Mathematics Teachers' Perceptions on Clinical Supervision

George Buzuzi[1] and Lovemore J. Nyaumwe[2]

*[1]Department of Mathematics and Physics, Cape Peninsula University of Technology
Private Bag 1906, Bellville, 7535 South Africa
[2]College of Education, University of South Africa, South Africa
Fax: [1]+27+21 959 6165; E-mail: [1]<buzuzig@cput.ac.za>; [2]<nyauml@unisa.ac.za>*

ABSTRACT This paper reports on mathematics teachers' perceptions on the professional development that they received from their local school management team (SMT) in Zimbabwe. The benefits and extent of the effectiveness of school-based supervision in meeting teachers' professional development needs, to become more effective in their teaching practices, were derived. Stratified and random sampling was used to select the participating schools. Sixty-four mathematics teachers provided their perceptions through Likert scale type of questionnaires and 8 teachers were interviewed to get in-depth understanding of the effectiveness of clinical supervisions conducted at a school. The results were that (a) the mathematics teachers had positive perceptions on the theme of clinical assessment modalities, and (b) their perceptions on the themes of professional insights and school culture were generally neutral. The mathematics teachers' perceptions were significantly influenced by the heads of departments (HODs) qualification on the themes of professional insight and school culture ($p < 0.05$).

INTRODUCTION

Principals are key players in successful curriculum implementation, improving the quality of instruction and consequently learner achievement at a school (van der Werf et al. 2000; Alhajaya and Al-roud 2011; Suraya 2012; Wallace 2013). A principal's willingness to share authority and responsibility with other teachers in a school is critical for successful schools. Sharing authority with others in a school entails a principal's initiatives to provide a structure that is necessary to develop a culture of shared responsibility, collegiality and empowering teachers to become autonomous in their instruction. These qualities can be achieved through sharing curriculum and pedagogical insights in school environments that are filled with trust and appreciations of teacher experimentations with pedagogical ideas. Panigrahi (2012) points out that teachers must trust the supervisor and feel that he/she is there to serve them and to help them become more effective teachers.

When faced with curriculum implementation challenges, principals alone should not think about how to improve instruction that can improve learner achievement. Learner achievement is the single most effective pointer that principals can use to account for the many hours that learners spend in schools each day; yet it should be the responsibility of all players in a school, if the tacit professional knowledge and experiences of the school leadership is harnessed to collectively pursue school goals. In Zimbabwe, the structure of school leadership has a principal at the top, the vice-principal, senior master, senior mistress, HODs collectively constituting the School Management Team (SMT) and teachers. Due to a principal's leadership styles he/she can run a school in an autocratic manner, or share responsibilities among SMT members. The daily practices of the principal include the development of personnel, responsible delegation and empowerment of the teachers (Suraya 2012). In her study Mendels (2012) established that an effective principal make good use of all skills and knowledge among the capable adults who make up the school community by inviting them into leadership roles and responsibilities. Thus, in a democratic school leadership style, the SMT share leadership expertise, knowledge and professional ideas with teachers in ways that can initiate pedagogical changes during curriculum implementation. Concerted efforts by the SMT in encouraging teachers to implement constructivist pedagogies through modelling ideal instructional practices, designing professional development programs and monitoring teacher implementation of the pedagogies through clinical supervision may provide teachers with opportunities to observe and share successful pedagogical practices. The sharing may encourage

teachers to review their attitudes and beliefs on pedagogical approaches, that they are encouraged, to adopt in ways that can lead to understanding their new roles in the enterprise of implementing constructivist approaches.

Clinical supervision by SMT members during curriculum implementation is encouraged in Zimbabwe in order to monitor teachers' implementation strategies, and to discuss possible challenges that teachers may encounter with a view to discussing how to reduce instructional challenges, if encountered, or strengthen opportunities that may arise. The importance of supervision is stressed by Coimbra (2013) who echoed that supervision promotes professional development, perfects teaching and learning and ultimately improves students' achievement. To perform these supervisory roles, effective local SMT necessarily play a central role in the continuous professional development of teachers in order to enhance their curriculum implementation strategies through organising subject or school-based discussions on specific topics, peer observations, grade level meetings and professional development sessions (Mendel 2012). The school initiatives that intricately weave constructivist pedagogies with school policy-making processes can ignite and nurture teacher initiated continuous professional development, which can provide opportunities for them to review their attitudes and values (Adey 2006). For instance, constructivist pedagogies encourage learner-active-engagement during construction of mathematical knowledge through formulating conjectures, argumentations, debates and negotiations of different views (Turmudi 2012). Such classrooms can be noisy and the local SMT should not view the noise as emanating from a teacher's weak classroom management style, but positively view the noise as effective implementation of constructivist pedagogies. Locally initiated continuous professional development programs that are supported by school policies, may give teachers opportunities to evaluate the effectiveness of pedagogies they use on learner understanding in ways that can have deep positive effects. Interactions during local professional development programs, that are enacted in real classroom situations, have potential to make teachers review their attitudes and beliefs on the nature of mathematical knowledge and how it can be mastered, if they find the strategies, extolled in a curriculum, effective for learner understanding.

