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Rationale of Teaching Physical Sciences Curriculum and Assessment Policy Statement Content: Teachers' Reflections

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ABSTRACT This paper presents a critical action research study of two out of six teachers who reflected on the rationale of teaching Physical Science Curriculum and Assessment Policy Statement (CAPS) in South African high schools. This study was conducted with a purpose to explore teachers' reflections on teaching Grade 12 Physical Sciences CAPS in rural schools in Ceza Circuit, KwaZulu-Natal. As a result, reflective activity, one-on-one semi-structured interviews and focus group discussions were utilised for data generation. Purposive and convenience samplings were used in selecting this specific group of teachers because the researcher needed teachers with whom the researcher was familiar and who were also easily accessible. This study was framed by the concepts of curricular spider-web in order to explore teachers' reflection of their teaching practice. This paper concludes that, in order to achieve positive achieved curriculum, teachers should first be driven by personal rationale in the implementation of the content.

INTRODUCTION

Miheso-O'Connor Khakasa and Berger (2016) outline that the rationale for teaching science subjects like Mathematics and Physical Science influences what teachers need to know (content knowledge) before teaching and learning processes begin. In support of this, Carl (2012) asserts that the various teachers' rationale for the implementation of curriculum varies at the national (macro) and classroom (micro) levels, making teachers responsible for teaching/implementing the intended curriculum (Physical Science CAPS). Furthermore, any intended curriculum has learning signals such as rationale, goals, content, space, time, activities, grouping, assessment, teacher role and resources that need to be understood by teachers for successful enactment/implementation (Khoza 2015a). The main learning signal is the rationale for teaching, which connects all others signals. The only way the teachers understand all the learning signals is when they reflect on their rationale for teaching in order to improve their teaching practices (Khoza 2015a). This is a clear indication that most teachers in their teaching process do not reflect as to why are they teaching and what is the motive/rationale that drives them. This is one of the problems facing high school teachers who are teaching Physical Science because it is not clear as to which rationale amongst the personal, professional, and societal drives them during the teaching and learning process.

Objectives

This paper intended to explore Grade 12 Physical Sciences teachers' reflections on teaching CAPS in order to evaluate the rationale that was propelling their teaching practice. The paper also intended to understand teachers' reflections by explaining what influences teachers' reflections and why teachers reflect in a particular way. Thus, the findings of this paper intend to empower teachers teaching Physical Science curriculum in order to improve their teaching practice. Kehdinga's (2014) findings concur with that of a case study conducted by Khoza (2015a) on student teachers' reflections on their practices of CAPS, when recommending that teachers should identify the vision (rationale) that underpin CAPS before the curriculum implementation begins, in order for them to understand all other curriculum learning signals.

This suggests that teaching the content revolves around the firm rationale for teaching any curriculum. As a result, technical, practical and critical levels of reflection influence the strong rationale of teaching the subject content

(van Manen 1977). Consequently, this seeks that teachers reflect on their teaching practice and also indicate which rationale is a driving force in their practices. This suggests that good possession of rationale may strongly bring an alignment between intended curriculum and implemented curriculum for the positively achieved curriculum. Furthermore, this suggests a need for a study that explores teachers' reflections on the rationale for teaching Physical Science content (topics and experiments). Therefore, the study was conducted not just to describe and understand the rationale of teaching the Physical Science CAPS content, but also to enhance improvement, justice, and fairness in schools (Cohen et al. 2013). It is for this matter that the next section presents the literature on curriculum presentation, teachers' reflections, and rationale of teaching as well as Physical Science CAPS content.

Literature

Curriculum Presentation

Rationale of teaching any content relies on the definition on the presentation of curriculum. Thus, Hoadley and Jansen (2014) and Pinar (1994) explain that the word curriculum originates from the Latin word 'currere' which implies to conduct a course of learning. Pinar (1994) reveals teachers' infinitive autobiographical nature of their lived experiences (reflections) in defining curriculum which in turn becomes a 'plan of learning'. This suggests that Pinar's (1994) definition of curriculum will enable teachers to reflect on the rationale of teaching Physical Science curriculum (content). Furthermore, Hoadley and Jansen (2014) assert that curriculum can be defined in three different dimensions: curriculum as intended, curriculum as implemented and curriculum as achieved. According to van den Akker et al. (2009) curriculum is divided into international curriculum (SUPRA), national curriculum (MACRO), school/institution curriculum (MESO), classroom/teacher curriculum (MICRO), and learner curriculum (NANO).

