

A case study of continuing teacher professional development through lesson study in South Africa

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We consider the professional development of in-service teachers and review traditional development efforts that have been used in the past. An alternative form of professional development using Japanese lesson study is proposed and discussed as a possibility. A case study involving the Mpumalanga Secondary Science Initiative, where lesson study was used, is described and its efficacy reviewed. The project was aimed at improving mathematics and science learning of secondary school learners using lesson study for teacher development. The discussion concludes with a reflection on the outcomes and efforts of the project.

Keywords: lesson study; professional development; teacher learning

Introduction

The introduction of Outcomes-Based Education (OBE) and Curriculum 2005 (C2005) was an unprecedented curriculum reform in the history of South Africa. However, there was a huge gap at the time between the aims of OBE and C2005 and what the majority of teachers had been trained for (Jansen & Taylor, 2003). Because OBE differs from previous practice, one would imagine that intensive and extensive professional development of teachers would be necessary to prepare teachers for the implementation of OBE (Fiske & Ladd, 2004), yet the training of teachers for OBE has been far from adequate (Jansen & Christie, 1999; Jansen & Taylor, 2003; Taylor & Vinjevoid, 1999). Rather than mount a costly and complex series of professional development, the Department of Education introduced a “cascade” model through which teachers were trained and in turn had to pass their knowledge on to their colleagues. Teachers frequently complained though that even the district trainers themselves did not always understand the curriculum. The result has been the “watering down and/or misinterpretation of crucial information” (Fiske & Ladd, 2004:162).

The initial reform in South Africa, which envisaged the implementation of OBE and C2005, may not be as successful as was hoped. Among the many factors that may have hampered its implementation, the lack of adequate teacher professional development probably had a more serious effect than others (Fiske & Ladd, 2004). Would professional development of teachers produce effective teachers?

Villegas-Reimers (2003) reviewed international literature on teacher professional development and considers professional development of teachers as one of the key elements in most of the educational reforms currently in progress in the world. She emphasises the relationship between educational

reform and professional development of teachers and further states that:

Currently in the world, most societies are engaged in some form of educational reform ... Regardless of the scope of the reform, the relationship between educational reform and teachers' professional development is a two way, or reciprocal, relationship ... educational reforms that do not include teachers and their professional development have not been successful. Professional-development initiatives that have not been embedded in some form of structures and policies have not been successful either (Villegas-Reimers, 2003:24).

Although professional development lies at the heart of nearly every educational effort to improve teaching and learning, it is not the panacea for all problems. In fact many models of professional development do not achieve their ambitious learning goals. Yet professional development is still seen as the best means to change teaching practice (Supovitz & Turner, 2000).

Traditional paradigm of professional development

Professional development of teachers, often called in-service education or staff development, has been conducted for different purposes and in different forms. Greenland (cited in Villegas-Reimers, 2003) identifies four categories of in-service education by purpose: for certification of unqualified teachers, to upgrade teachers, to prepare teachers for new roles, and curriculum related dissemination or refresher courses. Regardless of the purpose, traditional in-service education/teacher professional development programmes are delivered in the form of workshops, seminars, conferences or courses (Ball & Cohen, 1999; Collinson & Ono, 2001; Feiman-Nemser, 2001; Fullan & Hargreaves, 1996; Schulle & Dembélé, 2007; Villegas-Reimers, 2003; Vonk, 1995). These efforts have been criticised by many researchers as being brief, fragmented, incoherent encounters that are decontextualised and isolated from real classroom situations (Ball & Cohen, 1999; Collinson & Ono, 2001; Feiman-Nemser, 2001; Fullan & Hargreaves, 1996; OECD, 2005; Villegas-Reimers, 2003; Vonk, 1995). The traditional approaches to professional development of teachers, which Kelleher (2003:751) calls "adult pull-out programs", are less likely to result in improvement of teaching. Fullan (1991:315) stated the following:

Nothing has promised so much and has been so frustratingly wasteful as the thousands of workshops and conferences that led to no significant change in practice when the teachers returned to their classrooms.

The same dissatisfaction is observed in the research on professional development of teachers in developing countries (Leu, 2004; MacNeil, 2004; Villegas-Reimers, 2003; Schulle & Dembélé, 2007; Tatto, 1997; Tatto & Velez, 1997). In many developing countries, professional development of teachers has been neglected because of budget constraints and heavy emphasis on pre-service education, but when it is provided, the cascade approach is popular for reaching many participants in a short time (Leu, 2004). The cascade or "multiplier" approach transmits the knowledge or information from the top to the

lower stratified groups of teachers. This consequently entails “training-the-trainer” to ensure that the message “flows down” from experts and specialists, eventually to the teachers. A cohort of teachers is given short training courses and the teachers are then required to pass on their knowledge and skills to further cohorts of teachers through formal courses (Peacock, 1993). The advantages of this training model are that it allows for training in stages so that progress can be monitored and information can be disseminated quickly and to a large number of teachers as more and more of them receive training. In theory cascade training is cost effective as those who have been trained can then train others, thus limiting expenses. This is the approach that the South African Department of Education adopted and relied on when OBE and C2005 were introduced.