The extent to which Zimbabwean SMT can act as local coaches and monitors of teacher implementation of the mathematics curriculum through clinical supervision of classroom practices has not been documented, to the best of our knowledge. A study that analyzes the influence of local SMT on the professional development of mathematics teachers may be important to school Governing Boards, curriculum planners, educators and school leadership. Such a study can provide insight into debates that explore the effectiveness of the SMT, teacher effectiveness to implement new policies, and how these influence learner achievement.

Objectives of the Study

The study sought answers to the research question: What are secondary school teachers' perceptions of the professional insights received from local SMT after clinical supervision of how they implement the reform mathematics curriculum in the classes they teach? The study will focus on the following:

- The mathematics teachers' perceptions on the benefits of clinical supervision received from their local school management teams in the face of instructional challenges.
- The extent to which clinical supervision are effective in meeting teachers' professional development needs to become more effective in their instructional practices.
- Discussion on possible remedies to reduce instructional challenges encountered during curriculum implementation by the SMT and teachers.
- In seeking insight to answer the research question, the following literature review was conducted.

Literature Review

The primary roles of Principals in traditional Zimbabwean setting were management of personnel, finance and instructional resources. These traditional roles were found to be ineffective on implementing modern curricular policies necessitating the principals' duties in modern schools to expand to include educative, instructional and pedagogical leadership (Niesche and Jorgensen 2010). These expanded duties were necessitated by public demand for improved learner achievement that put pressure on princi-

pals to have a repertoire of synergised qualities. In a study titled 'The effective principal' Mendel (2012) asserts that, effective principals' boosts learning. According to Msila (2013) successful leadership is one that supports successful teaching and learning. Modern effective principals in Zimbabwe are expected to be visionary leaders who are "instructional and curriculum leaders, assessment experts, disciplinarians, community builders, public relations and communication experts, budget analysts, facility managers, program administrators, guardians of various legal, contractual and policy mandates and initiatives" (Davis et al. 2005: 3). Successful performance of these duties which determine the success of a school, "far exceeds the reasonable capacity of any one person" (Davis et al. 2005: 3), thus Zimbabwean principals are encouraged by policy to distribute duties among members of the SMT and experienced teachers.

School-based supervision can enhance teacher professional development in skills that they lack or need strengthening. It can involve positive, dynamic and democratic actions that are mutually designed to improve instructional practice through continued growth of all teachers. The primary goal of school-based professional development programs should be to help and support teachers as they adapt, adopt, and refine their instructional practices in their classroom, using specific contexts of schools. Thus when clinical assessment is based on instructional practices, that are experimented with, at a school, teachers must feel that the SMT is there to serve them and to help them become more effective teachers (Panigrahi 2012).

The potential benefits of clinical supervisions of mathematics teachers motivated our quest to assess the perceptions that the teachers, in a province in Zimbabwe, can possibly have on the clinical supervisions that they received from their local SMT. Such perceptions can help to determine the extent to which clinical supervisions are effective in meeting teachers' professional development needs to become more effective in their instructional practices.

METHODOLOGY

This case study was conducted in Mashonaland Central, a province located in the northern part of Zimbabwe. Sixty-four (64) mathematics teachers located in 28 secondary schools in the province provided data that were used to answer the research question. Some schools had more than two mathematics teachers due to large enrolments. The province has a population of 108 secondary schools. Mathematics is a core subject at secondary school and learners are encouraged to study the subject up to 'O' Level (16+). Names of the 108 secondary schools in the province were divided into strata according to district, type and geographical location. The number of schools by type in each district was noted and 28 schools were randomly chosen proportionately by type, geographical location and funding sources. The 64 mathematics teachers who participated in the study accounted for about 15% of the teachers in the province.

Instruments

A questionnaire was perceived to be suitable to collect the perceptions of the sampled 64 mathematics teachers on professional insights that they received during clinical supervisions by local SMT members. The questionnaire comprised teachers' demographic data (1 – 10), a Likert type of scale on a continuum of five options of Strongly Agree to Strongly Disagree (11 to 24) and three structured questions (25 – 27). The inclusion of demographic data was necessary in order to compare the teachers' perceptions with their background, such as educational qualifications and period of teaching experience at a school. A teacher's educational background and experience influence perceptions on the clinical supervision received. Extensive field experience influences linkages between theory and practice, which in turn can contribute to a teacher's perceptions of clinical supervisions conducted at a school. The responses on the questionnaire were verified by interviews with 8 mathematics teachers who provided responses to the questionnaire.

