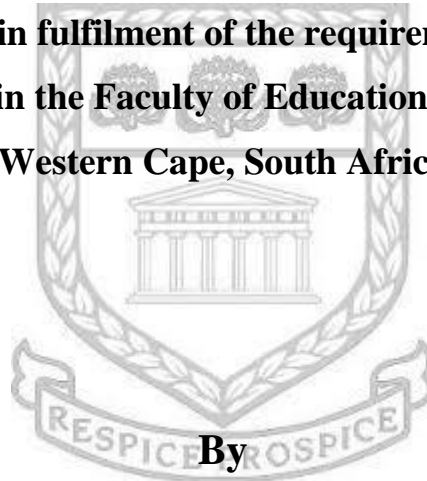


AN EXPLORATION OF HOW TEACHERS' USE OF VIDEO-STIMULATED RECALL AS A REFLECTIVE PRACTICE TOOL ENHANCES MATHEMATICS TEACHER PROFESSIONAL DEVELOPMENT



**UNIVERSITY of the
WESTERN CAPE**

**A thesis presented in fulfilment of the requirements for the degree
Magister Educationis in the Faculty of Education at the University of the
Western Cape, South Africa**



By

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November 2022

DEDICATION

I dedicate this thesis to my children Jamie and Jordan Petersen, that I have sacrificed these years from my undergraduate degree to this M. Ed. degree for, and my husband Dadriaan Petersen. My husband has been a source of support and strength for me to complete this thesis. The dedication is also to my friends, family and colleagues that have always been encouraging and supportive during this time.



ACKNOWLEDGEMENTS

Thank you to the staff at the schools that participated in the project, especially the teachers that were open and willing to share their views and experiences. You have been helpful and eager to participate in the study for your own interest as well as that of the school in a broader context. My thanks and appreciation go out to my supervisor Dr Benita Nel for her guidance, for being a constant support in this project and leading the way to completion of this M.Ed. thesis. My appreciation also goes out to the other team members that worked on this project.



ABSTRACT

The aim of professional development is to enhance teaching and learning. Reflection is a valuable way of developing professionally. However, teachers may need support and feedback on a regular basis to reflect on their own practice to develop and enhance on a professional level. This study explored how Video-Stimulated Recall (VSR) could support mathematics teachers to develop professionally. The aim was to investigate the extent to which teachers' use of VSR as a reflective practice tool, enhance their professional development as individuals and as a group in selected South African primary schools. The study sought to explore the following research question regarding mathematics teachers' professional development: to what extent did the teachers' use of VSR as a reflective practice tool, enhance their professional development as individuals and as a group in selected South African primary schools? The research question was further dissected to three sub questions which investigated; the implementation of VSR, how teachers used VSR as a reflective practice tool to enhance professional development, and the advantages and challenges that mathematics teachers experienced in the implementation of VSR.

A qualitative research approach was used with two case studies, which investigated two teachers as well as their mathematics teams in two different schools. The research study used thick descriptive data driven research design regarding the establishment of a mathematics teacher professional development team in primary schools through VSR. All the data collected was transcribed, and thematically analysed and discussed; a report on the findings of the research study was done. The theoretical framework was based on Schön's (1983) work on reflective practice and the theory of teacher noticing by Mason (2002).

Teachers' reflection can be enhanced by videos that provide the additional benefit of enabling teachers to observe other teachers, learners, settings, pedagogies, and content (Sherin et al, 2011). The study found that with the help of VSR, teachers noticed various aspects of their lessons that they found important to them in a lesson such as the use of resources, classroom resources and even learner response and interaction. Even though teachers had years of experience teaching the subject of mathematics, VSR allowed them to find additional ways in which to improve on their lessons. It is recommended that the use of VSR could be incorporated in the mathematics team as a reflective practice tool to create a community of learning.

KEYWORDS / PHRASES

Video Stimulated Recall

Mathematics teachers

Reflective practice

Mathematics subject teams

Continuous Profession Development



LIST OF ACRONYMS

WCED	:	Western Cape Education Department
CoP	:	Communities of Practice
DoE	:	Department of Education
SACE	:	South African Council of Education
PDP	:	Professional Development Plan
PD	:	Professional Development
VSR	:	Video Stimulated Recall
CPD	:	Continuous Professional Development
CPDP	:	Continuous Professional Development Points
ICT	:	Information and Communications Technology



DECLARATION

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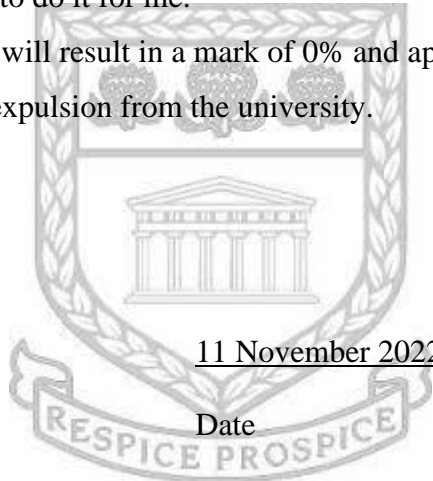


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CHAPTER ONE

1 Introduction & Background

1.1 Introduction

The mathematics education curriculum has seen changes in countries all over the world over the years. These curriculum changes also necessitate change in teaching approaches, and teachers may or may not be able to adjust to the new pedagogical model of learner centred education. The introduction of the Curriculum and Assessment Policy (CAPS) document, which has derived from the original Outcomes-Based Education (OBE) and Curriculum 2005 (C2005), in South African education, had left a gap between the aims of OBE and C2005 and what the teachers had been trained in, previously. The Department of Education (DOE) introduced a “cascade” model through which teachers were trained and had to pass on to their colleagues. This resulted in the “watering down and or misinterpretation” of crucial information (Ono & Ferreira, 2010, p.59). This has led to a need for programmes to enhance the professional development of teachers.

