When Professional Development Works: South African Teachers' Perspectives

Matseliso L. Mokhele[1] and Loyiso C. Jita[2]

School of Education, University of South Africa, P. O. Box 392,
Unisa 0003 Pretoria, South Africa
Faculty of Education, University of the Free State, P.O. Box 339,
Bloemfontein 9300, South Africa
E-mail: [1]<mokheml@unisa.ac.za>; [2]<jitalc@ufs.ac.za>, [2]< loyiso.jita@gmail.com>

ABSTRACT Despite the general acceptance of continuing professional development (CPD) programmes as essential to the improvement of education, reviews of professional development research constantly point to the ineffectiveness of most of these programmes. Furthermore, many teachers express dissatisfaction with the professional development opportunities made available to them in schools and insist that the most effective development programmes they have experienced have been self-initiated. There is consensus that many CPD programmes have yet to understand professional development from teachers' perspectives. Such perspectives will enable one to understand what drives teachers to enlist in these programmes and how such programmes make a difference to them and their classrooms. This will help to throw light on how professional development programmes can be improved upon**.** This paper, therefore, returns the emphasis of professional development back to the teachers. It explores the perspectives of a group of South African teachers on CPD in general, their personal meaning of CPD, and its meaning in the context of their work. By interviewing a sample of teachers who were part of a science and mathematics professional development intervention, the researchers explored the teachers' opinions of the intervention; its meaning to them and their work; and its impact on their classroom practices. The researchers present data from a longitudinal study of the teachers in greater detail. In discussing the data, the researchers argue that CPD, however well- intentioned and executed, is received differently by each teacher as a result of their personal circumstances and investment in the programme. The researchers then conclude that the greater the unity between the personal circumstances and motivations of the teachers and those of the CPD intervention, the more likely the outcome will be meaningful for the participating teachers. In turn, the ability to sustain the benefits of the intervention will be enhanced by such unity. An emergent recommendation is for policymakers and other providers of CPD to strive for such a unity of purpose.

INTRODUCTION

Professional development is, according to Fletcher and Zuber-Skerritt (2007), a significant issue in all workplaces for dealing most effectively with the complexity of modern society. Unprecedented technological advancements in recent times mean that changing workplace demands and a need for current knowledge results in ongoing economic imperatives that professional development seeks to address. Professional development is, therefore, a costly part of what governments, professions, companies and indi-

viduals must do in order to respond to contingencies and build platforms for sustainable growth in reaction to continuous change Fletcher and Zuber-Skerritt (2007).

In education, Continuing Professional Development (CPD) is increasingly becoming a priority in most countries throughout the world. It is widely viewed as the most effective approach to prepare teachers adequately, and to improve their instructional practice (Fraser et al. 2007). In other words, the CPD of teachers is one of the key factors in ensuring that education reforms, at any level, are effective. International evidence seems to suggest that the progress of educational reforms depends on the individual and collective capacity of teachers and its link with the school-wide promotion of the education of pupils (Stoll et al. 2006). Building the capacity to do so is thus critical, and that is what CPD aims to achieve. Various scholars concur that professional devel-

Address for correspondence:
Loyiso C. Jita
Faculty of Education,
University of the Free State,
P.O. Box 339,
Bloemfontein 9300, South Africa
E-mail: jitalc@ufs.ac.za

opment is goal-oriented and argue that it needs to be continuous, supported through a variety of techniques, and adapted to the specific needs of the teachers and students it affects (Little and Houston 2003). Bates (2000) argues that CPD becomes effective when it is needed rather than when it is offered. This argument is based on the premise that a teacher will be able to use the techniques learned in the programme, if not immediately then at some point in the future. Successful CPD opportunities for teachers tend to have significantly positive effects on the performance and learning of students (International Institute for Education Planning (IIEP) 2003). Similarly, Bolam (2000) argues that professional development is an essential part of improving school performance. Since the goal of most education reforms is to improve student learning and teacher performance, the professional development of teachers will continue to feature prominently in large education reforms. Teachers are at the heart of such reforms for they must execute the demands of these reforms in the classrooms. High quality CPD is inevitably a central component in nearly every modern proposal for improving education.