The second section of the questionnaire which comprised the Likert scale type contained statements on teachers' perceptions on school-based clinical supervisions. Construction of the questionnaire items was guided by theory and many years of the researchers' experiences of clinical supervision and assessment of pre- and in-service mathematics teachers' teaching practice. Assessment of the construct validity of the items was done by faculty members, with specialisations in assessment and evaluation, who

proof read the items on the questionnaire and suggested some improvements in their clarity. Ogunniyi (2005) appraises this strategy as an effective way of improving the face validity of items constructed from literature and researchers' theoretical experiences. The open–ended questions were used to clarify some of the answers given in the Likert items. For example, the structured question number 27 solicited teachers' views on how they wanted clinical supervision programmes organised in their schools. A teacher's response to the question is related to their response to question 24, which assessed the objectivity of school-based clinical supervisions.

The instrument was further refined through subjecting it to the evaluative criteria of validity and reliability during piloting. A pilot study to assess the clarity of items on the questionnaire was conducted on nine teachers whose schools were located near the research base. The teachers who participated in the pilot did not participate in the main study. After analysing the responses from the nine teachers, some items were altered in order to convey the intended meaning. Adjustments of some items on the instrument were done to solicit valid and reliable responses from the participating teachers. A Cronbach Alpha coefficient of 0.89 (Table 2) indicates that the reliability of the questionnaire was moderate (Alausa 2001). After effecting the changes that were identified during piloting, the questionnaire was distributed to the sampled mathematics teachers teaching in the seven districts of the targeted province.

To get an in-depth understanding of the effectiveness of clinical supervision programs in relation to the questionnaire responses, 8 teachers were interviewed. A 20-30 minute interview schedule was used. At least one teacher was randomly selected from each of the 7 districts to participate in the interview.

Data Analysis

Data from interviews were audio taped and transcribed while those from the questionnaire were coded for easy capturing on SPSS package. Coding of demographic data was done by placing responses into themes. For example, variable number 3, on area of specialisation of the principal, was coded in the themes of 1 for Arts, 2 for Sciences, 3 for Mathematics and 4 for a practical subject. Responses from section B

were coded sequentially, 1 for Strongly Agree, through to 5 for Strongly Disagree. The questionnaire responses were debated among the researchers until a theme that summarised the essence of the responses was sought. For instance, the SMT gave one general professional insight (item 13) and the SMT suggested appropriate methods on how to teach specific concepts (item 21) are aligned with professional effectiveness and their theme was named professional insights. The 14 Likert type items were similarly analysed, resulting in three themes namely, professional insight, school culture and clinical assessment modalities. These themes were determined before administering the questionnaire to the teachers.

Coding of responses in section C posed some difficulties because some of them were open- ended. It was after tabulating all the responses from the questionnaires that the coding was done. For instance, question 27 sought teachers' preferred clinical supervision durations. The frequencies of the durations ranged from, weekly, fortnightly, once per term (three months), twice per term, four times per term and 6 times per term. To cater for the variations in the responses the coding used was: 1 for weekly, 2 for fortnightly, 3 for monthly and 4 for once a term. Since six times in a 13-week term is approximately fortnightly it was coded 2. The captured data were used to generate frequency tables that facilitated interpretation of data from the questionnaire responses.

RESULTS

First, the subject area specializations of SMT members are presented. Understanding of SMT subject specializations, it was thought, would provide an understanding of mathematics teachers' perceptions on the clinical supervisions that they received. The mathematics teachers' perceptions were further analyzed to assess whether they were influenced by a teacher's period of service at a school or not. The perceptions are presented in the themes that they belong to as shown in Table 1.

In Zimbabwe Art subjects include languages, Divinity and History while Practical subjects are Building, Welding, Agriculture, Food and Nutrition, among others. Table 1 show that the majority of principals (60.7%) and vice-principals (64.3%) specialised in the Art subjects while the majority of the HODs (71.4%) specialised in

Table 1: Local SMT members' subject specializations (n = 28)

Designations of SMT member	Number (n) and percentages (%) in area of specialization				
	Maths	Science	Arts	Practical	Total
Principals	6 (21.4)	4 (14.3)	17 (60.7)	1 (3.6)	28 (100)
Vice-principals	3 (10.7)	5 (17.9)	18 (64.3)	2 (7.1)	28 (100)
Senior teachers (male and female)	11 (19.7)	7 (12.5)	32 (57.1)	6 (10.7)	56 (100)
Heads of Departments (HODs)	20 (71.4)	5 (17.9)	0	3 (10.7)	28 (100)
Overall	28.6	15	47.8	8.6	100%

Key: Numbers in brackets indicate percentages

Mathematics. This scenario has potential for the local SMT to offer both management and instructional leadership to those schools in which shared leadership is practised in that synergies between the HODs, vice-principals and senior teachers can offer instructional leadership that can enhance implementation of the mathematics curriculum; management leadership that can enhance procurement of instructional resources and organising local school professional development programs in areas of mathematics teacher needs.