The cascade model can be “an effective strategy to transmit messages about aspects of educational reform” (Leu, 2004:2), but the intended message does not cascade down to lower levels without the appropriate mechanisms and support to ensure multiplication. When transmitted to the next level, chances are high that the crucial information may be watered down or misinterpreted (Fiske & Ladd, 2004). The cascade model of teacher professional development was designed and operated under the same paradigm of teacher professional development criticised in developed countries in which learners were passive receivers of knowledge.

Beliefs about what teachers should know are linked intrinsically with beliefs about the type of knowledge worth teaching in schools ... In most countries schooling is characterized as using a “transmission model” where teaching is telling, and learning is “absorption”. This description fits most teacher education as well (Tatto, 1997:213).

Alternative professional development

The rise of constructive approach to learning coupled with criticism of traditional teacher professional development efforts lead to an alternative paradigm of professional development in the 1990s. Advances in brain research support the understanding that the human brain is constantly searching for meaning and seeking patterns and connections (Bransford, Brown & Cocking, 2000; Caine & Caine, 1994; Sylwester, 1995). Based on this notion, it is implied that learners construct knowledge of their own by deconstruction, interpretation and reconstruction when engaged in activities and in social discourse that take place in a certain context. In other words, knowledge is situated and is socially and culturally constructed (Brown, Collins & Duguid, 1989; Bruer, 1993; Bruner, 1996; Lave & Wenger, 1991; Rogoff, 1998). As Brown *et al.* (1989:32) put it, knowledge is in part “a product of the activity, context and culture in which it is developed and used”. The constructivist theory of learning is backed up by brain research for rethinking what is taught, how it is taught and how learning is assessed (Bransford *et al.*, 2000).

Partly in response to this interpretation of learning, an alternative approach to teacher learning has been proposed (Borko & Putnam, 1995; Col-

linson, 1996; Collinson & Ono, 2001; Darling-Hammond, 1996; Hiebert, Gallimore & Stigler, 2002; Lieberman, 1995; Lieberman & Miller, 1991; Tatto, 1997). Bransford *et al.* (2000:27) argue that “the principles of learning and their implications for designing the learning environment apply equally to child and adult learning”. They maintain that professional development programmes should be learner centred, knowledge centred, assessment centred and community centred to optimise teacher learning.

Villegas-Reimers (2003) suggests that a new perspective of professional development should be,

- based on constructivism;
- perceived as a long-term process;
- perceived as a process that takes place within a particular context;
- intimately linked to school reform;
- conceived as a collaborative process;
- very different in diverse settings.

Leu (2004) contrasts the different approaches to teacher learning in professional development in Table 1.

Table 1 Teacher learning (Leu, 2004:6)

Previous approach	Alternative approach
The goal is to have teachers who are competent in following rigid and prescribed classroom routines	The goal is to have teachers who are reflective practitioners who can make informed professional choices
Teachers are “trained” to follow patterns	Teachers are prepared to be empowered professionals
Results in passive learning	Results in active and participatory learning
Cascade model run as centralised workshops or programmes	School-based model in which all teachers participate
“Expert” driven	Teacher facilitated (with support materials)
Little inclusion of “teacher knowledge” and realities of classrooms	Central importance of “teacher knowledge” and realities of classrooms
Positivist base	Constructivist base

Thus, there is a consensus in the research community about “what” constitutes effective teacher professional development. However, the rift between the rhetoric and reality remains wide (Collinson & Ono, 2001; Hiebert *et al.*, 2002; Villegas-Reimers, 2003; Schwille & Dembélé, 2007).

The knowledge gap ... is not so much about knowing what good professional development looks like; it's about knowing how to get it rooted in the institutional structure of schools (Elmore in MacNeil, 2004:4).

Japanese lesson study

Lesson study has been practised in Japan for so long that it has been taken for granted by Japanese teachers and administrators (Hashimoto, Tsubota & Ikeda, 2003). Researchers in the United States of America (USA) have been interested in lesson study as an effective model of teacher professional development (Lewis & Tsuchida, 1997; 1998; Stigler & Hiebert, 1999).

What is lesson study? Lesson study is a type of classroom research in which a few teachers investigate teaching and learning in the context of an actual single class lesson. When the teachers complete the study they document their work in a report that describes the lesson they designed, explains how the lesson worked and what they have learnt about teaching and learning from the lesson study experience.