In a case study conducted by Khoza (2015a) on student teachers' reflections on their practices of Curriculum and Assessment Policy Statement (CAPS), the South African curriculum has been defined in terms of the intended/planned curriculum as the formal or official curriculum document (MACRO) from the Department of Education. All schools have their own curriculum in a form of a work schedule/annual teaching plan (MESO) and teachers in a form of a lesson plan (MICRO). Therefore, such studies bring in the issue of competence versus performance curriculum (Bernstein 1999).

In addition to the above, according to Hoadley and Jansen (2014), differences between competence curriculum and performance curriculum is defined by looking at learner control over curriculum, teacher role towards implementation of the curriculum, teaching methodology (focus), knowledge (every day or school), assessment (presence or absence), and learning space. The study conducted by Khoza (2015a) reveals that during the Apartheid era, curriculum in the South African context was driven by Christian National Education (CNE) which encouraged rote learning. The study outlines that after CNE, Curriculum 2005 (C2005) was introduced in 1998 which was driven by outcome-based education (OBE). In 2005 South Africa introduced another new curriculum called the National Curriculum Statement (NCS) to replace C2005 but outcome-based education (OBE), as the approach, continued to be utilised.

Moreover, Khoza (2015b) further asserts that at the end of 2009 another curriculum called the Curriculum and Assessment Policy Statement (CAPS) was presented by the Ministerial Review Committee. As a result, CAPS has been implemented in schools since 2012. The first graduates for CAPS were in 2014. Further to this, CAPS is in line with Bernstein's (1999) performance/vertical model of curriculum and Tyler's (1959) product approach to curriculum where the focus is on high levels of understanding of subjects. Berkvens et al. (2014) highlight that any spider web concept revolves around the rationale for teaching. This suggests that in evaluating a curriculum, rationale concepts become a foundation of all other concepts like content. In addition, van den Akker et al. (2009) simplified rationale and content concepts of vulnerable curricula spider-web by putting them in a question format in order to be more easily understood. The questions are as follows: Why are you teaching (Rationale)? And what are you teaching (Content)? Such questions seek teachers' reflections on their teaching practices.

Teachers' Reflections

Reflections play a major role in identifying the rationale for teaching/implementation of the intended curriculum. According to Dewey (1933) reflections are regarded as a process or activity that is central to developing and improving practices. This suggests that, reflections represent the process of teachers' introspection by learning from their experience of teaching for emancipatory purposes. Reflections help teachers to understand and "have control over the content and processes of their own work" (Zeichner and Liston 1987: 26). In other words, in the name of reflection many teachers are encouraged to think critically of their own teaching practice so that they may have sound rationale of teaching Physical Science content. Dewey's (1933) idea of reflective practice is in line with Killen's (1989) of becoming a reflective teacher. Killen (1989) outlines that there is always room for improvement in any teaching practices no matter how good teachers might be. This suggests that reflective teaching practice can help teachers to know why they teach Physical Science curriculum in particular ways. Furthermore, van Manen (1977) displays three levels of reflections when reflecting on any curriculum: technical level of reflections, practical level of reflections, and critical level of reflections.

As a result, van Manen (1977) as well as Zeichner and Liston (1987) assert that at the technical level of reflections, teachers deal with technical application of educational knowledge in a learning environment so that it would be easy to achieve aims and objectives of implementing the content topics. This level of reflection encourages school knowledge (research-based knowledge) (Bernstein 1999). Thus, in this level of reflection, performance approach to curriculum supports school knowledge. As a result, those teaching Physical Science should have personal rationale before reflecting on the other learning signals.

According to van Manen (1977) as well as Zeichner and Liston (1987) at a practical level of reflection, teachers are concerned with the principles that guide their teaching practices. In this level teachers are concerned with the learning outcomes to be attained. Schon's (1983) concept of reflection concurs with that of Zeichner and Liston (1987) when they highlight that the practical level of reflections encourages everyday knowledge. This suggests that the practical level of reflections is in line with competence curriculum where the focus is on the learner rather than the content. In other words, teachers should have societal rationale as to why they teach experiments in a local context. The rationale of teaching enhances the learning signal of the curriculum (Khoza 2015b).

In addition to the above, van Manen (1977) as well as Pedro (2005) further assert that at the critical level of reflection teachers are concerned with both internal and external factors from the classroom teaching practice that can inform their teaching. This suggests that understanding teaching practices/theories may have an influence in selecting the correct theory for teaching the content. Zeichner and Liston (1987) further assert that teachers at this level should use the critical criteria which encourage teachers to use aims, objectives and learning outcomes in their teaching. This suggest that various factors or aspect of teaching may result in the intertwining of both competence and performance approach in teaching. In other words, teachers should possess content knowledge of a subject in order to handle different theories. Thus, rationale of teaching enhances the learning signals of curriculum (Khoza 2015b).