1.2 Background

The aim of professional development is to enhance teaching and learning. Models of professional development may not achieve their ambitious learning goals, but it is seen as the best means to change teaching practice (Ono & Ferreira, 2010). Kriek and Grayson (2009) states that in a South African school there may be multiple, complex problems that can contribute to learners’ inferior performance. These can include poverty, resources, learning cultures, infrastructure of schools and low teacher qualifications. This also includes overcrowded classrooms where teachers may find it difficult to get constant feedback on their pedagogical performance. When learners perform poorly, the education department will firstly want to know what has been done by the teachers. The concern, however, is how teachers are supported to improve their practice.

In the South African context, the need for specific aspects of teacher’s professional development has been identified by Kriek and Grayson (2009). This can include teachers’ poor grasp of the knowledge structure of mathematics, which acts as a major inhibition to teaching and learning. Teachers’ content knowledge should be strengthened with integration and application of knowledge learnt in the mathematics classroom; teachers also need to be exposed

to the latest pedagogical approaches of teaching mathematics. The Department of Education offers teacher support in the form of curriculum advisors; however, these advisors have schools to oversee across the region during a term and might only be able to reach a maximum of one school twice a year. In addition, these curriculum advisors do not always do observations in teachers' classrooms. Teacher effectiveness is impacted by their knowledge of the subject, pedagogical content knowledge, the organisation and application of this knowledge, as well as the teacher's beliefs about teaching mathematics, knowledge of the development of higher order thinking skills, teachers' knowledge, beliefs, and understandings (Wessels & Nieuwoudt, 2011). Therefore, these factors should be incorporated in professional development activities.

In a school with a heavy loaded annual curriculum and administration, the school's School Based Support Team (SBST) should support teachers and often do not have time to evaluate a teacher's lesson. The Head of Department (HOD) of mathematics often also has a heavy workload, and sometimes have no subject expertise in the subjects in his or her department; consequently, they cannot always give the necessary subject-specific support to the teachers. The support they sometimes do offer teachers is assessment of administrative functions. They also keep them informed of workshops and courses that are offered during the year. These courses might be useful for content knowledge, pedagogical practices, and initiatives regarding curriculum development; however, there are seldom follow-up systems to ascertain what is being practiced in the classroom and whether delivery and content are appropriate in the different school contexts. Workshops do not always address individual needs.

Experienced and knowledgeable teachers should also understand learning processes of students and relevant theories related to effective learning. There are important principles that guide professional development programs due to the complexities of teacher learning. In the field of mathematics education, teacher development programs should focus on teachers' practices, the knowledge required for these practices, and that teacher development should have a "clear and defensible focus". Therefore short-term, fragmented seminars and workshops do not work (Brodie & Shalem, 2011; Luneta, 2012).

The Integrated Quality Management System was introduced by the Department of Education, aimed at enhancing and monitoring performance of the education system (Weber, 2005). It is an integrated quality management system that consists of three programmes. These are: Developmental Appraisal; Performance Measurement; and Whole School Evaluation (SACE, 2011). The purpose of Developmental Appraisal (DA) is to appraise individual educators in a transparent manner with a view to determine areas of strength and weakness of the teacher, and

to recommend programmes for individual development (Weber, 2005). This lengthy policy document (IQMS) outlines the process of annual teachers' evaluation. The process of evaluation of individual teachers should also be carefully planned and incorporated in the school planning, as this is a lengthy procedure and time needs to be allocated for a pre-meeting, lesson evaluation, and the post meeting. This also includes lengthy administration that need to be completed by the peer, teacher, and senior staff member. Afterwards a file which includes the teacher's courses for the year and personal development plan for the following year, is compiled. This process determines where teachers need support and determines whether they qualify for an incentive bonus the following year.

This system is in place in terms of the Personnel Administration Measures (PAM, 1999) a document from the Department of Labour. However, this system is not being followed; teachers may not receive the necessary support as stated in the outcome of the process. Teachers need feedback on where they can improve; the process also includes extensive paperwork. Time should also be allocated for staff development during the term, during which teachers can work in collaboration with each other within the school setting, to enhance context specific and continuous professional development. These strategies can be put in place for all subjects, as when it comes to teacher development there should be consistency.