For these reasons, teachers are expected to fulfil dual roles: teaching and engaging in CPD (Harwood and Clarke 2006). To do so, they must receive high-quality professional development and be given time to implement what they learn through validated interventions (Deshler and Schumaker 1993).

There are many professional development programmes that exist, which vary widely in terms of their content and format. Most programmes however, share a common purpose: to alter the professional practices, beliefs, and understanding of school persons towards an articulated end (Guskey 2002). CPD programmes are therefore viewed as systematic efforts to change the practices of teachers in the classroom, to change their attitudes and beliefs, and to change the learning outcomes of students. In her research, Borko (2004) provides evidence that intensive professional development programmes can help teachers to increase their knowledge and improve their teaching. While most developed countries have an established history of professional development, in South Africa the systematic skilling of the nation's workforce is relatively new and has major political, economical and social implica-

tions. As a result, the South African government has also adopted a range of programmes and approaches which are designed to support political stability, economic growth and educational development (Fletcher and Zuber-Skerrit 2007).

Despite the general acceptance of CPD programmes as essential to the improvement of education, reviews of professional development research constantly point to the ineffectiveness of these programmes (see Cohen and Hill 2000; Kennedy 1998; Wang et al. 1999). Furthermore, many teachers express dissatisfaction with the professional development opportunities made available to them in schools and insist that the most effective development programmes they have experienced have been self-initiated (National Research Council (NRC) 2007). A variety of factors undoubtedly contribute to this perceived ineffectiveness: such factors include the fact that a majority of the programmes fail to take into account two crucial factors: what motivates teachers to engage in professional development, and what processes take place which cause a change in the teachers (Guskey 1986). Worded differently, there is a consensus that many CPD programmes have yet to understand professional development from the teachers' perspective. The key questions from this perspective are what drives teachers to enlist in these programmes and how such programmes can make a difference to the teachers and their classrooms. This paper therefore seeks to correct this anomaly by returning the emphasis of CPD research back to the teachers. The study explores teachers' perspectives of CPD, by focusing specifically on a science and mathematics initiative to develop teachers (called the Mpumalanga Secondary Science Initiative or MSSI initiative) and its influence on the teachers' classroom practices.

The Mpumalanga Secondary Science Initiative (MSSI) Project

The Mpumalanga Secondary Science Initiative (MSSI) was launched in 1999 as a province-wide initiative aimed specifically at promoting a more collaborative approach to teacher development in the province of Mpumalanga in South Africa. The MSSI was a large scale initiative of CPD for mathematics and natural science teachers. The project had two phases: the period from April 1999 – March 2003 was known as Phase 1

while the period from April 2003 – March 2006 was known as Phase 2. The MSSI project sought to improve the quality of teaching and learning in Mathematics and Natural Sciences by enhancing the knowledge and experiences of the teachers. Coupled with this goal, the project promoted school-based or on-the-job in service training (INSET) where teachers from neighbouring schools came together to prepare lessons and share mathematics.

The MSSI approach, initially involved the training of curriculum implementers (CIs) (sometimes called Subject Advisors), who were then expected to act as teacher trainers (Jita and Ndlalane 2005). The CIs are subject specialists who are employed throughout the province to organise and support teacher professional development and other professional activities related to teaching and learning in schools. The training of CIs was initially carried out through a five-week group-study in Japan. Upon their return, the group of CIs was expected to organise district-level workshops for Mathematics and Science Heads of Department (HoDs) in the secondary schools within the districts. The HODs would, in turn, convene training sessions for their colleagues in the schools. In the latter stages of the project (Phase 2), however, the key stakeholders in the MSSI intervention opted for a slightly different approach to CPD in order to correct some of the perceived shortcomings of Phase 1. The MSSI in Phase 2 sought to bring the intervention much closer to the teachers and the classrooms. The new strategy of using teacher clusters (or networks) was intended to impact on the teachers' classroom practices more directly than had been the case in Phase 1. The entire project exposed the teachers to Japanese experiences and practices through the study missions in Japan. Secondly, Japanese subject matter experts and other subject experts from a local university were recruited to assist the teachers during the teacher (cluster) workshops. It also included the district education officials who were sent to Japan to observe the local education administration practices for CPD. Local university experts played a critical role in translating and supporting the Japanese experiences of the teachers and the managers upon their return to South Africa. The University of Pretoria (UP) helped to introduce Curriculum 2005-thinking into the MSSI teacher development programme. As noted earlier, the programme targeted three major stake-