The most salient feature of lesson study is that teachers are collaboratively engaged in action research in order to improve quality of instruction. The Japanese curriculum sets up the curriculum guidelines, which form the foundation for the writing of textbooks. Although the textbooks are published after inspection and authorisation by the ministry of education, culture, sports and technology (MEXT), teachers have a major input in designing lessons through lesson study, which bridges any possible gap between the course of study as intended by the curriculum and the actual lessons as interpreted and implemented.

Lesson study became popular in Japan after the 1960s, although it had been practised since the 19th century. The origin of lesson study was the Tokyo Normal School and its attached school, both of which were established in the early 1870s. The attached school served as a laboratory school for student teaching as well as for studying and experimenting with new teaching methods. Teachers at the attached school produced reference materials to disseminate these new methods, which were originally introduced from the USA. These methods were subsequently introduced to ordinary classrooms via a normal school in each prefecture (Baba & Kojima, 2004; Hashimoto *et al.*, 2003).

Nowadays lesson study is widely practised in Japan, though the organisers and number of participants may vary (Baba & Kojima, 2004; Fernandez & Yoshida, 2004; Hashimoto *et al.*, 2003). School-based lesson study involves an entire school. Almost all Japanese schools earmark a school-based professional development period within regular working hours during which various issues and challenges are discussed by teachers and administrators. A priority in school-based professional development has been the improvement of the quality of lessons. At various educational administrative levels such as district, municipality and prefecture, study meetings or conferences are held on a regular basis. Some designated schools for research and development have a lesson study "open house" on a specific theme and attract a large

number of participants from outside their own prefecture. As part of an induction programme, newly appointed teachers are observed regularly by an assigned mentor and sometimes by the principal and deputy principal. Generally speaking, Japanese teachers have plenty of opportunities to observe lessons facilitated by others (Baba & Kojima, 2004; Fernandez & Yoshida, 2004).

Lesson study consists of three phases, collectively referred to as “plan-do-see”. The planning phase begins with the selection of the topic, and it encompasses the study of teaching materials and mapping out lesson plans. The process of lesson study is initiated by setting a goal. The teachers will work collaboratively on ways to achieve the particular goal. The study of teaching materials is believed to help teachers clarify unclear points and to confirm and strengthen the content knowledge necessary to teach the topic effectively (Baba & Kojima, 2003). Mapping out lesson plans requires teachers to have a good understanding of their learners’ needs, pre-knowledge and misconceptions. Teachers are encouraged to anticipate the challenges learners may encounter in the lesson and to be prepared with appropriate strategies to assist them.

After the planning phase, a teacher conducts the study lesson based on the plan. This lesson plan is usually photocopied and distributed to each observer. The number of colleagues who observe the lesson varies depending on the purpose of the particular lesson study. If it is a lesson study by a subject group or a grade level of teachers, the number of teacher observers is usually smaller. On the other hand, when the lesson study is carried out in a large public research meeting, dozens of observers including curriculum experts and tertiary teachers will attend. In each case, the participants will carefully watch what the teacher and the learners do. The observers listen attentively to all contributions made by the learners, and make a note on the lesson plan of the critical remarks by and/or behaviours of the teacher and the learners in relation to achieving the lesson outcomes. The observational notes on a lesson plan serve as evidence for later discussions in a post-lesson conference or forum.

In most cases, the post-lesson forum follows immediately after the lesson. If time or schedules do not allow for it, the post-lesson forum may take place later on the same day. During the forum the teacher briefly explains the intended outcomes of the lesson and the points s/he emphasised in the lesson plan. All observers are encouraged to contribute to refining and improving the lesson by asking for clarification, recognising the strengths or good aspects and identifying the challenges. Comments on the challenges should be accompanied by suggestions and alternatives.

In summary, lesson study is a professional development activity that is characterised as classroom-situated, context-based, learner-focused, improvement-oriented and teacher-owned. It is also collaborative. These features of lesson study match the elements or principles which professional development requires (Villegas-Reimers, 2003). The experience of lesson study in

Japan has the potential to get an effective teacher professional development established in schools.

Lesson study in South Africa: the Mpumalanga Secondary Science Initiative (MSSI) 1999–2006

The implementation of C2005 was a challenge for many South African teachers who had inadequate knowledge, skills and competences and who relied on teacher talk and rote memory as the predominant mode of teaching and learning (Jansen & Christie, 1999). The case was more serious with mathematics and science teachers due to inadequate training in the previous political dispensation. The result was that there were too few teachers qualified in mathematics, science and technology, and this resulted in the poor quality of teaching in these subjects in schools (Sayed, 2002) and in lower learner performance in the subjects (Howie & Plomp, 2002; Macrae, 1994; Van der Flier, Thijis & Zaaïman, 2003). In response to a request for assistance by former President Nelson Mandela, the Japan International Cooperation Agency (JICA) conducted studies for project formulation, which led to the official inception of the Mpumalanga Secondary School Initiative (MSSI) in 1999.