Rationale of Teaching

Van den Akker et al. (2009) describe the rationale as a response to the question of why a subject is taught in school. The study conducted by Berkevens et al. (2014) reveals that teachers' reflections on the rationale of teaching should be based on three propositions: the personal rationale, societal/social rationale, and content rationale (professional). Kehdinga (2014) concludes that the concept of personal rationale plays a major role for teachers in order that learners attain the achieved curriculum and teachers are able to produce a thousand theories (teaching methods) during their teaching practice. This suggests that personal rationale enhances teachers' use of various teaching methods in the teaching of Physical Science curriculum. Kehdinga's (2014) findings concurs with that of a study conducted by Mpungose (2015) when recommending that teachers should identify rationale before the curriculum implementation in order for them to understand the implementation process. Amin and Vithal (2015) outline that personal rationale helps good teachers to know and understand their learners better. Teachers can use three ways to know their learners: solicited knowing (solicited information),

unsolicited knowing (volunteered information), and professional knowing (teaching profession information). Therefore personal rationale becomes the basics of both societal and content rationale.

In addition to the above, sometimes teachers teach because of the societal rationale which places the community before anything else in teaching (Mpungose 2015). Further to this, both Schon (1987) and Kehdinga (2014) and others outline that, those teachers as professionals should understand the rationale behind the teaching of values to learners living in the community. This suggests that teachers may teach because they want to contribute towards equipping the learners with the necessary knowledge/skills required by their societies. According to Czerniewicz (2015), some teachers teach the curriculum to learners irrespective of gender and poor socio-economic background, because they want to assist learners in order to give back to the community.

Content rationale places the profession at the centre of teaching and learning (Mpungose 2015). For this study, it places Physical Science at the centre so that when the teachers are teaching they follow the subject rules that frame both the teachers and learners with subject content/knowledge. Furthermore, Shulman (1987) stipulates that a teacher needs to be the professional qualified with the relevant knowledge/content in order to instruct specific skills and content to learners according to the curriculum vision. This suggests that those (curriculum implementers) who are teaching Physical Sciences content (implemented curriculum) should be trained and qualified to teach in order to instruct relevant skills to learners and attain intended curriculum stated aims. Khoza (2015b) asserts that some participants taught their subject content as based on what the CAPS documents stated and by reflecting on what they have been reading. This suggests that some qualified teachers are teaching because they understand the international content of the subject like Physical Science which supports school knowledge. In other words, it is necessary for teachers to master Physical Science CAPS content.

Physical Sciences CAPS Content

Studies articulate that "content is about what they are teaching/learning" (Khoza 2014: 54). These studies (Carl 2012; Ramnarain 2013; Berkvens et al. 2014; Hoadley and Jansen 2014) outline that decisions on content and subject are determined by subject topics to be covered, practical work/experiments and content-related knowledge. These studies move a step further by outlining that teachers need to possess content knowledge in order to teach subject topics and also demonstrate experiments. This suggests that qualified teachers with necessary content knowledge of Physical Science curriculum may lead towards a positively achieved curriculum.

Furthermore, Hoadley and Jansen (2014) assert that topics put more focus on the subject to be taught. Therefore, subject topics should be balanced, well-sequenced and organised for quality assurance (Berkvens et al. 2014). Tyler's (1959) product approach to curriculum also puts more focus on high levels of understanding of subjects topics. This suggests the performance approach to curriculum where teachers follow the intended/prescribed topics. In other words all teachers teach the same topics in all grades/phases and they assess learners using internationally recognised standards. Assessment is based on topics done by learners. Therefore mastering subject topics is vital because it enhances the achievement of aims and objectives. As a result, in South African performance curriculum (CAPS), each subject has its own internationally recognised topics. This suggests that CAPS influences teachers to have passion and love since they know what to teach. Ramnarain (2013) concludes that Physical Science topics should include parts of both Physics and Chemistry in order to implement experiments properly.

