course of training and the duration of courses, activities and practice require profound reconsideration.

Hopefully the change could lead to a transformative move in order to avoid or redress the situation that Fullan quoted in Cochran-Smith (2003, p. 25) describes by saying: *"The way that teachers are trained, the way that schools are organized, the way that the educational hierarchy operates, and the way that education is treated by political decision-makers results in a system that is more likely to retain the status quo than change"*.

With the inadequacy in lesson planning and reflection there is a dire need for intensive guidance. The induction of novice teachers is gaining much attention worldwide for quality professional performance and teacher retention which could be portraying the result or sign of job satisfaction in line with one of the aims of the Induction Program at NUL that intends *"to, help the Beginning Teachers to... gain job satisfaction, expressed as a wish to remaining in the teaching profession"* (National University of Lesotho, 2006).

5.2. The study limitations

The researcher was generally conducting the two studies while she had been involved with almost all research participants in varying capacities and levels and researcher effect surfaced. To ease the atmosphere participants were allowed to deliberate in English and Sesotho and the simple language and their expressions were adopted. With no accessible local research on teacher education in connection with the training of the science education STs and documented information on their performance during TP there was no reference point for the researcher. That resulted in the use of available sources from a wide spectrum of countries with their peculiar contexts. The linear choice with single study subject, one course in one school limited the scope for the intervention due to the time factor which however was rigorous and comprehensive.

The indirect observation of STs in action resulted in textual reports from TPTs and STs which admittedly were an abstract version of the actual occurrence and also likely to have flaws. But the presentation of texts from multiple sources and varied for the same participants was a precaution against the possible distortion of the situation since that enabled cross checking.

5.3. Issues for further research

The study findings open a lot of research avenues such as: extending similar study into other areas of the educational system that could ultimately lead to the attainment of the anticipated national goals from education; studying educators and teachers' idiosyncratic practices; exploring the modes and impact of interactions between teaching practice tutors and student teachers; investigating the modes of effective partnership mechanisms between the teacher training institutions and the practice schools for beneficial collaboration; and implementation of policies and their impact.

5.4. Final remarks

The observed pervasive inadequacy with pre-service teachers' classroom teaching proved to endure into the in-service practices hence the outcry of poor student performance trickling down to weak workforce that does not help in emancipating the nation from challenges such as unemployment and poverty. That compels the ongoing research in teacher education and reference to and implementation of the research results in teacher preparation programs which hopefully could gradually bridge the gaps. It is maintained that if there could be some evident concerted strong and ongoing support, guidance and supervisory systems which keep the STs, TEs and TPTs interactively engaged time might be utilized to curb the reported limitations. Clear policies at all levels of teacher education could facilitate the enforcement of the procedures leading to attainment of shared and clear goals embracing the coherent core curriculum related to practice. Thus, the whole training program should be more formalized, comprehensive, intensive and purposeful.

The issue of cross-cutting fragmentation in teacher education is a critical concern and the amalgamation of issues and phases in pre-service teacher training is unavoidable. The consideration could hopefully bring to fruition the requirements for coherence, collaboration, teacher educator modeling of innovative teaching, inclusion of core issues for teacher knowledge and practice, and the realistic time for teacher training.

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