holder groups: Firstly, the mathematics and science educators that teach both in secondary and primary schools in Mpumalanga. These educators were expected to form groups that are known as "teacher clusters" that would meet on a regular basis for professional development activities and sharing. Secondly, there were mathematics and science teachers who were entrusted with the role of leading other teachers in promoting cluster-based and school-based professional development activities in their circuits and schools. Such teacher leaders were referred to as Cluster Leaders (CLs). The cluster leaders have since been officially recognised by the Mpumalanga Department of Education (MDE) as teacher leaders who have the task of leading and facilitating cluster meetings in each school circuit. Thirdly, there were the General Education and Training (GET or Grades 1-8) and Further Education Training (FET or Grades 9-12) curriculum implementers (CIs) responsible for overseeing the implementation of mathematics and science in the various regions of the province.

Theoretical Framework

Our study begins with the idea that teachers are the key actors in CPD and should be directly involved in educational reforms. As a result, this study is carried out using a critical theory lens, which, as defined by Gordon (1995), seeks to understand the origins and operation of repressive social structures. Critical theory involves critique of domination. It focuses on the oppression of society, casts doubt on scientific rationality, and implies that present oppressive configurations do not have to be as they are.

The concept of critical theory has existed for nearly a century and was first coined by the philosophers of the Frankfurt School in the 1930s. Critical theory challenges the biased nature of all knowledge, specifically knowledge that is transmitted via dominant institutions such as schools and the media (Morrel 2009). It focuses on the oppression of the individual, the group, and of society by self-imposed or external influences. In order to emancipate people from all levels of oppression, people must engage in a critique of the personal, situational, and historical forces that are the cause of the oppression (Peca 2000). Peca (2000) further notes that critical theory focuses on power and this is significant as social power is seen as the basis for inequality in

society (p. 3). Not only do critical theorists attempt to discover why oppressive structures exist and critique their effects, but they also explore ways in which we can transform our society. In this sense, critical theory is not simply a critique of social structures; it is an analysis of power relations (Lynn and Parker 2006). Critical theorists ask questions about power, such as what constitutes power, who holds it, and in what ways is it utilised to benefit those already in power (Morrel 2009). These ideas have been considered in various ways by sociologists and theorists throughout the 20th century who have attempted to explain the reproduction of social, racial, gender and educational inequality. The present study began from a premise that the present CPD interventions have not served the teachers as well as they could in part because of the absences of teachers' voices during their planning.

The goal of critical theory, according to Popkewitz (cited in Peca 2000:6) is to change the world rather than describe it. To engage in the dialectical process causes an increased awareness of reality and from this, change may occur. The present study looks specifically at the views of teachers and which professional development model they believe is the best for improving their classroom practices. The researchers were particularly interested in how teachers' opinions can influence educational research, policy and practice. The researchers agree with Giroux (as cited in Darder et al. 2003) that teachers are key figures in education, and as intellectuals they deserve to have some influence in addressing oppressive conditions in classrooms as well as schools. Critical theory is therefore important in framing this study because of our belief that those most affected (the teachers) should be involved in framing the problems and evaluating the various proposals for addressing them. Teachers' opinions should be considered as they are involved in doing, rather than for interventions to rely solely on the perspectives and analyses of the developers of professional development programmes.