CAPS (2011) documents state all the systematic/prescribed practical activities or experiments to be demonstrated. A teacher must integrate practical work with topics covered (Hoadley and Jansen 2014). This suggests that practical work/experiments put more focus on skill development and problem solving skills of learners after a particular topic has been covered. According to CAPS (2011) practical work/experiments must be designed in such a way that they invoke learners to use skills like planning, information gathering, synthesising, hypothesis forming and drawing conclusions in achieving learning outcomes (competence curriculum). This suggests that in teaching Physical Science, practical work/experiments are influenced by societal rationale. Thus, a leaner should know how to do any practical work from Chemistry topics as well as Physics topics. This indicates that

both topics and experiments are dependent on a theory/content-related knowledge that a teacher has.

According to Grossman et al. (1989) theory/content-related knowledge refers to knowledge of the substantive and syntactic structure of a discipline. Substantive structure includes knowledge of facts, concepts and principles within a content area whereas syntactic structure involves philosophical scholarship on the nature of knowledge. This suggests that teachers teaching Physical Science should possess knowledge of the substantive structure since it is subject specific. Content-related knowledge assists teachers to be able to blend the content into an understanding of how particular topics, experiments and problems are presented and adapted to learners (Shulman 1987). This suggests that teachers without content-related knowledge, experience uncertainty about topics and experiments. Thus, content rationale may assist teachers to use critical reflection during teaching practice, so that they are able to use aims, objectives and learning outcomes (competence and performance). Otherwise, teachers will transmit boring and useless Physical Science theory to learners if they lack the necessary ideological acumen (teacher-centred, leaner-centred and content-centred) (Khoza 2015a).

METHODOLOGY

Research Questions

The data production/generation was organised to respond to the following research questions

What are the teachers' reflections of the teaching of Grade 12 Physical Sciences CAPS in Ceza Circuit rural schools?

Why do teachers reflect in particular ways on their teaching of Grade 12 Physical Sciences CAPS in Ceza Circuit rural schools?

Research Approach, Paradigm and Style

This paper adopted a critical paradigm. Critical paradigm is described as a paradigm in which a researcher intends to not only describe and understand, but also to change society in order to enable it to become more just and equal (Cohen et al. 2013). Moreover, this is a critical action research study of two Grade 12 teachers at rural schools in Ceza Circuit. The main purpose of the critical paradigm is to interrogate the phenomenon which in turn may transform the participants (Lisle 2010). Action research occurs in a specific context, which may not represent the whole population, and can only aim to create a reliable generalization. However, transferability remains a possibility. Action research is subjective but in-depth, open-ended, exploratory and transformative in nature. It is conducted on entities in their natural settings wherein teachers research their own practices with the aim of improving their teaching practices (McNiff and Whitehead 2009). The use of both the critical paradigm and action research is vital for this study because it is transformable, holistic, explorative and contextual in its nature (Khoza 2013). This suggests that the qualitative critical paradigm promotes a better self-understanding (transformation) and increases insight into human conditions (Babbie 2004).

The study used a critical action research process in order to help the participants to learn to plan, implement, observe, and reflect on their practices in order to improve their practices (McNiff and Whitehead 2009). Action research encourages a collaborative or participative approach to finding solutions to practical problems experienced by participants (Babbie 2004). The data was generated from the reflection stage as the final stage of action research. However, Babbie (2004) feels that this process is not suitable in education because it may take place even without following a scientific research process and be influenced by opinions rather than facts. Nonetheless, this study combined the action research with critical paradigm to overcome the above weakness (Lisle 2010).

Sampling

Sampling is described by Christiansen et al. (2010) as making decisions about which people, setting, events or behaviors to observe or study. As a result, purposive sampling supported by convenience sampling was used in selecting the most accessible two teachers teaching Grade 12 Physical Science curriculum. Further to this, teachers familiar with the researcher and who were from the same schools (Ceza circuit in Zululand) as the researcher, were included. All teachers were teaching Physical Science in Grade 12 and were full time teachers working for the South African Department of Basic Education (DBE). The two participants answered the re-

search questions through reflective activity, one-on-one semi-structured interviews and focus group discussions. The participants were given an activity to reflect on their practices/implementation of Curriculum and Assessment Policy Statement. Two participants' names were not revealed; instead acronyms, like A1 to B2, were used because of ethical considerations as suggested by Cohen et al. (2013). Informed consent and ethical considerations were acquired in addressing confidentiality, anonymity, voluntary participation, and withdrawal when they felt the need. Participants were also told that there would be no limits from any benefit that might be the result of their participation in the study.

