Maria Tsakeni
tsakenim@ufs.ac.za/
mtsakeni@gmail.com
University of the Free State,
Qwaqwa campus

Loyiso Jita
jitalc@ufs.ac.za
University of the Free State

DOI: http://dx.doi.org/10.18820/2519593X/pie.v37i2.7
ISSN 0258-2236
e-ISSN 2519-593X
Perspectives in Education
2019 37(2): 98-109

Date Published:
27 November 2019

School leadership practices for science and mathematics in high-stakes testing environments: An integrated school leadership approach

Abstract

High school science and mathematics achievements in high-stakes testing environments are often characterised by poor performance and reduced participation by learners. The poor performance and reduced participation by learners in science and mathematics is often on the school improvement agendas. Making sense of how to improve learner achievements in science and mathematics is a school leadership function in addition to being a function of classroom practice. This study used an integrated model of school leadership to explore how a Pretoria high school made sense of how to achieve and maintain high learner performance in science and mathematics under the pressures of high-stakes testing. The single case study was purposely selected for consistently achieving high learner performance in science and mathematics. Narratives were elicited from conveniently selected positional leaders, a science teacher and a mathematics teacher. The study highlights integrated school leadership practices for resource and material mobilisation, fit-for-purpose teacher professional development and cultivation of a school culture defined by attitudes, values and work ethics to achieve and maintain high performance is science and mathematics. A recommendation for a further study is made.

Keywords: *integrated school leadership approach; high-stakes testing environments; science and mathematics*

1. Introduction

Under-achievement is notably very high for secondary school science and mathematics in South Africa (Maree, Aldous, Hattingh, Swanepoel & van der Linde, 2006; Ndlovu, 2011). There are various factors linked to under-achievement in mathematics and science which may stem from the socio-economic status of the schools and learners including historical and current conditions (Rhodes & Brudrett, 2009; Visser, Juan & Feza, 2015; Govender, Grobler & Mestry, 2015). Some of socio-historical factors have had an enduring impact on science and mathematics achievement in stratified societies such as South Africa (Khupe, Balkwill, Osman, & Cameron, 2013). Some schools

in deprived communities are characterised by poor learner attainments as may be compared to schools in more affluent communities.

South Africa faces critical shortages of students with learner attainments that can allow them to be placed successfully in higher education to pursue careers in STEM (Maree et al, 2006; Ndlovu, 2011). The trend is similar in some parts of the world (McFarlane, 2013). The adoption of 'education for all policies' such as the ones adopted by the South African government aim for transformation to ensure the inclusion of previously disadvantaged learner groups in mathematics and science education. The emphasis is placed on raising participation and achievement of previously disadvantaged learners in senior certificate mathematics and science, providing quality science and mathematics education at general education and training (GET) and further education and training (FET) phases and developing the human capital to teach science and mathematics (Mushayikwa, 2009).

We realise that while socio-historical factors are known to have enduring effects on schools (Rhodes & Brundrett, 2009; Msila, 2011) some school improvement plans bring about the desired change despite the perceived incapacitation. Similarly, McFarlane (2013) notes that some countries bestowed with more wealth, resources and technology such as the United States are often outranked in international benchmarks for literacy in science, mathematics and reading by poorer countries. Maringe, Masinire and Nkambule (2015) explored the reasons why some impoverished schools manage to achieve enhanced learner attainments despite their conditions. Based on the observations above, we noted that conditions of affluence or poverty may not by themselves determine the performance of schools in science and mathematics. We noted that science and mathematics learner performance is measured through high-stakes testing methods such as common tests and national examinations. Accordingly we considered the high-stakes testing environments to be one of the contextual factors that school leaderships for science and mathematics need to consider in the day to day practices. For this study we assumed that, if schools are considered to be performing well in science and mathematics in high-stakes environments then it would be interesting to study the leadership practices that they put in place. Based on the discussions above and our own experiences we observed that school leadership practices may not bring about the aspired change in learner attainment in the subjects of science and mathematics in the same way they do for the rest of the subjects in the school curriculum. Achievement in science and mathematics does seem to respond in a unique way to school improvement plans under a given leadership practices set-up in high-stakes testing environments. Therefore we ask, *How do leadership practices mediate improved outcomes for science and mathematics in high-stakes testing environments?* The study was conducted in a high-performing school in science and mathematics in one affluent suburb in the city of Pretoria, South Africa. Therefore, the case study contributes to the conceptual development of school leadership practices for science and mathematics by highlighting some of the practices for high performance in high-stakes testing environments.