When the programme commenced, the Mpumalanga Department of Education (MDoE), JICA and University of Pretoria (UP) participated in the MSSI project as equal partners. It was agreed that three entities would mobilise their own resources and expertise to collaboratively achieve the project objectives, namely, to establish a school-based in-service system in the Mpumalanga province and to improve the quality of teaching in mathematics and science in the province by enhancing teachers' skills and subject knowledge (JICA, 2003). Consequently, the MSSI aimed to improve the quality of mathematics and science education by enhancing the teaching skills of in-service teachers. More specifically, although this was not stated on the project document, it aimed to institutionalise lesson study, the form of school-based, continuing professional development that is commonly practised in Japanese schools.

MSSI was implemented in two phases. Phase 1 (1999–2003) adopted a staggered implementation. Four districts closest to Tshwane joined the MSSI in the first year, four more districts in the following year and the remaining two districts joined in the third year. One curriculum implementer (CI) was involved for each subject in each district, consequently a total of 20 covering both the general (GET) and further education (FET) phases. Schools were also increasingly involved in this phase. The intention was to involve 540 schools with Grades 8 and 9 in the 10 districts; 313 schools were involved by the end of 2002. All schools across the province were however immediately involved in Phase 2 (2003–2006), but the ten districts were restructured into three regions with a total of 57 circuits. The MSSI invited two heads of departments (Mathematics and Science) from each school to attend the workshops. In most cases the heads of departments were senior teachers teaching in the FET phase. Many GET schools had only one Science and one Mathematics teacher and in some cases one teacher taught both subjects.

In Phases 1 and 2, CIs assumed the role of key players. The CIs are subject advisors appointed by the MDoE. The CIs were sent to Japan to study content and to prepare materials for three MSSSI workshops scheduled for the following year. The partnership approach was realised in two phases. The MDoE was expected to take the initiative in the planning, implementing and monitoring of the training workshops in the province at three different levels. JICA (backed by Hiroshima University and Naruto University of Education [NUE]) provided CIs and cluster leaders with the opportunity to get involved in study-cum-training in Japan and with technical support to lead the workshops on their return. UP assumed a role of “an interpreter of the Japanese subject and educational expertise in the context of C2005, and the provision of a certification process for training opportunities that could be accredited as recognised annual training hours or optional further diplomas or advanced degrees” (MDoE, UP & JICA, 2006:42).

Positive evaluation of MSSSI by both internal and external evaluators (JICA, 2003; Ofir & Stroebel, 2002) ensured the extension of the project for three more years as the “Phase 2” alluded to earlier. In this phase (2003–2006), the target grades were expanded to encompass Grades 8 to 12, with more focus on Grades 10 to 12. A lot of time and effort was expended on lesson study in the belief that one needs to work in classrooms with teachers where learning takes place in order to bring about a meaningful change in learning (Nagao & Kadowaki, 2003).

In response to the recommendation by Japanese experts, cluster leaders (CLs), who are practising teachers, were selected together with CIs to attend the training sessions in Japan in 2004 and 2005. The training programme in Japan was redesigned to focus on lesson study. The teachers and CIs literally immersed themselves in lesson study for three weeks: they researched the topics they had selected, drew up a lesson plan, conducted a simulation lesson based on the lesson plan, discussed how to improve the lesson plan, revised and taught the revised lesson plan to Japanese high school learners. After conducting the lesson, the colleagues got together to share their reflections on the lesson they had observed. It was expected that the CLs and CIs would share their learning with the others and that they would collaboratively promote lesson study in schools and in clusters on their return to South Africa.

The first study lesson and post-lesson forum were conducted in the relatively early stage of Phase 1. During the second CIs workshop in September 2000, a Japanese in-service science teacher planned and demonstrated a lesson to Grade 8 learners. The science CIs showed great interest in lesson study and presented a model lesson on their own at a subsequent workshop. Due to this interest of the CIs in lesson study, the November–December 2000 Japan training involved complete lesson study encounters at a local public school.

The lesson study cycle was planned as an important component of all MSSSI workshops scheduled for 2001. Two rounds of workshops conducted lesson study initiatives in nearby classrooms in 2001. However, an important

issue arose after the first round of workshops in 2001 when a post-lesson forum in one district resulted in criticism of the instructional skills of the presenter. It was a challenge for many South African teachers to learn what to observe during lesson study and how to record their observations. To avoid demoralising the teachers and to maximise the effectiveness of lesson study, the workshop report pointed out that in future observers should reach consensus and focus on constructive lesson analysis during the post-lesson forum (Hattori, Kita, Honda, Nishioka, Matachi, Kamiisaka, Nagao & Akagawa, 2001).