Furthermore, in addition to the IQMS system, the South African Council of Educators (SACE) (2011) was established as an independent professional body, whose mandate and responsibility is to promote greater professionalism amongst teachers through professional norms, standards, and values. The main purpose of SACE is to ensure that the status of the teaching profession is enhanced; it promotes the development of educators and the professional conduct of teachers (SACE, 2011). SACE also aims to promote development of educators through appropriate registration, management of professional development and inculcation of a Code of Ethics for all educators (De Clercq, 2013).

1.3 Statement of the Research Problem

Reflection is a valuable way of developing professionally. However, teachers may need support and feedback on a regular basis to reflect on their own practice to develop and enhance on a professional level. Murray (2015) explains that teachers should participate in collaborative reflective practices consistently over time; however, it must continue regularly. By being consistent in their reflection, teachers might gradually improve using pedagogical reflection and to addressing important challenges in the classroom.

This study sought to explore how Video-Stimulated Recall (VSR) could support teachers, by means of collaboration with colleagues and reflection to improve and develop professionally in the mathematics classroom. (VSR) is a reflection procedure in which video recorded passages of behaviour that is re-played to individuals such as teachers, peers, and trainers, to stimulate recall of their concurrent cognitive activity (Lyle, 2003).

1.4 Purpose of the study

The following aim guided the study:

- The aim was to investigate the extent to which teachers' use of VSR as a reflective practice tool enhance their professional development as individuals and as a group in selected South African primary schools.

Objectives of the study:

- To explore how mathematics teachers reflect using VSR as a professional development tool.
- To explore the shift in the development of the mathematics team after the implementation of VSR as a reflective practice tool in teachers' development.

1.5 Research Question

This research project provided more information to the following research question regarding mathematics teachers' professional development:

To what extent did the teachers' use of VSR as a reflective practice tool enhance their professional development as individuals and as a group in selected South African primary schools?

Sub-questions:

1. How did the implementation of VSR as a reflective practice tool enhance the development of the mathematics teams in the different schools?
2. In which ways did the teachers' use of VSR as a reflective practice tool enhance the professional development of individual mathematics teachers in selected South African primary schools?
3. What were the advantages and challenges that mathematics teachers experience in the implementation of VSR?

1.6 Outline of the chapters

The chapters of the study will include and outline the following:

In Chapter One, the introduction and background of the context of the study is discussed, as well as the statement of the research problem, the purpose of the study and the research question.

In Chapter Two, the literature review includes existing literature about professional development for teachers with the use of reflection, collaboration amongst teachers, creating teachers' teams and enhancement of the use of teacher collaborative reflection with the use of VSR.

In Chapter Three, the research design and methodology addresses research questions, the adoption of a qualitative research approach, two case studies (which investigated two teachers as well as their mathematics teams in two different schools), the use of thick descriptive data-driven research design, regarding the establishment of a mathematics teacher professional development team in primary schools through VSR.

In Chapter Four, the data analysis and discussion are included as a response to, the research question:

To what extent did the teachers' use of VSR as a reflective practice tool enhance their professional development as individuals and as a group in selected South African primary schools? This chapter uses the themes that derived from the data to analyse it.

In Chapter Five, the findings, conclusion, and recommendations, is discussed after the data was collected and analysed, and the results of the findings are revealed.

CHAPTER TWO

2 Literature Review

2.1 Introduction

At the time when South African education policy changes took place, curriculum changes were also needed to assist teachers to adapt with sections of the work they found challenging, and voluntary face-to-face workshops were scheduled during the year. Change in practice does not happen overnight and professional development mostly requires a long-term gradual progression to change (Muir & Beswick, 2007; Steyn, 2008). This section is a discussion on literature regarding professional teacher development with the use of reflection, collaboration amongst teachers and how the use of (VSR) can enhance teacher collaborative reflection.

2.2 Professional development

It is important that teachers consistently upskill themselves in their knowledge of the curriculum and pedagogical skills, to continue professional development. The latter is aimed at developing teachers after their initial training in order to contribute to their learning. Teachers who have been motivated to undertake mathematics- specific continued professional development over an extended period, had the intention of improving learners' mathematics conceptual understanding. Teachers' professional development and their learning is more effective if it addresses issues such as pre-existing knowledge and beliefs about teaching, learning, learners, and subject matter; it provides teachers with sustained opportunities to deepen and expand their content and pedagogical knowledge if it is grounded in teachers' learning and reflection on classroom practice (Day, 1999; Muir & Beswick, 2007; Steyn, 2008).

Teachers may make connections with classroom practice over an extended period. Long term professional development programmes are most effective when it is designed with the teachers' needs in mind, and needs to be suitably planned, have follow-up opportunities, for example supportive observations and feedback, peer dialogue and coaching. This can contribute to a general improvement in teaching (Ono & Ferreira, 2010; Steyn, 2008). Ono & Ferreira (2010) propose that teachers find it very difficult to take the initiative and to generate interest among other teachers, as they do not change their teaching overnight. Professional development requires a long-term, gradual progression to change. The cyclical process of "plan-do-see" is

supported by professional development research and any learning from experience and the practices of colleagues should contribute to a general improvement in teaching (Steyn, 2008).

