

Features of Continuous Professional Development (CPD) of School Mathematics Teachers in Zimbabwe

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ABSTRACT This paper describes some characteristics of continuing professional development (CPD) for mathematics teachers in Zimbabwe. The characteristics were identified from the pilot phase of a study with an objective of understanding the nature of mathematics teacher CPD programmes across 11 selected countries. Data were gathered from purposively sampled ministry officials, CPD providers, and teachers using through interviews and questionnaires. Findings were that the government in partnership with other stakeholders including non-governmental organizations provides CPD; teachers engage in CPD activities on voluntary basis; there are few mathematics teacher-targeted provisions outside standard university programme offerings; teachers seem to value CPDs essentially for personal career, while providers value CPDs in terms of improving the pass rates. The main observation was that the style of CPD provision for mathematics teachers in Zimbabwe is characterized by fairly stable structural arrangements, but the associated resource and support mechanisms render operational aspects largely dysfunctional.

INTRODUCTION

Continuing professional development (CPD) generally refers to planned opportunities and activities in which teachers engage for the purposes of enhancing life-long learning among themselves and their learners (Mansour et al. 2014: 101; Sabah et al. 2014: 92). Lifelong learning encapsulates the learning process as an active, context dependent and continuous through time (Mansour et al. 2014: 101). In life-long learning the context provides a vital source of learning through reflection and engagement with others in the community of practice (Gravem 2004 in Mansour et al. 2014: 101). The community of practice is the idea that learning is a long term process that is constructed through co-participation. But some researchers such as Webster-Wright (2009) in Mansour et al (2014: 101) have claimed that many CPD providers present their offerings as ready-made packaged programmes (Albalawi and Alrajeh 2012). This would make the CPD opportunities biased towards externally initiated activities and the pro-

vision transmissive with teachers having minimum input into and control over CPD content. Other studies have described characteristics of CPD provision that include the idea that knowledge is a transferrable object that can be acquired through an expert rather co-constructed in a social context (Mansour et al. 2014) or that lecture presentations are central feature of CPD activity. The absence of action research knowledge and skills among teachers (MSi 2014: 293), and mismatches between CPD programs and teachers' professional mathematical needs (Albalawi and Alrajeh 2012) have also been reported. There is need to increase understanding on the relationship between CPD providers, the teachers as clients, and the content and processes of learning.

The purpose of this paper is to describe features of professional development learning schemes for Zimbabwean mathematics teachers that may or may not be peculiar to the Zimbabwean context. Lifelong learning is now an imperative dimension of modern society largely due to rapid changes in all aspects of life in this high tech information age. If continuing professional development (CPD) activity can be considered an operationalization of life-long learning, then its effectiveness in terms of achieving quality learning and work performance outcomes needs to be continually monitored and reviewed. Mukeredzi (2013), for example, has highlighted

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teacher professional development practices as an area requiring urgent attention in research in order to improve efforts to improve quality of education in South Africa and Zimbabwe.

The researchers begin with sketching the background to the problem of professional development provisions for mathematics teachers in Zimbabwe by first identifying basic characteristics of the curricula and highlighting thrusts of transformative changes applied to the curricula in recent years. This is done in order to provide a context for interpreting current experience. An outline of the structure of initial preparation for teachers both for the primary and secondary phases is given, again to profile the context. Then, based on some information generated from interviews and a questionnaire some consistencies in the practice of CPD that could be indicators of underlying patterns of CPD provision are identified. The paper concludes with remarks on both the challenges of engaging in CPD in Zimbabwe and some implications of the identified style of CPD practice.

Background

In the immediate post-colonial era in the 1980s curricular changes in Zimbabwe were largely quantitative. The educational bottlenecks of the pre-independence era which ensured that only a tiny fraction of African learners using a highly selective system received education were done away with. The sudden expansion by over a thousand fold (USAP 2008) meant huge enrolments with scant to no matching resources, both material and human, with an emphasis on giving opportunity to everyone, young or old, to learn at any level commensurate with the learner's background. There were classes under trees and farm sheds, importation of teachers, fast-tracking local training of teachers, higher level learners teaching lower level learners, and various other on-the-spot improvisations to get on with the business of learning. Education was even re-defined as a basic human right with a move to declare education up to 4 years after primary basic school leaving attainment, with an expressed desire to make it compulsory and free (Unesco Report nnd). Within that mathematics was also considered a core subject up to that level (Zimbabwe EFA NAP 2005). The expansion necessitated continuing teacher develop-

ment/training to meet new needs it created. Teachers needed to adjust to new content as well as larger and diverse classes.

In the passage to the post-colonial era, however, the basic structure of the schooling system remained largely the same: 8 years (including kindergarten) primary; 4 years secondary (2 junior, 2 senior, with no examination barrier in-between); 2 years high school (specializations in preparation for tertiary, academic, vocational or professional). Graduates of the 4 years of secondary school could go directly to some vocational or professional institutions, including teacher training (to teach at most up to first 4 years of secondary).