Descriptive statistics were used to determine the popularity of perceptions on the clinical supervisions that the teachers received from the SMT theme by theme in descending order. Table 2 displays the rank order, means and standard deviations of the mathematics teachers' perceptions of the professional development

that they received after clinical supervisions by SMT members. The Likert scale of 1- Strongly Agree to 5-Strongly Disagree suggests that the smaller the mean response the more positive the perception is on the continuum. A mean ($\overline{x}$) is interpreted in the scale to which it can be rounded off to. For instance $= 2.4$ is rounded off to 2.0 which is interpreted as agree but not strongly whilst $= 2.5$ is rounded off to 3.0 which is interpreted as neutral. Responses falling in the strongly agree and agree are categorised as positive perceptions whilst those falling in disagree and strongly disagree categories are perceived as negative perceptions. Neutral responses are interpreted as a teacher's undecided perceptions as they cannot be placed in any one of positive or negative responses.

Table 2 shows that the mathematics teachers in the study had positive perceptions ($= 2.4$)

Table 2: Teachers' perceptions of the professional development that they received after clinical supervision by their SMTs (n = 64)

	Mean	SD	Rank
Theme 1: Professional Insight			
13: The SMT gave me general professional insights	2.0	1.2	2
11: Clinical assessments by SMT members helped teachers to develop professionally	2.4	1.2	5
19. I got a lot of professional advice during reflection on a lesson taught after clinical assessments made by SMT	2.8	1.2	9
21: The SMT suggested appropriate methods on how to teach specific concepts	3.3	1.2	14
Overall	2.7	0.6	
Theme 2: School Culture			
17: The SMT is accessible to members in a department	2.3	1.2	4
12: The clinical assessments by SMT members were conducted in a friendly manner	2.7	1.1	7
18: The local SMT was committed to their professional duties	2.8	1.1	10
24: The SMT conducted clinical supervisions objectively	2.9	1.0	11
22: The SMT encouraged peer assessments between teachers in the same department	3.2	1.3	13
Overall	2.8	.33	
Theme 3: Clinical Assessment Modalities			
15: The SMT usually provided feedback in written form	1.6	1.2	1
23: The SMT made constructive comments after clinical supervision	2.1	1.2	3
16: The clinical supervision visits by SMT members were announced in advance	2.6	1.4	6
14: The SMT members assessed my professional documents	2.8	1.1	8
20: The SMT organised regular workshops to discuss how to implement the curriculum.	3.1	1.1	12
Overall	2.4	0.6	
Overall mean	2.8		
Cronbach Alpha Coefficient	0.89		

on the clinical assessment modalities offered by the local SMT. The teachers' perceptions on professional insights and school culture were generally neutral, = 2.7 and = 2.8 respectively. This might be interpreted to mean that on these two themes the mathematics teachers' perceptions could not be determined.

The three themes summarising the teachers' perceptions were further analysed to establish their causes. Further analysis were conducted to establish whether these perceptions were influenced by a teacher's mathematics teaching experience at a school, mathematics teaching experience since qualifying as a teacher, or area of specialisation of the SMT members. One-way analysis of variance (ANOVA) was conducted to establish the influence on these themes. The p-values of the one-way ANOVA are shown in Table 3.

The mathematics teachers' perceptions on the three themes of professional insight, school culture and assessment modalities were not influenced by a teacher's period of mathematics teaching experience at a school, or mathematics teaching experience since graduation. The high p-values also show that the area of subject specialisation of principals, vice principals and senior teachers did not influence the mathematics teachers' views on the three themes. The teachers' perceptions on area of specialisation of the HODs had a significant influence on professional insight ($p < 0.05$) and school culture ($p < 0.05$). The responses on the questionnaire were corroborated with interviews in order to get a holistic picture of the effectiveness of clinical supervision on the mathematics teachers.

Interview Results

Due to limited space, only those transcripts that exemplify the three themes are presented. About 28.6% of SMT members in the province had qualifications in the discipline of mathematics (Table 1). SMT members without professional qualifications in mathematics (71.4%) can be assumed to offer limited suggestions to improve instruction after clinical supervision on aspects such as how to teach specific mathematics concepts. This observation was observed by a mathematics teacher during an interview who said that:

Our vice-principal had professional qualifications in History. During a discussion after clinical supervision of a mathematics lesson that I taught he emphasized classroom discipline, arguing that some learners solving problems in groups were noisy. Such suggestions contradicted constructivist learning atmospheres where learners are encouraged to debate, argue and negotiate their current understanding of mathematical concepts in order to develop conceptual understanding (Teacher 7).