2. Conceptual framework: Integrated model of school leadership

Educational leadership can be a tool to improve learning in the classrooms (Llorent-Bedmar, Cobano-Delgado & Navarro-Granados, 2017). The improvement in learning results from the influence exerted on classroom practitioners by individuals or groups of individuals in leadership positions. Accordingly, leadership may be regarded simply as influence exerted in

order for certain tasks to be completed in an organisation (Bush & Glover, 2014). Educational leadership encompasses various forms of school leadership, such as principal leadership, head of department leadership and teacher leadership, among others. Improved learner classroom achievement is a basis for monitoring school improvement. Hallinger (2003) asserts that there is not one school leadership model that can be singled out as the best practice for supporting school improvement.

The literature reviewed deals with the cultivation of school cultures and climates that translate into enhanced learner outcomes, and points to certain leadership functions that should be effective to improve learner attainment (Govender et al., 2015; Hallinger & Heck, 2010; Maringe, Masinire & Nkambule, 2015; Msila, 2011; Rhodes & Brundrett, 2009). The functions are closely linked to the typologies of school leadership outlined by Bush and Glover (2014). Bush and Glover (2014) outline eight typologies of school leadership which are (i) instructional leadership, (ii) managerial leadership, (iii) transformational leadership, (iv) moral and authentic leadership, (v) distributed leadership, (vi) teacher leadership, (vii) systems leadership and (viii) contingent leadership. These leadership functions will be explained below.

Instructional leadership

Instructional leadership influences the teaching and learning processes. This leadership focuses directly on improved classroom practices and learner achievements. An extraordinary focus on teaching through effective instructional leadership practices is underscored as a vital gateway to enhanced learner attainment. Studies on learner attainment improvement closely associate learner outcomes with strategies of proficient instructional leadership practices (Maringe et al. 2015; Valentine & Pratter, 2011). In addition, effective instructional leadership is closely associated with the school's capacity to execute managerial leadership to ensure that tasks and behaviours related to teaching and learning are performed optimally.

Managerial leadership

Managerial leadership focuses on the functions and behaviours of the people who are being led, such as classrooms teachers. The leaders engage in scheduling of work, planning and prioritising steps to achieve tasks that are related to teaching and learning. The teaching and learning process tasks need to be implemented effectively in schools. The inability to protect the time for teaching and learning is cited as one of managerial weaknesses that lead to inefficient and ineffective schools in some South African schools (Botha, 2013; Maringe et al., 2015). Engels et al. (2008) assert that in effective school cultures principals are devoted to tasks that focus on instructional leadership, people management and time management.

Transformational leadership

Transformational leadership focuses on ensuring that teachers have high levels of commitment and greater capacities to achieve centrally determined educational objectives. Bush and Glover (2014) explain that educational goals to be achieved would have been formulated by governments, or are aligned to the values of the leader. One way of building teacher capacity is through continuous professional development. Successful leadership hinges on its ability to engage both the teachers and learners in robust learning processes (Rhodes & Brundrett, 2009; Mushaikwa, 2009). Govender et al., (2015) root for an organic transformational leadership that transcends from being able to determine what was taught to establishing how it was taught and what was learned in order to bring about change in teaching and learning practices.

Moral and authentic leadership

The moral and authentic leadership focuses on integrity and is therefore, largely influenced by the values, beliefs and ethics of the leader. Leaders use certain orientations in educational, personal and professional values to direct their vision and guide school improvement. Bush and Glover (2014) further posit that the goals of transformational leadership should be morally and ethically appropriate. Similarly, Maringe *et al*. (2015) stress that leadership practices in disadvantaged schools should be empathetic to the plight of learners and work to improve their life chances.

Distributed leadership

Distributed leadership focuses on shared leadership practices. This form of leadership, however, differs from other forms of shared leadership in that leadership is spread over several individuals through harnessing their expertise. In addition, for distributed leadership to take root, the principal of the school should allow it to flourish (Bush & Glover, 2014). Distributed school leadership practices support teacher leadership. Harris (2003) points out that there is an overlap that exists between distributed leadership and teacher leadership.