In the 2000s two other transformative phenomena impacted on school mathematical education. One was the acknowledgement that effects of ICT tools and media in education in general and in mathematics instruction and learning in particular were inescapable. ICT-driven resources had to be incorporated 'full-time' into education. But this came with its own requisite demands on learners and teachers alike: specific ICT-related skills and appropriate affective orientations were required. ICT-mediated learning was touted as more a matter of efficiency (in learning and instructional processes) than of quality outcomes per se. It was believed the vision of quality that had been established in the 1990s would be achieved more efficiently with the exploitation of ICT-related resources. ICT skills training and attempts to deploy the skills in learning and instruction became a pronounced activity in the 2000s.

Then, while still pre-occupied with the ICT thrust the country experienced the much-talked-about socio-economic meltdown and collapse that either killed or depressed all aspects of everyday life, education included. Many teachers, especially those of science and mathematics, moved into the Diaspora (VVOB nd; VVOB Report 2012). The 2010s are being considered as the period for re-building everything that became dysfunctional, including mathematics and CPD education.

Initial Education of Mathematics Teachers

Primary

Prospective primary school teacher trainees must have passed mathematics, English lan-

guage and three other subjects with grade C or better at secondary school (Ordinary [O] Level) to enroll at a teachers' college for 3 years (9 school terms) to obtain a teaching diploma. Zimbabwe has three school terms per year and each term has 3 months. The student teachers currently spend the first 2 school terms at the college, the next 5 school terms at a school site, and the last 2 school terms back at college. The curriculum has 2 core content components: a professional studies component in which primary school mathematics topics are covered; and a 'main subject' component which treats the selected main subject up to first year degree level in theory (in practice it is more likely to be up to Advanced (A) Level). All students do the same professional studies component, but select a specific subject for the main subject component (not all select mathematics, of course)—a feature with implications for quality mathematics teaching at primary school. A student teacher thus specializes in one subject but is required to teach across the whole primary curriculum, which clearly has implications for quality learning outcomes.

Secondary

To teach up to the first four years of secondary, prospective teacher trainees must have a good pass in mathematics at high school (A-Level) then obtain their teaching diploma in 2 years from a teachers' college. The curriculum is similarly structured, but the main subject component is expected to treat mathematics to a depth of first year of a bachelor's degree program. Someone with a high mathematics grade at O-Level can enroll at a secondary teacher college, but will take 3 (instead of 2) years for the diploma, including a bridging year that should take the student up to A-Level equivalent in mathematics. This route is less preferred as it is perceived to result in inadequately prepared products, especially in pedagogical content knowledge (DTE 2012).

One dimension of curriculum that has always been contentious, yet has great impact on the quality of the trained teacher, is the balance within the curriculum between theory learning—often done on college campuses—and practical learning on school sites (DTE 2012). In Zimbabwe teacher education has experimented with different models. Current post A-Level student

teachers spend the first 2 school terms at the college, the next 2 school terms at a school site, and the last 2 school terms back at college. Post-O-Level student teachers, however, take a 3-3-3 format in school terms spent at college, at a school site, and back at college respectively. Monitoring of program quality in all the teacher training colleges (primary and secondary) is the responsibility of the Department of Teacher Education (DTE) of the University of Zimbabwe.

At high school, that is, A-Level, initial teacher training is accomplished at universities through 3 different routes. The Bachelor of Science degree in mathematics [3 years after A-Level, 4 if the degree is Honours] plus 1 year of post graduate diploma in education (PGDE); or Bachelor of Education (Mathematics) degree [2 years of content-concentrated curriculum after a secondary teacher college diploma]; or a Bachelor of Science Education degree [4 years of concurrent content plus pedagogy curriculum after A-Level]. In initial teacher education at teacher colleges for both primary and secondary school levels the Department of Teacher Education of the University of Zimbabwe is charged with the responsibility for moderating quality matters and certification. More recently one or two other universities have begun offering this basic teaching diploma directly at their campuses. The diploma in science education being offered by Bindura University of Science Education (BUSE) was introduced as a reaction to a drastic drop in enrollment for mathematics and science education degrees during the economic collapse of the 2000s. It was envisioned that diploma graduates students would naturally continue to undertake undergraduate studies.

Patterns of Continuing Professional Development (CPD)

Continuing professional development is a systematic development, maintaining, improving, and broadening of relevant knowledge and skills intended to increase an individual's professional capacity in their area of practice (Day and Sachs 2004; Pickering 2007). Continuing professional development refers to any kind of action that is done to promote, assist, support, and enhance teachers' practice so that they fulfill their roles more effectively while maintaining desired standards. Capacity for performing can thus be increased through engaging in planned

activities designed to enhance expertise and career progression. At the core of CPD activities is reflection on practice, that is, CPD education rests on ability to reflect on what, why, and how things unfold in initiating, adapting, and developing CPD programmes for lifelong learning. As Desimone (2009: 182) points out, professional development can come in a variety of forms, from “co-teaching, ... group discussions, ... book clubs, ... curriculum materials, ...” to taking formal lessons, action research on own work, etc. Borko et al. (2008) add interactions with video material (for example watching and reviewing video clips of teaching action) to the list of legitimate continuing professional development activity.