Teacher 7 seems to infer that an SMT with specialization in the Arts seems to be biased towards the mode of instruction in the Art subjects where learners are sometimes encouraged to passively listen and regurgitate teacher narration of events. For instance, a vice-principal with a History specialization discouraged learner negotiations of mathematical strategies because they were perceived to be noisy. Unlike History lessons, where teachers can dictate notes to learners, mathematical concepts can be developed by learners using their intuitions through discussion, debate and formulation of conjectures, necessitating noise.

Schools with HODs, with specializations in mathematics, potentially had teachers who received meaningful professional insights after clinical supervisions. Such schools were capable of providing communities of mathematics practice where post-clinical supervision discussions could emphasize networking on implementing constructivist pedagogies that are extolled in curriculum documents to nurture learners' communication, reasoning, connections and

Table 3: One-way ANOVA on the themes and their probability (p) values

Items	Theme and p value per item		
	Theme 1	*Theme 2*	*Theme 3*
Period of maths teaching at a school	0.51	0.84	0.79
Cumulative maths teaching years after graduation	0.25	0.86	0.90
Area of subject specialization of principals	0.58	0.80	0.36
Area of subject specialization of vice-principals	0.49	0.99	0.91
Area of subject specialization of the senior teachers	0.37	0.97	0.44
Area of specialization of Heads of Departments (HOD)	0.01[*]	0.03[*]	0.08

argumentation skills. Teachers 31 and 18 attest to these observations:

The clinical supervisions made by my mathematics HOD with specialization in the subject were insightful in that we discussed alternative strategies that we anticipated could improve learners' conceptual understanding. For instance, on the topic of simple interest the HOD suggested strategies to teaching the concepts on the topic that were based on practical applications connected to loans that could be solved intuitively without using rules or formulae. This led us to agree to sit in an accounts lesson to see how they teach the concept of investments involving capital amounts. The discussions not only led to designing pedagogical approaches that enhanced learner experimentation with their prior knowledge, but integration of concepts across subjects and building of communities of practice that exchanged insights on supportive classroom environments and connectedness of mathematics concepts with other disciplines (Teacher 31).

Teacher 18 also agreed that they had fruitful discussions and insight on instructional practice after clinical supervision by an HOD with mathematics specialization as depicted in the verbatim intercept below:

The discussion with the HOD after teaching Pythagoras' theorem provided a lot of professional insight into my teaching of mathematics. The HOD suggested both the algebraic and geometric proofs to be used in a lesson as essential to enable learner understanding of the theorem. The discussion went further to show the essence of presenting mathematical concepts using multiple representations to enhance learners' conceptual and procedural understanding (Teacher 18).

The few HODs, without specialization in the mathematics discipline in the study, provided general professional insights that were considered by some mathematics teachers as useful. For instance Teacher 5 noted that:

I am very grateful of the assistance that I got from the SMT members. A teacher not only study, implement and assess learner outcomes as outlined in the national curriculum statement, but also provides meaningful learning on the cognitive, social and cultural aspects of the diversified student population. The SMT provided professional advice on school rules, local policy and other professional ethics that

the school viewed as important to improve learner achievement. A discussion on local school priorities in a collegial environment was very useful (Teacher 5).

The interview intercepts show that the mathematics teachers who participated in the study received useful instructional insights from the HODs with specialisations in mathematics. This observation concurs with results of Table 3 where the area of specialisation of the HODs had a significant influence on teachers' professional insights ($p < 0.05$) and school culture ($p < 0.05$).

DISCUSSION

The three themes of professional insight, school culture and assessment modalities that emerged from this study are central to school leadership styles that are sensitive to learner improved achievement. The mathematics teachers who participated in the study showed positive perceptions ($= 2.4$) on the items falling in the clinical assessment modalities theme. It is worth noting that despite the wide range of the professional qualifications of the SMT members, some mathematics teachers were satisfied by the general professional insights that they gained from them as observed in the responses on item 13 ($= 2.0$). In this case one anticipates that the SMT's successful coaching of school policies on implementing a curriculum (Teacher 5) may translate to the teachers' improvement of classroom practices (Enrich et al. 1995).

Sharing power and responsibility in a school is premised in the philosophy that "leadership is not the exclusive domain of any one person" and that it can "provide a structural support for democratic leadership" (Williams 2011: 192). The democratic principles of shared leadership are vital in nurturing a principal's productive headship which encourages teachers to contribute ideas on how to improve curriculum implementation. Productive headship entails a principal's commitment to leadership styles that support the spread of responsibilities and collaborative decision-making processes to others in ways that can enhance "building common visions and purposes" (Nieshe and Jorgensen 2010: 105). Principals who pursue productive leadership do not rely on power over teachers, but instead emphasize delegation and empowerment in which leadership is spread widely among mem-

bers of staff to achieve shared school visions and goals (Bipath 2012). Shared leadership is important as it usually encourages teachers to freely debate school issues in ways that sometimes motivate them to present creative thoughts that may facilitate innovative curriculum implementation strategies (Al-hajaya and Al-roud 2011). For instance, the complexity of teaching mathematics has always provided teachers with challenges, which shared leadership, may go a long way to reduce.