Teacher leadership

Teacher leadership recognises that teachers can execute leadership roles. Both the distributed and systems leadership set-ups allow teachers to lead through their agency of expertise. It follows that teachers may become leaders in school improvement by engaging in activities to improve their classroom practices and learner attainment. Teacher leadership is very significant in school science and mathematics (Tsakeni & Jita, 2017). There is an increasing observed usefulness of teacher leaders in driving continuous teacher learning and professional inquiry for classroom change in mathematics and science (Green & Kent, 2016).

Systems leadership

Systems leadership may use set-ups such as school clusters, so that teachers learn from each other. Subject teachers from a number of schools meet periodically to develop work schedules, discuss teaching strategies, develop assessment tools and share resources, among other professional development activities.

Contingent leadership

Contingent leadership provides insights into ways leaders respond to unique school improvement situations. Contingent leadership recognises that a single type of leadership may not be appropriate for all situations. Therefore, the school leadership should be able to respond to unique school improvement situations appropriately.

All of the functions of school leadership mentioned above should be implemented accordingly, to support a holistic change and school improvement. We used this integrated leadership model approach as a lens to identify practices that support enhanced learner outcomes.

3. The context of the study

Using a descriptive qualitative single case study approach, data were collected from a high performing school in science and mathematics. The case study was defined by two parameters which were context and the phenomenon under study. The school was situated in an affluent suburb of Pretoria in South Africa. The school was one of the former Model C schools in

South Africa. These schools were formerly reserved for Whites only before the dawn of democracy in 1994. The school used Afrikaans as a medium of instruction. The phenomenon under study was how the school leadership for science and mathematics were practised under high-stakes testing environments. The high school was selected because it had achieved a consistent track record of good learner performance in science and mathematics over a period of five years before the study. The information on the schools' performance was obtained through word of mouth. Data were collected by means of semi-structured interviews and unstructured observations. The interview schedules for mathematics and science teachers (including positional leaders who taught these subjects) included questions to probe experiences of challenges and opportunities in leading for improved learners' attainment. Some of the questions probed the teachers' experiences of activities and support that had been organised to improve learner achievement at the schools. The questions were asked in ways that revealed the leadership functions in place for improved mathematics and science teaching and learning by both the teachers and the positional leaders. In addition, the positional leaders were asked about the schools' visions, plans, forms of support and activities for improved learner achievement in mathematics and science. The interview schedule was one of the instruments developed for a wider National Research Foundation-funded project. Experienced researchers in the area of instructional leadership developed the interview schedule collaboratively. The unstructured observations captured relevant data, such as that used in the description of the sample. The unstructured observations were used to collect relevant school contextual data that might have been missed by the interview schedule. Martin (2016) says that narratives bring forth stories in which the participants paint pictures of real experiences.

Sample

We were allowed to interview four participants in the school whom were, the vice-principal responsible for curriculum and instruction (he was also a physical sciences teacher), the head of department for Grades 10-12 science, a physical sciences teacher and a mathematics teacher. Accordingly, we used a convenient sample. This was a sample taken from 13 mathematics and 15 science teachers. The school had one principal and six vice-principals. We coded the participants as VP (vice-principal), HOD (head of department for science) PST (physical sciences teacher) and MT (mathematics teacher). The school had close to 1800 learners and 105 teachers.

Ethical considerations and quality measures

Using an ethical clearance that we obtained from the University of the Free State, we sought further clearance from the Gauteng Department of Education, Tshwane South Education District and the school principal. The principal consulted with the School Governing Body before granting us permission to conduct research. In order to ensure the trustworthiness of the data that was collected, the semi-structured interviews were developed with an analytical framework in mind, based on the eight leadership functions discussed above and proposed by Bush and Glover (2014). Data from the 4 participants were triangulated during analysis in order to of ensure the credibility and trustworthiness of the findings.

Data analysis

The components of the integrated model of school leadership were used to develop the analytical framework as a first step in making sense of the data. The second step involved

developing themes that were used to respond to the research question. The two steps in data analysis were conducted to ensure rigour as a quality measure. The interview transcripts were shared with the participants for member checking. In addition, the findings were compared with literature findings on the same phenomenon.

4. Findings of the study

The findings of this study are discussed under six themes which are (1) material mobilisation for science and mathematics classrooms, (2) school-based professional development on mastery of content, (3) professional development organised by a teachers' labour union (4) district-based professional development focusing policy and scheduling of work, (5) managing school activities to protect teaching time, and (6) Enacted school culture for high-stakes testing.