A major aim of CPD therefore is to maintain high standards of professionalism and to ensure that knowledge is translated into best practice. Apart from providing intellectual support to individuals in their areas of practice, CPD should also be conceived in broader terms that include providing emotional, funding, and material (resource) support to professionals in their working environments. In this paper CPD of mathematics teachers in Zimbabwe is viewed from this broad perspective but with a focus on CPD learning activity after the teachers have completed initial training and obtained the requisite professional qualification for mathematics teaching.

There is a range of conceptualizations of professional development (Neil 1986). Some of them place the notion of change at the centre, for example, Marcelo's (2009: 13) Implicit Model and Guskey's (2005) Teacher Changing Process Model that is illustrated very well in Marcelo (2009). In such models professional development is recognizable when one places focus on the nature and content of change in the teacher. Other conceptualizations of professional development are expressed in terms of the format and driver of the learning provision. For example, Gaible and Burns (2005: 25), also cited in Hoover, describes 3 such CPD models. The Standardized Model is one where learning is provided at a central location, often to large groups of teachers and using externally sourced resource persons as drivers of the provision. In the Site-Based model the learning is located within the work environment of the teacher and small groups of teachers sharing similar interests drive the learning. The learning groups can comple-

ment their own expertise with that from resource persons they may invite from elsewhere. Then there is the Self-Directed model where the individual teacher initiates and drives own learning, exploiting any available resource and seeking essential assistance from more knowledgeable others accessible to the teacher.

The study from which this paper emerged was intended to find out the style of CPD provision for Zimbabwean mathematics teachers.

RESEARCH QUESTION AND METHOD

The research question for the investigation reported in this paper was, “*What is the nature of continuing professional development provision for mathematics teachers in Zimbabwe?*” This research question captures one dimension of a wider comparative study across 11 selected countries and has an overall goal of sharing best practices in CPD education. The qualitative data used in this paper were generated during instrument validation phase of the wider study. The information came from interviews with 2 school principals (one primary one secondary), 3 ministry of education officers in the staff development division of the ministry (one national level, one provincial level, one district level), 2 mathematics inspectors (subject advisors), 4 professional development (PD) providers (one university department, 2 ministry of education units, one unit of an independent schools consortium), and a questionnaire administered to 26 qualified and practicing student teachers (14 undergraduates and 12 post-graduates) on professional development programmes offered by one university.

The interview guide had the same basic structure which sought informants' knowledge, perspectives, or experiences with

- ♦ The concept of CPD
- ♦ Awareness of CPD policy for teachers
- ♦ Implementation characteristics of the policy
- ♦ Nature and style of implementation of mathematics CPD programmes or schemes
- ♦ Nature and style of implementation of mathematics CPD activities in these programmes or schemes
- ♦ Outcomes of the activities and programmes, including assessment and accreditation issues
- ♦ Characteristics of benefactors, facilitators, and beneficiaries of the CPD

- ♦ Monitoring and evaluation of programme offerings

The questionnaire instrument covered similar issues but added a dimension that explored teacher awareness of need for CPD education and their motivations for engaging in CPD activities. Since the focus of the pilot research activity was on instrument validation, the informants were opportunistically accessed although the sample had to be representative of that to be used in the subsequent main study.

RESULTS

Information with relevance to the research question is presented here by data source in condensed 'synopsis' form, but capturing the responses as much as possible using informants' own expressions.

Questionnaire (*synopsis of responses from 26 teacher informants*)

- o CPD is interpreted to be aiming at increasing one's capacity on professional matters (7 out of 12 responses), and perceived in terms of acquiring the teacher's own academic and professional qualifications
- o CPD activities are included in school policy (14 out of 22 responses)
- o Most CPD provisions are arranged through central government (7 out of 12 responses)
- o CPD activities are focused on content knowledge, pedagogic content knowledge, and curriculum interpretation; the affective domain is generally not attended to in current CPD activities
- o Benefits of CPD included boosting of confidence in lesson preparation, deep understanding of subject matter, being tolerant of pupils' views
- o There is need for resource injection in CPD and to involve teachers in design of CPD activity in order to minimize imposition by providers and resistance by teachers to implementing new ideas

Ministry Officials (*synopsis of responses from interviews with district level officials*)

- o There are short (1-2 days) CPD activities in districts, but not specifically for mathematics teachers
- o Ministry sources providers (for example UNICEF) for the activities, ministry also monitors and evaluates services of the providers