Data Production/Generation and Analysis Methods

Methods used in this study for data generation/production (sources of data) were reflective activity, one-to-one semi-structured interviews, and focus group discussions for the two participants to answer the research questions. All three methods were used twice because it is a useful tool if one wants to generate first-hand information (Khoza 2014). The reflective activity had teachers' reflections on their teaching practices of Physical Science CAPS. The one-on-one semi-structured interview was administered for approximately forty-five minutes per participant after the reflective projects were analysed. The focus group discussion was also administered for about forty-five minutes. The multiple sources of data were used for the purpose of enhancing authenticity of data and achieving measures of trustworthiness (Khoza 2013). The cell phone was used to record the semi-structured interviews and focus group discussion for transcription purposes. This was done to ensure that the data generated were consistent across all sources of data. As a result, the researcher used multi-methods (triangulation).

Furthermore, findings were presented clearly, in order to be applicable to similar contexts of this study (transferability). The researcher presented evidence including direct quotations to allow readers to evaluate the findings (dependability). The researcher described the steps in detail to make sure that the researcher's position did not influence the findings (confirmability) and credibility was ensured through the Curricular Spider Web conceptual framework (Cohen et al. 2013). This was done to also ensure trustworthiness of the findings as the important process of authenticity (Babbie 2004). In terms of data analysis, this study used guided analysis where themes and categories that emerged from the process approach were modified through interaction with data (Christiansen et al. 2010). The findings were exploratory in nature; two themes were generated from the Curricular Spider Web.

RESULTS

All participants indicated their reflections through the use of reflective activity, one-on-one structured interviews, and focus group discussions. All these methods were administered in two phases or stages of the action research which include, planning, implementation (action), observation, and reflection. Reflections were based on two themes which are the rationale and content.

Theme: Rationale

Why Are You Teaching Grade 12 Physical Science CAPS (Rationale)?

Participants reflected in various ways from their own different experience and context. For instance, during the first phase of reflection B2 outlined that,

"I am teaching Physical Science CAPS because I enjoy it (personal rationale) *and I want to give back to my community learners from rural schools by equipping them with necessary skill and knowledge for Physical Science CAPS"* (societal rationale). A1 added that *"I love demonstrating experiments in order to expose learners to real world of science"*.

Whereas during the second phase of reflection A1 responded in this way,

"Since I am a qualified teacher holding BSc. Degree and PGCE (content rationale), *I then enjoy teaching Physical Science CAPS* (personal rationale) … *I teach Physical Science CAPS in order to help Grade 12 learners to pass well so that they can get bursaries for their tertiary level of study* (societal rationale)…". *"I teach Physical Science following approaches stipulated in CAPS document, this enhances interest and love of teaching in order to assist learners"*, said B2.

Theme: Content

What Content Are You Teaching In Grade 12 Physical Science CAPS?

In the first phase of reflection, B2 reflected as follows:

'*I teach both physics as paper 1 and chemistry as paper 2, these papers makes up 150 marks each and when combined is 300 marks. I do experiments as detailed in CAPS document. I find it difficult to teach physics part, I rather keep more time in chemistry because I am familiar with it'*. While A1 added that, *"I have covered first and second term work as prescribed: work, energy and power; projectile motions; momentum; organic chemistry and chemical change"*.

On the other hand, during the second phase of reflection, A1 said,

"I always cover all six chapters in Physical Science CAPS. I always ensure that I keep more time drilling learners on chapters that have high marks like chemical change and electricity & magnetism". Further to this, B2 said. *"Possession of relevant content-related knowledge helps me to master both topics and experiments irrespective of resources barriers"*.

DISCUSSION

During the first phase of reflection, participants reflected on one question which sought to establish the rationale behind teaching of the Physical Science CAPS. Mostly, participants reflected on only two elements of the three categories. The above accounts indicate that passion and love (personal rationale) of teaching Physical Science CAPS played a major role. In other words when you love teaching (passion), automatically you know your learners. This enables the participants to easily achieve aims and objectives (performance curriculum). Furthermore, Khoza (2016) also emphasises that personal rationale is the impetus that enhances teachers to assist learners from the society. Teachers' reflections indicate that societal rationale was influenced by the learners' opinions from the community at a local context. This means that societal rationale is driven by competence curriculum which puts more focus on the learner (learning outcomes) (Hoadley and Jansen 2014; Dreyer 2015). In other words both participants in phase one reflected as based on the technical and practical level of reflection without deep thinking (critical level reflection) (Zeichner and Liston 1987). Findings also suggest that personal rationale is a basic or a major rationale to any other rationale (Khoza 2016).