Material mobilisation for science and mathematics classrooms

Through our unstructured observation we noticed that the science and mathematics classrooms were well-resourced. Below is an extract from the field notes written by one of the researchers during a visit to the school. The extract was as follows,

> *After the interviews I was escorted on a tour of the science laboratories in the school. I was taken to 7 large physical sciences laboratories and equally large 5 life sciences laboratories. The labs are well equipped and in good condition. In one of the physical sciences labs, Grade 11 learners were conducting experiments on redox reactions. In one reaction the learners observed a small boat made out of an aluminium foil disappear as it was floating in a solution of copper (II) sulphate and in the other reaction learners collected hydrogen gas in balloons from the reaction between zinc and hydrochloric acid. They then tested the hydrogen gas with a flame to get a popping sound. Learners wore safety goggles and aprons. The teacher was in a lab coat. The class was of about 22 learners.*

The evidence in the extract indicates that resources for science teaching and learning were available in the school. There is evidence that the teachers and the learners used the materials for teaching and learning activities. In addition to the science laboratory, virtual laboratories were also available. The physical sciences teacher PST said the following about the existence of virtual laboratories,

> *We have a simulator, the PHET program from the internet. We use the PHET. We use those simulations in class for the kids and me as well and it helps with other problems as well yes.*

The mathematics teacher MT also indicated that the school had sufficient resources. These included human resources with several heads of departments. Below is an extract of the conversation that the researcher had with MT.

> **Interviewer***: Are you happy with the resources you have in mathematics?*
>
> **MT:** *We have lots of resources but what I can also tell you is that our department is broken up into five little departments, with a head. The Grade 8s, all the teachers teaching Grade 8 is one umbrella, how do you say it in English? That makes the group even smaller and accessible*

Both teachers perceived the resources to be adequate for the needs of teaching and learning in science and mathematics. Ensuring that teachers had enough resources to execute their duties and complete tasks was one of the ways to demonstrate *managerial leadership* in the school. The extract from the interview with the mathematics teachers was suggestive

of *distributed leadership* practices in which there were several smaller departments by Grade for example.

School-based professional development on mastery of content

The teachers mentioned that school-based professional development was an ingrained exercise within their daily activities. The head of department for science pointed out that it was her duty to make sure teachers are assisted with mastery of content. The following interview extract shows that she had 25 years of teaching experience at the time of the interview and used that experience to mentor other teachers.

> **HOD***: I've been an HOD since 1990 so it's been 25 years you know*
>
> **Interviewer:** *So what can you say are the roles of HODs, what are you doing as an HOD? Especially in mathematics and science*
>
> **HOD:** *Yeah, yeah, the real important thing is to look at the standard of the teaching and learning of everybody. I'm only HOD for grade 10-12 physical sciences at the moment and really it's imperative for me to make sure that all the teachers know the content, they can discipline the learners and they can put empathy within the learners, the standards of learning is very important so the whole story is on a high standard and that's about it.*

The mathematics teacher also indicated how the teachers helped each other with the content. The following interview extract demonstrates how having many teachers of mathematics in one school who were working in one building facilitated the discussions on content.

> **Interviewer:** *You see with teaching there are many things that are encountered, for example the learners and whether it is a change in curriculum, do you get assistance somehow to understand things, and how is it easy to get any kind of help?*
>
> **MT***: It's very easy here because we are 13 in the Maths department and we work together very, very [emphasis] well. We stand outside the classes. All our Maths classes are in one building so during breaks and when the children come to class in between lessons, we stand outside and we ask questions. No it's very easy and um our union [teachers' union] has created an activity book for the year which has helped a lot.*

School-based professional development was a demonstration of active *instructional leadership* facilitated by the heads of departments and through teacher interaction. The mathematics teacher also gave an indication of how a teachers' union facilitated professional development for the teachers at the end of the extract.

Professional development organised by a teachers' labour union

It looked as if the teachers in the school belonged to one teachers' union that catered for some Afrikaans medium schools similar to this particular school that we studied. The mathematics teacher went further to describe the kind of support the teachers received from the teachers' labour union after the researcher probed for more information in the interview extract below.

> **Interviewer:** *So what kind of support do you get from the union?*
>
> **MT:** *Worksheets and question papers whatever you ask them, they will reply the same day and help you, with whatever your problems is.*

The professional development role of the teachers' union was also confirmed by the vice-principal in the following interview extract.