Tools for lesson observations and lesson analysis were developed by collaborative efforts of Japanese and South African teachers for the second round of workshops in May 2001. A videotaped lesson from a local school was used to practise the facilitation of an effective post-lesson forum and Japanese experts supported the teachers by serving as role models when comments were made in the post-lesson forum. Some of the principles agreed to were:

- Firstly, identify positive aspects of the lesson.
- Comment on the lesson, not the presenter: use “the lesson” instead of “the teacher”.
- Identify the areas to improve with suggestion(s).

The initial outlook of lesson study for professional development appeared bright in 2001, but contrary to the expectations of the Japanese cohort, lesson study was not practised again in workshops until 2007. Lesson study sessions scheduled in the first round of MSSSI workshops in 2002 had to be cancelled as the National Department of Education barred all workshops during the school term because of poor matriculation results. Since then the professional development sessions of teachers were scheduled to take place during school holidays. Various training workshops competed for training time, which complicated the involvement of teachers in lesson study workshops. In addition another curriculum change, namely, the National Curriculum Statements (NCS), was introduced and required preparation in the period 2003–2005. The province had to hold many “training sessions to prepare the teachers for implementation. However, the MSSSI workshops and the NCS workshops did not complement each other” (MDoE, UP & JICA, 2006:35). Phase 2 of the project faced some challenges inherent in the project design, such as more subjects, new CIs, a large number of schools to cover as well as constraints imposed by education policies.

Reflections on the MSSSI (1999-2006)

The MSSSI was not successful in its attempt to institutionalise lesson study as school-based professional development for teachers during the project period, although it did contribute to the establishment of a cluster system throughout the province. The MSSSI functioned as an effective mechanism for MDoE to disseminate information or materials in top-down manner and to use them for curriculum related activities not necessarily specific to the MSSSI project (MDoE, UP & JICA, 2006). On the individual level, the intensive lesson study

experience in Japan seems to have had a positive impact on teaching practices, although the degree of impact varies from one teacher to another (Ono, Chikamori, Ozawa & Kita, 2007; Ono, 2008).

The JICA evaluation suggested that some kind of school-based development was conducted in 15% of the schools involved. However it became apparent that very little lesson study took place as teachers indicated that it was not possible to do so. However it would not be fair to view the MSSSI project as unsuccessful because the project was affected by many factors and changes beyond its immediate control such as the structural reorganisation of MDoE, UP and JICA, almost at the same time (2002–2003), change of C2005 (Department of Education, 2002) and, following massive training efforts, the barring of workshops during school terms, the introduction of new policies such as continuous assessment and whole school development, among others. In addition, the unique situation in South Africa required that priority be placed on equity issues. It was difficult for JICA to use more resources and time on a group of schools/teachers to develop good practices, which could serve as a model in Mpumalanga.

Reflections on post MSSSI: 2006–2008

The MSSSI project was terminated in March 2006, but Japanese efforts to support professional development of South African teachers continued after the termination of the project. The study-cum-training of Mpumalanga teachers funded by JICA continued until the end of 2008. Starting in September 2005, the NUE research team visited Mpumalanga twice a year in April and September. The purpose of the visits was twofold: to understand how the teachers had experienced their training sessions in Japan and to study qualitatively how their lessons had improved since their lesson study training in Japan (Ono *et al.*, 2007; Ono, Mafumiko, Phwetekele, Adzifome, May & Chikamori, 2008). The lessons of these teachers including those reflecting on the training undertaken in Japan have been videotaped (Ono *et al.*, 2008). The NUE research team visited the teachers in the schools prior to their training in Japan. This ensured that the Mpumalanga teachers knew the NUE team before they departed for their training. Of the five objectives listed in the general information of the training course in 2006 and 2007, “to experience and comprehend the whole process of lesson study activities” was given the top priority throughout the training. In other words, the entire training course of the NUE was designed and implemented in the lesson study cycle of planning, implementation and reflection. The participants developed drafts for a Lesson Study Booklet in 2006 and 2007. This booklet contains the topics, sample lesson plans, suggestions offered in post-lesson forums and transcriptions of the lessons. The booklets are to be printed by MDoE and will be shared with all teachers at a workshop.

Of the four teachers who participated in the training in 2006, one successfully initiated lesson study in his cluster, which meets regularly for lesson planning. The lessons are presented in a classroom in the same week. Lesson plans and the comments from the post-lesson forums are filed in a portfolio.

The principal of the site is positive about practice-based professional development and expressed his full support of the activities. The teacher coordinating the lesson study intends expanding the lesson study practices to incorporate the intermediate phase.

In April 2008 the NUE cohort returned to the classrooms of the 2007 participants to videotape their posttraining lessons. Three of the five teachers organised a lesson study on the day of the visit and shared their lessons with colleagues in their clusters. The NUE research team participated in the post-lesson forums but refrained from comment until the end. The team's comments were mostly positive and challenges were only raised when accompanied by practical suggestions for improvement.