- o An example of a CPD activity held in the district was that on matching teaching schemes and plans with textbooks
- o CPDs are relevant to development of our mathematics teachers but these are not effectively done at district level
- o There is need for certification to motivate teachers

Ministry Officials (*synopsis of responses from interviews with national and provincial level officials*)

- o Government has policy on quality education through provision of CPD
- o Government through ministry sources funds from donors, such as UNICEF or VVOB, for staff developing teachers
- o Staff development specifically for mathematics teachers is minimal, when that happens teachers organise the activity themselves
- o Implementation of some CPD ideas is hampered by lack of resources, for example computers, so some schools try to fundraise through their school development committees—'and that is good'
- o Low pass rates in mathematics are experienced at both primary and secondary phases
- o Things might improve if there could be single subject inspectors instead of subject-cluster inspectors (one for science and mathematics subject cluster)

Providers

University Department (*synopsis of responses from interview with a university department chair*)

- o Policy on CPD is formulated by government through ministry
- o Policy leaves decision to professionally develop oneself to the individual teacher, which is a weakness
- o Their professional development programme focuses on academic upgrading of teachers following a curriculum – subject – topic based delivery model
- o Students (in-service teachers) typically fund themselves, while the provider and ministry sometimes support the student through various facilitations—often non-monetary, for example granting study leave or flexible delivery arrangements

- o Most of the programme provisions lead to formal certifications for the teacher
- o More meaningful incentives for getting targeted teachers to join the programme would be useful
- o Doing research on modalities of the programme in relation to sustainability would be informative.

Better Schools Program Zimbabwe (BSPZ) (*synopsis of responses from interview with a coordinator of the provider BSPZ*).

The motto of the Better Schools Programme Zimbabwe (BSPZ) says “*Uplifting the quality of education through personal and professional development of teachers*” and was also depicted on a poster at one BSPZ district centre. The BSPZ intervention began as an externally funded in-service project (NUFFIC, the development agency of the Netherlands Government in this case) to improve quality of managerial/supervisory aspects of the schooling system. Hence, initial phases of workshopping activity targeted personnel such as school heads, education officers, district administrators, and school departmental heads. This professional development provision eventually evolved into a network of resource centres within the Ministry of Primary and Secondary Education system. A BSPZ resource centre serves a cluster of schools, mostly primary but secondary as well depending on the topic of concern, defined as a school district for the purpose. Although structurally BSPZ is now a formal entity within the ministry, it is, however, now funded by the School Development Committees (parents really) of the school district, functioning more or less like a social community centre. Resource availability at the centre is thus dependent on the economic muscle of the schools making up the district. At a BSPZ resource centre you would find

- ♦ Equipment (for example photocopier, computers, etc., for use by the client membership)
- ♦ Services offered (for example short courses, ICT skills, etc.)
- ♦ Workshops held for client members, including teachers, on any issue of interest (for example assessment, professional conduct, socio-cultural literacy)
- ♦ Subject panels where teachers share teaching ideas on subject content [Feb 4, 2013, interview with one coordinator of a BSPZ district centre]

Of note here is the inclusion of teacher instructional in-service activity at these resource centres.

Open Distance e-Learning (ODEL) (*synopsis of responses from interview with a facilitator in a CPD providing university department whose chair was also interviewed*)

The University of Zimbabwe’s Department of Science and Mathematics Education (DSME) introduced a programme called Open Distance e-Learning (ODEL) that began as a project supported by the African Virtual University (AVU) about 7 years earlier. The student teachers, who are either post-A Level or college diploma holders wishing to obtain a BEd degree, learn on location at their school work sites or homes, but regularly visit designated Teacher College institution centres for peer and tutor interactions and other ICT-related resources (for example internet), and for taking paper-based formal tests and examinations. ODeL has an element of both pre- and in-service learning offered and certified by a university with lecturers in the teacher education department of the university being the facilitators.

The programme targets secondary school teachers—who are typically post-diploma individuals, relief (mostly post A-level and untrained) teachers, and unemployed post-A level, often younger, persons. Students fund themselves and the institution (university) and Ministry (through the participating partner teachers’ colleges) support the program through various facilitations such as e-learning material provision, and online discussions with students. The program is evaluated through working in consultation with the institution’s cognate departments (Mathematics Department in this case); other universities through external examiners; and by the ministry through assessment of post-graduation performance in the practice of the beneficiaries (teachers). Internally, the department that delivers the program (DSME in this case) administers students’ courses, tests and examinations, and assesses teaching practicum (where partner teacher college lecturers also make an input) and post-graduation performance (through tracer studies) and the graduate’s level of preparedness to undertake post-graduate study.