As pointed out by Teacher 5, an SMT that discussed local "priorities in a collegial environment" facilitated the implementation of effective instructional strategies. In such collegial discussions, were a body of school strategies was not imposed to improve learner achievement, but the SMT created a process of familiarising and negotiating with teachers a body of knowledge that could improve their social practice (Henderson 2006). As also noted by Sharma (2012), collegiality is a vital facet of professional development of teachers, if reform changes are to take place. Collegiality can lead to the formation of a community of practice. A community of practice, in which teachers perform their teaching practice using the local school identity, is influenced by a school's culture (Wenger 1998). DuFour and Mattos (2013) noted that the most powerful strategy for improving both teaching and learning is not by micromanaging instruction but by creating the collaborative culture and collective responsibility of a professional learning community.

The SMT has a task to create a strong culture of learning and teaching (Bipath 2012). As shown in Table 1, the mathematics teachers' neutral responses on items such as the SMT encouraged peer assessment within members of a department ($= 3.3$); and the SMT members, were committed to their professional duties ($= 2.8$), may be taken to mean that aspects of the culture that gives a school an identity were not emphasised on regular basis. For instance, neutrality on commitment on professional duties encouraged by the local SMT may mean that there was no consistency in the execution of some school policies. In this case teachers found it difficult to reflect a type of school policy because they were not sure what the SMT liked. This neutral response may be detrimental to curriculum implementation because whilst teachers do not work to please their superiors, they "cannot

change by themselves' (Adey 2006: 55). The teachers may have their interest in professional duties encouraged by the SMT, if their views are valued and they are involved in every process, right from planning to outcome, and feedback is provided timeously (Sharma 2012).

The purpose of clinical assessment is to improve teaching practice in ways that can facilitate achievement of high learner grades. The SMT and teachers get to know each other as professional colleagues and cohesion between the two is vital in order to promote student learning (Mendels 2012; Panigrahi 2012). To achieve such cohesion, shared leadership is vital in which SMT invest time, money and energy into the development of teachers in ways that encourage teachers to work together for mutual professional development. A healthy school culture collaboratively developed by teachers, students and SMT members, has potential to work to fulfil the needs of the teachers, students and SMT (Mendels 2012; Sharma 2012).

Shared leadership that nurtures positive clinical supervision climates are necessary for effective school-based professional development of teachers. This is possible because SMT members can engage in reflective dialogues with teachers that are focused on bilateral relationships, which recognise teachers' capacities, needs and interests as paramount to the promotion of teacher active roles in decision-making. In such schools, clinical supervision engages members of the SMT and teachers in collegial relationships that encourage collaborative planning, sharing of knowledge and ideas, and fostering consensus during decision-making (Owens 1991: 310). To foster these aspects, there needs to exist cooperation and mutual respect that enables SMT members to listen attentively to teachers' concerns in ways that can lead to open-minded discussion on issues that teachers raise, and give genuine and frequent feedback (Bipath 2012; Sharma 2012). Such cooperation and mutual understanding can enhance teachers' willingness to perform to their maximum ability, without close monitoring or coercion by SMT members. Such willingness to work without supervision has potential to enhance the development of effective teaching without bureaucratic trivia. The teacher autonomy developed by cooperation, openness and mutual trust can be established if there are effective channels of communication between SMT mem-

bers and teachers at a school (Ozigi 2000). Effective channels of communication can keep teachers informed of clinical supervision purposes, policies and programmes within a given period. Such effective communication channels can minimise unnecessary misunderstanding which sometimes arise when teachers are in the dark of the intentions of classroom supervisions, and when they receive misleading or inadequate information on how they can improve or strengthen their instructional practices.

Commitment by principals to shared leadership may enhance teacher development of professional skills in a community of practice, which encourages teachers to contextualise their instructional practices within school expectations. In such schools teachers are encouraged to collaborate on decision-making processes which may involve peer assessment of each other, sharing a repertoire of resources at their school, sharing different experiences each one of them is capable of bringing, and discussing ways of handling learning challenges that can arise in their classrooms (Wenger 1998). That some school management teams in this study did not encourage peer assessment among teachers (item 22), can be viewed as some principals practising the autocratic industrial model of school management. In the industrial model, the principal and his management team manage the school, whilst teachers are perceived as line-workers (Collay 2006). The principal designs the vision of the school and the teachers implement the pre-determined vision. In such schools teachers are isolated in their classrooms, working minimally towards achieving their teaching duties or any duty assigned to them. The principals who practise the industrial model of management can create school cultures in which teachers do not feel like doing the best that they are capable of offering because they harbour some form of resistance for not being invited to contribute to the vision of a school. A more participatory and democratic model of school leadership that spreads leadership practices to teachers in a school extend invitations of initiatives from all teachers through giving them freedom to negotiate meaning, strategies and resources for collective achievement of a school's vision through the guidance and coaching by democratic local SMT. In such a distributed leadership approach, teachers are allowed to talk about strategies they are using that are proving successful (Wallace 2013).