RESEARCH METHODOLOGY

For the purpose of this study, the researchers opted for a qualitative research approach. Such an approach provides a number of distinct advantages for a study such as this. As Creswell et al. (2010) asserts qualitative research attempts to collect rich descriptive data on a particular phenomenon with the intention of developing an understanding of that phenomenon. This research approach focuses on how individuals and groups view and understand the world and construct meaning out of their experiences (Creswell et al. 2010). In studying teachers' perspectives, it is their experiences of this CPD project and the meanings ascribed to those experiences that we were particularly interested in. The MSSI provided the context, or the "world" in the terminology used by Creswell et al. in which the teachers' constructions of meaning and understandings could be described and interpreted for this study. After seeking the necessary permission from the district offices and the schools, the researchers identified a group of 20 teachers in the Ehlanzeni district of Mpumalanga, who had been part of the MSSI throughout its implementation from 1999-2003. Within this group, the researchers further sampled those teachers who had participated in the project for its entire duration, and had also been involved in all its various components, from the large scale workshops, the small group clusters and the exchange visits to Japan. Based on all these features, we narrowed our focus to 7 teachers who were briefed about the study and provided their informed consent for participation. For data collection, we visited each of these teachers' schools and conducted prolonged interviews with the selected participants. The fieldwork for the study was done between July and October 2010. During this time, a minimum of two 5-day visits were made to each of the school where teachers were interviewed several times. The researchers conducted semi-structured interviews with the mathematics and science teacher. The researchers did this in order to establish their views on professional development in general and the MSSI project in particular. The interviews provided information about the teachers' educational backgrounds, their teaching practices and their involvement in the other professional development programmes. Interviews were also used to get a clear sense of the impact of the MSSI project on the teachers' classroom practices.

FINDINGS AND DISCUSSION

The researchers focussed their discussion on the five major findings that emerged from the

data analysis. First, the researchers discuss structure as an important consideration for teachers when reflecting on a programme of continuing professional development. Then they explored the findings with regard to collaborative teaching, content knowledge, duration of engagement and personal transformation and growth.

Structure of the Continuing Professional Development

In terms of the MSSI project, the sample teachers interviewed were both attracted to and intrigued by the structures that were used to promote teacher learning and change. The MSSI project adopted cluster or network approaches where teachers from different schools convened to discuss issues relating to the teaching and learning of mathematics and science. These teachers (in the clusters) met at different times and participated in activities designed to challenge and change their knowledge and classroom practices. Here is how one of the teachers reflected on these "new" structures (the clusters):

Yes, we came together as teachers from different schools. We were helping each other. A teacher would come and present his problem to the group. We would discuss the problem together, and one of us would teach the topic. As he is teaching we would identify the loopholes in his teaching and we would discuss, taking note of the problem that was raised by the teacher. If you wanted the background on the chapter you came and we discuss the chapter as a group, then you have knowledge.

Many of the participating teachers found this structure to be useful as a vehicle for learning. They argued that, they gained new knowledge through sharing information with other teachers. In the clusters, the teachers formed smaller subject-related groups to share knowledge and expertise under the facilitation and support of university-based subject matter experts. That is, the science teachers further grouped themselves while the mathematics teachers also formed themselves as one group. The clusters therefore seemed to have fostered networking, sharing and collaboration among the teachers. As if in agreement with what the teachers in our study had to say about teacher networks, Villegas-Reimers (2003) argues that networks bring teachers together to address the problems which they experience in their work. In that way, the teachers thereby promote their own professional development as individuals and as groups.