Lecturer-student contact and interactions are accomplished through specially designed instructional materials that are web-resources

reliant. The instructional materials and communications should all be in electronic format (learning management system, e-mails, CDs), hence possession of a laptop and accessibility to connectivity are pre-requisites for enrollment into the programme. The ODeL effort tries to be sensitive to quality and responsive to ICT multimedia efficiency in addition to the quantity concern. Post A-Level students complete the program in a minimum of 3 years while post-Diploma holders complete in a minimum of 2 years. Both students do teaching practice at A-Level Schools (post -Diploma students for 3 months and post A-Level students for 6 months). (Interview with a facilitator in this professional development programme, Feb 15, 2013)

Science Education In-service Teacher Training (SEITT) (*synopsis of responses from interview with one of the designers of the provision*)

Science Education In-service Teacher Training (SEITT) was conceptualized in the 1990s as a teacher support system initially aimed at A-Level science and mathematics teachers in the field, but with a possibility of incorporating the mid-secondary level. Supported by the Netherlands Government through NUFFIC (the Netherlands development aid agency), this project was in response to a desire to improve quality of lesson delivery of teachers by establishing a systemic support system that would provide an enabling platform for the teachers to drive their own professional development activities in a self-perpetuating way as explained in (Ndeya-Ndereya et al. 1997; Mushayikwa et al. 1999). The scheme rested on the following 6 webbed pillars:

- ♦ Resource centres, called Science and Mathematics Centres, which would be the centre of teacher activities and services contributing to their professional development
- ♦ Training, which would see to the preparation of teacher leaders to facilitate in-service education of their peers
- ♦ Curriculum development, focused on developing teacher expertise in design and production of own instructional and learning materials
- ♦ Networking, which aimed at cultivating collaborative links with related entities and groups such as teacher associations, some NGOs, etc., to reduce teacher isolation

- ♦ Technical assistance, related to increasing the capacity of teachers' work environment to function and exploit current information/technological resources such as ICT multimedia.
- ♦ Integrated research, where constituent stakeholders of the system were encouraged to engage in collaborative and mostly action or developmental research to continually inform practice.

Coordinated by one department in the University of Zimbabwe and working in collaboration with the Ministry of Primary and Secondary Education, the project phase ended with moves towards integrating the SEITT with BSPZ, in part, to strengthen its institutionalization. The SEITT structure is now functioning within the ministry of education system (Interview with one of the officers who participated in the design of the SEITT provision, Feb 20, 2013).

Private School Training Unit (*synopsis of responses from interview with a training officer for an independent schools consortium*)

There are also private schooling institutions (called Trust Schools or Colleges), who have their own in-house training units that provide in-service education needs of their teachers and interested others from like institutions. Some of the training units offer a kind of formal certificate/diploma qualification, but their mainstay is in short courses of sorts and workshops BSPZ-style to their clientele on topics of common concern and interest to the teachers. Matters of assessment and syllabus interpretation and pedagogy feature considerably in their workshops, especially as they work with foreign examining bodies such as those in UK (Feb 4, 2013, interview with training officer at one such school, corroborated by a training schedule document received from one such college).

DISCUSSION

It has been noted that professional development transcends general pedagogical knowledge and skill acquisition to comprise occasions for critical self-reflection and self-evaluation and takes place within a particular context and is related to the daily activities of teachers and learners (Mukeredzi 2013). In reality teachers are continually engaged in professional development even in the absence of, or in between, supported professional development programmes

(Mushaikwa and Lubben 2009). In-service education or training is a format of CPD education aimed at increasing or improving capabilities of already qualified personnel. An indication from our data is that in Zimbabwe the in-service learning enterprise takes the following forms, in order of preference or popularity among beneficiaries.

- ♦ Progression to a formal higher qualification (for example diploma '! bachelors '! masters)
- ♦ Short (relevant) courses (acknowledged by some kind of certification)
- ♦ Workshops (with recognition of some sort for participation)
- ♦ Mentorships (acknowledgment of transfer of expertise is considered desirable)
- ♦ Conferences/seminars (more for personal enrichment but with rub-off effects into practice)

Further research would be needed to confirm this preliminary observation. It is, however, noteworthy that in-service learning is largely a matter of voluntary endeavor, only occasionally is it made mandatory on the teachers. For example, one provincial chairperson for the mathematics panel remarked that workshops where teachers meet on their own initiative to organize common instructional goals were beneficial to the teachers. At such workshops they discuss how to construct school syllabi from the national curriculum document, set O- and A-Level mathematics test papers collaboratively, and analyse performance reports and consider recommendations (Feb 20, 2013, interview with a provincial chairperson for the mathematics panel in one province). Although workshops as a format of CPD appear to be popular in Zimbabwe (after higher qualification programmes and short courses, of course), a major flaw with workshops is that CPD assessors do not allow teachers sufficient time to adapt the new acquired knowledge skills during workshops. This mode of CPD delivery does not fully incorporate the idea that learning is relational in the sense that learning occurs through reflection (Mansour et al. 2014). Mentorship, which was indicated as the next popular format after workshops, could sometimes be presented in a top-down fashion where the provider (often the central government) who has the responsibility of deciding what sort of CPD knowledge is legitimate (Mansour et al. 2013). This could mean CPD providers might

have a view of CPD learning as decontextualized rather than situated in teachers' daily practices and routines (Fullan 2007 in Mansour et al. 2014: 105). Such situation would be indicative of a transmissive model of CPD provision that locate the teacher's learning in the transformation of the teacher's role and identity as pointed out by (Graven 2004 in Mansour et al. 2014: 101).