2.3 Reflection

Reflection can be defined as a critique of the practice of participants, and values that are implicit in the practice, personal, social, institutional and the broad policy context that the practice take place in (Day, 1999). Furthermore, research found that reflection can be a deliberate and consistent examination of teaching practices to improve instructional practice and foster an environment in which deciding what to teach and how to teach it, are essential questions upon which teachers reflect. Reflection is essential to building, maintaining, and developing the capacities of teachers. It has n four domains: the personal domain of knowledge, beliefs, and attitudes and that of professional practice; the domain of outcomes and the external domain (De Clercq, 2013). This practice can also include making notes in a journal, group meetings and thoughtful consideration of the school day during a planning period (Day, 1999; De Clercq, 2013; Muir & Beswick, 2007; Pellegrino & Gerber, 2012).

The aim of reflection and reflective practice is to develop life-long critically reflective teachers (Muir & Beswick, 2007). When teachers observe other teachers and are being observed in the classroom, it is not daily customary practices in the general South African context. Teachers admit that given the opportunity to be observed, this may negatively impact on their practice. Reflective practice involves noticing aspects of someone's own practice that may trigger a question from an outside observer, and then recognising and working on issues of concern. When reflective practice is being recorded by an individual or by others, this reflection may focus on specific events or incidents. It is an individual subjective experience. Reflection can consist of reframing the problem and applying immediate improvement. When reflecting on classroom practice, reflections, and the teacher's continuing conversation concerning classroom incidents, may lead to a renewal of reflection, or a cycle of reflective inquiry (Muir & Beswick, 2007).

The reflective process is a dialectic between thought and action, theory, and practice. This dialectical reflection is aimed at transforming by reconstructing the practice of the mathematics teacher. Through a fundamental shift in teacher beliefs, values and feelings about teaching and learning, there may be a meaningful change brought about in practice. In this way, creating a culture of critical reflection enhances our educational potential and provides practitioners with opportunities to deconstruct conventional practices (Sonyel, 2013). Through VSR, teachers

could experience the reality of the classroom situation and the use of real-life examples in simulated training and learning contexts. This may help the teachers to review prior experiences, learn through reflection and hear alternative strategies from experts, VSR could be a valuable educational and training tool (Day, 1999; Lee, 2001; Lyle, 2002; Sonyel, 2013).

2.4 Collaboration amongst teachers and creating mathematics teams

General collaboration among teachers develops their strengths, knowledge, and skills, while also stimulating reflection and broadening perspectives (Steyn, 2008). This can give rise to more effective teaching and ownership of their professional learning (Steyn, 2008). Effective professional development programmes should have an appropriate level of challenge and support (Steyn, 2008). It needs to provide activities which demonstrate new ways to teach and learn, build internal capacity, use a team approach, provide time for reflection and to evaluate the effectiveness and impact of its activities (Steyn, 2008). Teacher collaboration through VSR can become a vehicle to support teacher reflection of their thinking about their practice and about their learners' thinking. Collaborative teacher reflection using VSR and learning from practices, set higher standards of practice and ethics. Reflection and accountability constitute a shared process, which requires that the teachers in collaboration should hold themselves and each other accountable, and it require that they account for their ideas and actions in terms of their experiences and their professional knowledge (Steyn, 2008, Brodie & Shalem, 2011).

Researching mathematics teaching and learning, through developmental research teams and communities of practice involving teachers, should assist in using research as a tool for learning and professional development. Through engagement with communities of practice and creating opportunity for participation, a community grows into a source of encouragement, and mediation of the complexity of teaching and learning. In a collaborative setting, teachers need to be available to relate to their school context and may seek out opportunities to collaborate beyond the traditional peer-teacher partnership. The professional knowledge and experience of teachers can serve as an important source of information for team composition processes. When creating teacher teams, administrators should use the experience and knowledge of the teachers in which the teammates are compatible with each other (Krammer, Rossmann, Gastager and Gasteiger-Klicpera, 2018).

The duration of the professional development is an essential component of effective initiatives. Team membership that is always changing, will hinder efforts for collaboration (Jao and McDougall 2016). The kind of team composition does not have any influence on general job

satisfaction, but it seems possible that experiencing social pleasure in occupational activities may be more important for the job satisfaction than the kind of team composition (Jaworski, 2008; Jao and McDougall 2016, Krammer et al, 2018).

The collective wisdom of the team and professional collaboration may increase teacher efficacy and flatten the power structure (Jao and McDougall 2016). Collaborative teaching discussions are heavily dependent on the teachers' fluency in using the data to inform instructional decisions on mathematical content. Teams may have a positive influence on the quality of the teaching, but this collaboration may or may not be an enjoyable social interaction. The enjoyment refers to the positive characteristics of enjoyment during the related productive discussions. To build rapport between team members, team building measures provided could be helpful (Jao and McDougall 2016). The teams' members may feel that they may need support from their leaders, something which could be critical to successful collaboration, if the department head forms part of the collaboration and has helpful advice to assist teamwork.

Teachers may feel reassured to engage in new initiatives if they get the support of colleagues in leadership roles (Jao and McDougall 2016). During team discussions it would be particularly important to clarify roles as it would help in the negotiation of personal differences. During team meetings and collaborative settings, leaders may need to put in place supportive mechanisms to encourage team members during uncomfortable moments (when teachers may be hesitant to engage in conversations and when faced with personality conflicts) (Slavit, Kennedy, Lean, Nelson & Deuel, 2011; Jao & McDougall, 2016; Krammer et al, 2018).