It was not only the clusters that made the MSSI structuring to stand out for the participating teachers. Another important dimension of the structure of the MSSI relates to the teacher workshops. The workshops were presented by the curriculum implementers to the cluster leaders who would then train fellow teachers during the cluster meetings. Each cluster selected a leader who would receive further training that he/she was expected to bring back to his/her cluster. The MSSI teachers were happy with much of the information received from these workshop sessions and considered them to be informative and helpful in their teaching:

I would prefer the workshops, you see. They keep the teachers on their toes. Not to say you know, the workshops are telling you that you do not know. In the workshops we were trained on how to prepare a lesson, you find that I know how to prepare a lesson from the college, you find that is now an old thing, so the workshops helped us to prepare lessons nowadays, how to set a quality exam for the learners, and how to conduct the experiments, and how to improvise. That's why I can recommend the (MSSI) workshops.

This support for the workshops by teachers is also reflected in the literature on professional development. Cutler and Ruopp (1999) for instance, argue that teachers found the particular continuing professional development workshops important for personal development, support, the provision of information, teaching confidence, skills development and a change in teaching habits. However, the researchers the researchers' analysis in this case shows that for many of the teachers, it was the combination of both workshops and cluster meetings that made the structuring of the MSSI project work for them. As one of the teachers noted:

I think what I like most about MSSI; I can say almost everything but mostly the workshops and the clusters. Because in the workshop that is where now we were getting more information on what we were supposed to do in the classroom and also in the cluster, we were also helping one another on how to teach the learners, in terms of the content, in terms of approaching any topic, and in terms of making preparations. So I can say (a combination of) the two helped us.

The strategy of combining the two professional development models, as they are sometimes called in the professional development literature, (the teacher clusters and the workshops), is consistent with some of the recommendations from recent literature on CPD. It is an innovation that takes the best from both worlds. Swart et al. (2002) note that given the new understanding of professional development as an ongoing process of growth and learning, there are cases that show that offering workshops, seminars and courses, in accompaniment to other types of professional development, can be successful. In the case of the MSSI, the researchers' data suggests that the teachers indeed felt more comfortable with the combination of both the cluster meetings and workshops. The combination provided various opportunities to complement and consolidate learning from both models.

The other component in the structuring of the MSSI initiative relates to the project's study visits to Japan. The curriculum implementers (CIs) participated in a 6-weeks group study in Japan in order to "enhance their own curriculum development skills, to be exposed to relevant Japanese practices, and to develop teacher and learner support materials with support from Japanese subject matter experts" (Mpumalanga Department of Education 1999). The resulting support materials were to be used in South Africa as resources during professional development programme for the teachers. Here is how one of the participants of the study reflected on the experience:

In our six weeks visit in Japan, we learned how to teach science and how science is taught in other countries. We also engaged with professors on the content. They lectured to us, they conducted experiments with us, they also took us somewhere where we could see science in practice. The visit really was an eye opener. We did everything that could help one to teach science.

There are not many examples of teacher professional development programmes that allow an exchange of experiences among the participants by physically visiting different teaching contexts during the professional development sessions. In their view, a teacher professional development programme that is comprised of all of the three structural features discussed in this section is capable of improving their classroom practices. More significantly, it is not just one separate aspect of the structure that makes for a greater impact, but a combination of all three in one initiative seems to provide possibilities for greater benefit.

Teacher Collaboration

In the MSSI project, teacher clusters were not just structures around which the CPD was constructed. They soon became convenient vehicles for networking and fostering subject-specific collaborations.

It is argued that one of the means for realising collective participation in a CPD project is by recruiting several teachers from the same school, grade, or department. This allows for interaction and discourse among colleagues, which can be a powerful form of teacher learning (Borko 2004; Desimone et al. 2003). Furthermore, it is likely that the benefits would increase as teachers from one school begin to work with groups of teachers from other schools. In the MSSI project, teachers were expected to meet in clusters and through these get in contact with others and learn new skills. These clusters were a collection of teachers from various schools across the province of Mpumalanga. Through these clusters, teachers got in contact with other teachers and could learn new skills from each other. The teachers also supported each other by sharing their experiences. This is how one of the interviewees described the sharing and networking experience in the MSSI:

There were two teachers from Khumbula Secondary school and Sbula and there were other teachers from white river circuit, actually we were sort of a big team, we were more or less twenty of us , we met together and discussed ...I can say lesson preparation, prepare together and looking at challenging chapters and hoe we can help one another in terms of subject content. The curriculum implementer was always there to monitor and assist us

It is evident from the above description that teachers from different schools met and conducted many of the activities as a group. Besides the specific content knowledge that the teachers discussed in their clusters, they also shared and discussed their problems regarding pedagogy and classroom practice. Several researchers (such as Dittmar et al. 2002; Marneweck 2002; Muijs 2008) concur that cluster membership has several advantages, which include the fact that

the exchange of expertise is improved as members learn and solve problems collaboratively. This tended to be one of the benefits provided by the MSSI to the participating teachers.

The Content Focus and the Context of Teaching in the Rural Settings

The third finding from the case studies is the importance of focusing on subject matter content in a professional development programme. Indeed, the MSSI project focused deliberately on mathematics and science. In all the activities, the subject matter content was an ever-present theme. For example, in the workshops and the clusters, the teachers' exchanges were all about the subject matter content and how to effectively teach it to learners:

In the workshops, they used to train us on content, because as I have indicated, you find that some topic may be just difficult for the teachers and then the CI would come and help us here (in the workshops). So when we come back from those workshops we would get to our clusters and share everything that we learned from the workshops with the teachers. We equipped each other so that we go back to our various schools and give our learners the right thing.

The focus on content knowledge was very evident to the participating teachers, as described by yet another teacher:

We did content, all about Natural Science. I remember the ecosystem. They told us about each ecosystem that you can take the learners to observe and that it is not always that when you want to show learners the eco-system you take them to Kruger National Park. Even around the school, yes, we were not aware that around the school can be an ecosystem but when they taught us we become aware, even now when I want to take the learners to observe an eco-system I take them to the ground here at school.

The weaknesses of many science and mathematics teachers in mastering the content in these subjects, has been discussed extensively by many South African researchers (for example, Jita and Ndlalane 2006). It is with this in mind that the MSSI project opted to focus the project on the subject matter content of science and mathematics. The idea was to address the weaknesses in the teachers' knowledge of their subject matter. Interestingly, the quotation above provides evidence that confirms the need for such a

focus. For a Natural Sciences teacher to be so excited about the discovery that ecosystems exist all around their school and not only in conservation parks such as the Kruger National Park is indicative of the serious lack of depth in the teachers' knowledge of the subject matter. The fact that this example was remembered so vividly by this teacher, even a few years after the intervention, demonstrates how profound a learning experience the intervention must have been for her.

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It is evident that the activities that the teachers were involved in for the MSSI project emphasised mathematics and science content. This seems to have been one of the highlights of the MSSI projects. What actually attracts teachers to professional development is, according to Guskey (2002), their belief that it will expand their knowledge and skills, contribute to their growth and enhance their effectiveness with their students. The data in this study shows that a professional development initiative that focuses on content tends to provide teachers with the knowledge, skills and confidence to teach the subject matter better. From the teachers' perspective, it makes implementing their new knowledge and skill easy. This sentiment was echoed by another one of the participating teachers:

I found it helpful when we did the content. I enjoyed it so much. It improved my knowledge. It was refreshing, uplifting and it really made me feel like I am a teacher. That's why I would love to go again, there are a lot of changes taking place and they need a teacher to develop himself/herself. If you stay, you will be left behind!

Time of Engagement

The fourth major finding of this study deals with the amount of time available for teachers to attend professional development programmes. The amount of time spent in the professional development activities must receive consideration because professional development, by its nature, should happen while the teachers are engaged in their work and profession. Longer activities, as noted by Desimone (2009) are more likely to encourage in-depth discussions of content, student conception and misconceptions.

In their discussion of duration, Garet and his colleagues also argue that the longer the professional development activities are, the more likely they are to encourage in-depth discussions of content and pedagogical strategies (Garet et al. 2001). These scholars also indicate that the more time that is spent on activities will result in a greater likelihood that teachers will be able to implement their new practices and obtain feedback on their teaching.