> **VP***: There are a lot changes that came along in the 20 years and luckily the department and the unions had some courses for the change in the syllabus. We sent out teachers to those development sessions to get used to the new system and the new syllabus. We sent them for those workshops to go and learn more and at school we have staff meetings as well so that if they have questions or people have questions we discuss such situations in the staffroom and the meetings.*
>
> **Interviewer***: Are you saying the teachers' union is involved in the professional development of the teachers?*
>
> **VP***: Yes it is the teachers' union, we are part of the South African um! They conduct workshops for the different subjects.*

The above evidence was an indication of an active systems-based leadership. The systems-based leadership also happened at another level through district and cluster based professional development.

District-based professional development focusing on policy and scheduling of work

The district-based professional development focused mostly on policy interpretation and scheduling of work. This finding was gleaned from the interview extract below with the physical sciences teacher.

> **Interviewer***: So in cluster meetings what do you do?*
>
> **PST***: In cluster meetings, usually our facilitator goes through certain sections whereby she finds um what we might still need to develop in, it's not like a workshop it's only mentioning like in this section you must pay attention to this. It's quick and it's not a whole thing. Cluster meetings are all about dates and when we are writing exams and all of those things. It's not workshop related.*
>
> **Interviewer***: Not workshop related? So the workshops that you receive are from within?*
>
> **PST***: Yeah we discuss amongst ourselves. I just passed one of my colleagues in the hall and we quickly discussed the thing and it is 2 minutes and it's finished. Sometimes it's through corridor meetings and at times we sit and we discuss a certain aspect.*

The vice principal (VP) further explained that the district activities focused on monitoring assessments through moderation of test papers and marked learners' scripts. He said,

> *Mostly at our school we've got sessions, so moderators at times and the different facilitators come long to the school, not all the subjects every time so there is a process and they've got to visit every school at a certain time. So they are visiting us and all the assessments should be sent at one stage to the district moderation session so the people in our cluster or circuit are moderating and we are discussing such situations at the meetings on how we should implement new developments. That's what the district does.*

The participation in district activities was another demonstration of *systems leadership* in addition to the union activities.

Managing school activities to protect teaching time

In a demonstration of *managerial leadership* to protect teaching time the HOD explained how the school ensured that the 35 minutes of class time are optimally utilised in the following interview excerpt.

> **Interviewer:** *How do you ensure that learning is taking place because our concern is that learning should take place, if it is happening how is the principal involved?*
>
> **HOD:** *I think in our context, learning is happening here 35 minutes of each period 8 times a day. That's all we do. We have to be in class on time when the bell rings. There is nobody that's not in his/her class. I've been to a class just know, half an hour ago and we are teaching as from the beginning to the end of the year.*

The notion of class time protection was reiterated by the vice-principal of the school when he said the following,

> *So we using all the time we have and we don't mess around with time. Our academic time is very important, so we keep to our timetable. We keep to our time so that the kids can go to class on time and do what is expected of them.*

Enacted school culture for high-stakes testing

The deputy principal outlined what he believed is a school culture that enabled learners to do well in science and mathematics. He mentioned the nature of learners who were eager to obtain good marks, teachers who were willing to support the learners and protection of teaching time.

> **Interviewer:** *So I think I've met the right person here being a vice principal and also a physical science teacher. So what is crucial about the school's vision and mission for science and mathematics in the school and what you wish your learners' performance to be?*
>
> **VP***: As I said it is the culture of the school for learners to want to study and they want to do good and want to get good marks. Then as teachers we get them on the way and give them direction on where to go… The kids compete for top academic positions. They are working each other out and they want to learn so it is nice in our school. We just have to manage it but as a school we want 100% pass rate, we want the most distinctions we can get from the school, every year and the kids know they have to respond to it.*

In addition to instilling a culture to achieve high performance in science and mathematics through the learners, new teachers were also inducted into the culture by the HODs. On being asked about how the school communicated the vision of the school for science and mathematics the vice-principal said the following,

> *Yeah you see that's part of the schools culture, so mainly the head of departments will be involved in orientating the new staff members, the various science and mathematics teachers and through that we are getting the culture of science and mathematics in our school through the younger teachers. We try to develop them well.*

The development of a school culture conducive to the learning of science and mathematics was a demonstration of *transformational leadership* practices. In addition, the influencing of the learners' and teachers' values and work ethics towards science and mathematics is evidence of *moral and authentic leadership*. Leadership is value-laden and based on beliefs of individuals (Bush & Glover, 2014). We interpreted the engagement of the school in a three tier

professional development set-up through the school-based, district-facilitated and teachers' union facilitated activities as a demonstration of *contingent leadership.* The professional development activities seemed to complement each other in meeting the teachers' needs to allow easy access to content enrichment, support for the curriculum and assessment policy implementation and work scheduling and pacing.