In a team discussion and reflective session, for a powerful discussion to occur, teachers must be comfortable in sharing questions and uncertainties, challenging the existing methods of teaching practice, and reinterpreting views on teaching and learning from other perspectives (Jaworski, 2008). Several factors may support teachers to shift to more productive discussion, which could result in specific impacts on their classroom practices and their learners' learning. Mathematics teacher collaboration may help teams to overcome resistance to, or fear of opening their instructional practices, resulting in shifts away from the present circumstances. Powerful discussion can support mathematics teams to develop and commit to developing a more common vision of practice. A commitment to this vision requires an expectation that the questioning and challenging of ideas, practices, and beliefs is normative and not a personal insult or affront (Jaworski, 2008). Team discussion should not avoid issues, tensions, and contradictions, but deal with them as part of developing appreciation and understanding,

leading to possibilities for expansive learning. It should investigate ways of accepting the unfinished nature of learning and development (Jaworski, 2008; Slavit et al, 2011).

2.5 *Video-Stimulated Recall (VSR) as a professional development tool*

This method of data collection (VSR) is useful in real-life studies with minimal intervention that explores cognitive strategies, other learning processes, teacher behaviour, particularly complex, interactive contexts characterised by novelty, uncertainty, and non-deliberative behaviour (Lyle, 2003). The desire to collect data during the decision making itself has prompted a long-standing and continuing debate about the extent to which ‘think aloud’ techniques provide access to introspective, higher order mental (Lyle, 2003).

VSR could be a useful professional development tool; it may help teachers to gain a clear insight into their practices, their own and their learners’ learning. In a study where novice teachers were matched with experienced classroom teachers, this could therefore appear to be an avenue for constructive, collaborative, and productive conversations about teaching and learning. Teachers could look at their own practice with a fresh eye and consider their practice more closely by reflecting on potential ‘incorrect’ pedagogical methods. The teachers could experience the VSR sessions as useful in helping them to evaluate which teaching goals were best achieved during lessons (Schmid, 2011).

VSR sessions can be an opportunity to rethink decisions made during the lesson, and the reflections that took place could help teachers gain a better understanding of pedagogical methods that are extremely valuable for their professional development. Teachers could view challenging aspects of the lesson in the VSR session, and it could propel them to engage in self-reflection and self-evaluation, especially in collaboration with peers and trainers (Schmid, 2011). VSR is a tool used to potentially enhance professional development of teachers and a reflective technique that incorporates and encourages reflection on lessons practiced. These sessions are conducted in a collaborative way where video recorded lessons are viewed and discussed by the teacher, colleagues, and researchers, with the aim of enhancement in teachers’ practice (Muir, 2010).

In this study, during VSR interview sessions which took place after a time lapse, teachers could through reflection ‘on action,’ identify what they could improve on in their lesson. In these sessions, teachers can take time to reflect on their practices and be self-critical regarding their

personal conduct. they received feedback or suggestions from experienced colleagues on where to improve. In this way the teacher charted their own development. This type of continuous professional development was done in the teachers' own environment and customised to their personal needs.

2.6 Theoretical Framework

The practice of reflection in education on personal and intellectual growth originated from the work of John Dewey in 1933. Reflection can be described as an integration of attitudes and skills in the methods of inquiry, the attitudes of open-mindedness, responsibility and whole-heartedness are prerequisite to reflective action (Rodríguez, 2008; Barton and Ryan, 2014). Dewey defines reflection as "the active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further consideration to which it tends" (Dewey, 1933, p 9). One of Dewey's key issues regarding reflection is related to the time frames within which reflection takes place. Dewey implied that the time frames should be extended and systematic rather than be immediate and short term (Bjuland, 2004).

Donald Schön had done prominent work on reflection, and it was further discussed in his book *The Reflective Practitioner* (1983). Schön (1983, 1987) talks about reflection-in-action, implying conscious thinking and modification of actions virtually instantaneously and reflection on action, implying conscious thinking upon action after it has taken place. Schön's work enables one to theorise a framework for reflection, whether in the moment or as a reflective task looking back on professional practice (Barton and Ryan, 2014). Schön (1987) presented a view of reflection by proposing the concept of reflection 'in action', arguing against the view of professional action as a series of steps in a decision-making process (Rodríguez, 2008, p. 93). Reflection 'on action' involves looking back upon action sometime after it has taken place (Bjuland, 2004). Schön's work can be linked to the teaching profession by teachers reflecting 'in action' when presenting a lesson and then reflect 'on action' when viewing the recorded lesson episode after a time lapse in the VSR interview.

Schön's work claims that professionals can reframe a problem as they work on it, evaluating our interpretations and solutions, combining both reflection and action. Reflection 'in action' is a reflection through which practitioners sometimes make new sense of uncertain, unique, or conflicting situations of practice. Teachers' knowledge increasingly interconnected and

integrated with past experiences, and reflective teaching serves as a mechanism to allow teachers to modify their knowledge and expertise (Rodríguez, 2008). Reflection is, in fact, a cyclical or spiralling process in which teachers continually monitor, evaluate, and revise their own practice (Rodríguez, 2008).