The teacher who initiated lesson study in his cluster succeeded in involving intermediate teachers in lesson study practices. Encouraged by the active involvement of 2007 participants in lesson study, the NUE suggested to the Regional Director of the particular cluster and MDoE officials that they organise lesson study dissemination workshops in September 2008. The NUE referred to the national policy framework for teacher education and development in South Africa (Department of Education, 2007) to convince the Mpumalanga officials that lesson study practices are in line with the national policy to promote school-based professional development and teacher reflection on their practices. There was no definite response from the director, as information first had to be collected on lesson study activities in the various clusters.

In early July 2008 the NUE contacted the MDoE, informing them of their intent to visit Mpumalanga for two weeks in September 2008 and requesting that classroom visits and lesson study dissemination workshops be scheduled. At the beginning of August, MDoE sent the NUE a schedule of lesson study dissemination workshops at five different sites in four sub-regions from September 8 to 12 for Mathematics and Science for Grades 6, 7, and 8. The cluster leaders who participated in the training in 2006 and 2007 were responsible for the organisation and implementation of the workshops in collaboration with the CIs.

The programmes were more or less the same at all the sites and were scheduled as half-day workshops from 9:00 to 13:00. The number of participants varied from 80 to 100 and besides teachers included principals, circuit managers, CIs, and regional office personnel. The core part of the programme consisted of an introduction to lesson study, lesson observation, post-lesson forums, feedback and the way forward. The workshops were well prepared and well implemented. The organisers prepared the agenda, the handouts outlining lesson study process and lesson plans.

The regional director attended one of the workshops. She recognised the commitment of the cluster members in promoting lesson study and endorsed lesson study as a teacher-owned, self-sustained form of professional development, giving her full support to the process.

It became apparent that there are challenges that will have to be addressed in future. Once-off lesson study dissemination workshops do not

ensure the proliferation of lesson study in schools and clusters. There are a number of anticipated obstacles.

For schools and clusters that are about to start lesson study, the foremost challenge is securing the time to meet regularly. Many teachers shared the concern in the feedback responses that the NUE received at the workshops. Although there was no practical suggestion from head office on how to make time available for lesson study, one cluster provided some useful input. They meet on Mondays after 13:00 for lesson planning, and schedule lesson presentation for the last lesson period of Wednesdays after which the post-lesson forum commences. An alternative suggestion was proposed that a block of time should be reserved in the timetable for school-based professional development. The time issue can be solved if teachers are motivated enough to conduct lesson study with full support from the principal.

Irrespective of whether schools and clusters successfully initiate lesson study, teachers will not continue their involvement unless they see some benefit to it. Teachers were asked to indicate which component of lesson study they liked best and why. Most of the teachers involved in lesson study favoured the lesson planning phase. Some of the reasons given are the following:

"It opens our minds on how we can present our lessons using different skills and formulating a task."

"The lesson is planned by a group for the group."

"It helps me to digest the policy documents and assessment standards."

"We are able to analyse the Assessment Standards as a group and we come up with numbers of approaches to present the lesson and activities and also Assessment Strategies."

Comments such as *"Learning outcomes were achieved"* and *"The lesson was conducted as planned"* were most often heard as positive feedback during the post-lesson forums. The serious challenge when drawing up lesson plans lies in the fact that many teachers seem to be more concerned with completing the curricula than with learners' understanding of concepts. Lessons that addressed learners' misconceptions were few and far between. If the teachers continue to develop lesson plans merely to complete the curriculum and do not pay attention to learners' understanding of the content, achievement will not be improved. This will eventually lead to the downfall of lesson study. The focus on learners is the key to improving the quality of lesson study practices. This is particularly the case for schools and clusters that have successfully launched lesson study.

Conclusion

The question arises whether the lesson study endeavour in Mpumalanga can serve as a model for lesson study in the rest of South Africa. Although lesson study did not take off in Mpumalanga, the results of this research revealed that the teachers who were involved in lesson study have improved their lessons. Disseminating lesson study in schools is not an easy task as there is a strict division of responsibilities in each post level. It seems very difficult

for teachers to take the initiative to generate interest among all teachers.

A further point to keep in mind is that teachers do not change their teaching overnight. Any form of development would require a long-term gradual progression to change. The cyclical process of “plan-do-see” is supported by professional development research and any learning from experience and from the practises of colleagues should contribute to a general improvement in teaching. As lesson study has been used with success elsewhere, it could make a major contribution to the professional development of teachers in the country. A further advantage of this strategy is that with time a culture of lesson study could be established in schools that would be of benefit to newly qualified teachers who enter the profession.