Data of this study suggests that the MSSI took the issue of duration seriously and provided extended opportunities for the teachers to acquire new knowledge and practices, and to then practice those in a supportive environment (aided by the curriculum implementers and university professors involved in the partnership). The MSSI project was implemented over a period of seven years (with an additional two years of group study visits to Japan), and this duration exposed teachers to all of the different activities within the project. The central focus of all the activities was on learning the subject matter content, and practicing the new approaches to teaching that subject matter in their own classrooms. The MSSI was not only exemplary in terms of its longer duration of intervention (7+2 years) but also in its design of the project activities. The 6-week long exchange visits to Japan for example, the monthly cluster meetings and also the week-long workshops for cluster leaders during school holidays were exemplary from the teachers' perspectives.

I was the one that was organising the activities, making sure that at least per month we are having two formal meeting, where we discuss issues, but every week we would be having an inset where we would be dealing with problematic topics in science.......

Another teacher in the group contributed to the discussion:

You see, I had an opportunity to go to Japan. I stayed there for about two months. We did a programme on practice science teaching in secondary schools.

Personal Transformation and Growth

The fifth and final set of finding in this study suggests that personal transformation and growth is important for teachers who participate in a professional development programme. Teachers are attracted to a professional development programme not only because of the four aspects discussed earlier, but also primarily because it can fundamentally change them for the better. This is the theme that we have labelled "personal transformation and growth". In his account of why some teachers are able to change their classroom practices by adopting very difficult and challenging approaches to their teaching of science, Jita (2004) argues for the need to consider the teachers' biographies or identities as a critical factor in this ability to change. He argues that the teachers' (multiple) identities contribute to determining whether they are able to change their classroom practices and embrace some of the more fundamental changes that are required in many of the curriculum reforms. Based on his research with a group of South African science teachers who managed to significantly change their classroom practices to promote student learning, Jita (2004) argues that "to change their classroom practices, teachers in South Africa and elsewhere will be challenged to (first) reconsider and change who they are as individuals (identities) within existing frameworks of educational practice" (p. 25).

If professional development programmes such as the MSSI programme aim to help teachers to change their classroom practices, then they may need to pay more attention to the issue of teacher identity. In this view, CPD programmes will have a better chance of success if they help to change who the teachers are personally, by, for example, providing them with life-changing experiences which can become a catalyst for such changes. Unfortunately, many professional development programmes concentrate either on the content or on the teaching methods without considering what the impact on the teachers' individual personal transformation and growth may be (Van Eekelen et al. 2006).

One of the key findings about the MSSI project was that it afforded the participating teachers several opportunities to change their lives. Some of the teachers discussed how the project enabled them to transform their lives and grow on a more personal level. In one very vivid case, a teacher who had not previously studied or majored in natural science was asked by her principal to teach the natural sciences. She had in fact studied geography for her teacher training diploma but the MSSI initiative helped her to change her professional identify:

You see it (the MSSI) helped me so much. When I got to this school, I was asked to teach general science and I have done only biology

(life sciences) and geography at the college. I knew nothing, nothing about science but then, by attending this programme, I like it and I am confident with teaching of natural sciences.

The important point raised in this quotation is how the teacher's life changed forever through her participation in the project. Although she had studied the subject life sciences at college, by her own confession she was in no way close to being a physical sciences teacher. Her participation in the MSSI project however, enabled her to learn and develop the knowledge, skills and confidence required to teach physical sciences. Over the period of her involvement in the MSSI, she was literally transformed into being a competent natural sciences teacher irrespective of her previous qualifications. She finally felt confident that she was able to do all of the activities that were associated with the teaching and learning of natural sciences:

This programme helped me a lot, hence I said I knew nothing about Science, and then by attending the workshops and participation in the clusters I gained more knowledge and confidence on how to teach natural science. My attitude is changed. I used to think that natural science was the most difficult subject.