In this study Schon's theory of reflection was used to analyse the data, specifically focusing on reflection 'in action' and reflection 'on action,' and this analysed how teachers use VSR to reflect. Furthermore, the theory of reflection was extended to the theory of noticing, when collecting the data, exploring how teachers reflected on their practice during VSR sessions, and analysed what teachers noticed during reflecting on their lesson.

Teacher noticing is a theory that can link into reflection and VSR. The theory of teacher noticing requires that teachers should evaluate all claims and assumptions in practice to make sense for future reference (Mason, 2002). A feature of professional teacher development is that teachers notice different things for the first time at different times. Occurrences that may have seemed invisible in the past could be obvious now and conversely, that which was currently invisible could become blindingly obvious in the future (Mason, 2002). This study focussed on professional teacher noticing to establish which aspects of the lesson episode teachers noticed and focused on more during the VSR interview. Whether it was learners' mathematical understanding, interaction or behaviour, classroom resources or management, lesson content or preparation, or even reflecting on own practice.

The term teacher noticing is the processes which teachers face during ongoing information they are presented during instruction. This involves two main processes; attending to events in an instructional setting such as learners' mathematical thinking and making sense of events in an instructional setting which can include teachers' instructional responses. Furthermore, there are three areas of mathematics education that supports teacher noticing to be important and productive, which are adaptive and responsive teaching, learning from teaching and decomposing practice (Sherin, Jacobs, & Philipp, 2011).

Sherin, Jacobs and Philipp (2011), focused on teacher noticing in the field of mathematics education, they ask primal questions of mathematics teaching such as: where do teachers look, what do they see and what sense do they make of what they see? Furthermore, teacher noticing is a critical component of mathematics teaching expertise, it acts as an important factor for

improving the quality of teaching and learners' mathematical achievements (Sherin et al, 2011).

Sherin et al (2011) claim that the incorporation of video technology in teacher education affords a few pedagogical advantages such as engaging in a full discussion with colleagues on videos viewed. Videos provide the additional benefit of enabling teachers to observe other teachers, learners, settings, pedagogies, and content (Star, Lynch and Perova, 2011). Viewing recorded lessons is a tool to engage in noticing activities, this allows the teaching and learning process to be slowed down and make visible the details of the interactions or viewing perspectives not readily available while teaching (Santagata, König, Scheiner, Nguyen, Adleff, Yang, & Kaiser, 2021). Although professional noticing is grounded in video-based professional development activities, studies found that using noticing skills positively impacted teachers' instructional practices (Thomas, Jong, Fisher & Schack, 2017).

Teacher noticing consist of two key processes: identifying and interpreting, thus teaching involves attending to some interactions while not attending to others, teachers can interpret what they notice and are likely to draw on a range of prior knowledge and experience to do so (Sherin, 2017). Professional noticing is a skill teachers use to identify and act on in relation to noticeable mathematical actions of learners, themselves, and the overall classroom (Thomas et al, 2017). It can also be seen as a systematic method for conducting research into one's own practice based on a teacher's experience; the method of validation of the outcomes of noticing are humanistic and long-term (Mason, 2021).

This study explored how teachers' use of VSR as a reflective practice tool enhanced mathematics teachers' professional development. The VSR interview sessions were instrumental in analysing how teachers reflected on their lessons. The aim of the questioning during the VSR interview sessions was to extract information from the teachers on what they noticed during the lesson's episode. What teachers noticed in the lesson episode and how they reflected on it. These questions were to engage teachers in conversation on how they reflected on their teaching practice. The interview questions intended to probe the teachers on how they felt about the lesson, what they thought was good or bad and what would they do differently if they were to teach the same lesson in the same context. This questioning was to analyse how and what they reflected on. The responses were analysed on key aspects they may or may not have noticed from their own or their colleagues' lessons.

This study combined reflection ‘on action’ and reflection ‘in action’ with ‘teacher noticing’ to investigate whether ‘teacher noticing’ and VSR enhanced mathematics teacher professional development or not. During the VSR interview sessions the teachers watched the lesson episodes, reflected ‘on action’ and noticed aspects of their practice. The study investigated to what extent ‘teacher noticing’ facilitated teachers (while watching the episodes of their lessons) enhancement of professional development either as an individual or as a mathematics team. Teachers reflected ‘on action’ by viewing these lesson episodes and then tried to recall how they reflected ‘in action’ at the time of the lesson recording. Analysis of what teachers noticed during the VSR interview and how they reacted during the following lesson, assisted in professional development.

2.7 Conclusion

The literature review concludes that VSR can be instrumental in enhancing mathematics teacher professional development initiatives when strategically combined with reflection and in collaboration with mathematics teams.



CHAPTER THREE

3 Research Design and Methodology

3.1 Introduction

This chapter will discuss the research design and methodology used to answer the research question. In the next section design will be discussed.