5. Discussion

The study set out to describe how school leadership practices mediated the achievement and maintenance of high science and mathematics achievement using one Afrikaans medium and former Model C secondary school in one affluent suburb in Pretoria. The case study is important because Hallinger and Heck (2010) observe that schools follow unique trajectories when they conduct activities for school improvement. The findings were made from the participants' point of view in line with qualitative case study in which data were collected by means of narratives. The use of the integrated school leadership conceptual framework opened up a lens to explore all possible avenues of leadership through which the high learner performance in science and mathematics was influenced. We were able to conclude that the school made use of the integrated leadership model comprising the eight leadership functions mentioned by Bush and Glover (2014). There was evidence of managerial, distributed which was suggestive of teacher leadership, systems, transformational, instructional, moral and authentic, and contingent leadership. We noted that the use of most of the leadership functions contributed to the construction of the school's leadership for science and mathematics.

In addition, the leadership functions were performed through six leadership practices that were highlighted for having an influence on school's science and mathematics high achievement record. These leadership practices were (1) mobilisation of resources for science and mathematics, (2) school-based professional development for mastery of content, (3) teachers' union facilitated professional development, (4) district-based professional development focusing on work scheduling and policy implementation, (5) protection of teaching and learning time for science and mathematics, and (6) an enacted school culture for high-stakes testing to ensure improved learner achievement in science and mathematics. There were significant efforts to mobilise resources for effective science and mathematics teaching and learning. The resources included a significant human capital base in a demonstration of managerial leadership to enable teachers to complete their tasks (Bush & Glover, 2014). In addition, managerial leadership was demonstrated through efforts to protect teaching and learning time by making sure that the timetable is respected by both the teachers and the learners. Maringe et al. (2015) observe that failure to protect the time for teaching and learning is one of the factors that lead to poor learner performance in South African schools. The school engaged in professional development for the teachers at three identified levels. There was a significant drive to ensure mastery of content by the teachers through school-based professional development entrenched as a school culture. The school-based professional development was a demonstration of instructional leadership activities facilitated by a mix of the positional, distributed and teacher leadership set-ups. The creation of sub-divisions headed by different teachers under a department ensured the practice of leadership spread over several individuals and teacher leadership. Harris (2003) propounds that there is an overlap between distributed leadership and teacher leadership. Professional development was also facilitated by a systems leadership through the district and a teachers' union based activities. The districts were mostly responsible for ensuring the implementation of the curriculum and assessment policies through scheduling of work and

moderation activities. The teachers' union engaged the teachers in professional development activities by providing some resources in electronic forms and through content mastery enrichment activities. The district and teachers' union facilitation of professional development for the school was a demonstration of both instructional and systems leadership. The use of a three tier professional development was evidence of contingency leadership to make sure that the teachers optimally received the necessary support. The professional development presented itself as a unique response to particular support needs that the teachers required.

Finally, transformational leadership was demonstrated through an enacted school culture responsive to the high-stakes environment by ensuring high performance in science and mathematics. The school instilled suitable attitudes, values and work ethics for science and mathematics achievement in learners. The teachers were also inducted to support the learners and maintain the school culture. The development of values and work ethics were a demonstration of moral and authentic leadership. Through this case study we explored how leadership functions and leadership practices can be used by a school to achieve high learner performance in science and mathematics in high-stakes testing environments. Although the findings of the study are limited to a context, they serve as an example of how schools can use most of the leadership functions to survive the high-stakes testing environments.

6. Conclusion

The provision of sufficient resources and protection of teaching time supported managerial leadership efforts that ensured the completion of tasks by the teachers and learners. The use of a three tier fit-for-purpose professional development set-up through school-based, district-facilitated and teachers' union facilitated activities worked to meet the teachers' needs for content enrichment; curriculum and assessment policy sense-making and implementation; and work-scheduling and pacing. The enactment of a school culture to achieve and maintain high learner achievements in science and mathematics was made possible by instilling appropriate attitudes and work ethics in both the teachers and the learners through transformational and moral and authentic leadership functions. The study recommends further research on how teachers' labour unions can be effective players and stakeholders for school improvement in other school contexts.

7. Acknowledgements

This study was funded by the National Research Foundation (NRF) of South Africa.

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