In Zimbabwe low pass rates in mathematics in the late 1990s pushed the ministry of education into considering the introduction of mathematics clusters in districts which were made compulsory for all mathematics teachers. Currently the national average pass rate fluctuates around 25 percent some tertiary institutions struggle to recruit suitable candidates on their programmes which require a pass in the subject. For instance, at one tertiary institution a highly placed informant remarked, "...out of about 109 aspiring candidates we had last year 60 of them had no mathematics at O-Level so we could not accommodate them." (Interview with a provincial education officer for science and mathematics, Feb 20, 2013) In general Teachers' Colleges provide both pre-service and in-service teacher training, while regional offices are responsible for organising in-service courses for teachers in their regions. According to (UNESCO 2001), teacher education curriculum was generally being diversified so that it becomes innovative and responsive to changing needs of society. In Zimbabwe the on-going devolution of teachers colleges into degree awarding institutions reflects a quest for quality and excellence (International Bureau of Education). For instance, the devolution of the Bachelor of Education and Bachelor of Technology degrees to teacher colleges is meant to improve the quality of diploma teachers through further training. All these developments can be regarded as different dimensions of CPD provision in Zimbabwe.

There is a policy on CPD formulated by government through the 2 components of the ministry of education (one primary and secondary education and the other for higher and tertiary education). Implementers generally refer to it in terms of acknowledgment of the needs of the country and the standards aspired to, and this informs the nature of programmes/activities offered at the different levels. In each of the ten provinces there are two Deputy Provincial Directors, one for primary and the other for secondary, who are responsible for CPD among their

other duties. The policy also influences implementation in terms of noting changes, for example shifts in syllabi foci, or in societal reactions. Awareness of the policy is not uniform, however. One deputy Provincial Director of Education pointed out that to a certain extent policy does exist in form of 'standards control,' which is a requirement that stipulates what has to be done and achieved. The ministry through the inspectors identifies areas of weakness in teaching and then tries to address them. Although one school-principal stated that CPD was not part of their school policy, a number of student teachers (14 out of 22) who completed a questionnaire when they were on a CPD programme pointed out that CPD activities were included in school policy. These, however, are mostly once off workshops or short courses where teachers attend for one or two days, but different levels of awareness of the status of CPD policy are reflected here.

Though the CPD policy embraces all subject areas when need arises activities are organised specifically for mathematics teachers to identify suitable text books and scheme and plan appropriately for the mathematics subject. Subject inspectors, who are found at provincial level only, have the responsibility of identifying what the needs are and then suggest desirable interventions. Thus CPD providers are brought in by

the Ministry of Education and in general it is the ministry that monitors and evaluates them.

Figure 1 depicts players in the provision of CPD in Zimbabwe current at the time. The government at the top oversees both arms of the ministries of education by way of promoting initial and continuing professional development of teachers. Various players within and across the ministry provide development for staff at different levels so that they may undertake their roles and responsibilities effectively with the final goal being that of increasing learner achievement. Providers of CPDs are mainly the government through the 2 ministry arms: Ministry of Primary and Secondary Education (formerly Ministry of Education, Sport, Arts, and Culture) (monitoring provincial, district, cluster, and zone and school levels) and Ministry of Higher and Tertiary Education (monitoring universities, vocational colleges, teachers' colleges, some private educational institutions) in partnership with other stake holders such as non-governmental organizations (providing mainly financial resources).

Figure 2 shows the various forms of CPDs provided to mathematics teachers in Zimbabwe. The forms are mainly pre-service and in-service teacher training. Workshops, seminars and staff meetings are used as forms of CPD provision