3.2 Research Design

This study adopted a qualitative research approach. Anderson and Arsenault (2005) explain that a qualitative research approach is a form of inquiry that explores phenomena in their natural settings and uses multi-methods to interpret, understand, explain, and bring meaning to these phenomena. Denzin and Lincoln (1994) maintain that qualitative research involves the participants 'studied' through the use and collection of a variety of empirical materials such as case study, personal experience, introspective life story, interview, observational, historical, interactional, and visual text, which describe routine and problematic moments and meanings in individuals' lives. The research study used thick descriptive data driven research design regarding the establishment of a mathematics teacher professional development team in primary schools through Video-Stimulated Recall.

Ponterotto (2006) describes a 'thick description' qualitative research approach as; a researcher's task of both describing and interpreting observed social action within its context. 'Thick description' accurately describes observed social actions and assigns purpose and intentionality to these actions, by way of the researcher's 'understanding and clear description of the context under which the social actions took place (Ponterotto, 2006, p.543).

3.3 Research methods/approaches

The study adopted two case studies which investigated two teachers as well as their mathematics teams, in two different schools. Anderson and Arsenault (2005) define that a case study is a holistic research method that uses multiple sources of evidence to analyse or evaluate a specific phenomenon or instance. Case studies are highly data based and strive for a degree of reliability and validity; it can be a useful way to systematically look at a specific case, collect data, analyse, and interpret findings within their context and report the results (Anderson and Arsenault, 2005). Hence the four teachers were each viewed as a separate case study.

3.4 Data Sources and Sampling

The participants that were invited to the study, were mathematics intermediate and senior phase teachers from two primary schools located in a circuit in the Western Cape. The schools and mathematics teachers were conveniently selected. That is; the schools and teachers that were willing to participate in the study. The schools approached had good management to maintain discipline. Studies have shown that the most effective means to implement professional development initiatives, is when participating schools are selected are well managed, hence the selection of these schools. They also included novice mathematics teachers with four to five years of experience in the mathematics classroom. The specific participants selected was one novice mathematics and one experienced mathematics teacher in the intermediate phase, per school, to establish variability. The mathematics teachers approached made themselves available to have their lessons observed and video-recorded, then followed by a VSR feedback interview session.

3.5 Data collection techniques

The data collection proceeded with a VSR training session, explaining the research study and the training session conducted with the mathematics team from the two schools participating in the research study, on a predetermined date, was at a venue suitable for all the participants. COVID-19 protocol rules applied when conducting the training session. The training session was conducted by the researcher (is a master's student), another master's student and the supervisor of the project. The mathematics team from the schools consisted of the Mathematics' Head of Department (HOD) at the schools and one mathematics teacher from each grade - 4 to 7 at the school. The school identified the participating teachers per grade. The mathematics team functioned as a support system at the school for mathematics teacher professional development and used VSR as a means of offering support to mathematics teachers regarding content and classroom issues that teachers might find as challenging in their practice. The study consisted of three stages of data collection:

Stage 1: The first stage of the study involved the selection of the participants that participated in the research study. The participants consisted of a representation of the School Base Support Team (SBST) which included the HOD of the mathematics department and one mathematics teacher from each grade in the intermediate and senior phase. This group had five members; volunteers were requested. This stage also included training of the selected mathematics teams at respective schools. The training session included explaining the research project and an explanation of the use of the VSR tool during the research. Here the researcher, with the help of her supervisor and another M-student, conducted a training session on the research and the use of video-stimulated recall as a tool to enhance reflection. This session included an

introduction, exposure, and support of the use of video-stimulated recall as a tool to reflect on practice. At the end of this training session the participants completed a questionnaire about their experience of the training (Appendix 9) and professional development initiatives they participated in. This questionnaire proved whether the possible implementation and use of VSR could enhance the development of the mathematics team in terms of teacher professional development.

Stage 2: The second stage of the study included the first cycle of lesson observations of the two volunteers where one or two of their mathematics lessons was video recorded by the researcher or a research assistant. This stage included a VSR interview sessions with the teacher observed, where the teacher first watched an episode of the lesson which the researcher identified. Thereafter there was an interview with the teacher as a means of a reflection discussion. The VSR interviews took place after a time lapse of two to three weeks, with semi-structured interview questions (Appendix 8). A novice mathematics teacher presented a lesson that was video recorded and observed by a researcher. Another lesson conducted by an experienced teacher was observed by a mathematics teacher and the researcher. After the time lapse period the researchers returned to the school to engage with the teachers on reflecting on the video recorded lessons. The mathematics team and researcher were present during these VSR interview sessions, and this was an opportunity for the team members to view the recordings, engage and give feedback; the researcher prompted the teacher to clarify his or her intention during challenging or specific incidents during the lesson.

Stage 3: The third stage of the study was the second cycle and follow-up lesson observation of the same teachers who volunteered, which was also video recorded. This stage also included viewing and reflecting on the video-recorded lessons by both the researcher and the teacher during the VSR interview sessions. During viewing of the video-recorded lessons by the teacher, researcher, and the mathematics team, the researcher prompted the teacher to clarify his or her intention during challenging or specific incidents during the lesson. This created, by means of the video-stimulated recall, opportunities for professional development through support from the researcher or colleagues in the VSR sessions.