On the other hand, during the second phase of reflection participants were aware of all three rationale categories since they showed an expansion in their levels of reflections by reflecting on all three rationale categories. This suggests that participants were learning and improving during phases of the study in order to understand better the rationale of teaching Physical Science curriculum. Furthermore, Schoenfeld and Barton (2016) as well as Percy (2005) are of the view that teacher proficiency, transformation and empowerment are as a result of the critical level of reflection. This suggests that critical thinking involves the self-thinking about the profession which then has a greater influence on content rationale. The teaching profession is grounded on school knowledge which is in line with the performance curriculum (Bernstein 1999). However, content rationale of teaching (critical reflection) influences teachers to use both types of approach to curriculum (performance and competence) in order to put more focus on content-related knowledge using relevant theories: teacher-centred, learner-centred and content-centred (Francis and le Roux 2011 Khoza 2016). This means that content rationale equips teachers with teaching methods in order to improve teachers' teaching practices of Grade 12 Physical Science CAPS.

Furthermore, all participants during the first phase of the action research, relevant to the content theme, were able to reflect on the subject topics category, paper 1 (P1) and paper 2 (P2) including experiment category (practical work) which indicated that technical and practical level of reflection were addressed. Teachers were able to reflect on the topics stipulated in DBE (2011) as follows: matter and materials (P2); chemical system (P2); chemical change (P2); mechanics (P1); waves, sound and light (P1) and electricity and magnetism (P1). These reflections indicate that some teachers were comfortable in teaching P1 but some were more comfortable with P2 and vice versa. This suggest the teachers' weakness in balancing the whole content in both P1 and P2. In other words, learners may be interested in either physics topics (P1) or chem-

istry topics (P2) because of the influence of teachers whose primary qualification may be in either physics or chemistry (Pandey et al. 2016). This does not create consistency in the implementation of the intended curriculum of Physical Science (Berkvens et al. 2014). Additionally, Shulman (1987) and van den Akker et al. (2009) believe that teachers as scholars should know all parts or topics of the subject. Thus, this assists teachers to master all practical work of the subject.

Moreover, reflections of the second phase which are based on content suggest that, participants were transformed because they were able to articulate on topics covered in Physical Science CAPS. They even indicated that they possessed content-related knowledge of Physical Science CAPS which helped them to master subject topic and experiments. This is an indication that CAPS curriculum is well balanced in terms of Physical Science content. On the other hand, some participants found it too difficult to implement experiments due to the local context barriers such as hardware resources (Khoza 2015a). A teacher must possess the content and the curriculum knowledge needed to enhance smooth teaching practice (Putra et al. 2016). This suggests that if participants do not have enough pedagogical content knowledge, they may influence the high failure rate (achieved curriculum). The performance approach to the curriculum suggests that on curriculum content, the Department decides which subjects to teach and what subject topics and content-related knowledge to be covered (Hoadley and Jansen 2014). This suggests that quality and sustainability in CAPS is maintained since Physical Science CAPS specifies content to be taught and it encourages school knowledge.

CONCLUSION

The paper concludes that teachers' reflections can be at the technical, practical, and critical levels and that these reflections can be influenced by personal, societal, and content rationale for teaching any curriculum. Reflections influence teachers to have a strong drive or rationale for teaching. This suggests that all other curriculum concepts or signal like content come after the interrogation of the rationale concepts. In other words a strong personal rationale influences the good and improved teaching practice of Grade 12 Physical Science content. Further to this, teachers should understand the rationale for teaching the Grade 12 Physical Science CAPS and be willing to teach and learn. Thus, teachers should always reflect before, during, and after their teaching practice in order to master the Physical Science content. As a result, teachers may definitely and accurately implement the intended curriculum according to its vision. Teaching without any rationale towards teaching the content may have a negative impact on the achieved curriculum. This may lead to learner drop out from high schools in South Africa.

RECOMMENDATIONS

It was interesting in this paper to observe that teachers can improve their teaching practices, and can be transformed and empowered after certain intervention programmes have been administered. This was evident during the phases of this study; teachers were transformed and were able to reflect critically. Therefore, in paving the way forward it is recommended that further action research be undertaken in order to empower Physical Science CAPS teachers to improve their teaching practice. Thus, the personal rationale assists teachers to master Physical Science topics and experiments. The relevant content-related seminars may be conducted by DBE and also influence teachers to further their studies to uplift the content knowledge of Physical Science. Therefore, this paper recommends that teachers' reflective activities should be administered since it is observed that it includes necessary answers in providing quality teaching in Physical Science curriculum.

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