This is one example of how a professional development programme can begin to reshape a teachers' identity forever – changing an insecure Life Sciences teacher into a competent and confident Natural Sciences teacher. Through this example and others from the data collected, the researchers have a picture of the kind of professional development programmes that teachers would like to enlist in, as something that would have a lasting effect on their lives beyond the duration of the project. Through her own active participation in the programme, and the MSSI experiences, the teacher referred to earlier will forever see herself as a competent Natural Sciences teacher.

A similar example in this category of changing the lives of the teachers relates to the teacher exchange visits to Japan. Teachers, who had the rare opportunity to travel and experience the Japanese (teaching) culture first-hand, also saw the project as a transformational experience which changed their lives:

The visit to Japan was an eye opener, because it's where I met other colleagues from other African states. There was a person from Zimbabwe, one from Zambia, one from Ghana, one from Tanzania and one from Uganda. You know, from my experience one could see that we were teaching the same thing but in different ways.

In the latter example, the teachers were able to experience the Asian culture and specifically the Japanese teaching culture first hand. Even if the expedition were to be merely a tourist venture to the East, it would still have been a life changing experience. However, in reality, the visits to Japan were not just about experiencing and learning another culture, but were part of a carefully designed programme to enhance the teachers' knowledge, skills and teaching practices, and to offer extended opportunities for self-reflection and personal transformation. The interactions with other teachers from various African countries were also an opportunity for the MSSI teachers to learn about the teaching of science beyond the borders of South Africa. Such opportunities are indeed very rare, but have the potential to be transformative. There are many such stories of personal transformation that the participating MSSI teachers discussed during the interviews. Beyond these personal transformations, many of the participating teachers got promoted largely as a result of their participation in the MSSI project. In the final analysis, the data suggests that the MSSI teachers felt more comfortable with their professional development programme, partly because it focused on their personal needs for transformation and growth.

CONCLUSION

In this paper, the researchers have discussed five major sets of findings that have emerged from the study of teachers' perspectives on CPD. These findings begin to provide suggestions for what the teachers identified as the best characteristics of effective professional development programmes they had attended. The study examined the teachers' perspectives and listened carefully to the issues they raised. The researchers have learned, somehow, what a professional development programme that works may look like from the perspectives of the teachers. While the researchers know that the features may not necessarily work for all teachers at all times, however an important lesson of the present study is that it is imperative that teachers are directly involved in their professional development. The findings in this study suggest that in order for

continuing professional development programmes to be successful, they have to be meaningful to the participating teachers. The challenge for policymakers therefore is to understand what the teachers want and what they find meaningful. Using that information, they can then design continuing professional development programmes that respond to teachers' needs.

RECOMMENDATIONS

The central thesis of the present paper has been that teachers should not only be involved in the planning of the CPD programmes, but that the programmes should be aligned with their own personal circumstances and motivations. Only if the CPD programmes have personal meaning for the teachers will they have the potential to be transformative and life changing. Policymakers and organisers thus need to ensure that CPD programmes are relevant to the lives and work of the teachers.

If it is correct that changing the classroom practices of teachers may be influenced by whether the CPD programmes they attend are transformative, then there is a bigger challenge for organisers of teacher professional development programmes. The challenge or recommendation is (for them) to determine which experiences have the potential to be personally meaningful and transformative for the participating teachers. Such knowledge and information can only result from a comprehensive interaction and collaboration with the teachers. If such interactions can be accomplished, then the resulting opinions of the teachers would be considered, protected, privileged and then incorporated into the planning and implementation of the CPD programme. In the views of the teachers in our study, it would appear that the MSSI project may be one example, however elementary, of such a meaningful interaction and collaboration with teachers for CPD.

For these teachers, the MSSI project was not just a chance to refine and develop their subject matter knowledge and teaching skills in science and mathematics, but may have been a genuinely life changing or transformative learning opportunity. In order to maximize the gains from CPD interventions, organisers therefore have a bigger challenge of designing potentially life changing or transformative learning opportunities for teachers.

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