The style of running a school is evident in the way standard controls are made through clinical supervision modalities of curriculum implementers. The mathematics teachers in the study agreed, though not strongly, that SMT usually provided assessment feedback in written form, $= 1.6$ and that it made constructive comments after assessing a lesson taught by a teacher, $= 2.1$ (Table 2). This may mean that SMT provided teachers with a written document on a lesson assessed, which they could refer to when they wanted to check on the professional areas that required improvement and those needing strengthening. The constructive comments provided by SMT after clinical supervision can be viewed as reinforcing the comments written during the assessment of lessons. That the teachers were neutral, $= 3.3$, on the regular organisation of staff development seminars, is not surprising. Most SMTs narrowly conceive staff development programs as those focusing on curriculum matters or teaching strategies (Jones in Enrich et al. 1995). With this narrow conception of professional development, issues relating to teachers' individual, social and psychological growth, school organisation and developmental plans do not feature on the agenda of teacher professional development activities.

Effective principals help teachers improve their instructional practice either directly, or with the aid of HODs and other teaching experts (Wallace Foundation 2012). The HODs are responsible for teaching and learning in a department that they head by monitoring instructional practices through conducting regular clinical supervisions that can expose teachers' strengths or weaknesses. Where instructional weaknesses are noted, strategies to reduce them are explored and subsequent clinical supervisions would focus on a teacher's attempts to implement the suggested strategies to improve instructional practices. In such circumstances, members in a department are sometimes encouraged to create time and space to discuss and identify experienced teachers who can offer model lessons on identified areas of teacher needs. Rosemary et al (2013) viewed it critical that mentors at a school should provide apt lesson demonstrations as this will improve instructional practice. As depicted in Table 3, the teachers' perceptions were significantly influenced by the HODs qualification on the themes of professional insight and school climate ($p < 0.05$).

Eya and Chukwu (2012) points out that an effective supervisor should have a sound knowledge of the subject matter. In support of this view Panigrahi (2012) asserts that instructional supervision in secondary schools is constrained by the subject specialization of the supervisor. Effective instructional supervision requires a sound knowledge of the subject matter and supervisors who have been teachers of languages cannot effectively assess the students' performance in mathematics, as they cannot offer the mathematics teacher the support they need (Panigrahi 2012).

CONCLUSION

The secondary school teachers' perceptions of the professional insights, received from local SMT after clinical supervision of how they would implement the reform mathematics curriculum in the classes they teach, were mixed. The mathematics teachers in the study had positive perceptions on the clinical assessment modalities offered by local SMT. The teachers' perceptions on professional insights and school culture were generally neutral. These perceptions were not influenced by a teacher's teaching experience or the SMT members' subject specialisations, but were significantly influenced by an HOD's qualification on the themes of professional insight and school culture.

In a school, where a principal believes in shared leadership, HODs and senior teachers can play vital roles in conducting clinical supervision on members of the department to enable teachers to teach at their best and students to learn at their best. Shared leadership can be effective in schools where principals recognise that teachers are in possession of different fields of expertise and human resource potentials that can be used for the development of a school. In such schools the role of the SMT is crucial and most teachers may feel that their contributions are recognised and valued. Where teachers feel that their contributions are not recognised, they may recycle one year of teaching practice throughout their teaching years in a school. In such a case the profound changes that can occur over time in the content, instructional practices and how students learn, would remain on the periphery of the classrooms. It is hoped that this study has contributed literature on how principals can play vital roles in creating functional

nurturing cultures built by all players involved in the teaching and learning of students at a school.

RECOMMENDATIONS

In line with the above discussion, the researchers recommend that, principals in schools should work collaboratively and decentralize power of instructional supervision to vice-principals, senior teachers and HODs. Ideally the SMT should have a minimal teaching load so that adequate time is given to scheduled, well-planned and frequent instructional supervision. The SMT should develop culture of collegiality and empowering of teachers to become autonomous in their instruction. In addition to having a positive attitude towards mathematics, the HOD must be a subject specialist so that the supervised teacher may receive support in terms of subject matter. It is also recommended that the SMT, and even the teachers, should organise/attend seminars, workshops and conferences on instructional supervision so as to acquaint themselves with the various supervision models.