However, there are matters that need to be considered by the respective provincial Departments of Education:

- Endorse lesson study and make the effort to mobilise not only teachers but also circuit managers, principals, CIs and staff at regional offices to become involved.
- Reserve time for school-based professional development during regular working hours.
- Identify and empower teachers with a deeper understanding of Mathematics and Science as lesson study coordinators to share their expertise with other schools.
- Encourage CIs to use more time to visit schools and clusters to facilitate lesson study.
- Create opportunities for teachers to share best practices regionally and provincially.

If these proposals could be accepted, in service teachers should be able to develop the required skills and competences to teach Mathematics and Science with confidence. This would inevitably lead to improved learning in these subjects.

It should be noted that although this research focused on Mathematics and Science teachers, it would be possible to use lesson study in other subjects too. It has been used with success in the social sciences and languages in Japan and the USA and could benefit the entire teaching corps in South Africa.

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References

- Baba T & Kojima M 2004. Lesson study. In: *The history of Japan's education development: what implications can be drawn for developing countries?* Institute for International Development. Tokyo: JICA.
- Ball DL & Cohen DK 1999. Developing practice, developing practitioners: toward practice-based theory of professional education. In: G Sykes & L Darling-Hammond (eds). *Teaching as the learning profession: handbook of policy and practice*. San Francisco: Jossey Bass.
- Borko H & Putnam RT 1995. Expanding a teacher's knowledge base: a cognitive

- psychological perspective on professional development. In: TR Guskey & M Huberman (eds). *Professional development in education: new paradigms and practices*. New York: Teachers College Press.
- Bransford J, Brown AL & Cocking RR (eds) 2000. *How people learn: brain, mind, experience, and school*. Washington, DC: National Academy Press.
- Brown AL, Collins A & Duguid P 1989. Situated cognition and the culture of learning. *Educational Researcher*, 18:32-42.
- Bruer J 1993. *Schools for thought: a science of learning in classrooms*. Cambridge, MA: MIT Press.
- Bruner J 1996. *The culture of education*. Cambridge, MA: Harvard University Press.
- Caine RN & Caine G 1994. *Making connections: teaching and the human brain*. Menlo Park, CA: Addison-Wesley.
- Collinson V 1996. *Reaching students: teachers' way of knowing*. Thousand Oaks, CA: Corwin Press.
- Collinson V & Ono Y 2001. Professional development of teachers in United States and Japan. *European Journal of Teacher Education*, 24:223-248.
- Darling-Hammond L 1996. The quiet revolution: rethinking teacher development. *Educational Leadership*, 53:4-10.
- Department of Education 2002. *Revised National Curriculum Statement: Overview*. Pretoria: Government Printer.
- Department of Education 2007. *The national policy framework for teacher education and development in South Africa: more teachers, better teachers*. Pretoria: Government Printer.
- Feiman-Nemser S 2001. From preparation to practice: designing a continuum to strengthen and sustain teaching. *Teachers College Record*, 103:1013-1055.
- Fernandez C & Yoshida M 2004. *Lesson study: a Japanese approach to improving mathematics teaching and learning*. Mahwah, NJ: Lawrence Erlbaum.
- Fiske EB & Ladd HF 2004. *Elusive equity: education reform in post-apartheid South Africa*. Washington, DC: Brookings Institute.
- Fullan MG 1991. *The new meaning of educational change*. 2nd edn. New York, NY: Teachers College Press.
- Fullan M & Hargreaves A 1996. *What's worth fighting for in your school*. New York: Teachers College Press.
- Hashimoto Y, Tsubota K & Ikeda T 2003. *Ima Naze Jugyo Kenkyu Ka: Sansujugyo no Saikochiku*. Tokyo: Toyokan-Shuppan. (Why lesson study now: restructuring Math lessons).
- Hattori K, Kita M, Honda M, Nishioka K, Matachi A, Kamiisaka A, Nagao M & Akagawa I 2001. MSSJ First round district level workshop. Unpublished report submitted to JICA.
- Hiebert J, Gallimore R & Stigler JW 2002. A knowledge base for the teaching profession: what would it look like and how can we get one? *Educational Researcher*, 31:3-15.
- Howie S & Plomp T 2002. Mathematical literacy of school leaving pupils in South Africa. *International Journal of Education Development*, 22:603-615.
- Jansen J & Christie P (eds) 1999. *Changing curriculum: studies on outcomes-based education in South Africa*. Cape Town: Juta.
- Jansen J & Taylor N 2002. *Educational change in South Africa 1994-2003: case studies in large scale education reform*. Washington DC: World Bank.
- Japan International Cooperation Agency (JICA) 2003. *Summary report of the final evaluation on the Mpumalanga Secondary Science Initiative (MSSI) in the Republic of South Africa*. Tokyo: JICA.
- Kelleher J 2003. A model for assessment-driven professional development. *Phi Delta*

Kappan, 84:751-756.