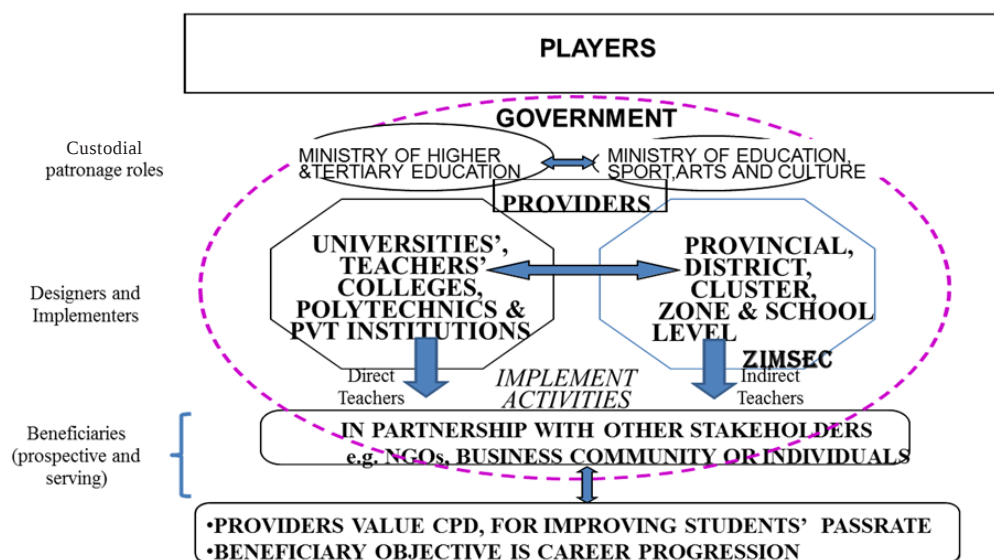


Fig. 1. Players in the provision of CPD for mathematics teachers in Zimbabwe

platforms for in-service teachers. The challenges faced include inadequate human and material resources resulting in pronounced donor dependence.

Though CPD is acknowledged as relevant by many of the informants, conceptualization of it, however, varies across CPD recipients and providers. Some students involved in in-service courses at one university revealed an understanding of CPD activity characterized by a thrust in increasing one's capacity on professional matters through obtaining higher qualifications (the paper chase). Responses such as *"...helps individuals to acquire knowledge and skills about a certain area of studygaining more teaching skills"* *"improving individual's proficiency"* were common among the sample of teachers used and is indicative of such an orientation. More responses (7 out of 12) were in the category that concerns upgrading of skills and knowledge. Hence, there is a tendency among teachers to perceive CPD largely in terms acquisition of higher academic and professional qualifications, which is a somewhat narrow perspective of CPD.

Challenges in Provision of CPD for Mathematics Teachers

The political and socio-economic challenges faced by Zimbabwe during the 2005-2010 period of economic meltdown had a severe impact on both the government and educator capacity to support learning and instructional processes. The ministry of education had a limited budget that could not inadequately support schools at the time of writing this paper. Students themselves and their parents were largely responsible for looking for funds to support their schools (VVOB Programmes in the South).

The style of CPD provision, however, shows (a) structural design that has built-in elements of institutionalization and systemization to enhance sustainability, (b) funding and support levels that are influenced in part by the nature of partnership agreements the national government (through the relevant ministry arm) and a supporting funder/stakeholder (who could be an NGO (local or foreign), friendly foreign government partner, UN agency, or the private sector, who assists with inputs usually in form of funds

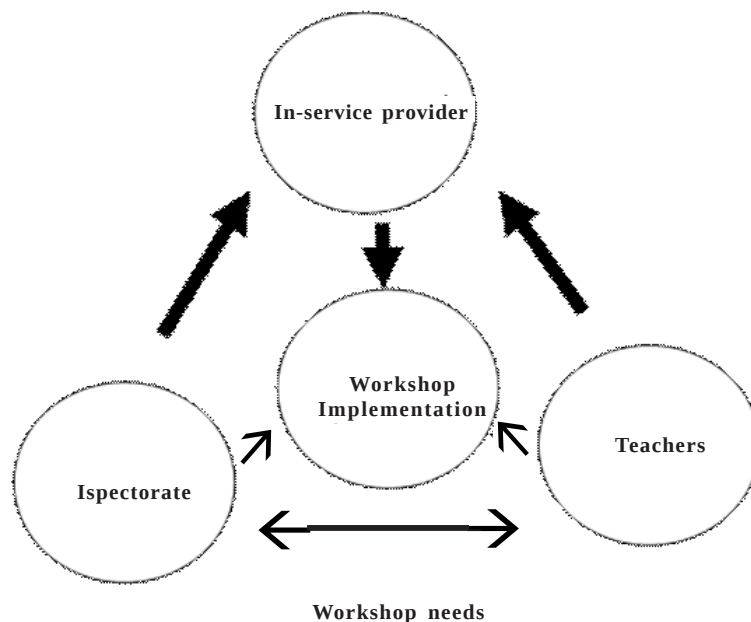


Fig. 2. Some operational characteristics of continued professional development provision for mathematics teachers in Zimbabwe

and or technical expertise (the ministry's inputs are typically in form of an enabling environment and access to infrastructural or material resources), and (c) operational and managerial characteristics that appear to indicate that technically (or structurally), Zimbabwe has a reasonable level of provision for the CPD of mathematics teachers; however, the provisions are rendered functionally ineffective largely due to financial constraints and weaknesses—in some aspects human resource (expertise) inadequacies weigh in too. The authors acknowledge from their personal involvement in some other CPD activities in the country that teacher associations such as the once active Mathematics Teacher Association and other subject related clubs, for example, are structurally provided for in the ministry system but that they are also dysfunctional in reality on the ground. And funding constraints for teacher professional development render even the vibrant professional association of the Southern African Association for Research in Mathematics, Science, and Technology Education (SAARMSTE)-Zimbabwe Chapter helpless to engage and motivate research oriented mathematics teachers. The problem of dysfunctionality of CPD mechanisms that are in place would need to be researched in order to gain knowledge that could assist with managing the impacts of dysfunctionality. One implication of this observation is that an attempt to remedy deficiencies and improve the efficacy of the system might well have to begin by thorough research on this problem of dysfunctionality in order to fully understand its nature and associated manifestations.