REFERENCES

Adey P 2006. A model for the professional development of teachers of thinking. *Thinking Skills and Creativity,* 1(1): 49-56.
Alausa YA 2001. Gender differences in the Namibian students: Perception of their mathematics classroom environment. *Zimbabwe Journal of Educational Research,* 13(1): 28-42.
Al-hajaya SS, Al-roud A 2011. The administrative creativity skills of the public school principals in Tafila Directorate of Education. *International Journal of Educational Science,* 3: 1-7.
Bipath K 2012. Exploring the role of the principle in creating a functional school culture. *International Journal of Humanities and Social Science*, 2(17): 203-209.
Coimbra MNCT 2013. Supervision and evaluation: Teachers' perspectives. *International Journal of Humanities and Social Science*, 3(5): 65-71.
Collay M 2006. Respecting Teacher Professional Identity as a Foundational Reform Strategy. From <http://www.newhorizons.orginfo@newhorizons.org> (Retrieved on May 17, 2014).
Davis S, Darling-Hammond L, LaPointe M, Meyerson D 2005. *School Leadership Study: Developing Successful Principals (Review of Research)*. Stanford, CA: Stanford University.
Dufour R, Mattos M 2013. How do Principals Really Improve Schools? Educational Leadership. From <http://www.ascd.org/publications/educational-leadership/apr13/vol70/num07/How-Do-Principals-Re-

aly-Improve-Schools> (Retrieved on November 25, 2013).

Ehrich LC, Simpson T, Wilkinson M 1995. The principal as adult educator in the professional development of teachers. *British Journal of In-service Education*, 21(2): 167–180.

Eya PE, Chukwu LC 2012. Effective Supervision of Instruction in Nigerian Secondary School: Issues in Quality Assurance. From <http://www. wesoeduon-line. com/journals/asseqen> (Retrieved on May 15, 2013).

Henderson M 2006. Sustaining the professional development of teachers through a model of community of practice. *Thinking Skills and Creativity*, 1(1): 59–66.

Mendels P 2012. The effective principal. *JSD,* 33(1): 54-58.

Msila V 2013. Instructional leadership: Empowering teachers through critical reflective and journal writing. *J Soc Sci*, 35(2): 81-88.

Niesche R, Jorgensen R 2010. Curriculum reform in remote areas: The need for productive leadership. *Journal of Educational Administration*, 48(1): 102-117.

Oguninyi MB 2005. Relative Effects of a History, Philosophy and Sociology of a Science Course on Teachers' Understanding of the Nature of Science and Instructional Practice. *Paper presented to the Knowledge Production and Higher Education in the 21st Century Conference* in Bergen, August 31 to September 2, 2005.

Owens RG 1991. *Organizational Behaviour in Education*. Englewood Cliffs, N.J.: Prentice Hall.

Ozigi AO 2000. *A Handbook on School Administration and Management*. London: The College Press.

Panigrahi MR 2012. Implementation of instructional supervision in secondary school: Approaches, prospects and problems. *Science, Technology and Arts Research Journal*, 1(3): 59-67.

Rosemary N, Richard N, Ngara R 2013. Teaching practice supervision and assessment as a quality assur-ance tool in teacher training: Perceptions of prospective teachers at Masvingo teachers training colleges. *European Social Sciences Research Journal*, 1(1): 126-135.

Sharma S 2012. Instructional leadership model through Asian principals' perspective. *IPEDR,* 30(1): 17-21.

Suraya WH, Yunus JN 2012. Principal leadership styles in high-academic performance of selected secondary schools in Kelantan Durulnaim. *International Journal of Independent Research and Studies*, 1(2): 57-67.

Turmudi 2012. Teachers' perceptions toward mathematics teaching innovation in Indonesian high school: An exploratory factor analysis. *Journal of Mathematics Education*, 5(1): 97-120.

van der Werf G, Creemers B, de Jong R, Klaver E 2000. Evaluation of school improvement through an educational effectiveness model: The case of Indonesia's PEQUIP project. *Comparative Education Review*, 44(3): 329-357.

Wallace Foundations 2012. The School Principal as a Leader: Guiding Schools to Better Teaching and Learning. From <http://www.wallacefoundation.org/The-School-Principal-as-leader-Guiding-Schools-to-Better-Teaching -and -learning> (Retrieved on June 13, 2013).

Wallace Foundations 2013. The School Principal as a Leader: Guiding Schools to Better Teaching and Learning. From <http://www.wallacefoundation.org/The-School-Principal-as-leader-Guiding-Schools-to-Better-Teaching -and -learning> (Retrieved on November 29, 2013).

Wenger E 1998. *Communities of Practice: Learning, Meaning and Identity*. Cambridge: Cambridge University Press.

Williams CG 2011. Distributed leadership in South African schools: Possibilities and constraints. *South African Journal of Education*, 31: 190-200.