- Lave J & Wenger E 1991. *Situated learning: legitimate peripheral participation*. Cambridge, MA: Cambridge University Press.
- Leu E 2004. *The patterns and purposes of school-based and cluster teacher professional development programs* (EQUIP1 Working Paper No. 2). Washington, DC: USAID. Available at www.equip123.net/docs/working_p2.pdf. Accessed 12 December 2006.
- Lewis C & Tsuchida I 1997. Planned educational change in Japan: the shift to student-centered elementary science. *Journal of Educational Policy*, 12:313-31.
- Lewis C & Tsuchida I 1998. A lesson is like a swiftly flowing river: how research lessons improve Japanese education. *American Educator*, 22:12-17, 50-52.
- Lieberman A 1995. Practices that support teacher development: transforming conceptions of professional learning. *Phi Delta Kappan*, 76:591-596.
- Lieberman A & Miller L 1991. Revisiting the social realities of teaching. In: A Lieberman & L Miller (eds). *Staff development for education in the 90's*. New York: Teachers College Press.
- Macrae M 1994. A legacy of apartheid: the case of mathematical education in South Africa. *International Journal of Educational Development*, 14:271-287.
- MacNeil DJ 2004. *School- and cluster-based teacher professional development: bringing teacher learning to the schools*. Washington, DC: USAID.
- Mpumalanga Department of Education, University of Pretoria & Japan International Cooperation Agency 2006. Joint Evaluation Report of MSSI. Unpublished report.
- Nagao M & Kadowaki S 2003. *Report on MSSI Phase 2 planning study*. Tokyo: JICA.
- OECD 2005. *Teachers matter: attracting, developing and retaining effective teachers*. Paris: OECD.
- Ofir Z & Stroebel A 2002. *An evaluation of the first phase of the Mpumalanga Secondary Science Initiative (MSSI)*. Johannesburg: Evalnet.
- Ono Y 2008 Lesson study as professional development of teachers in South Africa and in Afghanistan. Paper presented at the *Comparative and International Education Society* 52nd Annual Conference, Teachers College, New York.
- Ono Y, Mafumiko F, Phwetekele P, Adzifome SN, May S & Chikamori K 2008. A case study of teacher learning from lesson study and its sustainability. Paper presented at the *International Council on Education for Teaching Annual Meeting*, University of Mino, Braga, Portugal.
- Ono Y, Chikamori K, Ozawa H & Kita M. 2007. Effectiveness of lesson study in international cooperation in education: a case study of Biology lesson by a South African teacher. *Journal for the Science of Schooling*, 8:11-22 (in Japanese).
- Peacock A 1993. The in-service training of primary school teachers in science in Namibia. *British Journal of In-service Education*, 19:21-26.
- Rogoff B 1998. Cognition as a collaborative process. In: D Kuhn & RS Siegler (eds). *Handbook of child psychology: Vol 2. Cognition, perception and language*. New York: Wiley.
- Sayed Y 2002. Changing forms of teacher education in South Africa; a case study of policy change. *International Journal of Educational Development*, 22:381-395.
- Schulle J & Dembélé M 2007. *Global perspectives on teacher learning: improving policy and practice*. Paris: UNESCO International Institute for Educational Planning.
- Stigler J & Hiebert J 1999. *The teaching gap: best ideas from the world's teachers for improving education in the classroom*. New York: Summit Books.
- Supovitz JA & Turner HM 2000. The effects of professional development on science

- teaching practices and classroom culture. *Journal of Research in Science Teaching*, 37:963-980.
- Sylwester R 1995. *A celebration of neurons: an educator's guide to the human brain*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Tatto MT 1997. Limits and constraints to effective teacher education. In: W Cummings & N McGinn (eds). *International handbook of education and development: preparing schools, students and nations for the twenty-first century*. Oxford: Pergamon.
- Tatto MT & Velez E 1997. Teacher education reform initiatives: the case of Mexico. In: CA Torres & A Puigros (eds). *Latin American education: comparative perspectives*. Boulder, Colorado: Westview Press.
- Taylor N & Vinjevd P 1999. *Getting learning right: Report to the President's Education Initiative Research Project*. Johannesburg: Joint Education Trust.
- Van der Flier H, Thijis GD & Zaaïman H 2003. Selecting students for a South African mathematics and science foundation programme: the effectiveness and fairness of school-leaving examinations and aptitude tests. *International Journal of Education Development*, 23:399-409.
- Villegas-Reimers E 2003. *Teacher professional development: an international review of the literature*. Paris: UNESCO International Institute for Educational Planning.
- Vonk JHC 1995. Teacher education and reform in western Europe: sociopolitical contexts and actual reform. In: NK Shimahara & IZ Holowinsky (eds). *Teacher education in industrialized nations*. New York: Garland Publishing.

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