Other challenges seem to be more of the affective type than economic. Although CPDs are acknowledged as relevant to the development of mathematics teachers, they do not appear to be effectively done at district level, in part because teachers need to be motivated to attend CPD even though they appear to show baseline levels of motivation. One informant from the sample strongly endorsed the idea of certification for CPD learning, claiming it increases motivation. As noted, too, by one interviewed provider, a weakness of the operational CPD policy is that it leaves the decision to professionally develop oneself to be voluntarily made by the individual teacher. A better strategy, according to the provider interviewed, would be to make the policy apply more collectively and

forcefully on sets of teachers. The current individual teacher voluntary approach also makes the policy non-facilitative of implementation. For example, prospective beneficiaries routinely experience tremendous difficulties in trying to obtaining work-release permissions for undertaking the programmes.

CONCLUSION

The discussion above indicates that the Standard Model—which is often associated with the transmissive mode of learning—is the dominant form of professional development provision available to and experienced by mathematics teachers in Zimbabwe. That would be consistent with the observation that most teachers prefer the type of CPD that leads to acquisition of formal higher qualification certificates, often attainable through physical attendance at some tertiary institution in the current Zimbabwean practice.

Data from this pilot study indicates that, while the teachers seem to value CPDs essentially for personal career progression (attain higher academic qualifications), providers value CPDs in terms of improving the pass rates. This could be branded natural, but we believe that need not be so as there could be other dimensions of valuing CPD that may be ignored. Implications of this observation for introducing new forms of CPD activity into the arena could be worth contemplating about before such introductions. Deriving from pilot data, these preliminary observations relating to the style of CPD provision for mathematics teachers in Zimbabwe are expected to be validated and elucidated in the main study. It would also be interesting to find out as well who initiates CPD interventions and manages or controls quality mechanisms. Nonetheless all these characteristics would no doubt be of interest in considerations for fresh CPD interventions in this era of concern for equity, quality, and efficiency (using ICTs), all at once.

RECOMMENDATIONS

One issue that remains a challenge is how can the desire of teachers (academic qualifications) be reconciled with what providers want (improved pass rates)? Is it not possible for the providers to fund teachers so that they improve

their academic qualifications and at the same time the providers introduce mechanisms / the skill to identify and implement programs at improving pass rates in universities where these teachers are attaining their academic qualifications, so that when they are done with their studies they have the necessary skills which will see a boost in pass rate?

Some of the CPD initiatives referred to in this paper seem to be donor driven rather than locally defined. The external origination might not produce enduring effects, especially if the efforts are not institutionalized properly. The government could initiate the process of developing and funding a local driven programme of CPD activities for teachers of mathematics, while taking cognizance of international best practices in CPD that can meet their needs at various stages of their careers. A clear and strong theoretical basis would be needed. Programmes could be structured so as to allow opportunities to relate theory to practice in the classroom and to provide time for informed and collaborative reflection with peers and with those with appropriate expertise.

It would be good to have a continued professional development system specially designed and implemented for mathematics teachers outside the regular and standard college and university academic programmes, such as developing web conferences to make it easier for educators to access training from the convenience of their school or home sessions where they can key in questions, take part in typed 'chat' sessions, pooling activities and marking student work collaboratively.

Lastly, there is plenty of room for inquiry through action research by teachers in the classroom and improvement if the provision of more funds for workshops on problem topics is made readily available. Platforms for ongoing sharing of research findings among the teachers could be created. Keeping track of professional development needs, and creating opportunities for teachers to collaborate can boost student performance.

Some of the CPD initiatives referred to in this paper seem to be donor driven rather than locally defined. The external origination might not produce enduring effects, especially if the efforts are not institutionalized properly. The government could initiate the process of developing and funding a long-term programme of CPD

system for teachers of mathematics, while taking cognizance of international best practices in CPD that can meet their needs at various stages of their careers. A clear and strong theoretical basis would be needed. Programmes should be structured so as to allow opportunities to relate theory to practice in the classroom, and to provide time for informed and collaborative reflection with peers and with those with appropriate expertise. It would be nice to have a CPD system specially designed and implemented for mathematics teachers outside the regular and standard college and university academic programmes.

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