The instruments used to collect the data were as follows: The participants completed questionnaires after the training session and after the second cycle of VSR feedback interview sessions (Appendix 9), on their experience with VSR as a professional development tool. The researcher also took notes of key areas during lesson observations, with Appendix 10. The

researcher conducted follow up VSR feedback interviews sessions with the teachers with semi-structured questions (Appendix 8). The data collected from the interviews could clarify aspects around decisions made before or during the lesson and how the teachers reflected on episodes viewed using VSR as a tool to reflect. The participants were video recorded during the lesson observations and the follow-up VSR interview sessions were audio recorded. These audio recordings were transcribed.

3.6 Ethical considerations

Ethical clearance was applied for at the University of the Western Cape and the Western Cape Education Department. Consent to conduct the research at the participating schools was requested from the teachers, principals, and the school governing body. Assent was requested from the learners in the classes being video recorded. Consent forms were sent to the learners' parents regarding permission for participation in the research project. It was made clear that any participants were also free to withdraw from the study at any point without negative repercussions.

The confidentiality and anonymity of the research respondents were always respected. The participants were in the study on a voluntary basis and harm to the participants was avoided at all costs. Data in hard-copy format was locked away in a safe place. Data and recordings were saved on computers and other electronic devices with password protected security. All data were discarded within five years after the study has been completed.

Also, COVID-19 regulations had to be adhered to as per the Department of Health, such as assurance from the principal that the school was sanitized before entry, temperature of participants had been checked, and their hands were sanitized before entry of the location. All participants had to wear face masks.

3.7 Validity and Reliability

Triangulation is the use of multiple methods or sources of data to develop a comprehensive understanding of a phenomena (Patton, 1999). Triangulation is a method during which a researcher may analyse data and present results to others to understand the experience of a common phenomenon (Denzin, 1994). The application of triangulation can enhance the reliability of the study results and enable one to saturate the data. Triangulation is a qualitative research strategy to evaluate validity through the convergence of information from diverse sources. It can also illuminate ways to evaluate or maximize the validity and reliability of a qualitative study (Golafshani, 2003; Fusch, Fusch, and Ness, 2018). In this study triangulation

was done by triangulating the observations, interviews, and the questionnaires. Triangulation ensures the validity and reliability of the data collected.

3.8 Data Analysis

3.8.1 Data Analysis Procedure

The analytical framework used to analyse the data was thematic analysis. Thematic analysis is a qualitative research method for identifying, analysing, organising, describing, and reporting themes found within a data set (Nowell, Norris, White and Moules, 2017, p.2). It involves finding repeated meanings across a data set, which is crucial to the interpretation of the study. The themes are specific patterns found in the study, which captures some crucial information about the data in relation to the research questions and features patterned meanings across the data set. It pertains to a shared topic about area of focus rather than summaries of data domains (Xu and Zammit, 2020). Braun and Clarke's (2006) approach to thematic analysis is described as a theoretically flexible method, and the following six steps can be followed to analyse data; 1. familiarising oneself with the data, 2. generating initial codes, 3. searching for themes, 4. reviewing themes, 5. defining and naming themes, and 6. producing the report (Xu and Zammit, 2020).

The data collected for this study was from the following instruments: the questionnaires, video recordings of the lessons and the post-lesson interviews. The data collected for each of the participants was analysed using themes, comparisons, similarities, and differences of how the different mathematics teachers reflected on their lessons. The themes derived by the data collected was analysed inductively. Analysed inductively refers to the approach that allowed the data collected to determine the themes of the study. Examples of the themes of the study were the challenges faced during the research; what the participants found as challenges and advantages of VSR and effective implementation of VSR in their schools; the teachers' conduct in the classroom while being video recorded, how teachers reflected during the VSR interview sessions and whether the teachers felt that the process helped them in making changes in their practice. The analysed data compiled in a written report, stated the findings and the discussion of the research study. This report can potentially assist in how learning dialogues in mathematics teams may strengthen primary schools in the Western Cape to create opportunities for mathematics teachers to develop.

3.8.2 Pseudonyms used

The following is a table of the Pseudonym codes that were assigned to the teachers and the schools: Schools No. 1, School A; Novice Teacher 1 (NT1) and Experienced Teacher 1 (ET1); School No. 2, School B; Novice Teacher 2 (NT2) and Experienced Teacher 2 (ET2), Team Member 1 (TM1), Team Member 2 (TM2) and Team Member 3 (TM3).

Table 1: Pseudonyms assigned to participants

PSEUDONYM CODES ASSIGNED						
Schools No.	School	Teacher		Team Member Code		
1	A	NT1	ET1	TM1	TM2	TM3
2	B	NT2	ET2			

3.8.3 Context of the study

The researcher, a teacher of the study was not a participant of the study but was only collecting data and is a teacher at School A. School A is a well-equipped and well-resourced, previously disadvantaged school in the Cape Flats community in the Western Cape. Due to the COVID-19 regulations at the time of video-recording the lessons, each teacher had 15 to 20 learners in their classes. This is half of the class as the school followed a rotational system of attendance.

The one volunteer teacher was NT1, who teaches one Grade 5 mathematics class, with approximately thirty-five learners, has 8 to 9 years mathematics teaching experience, as well as teaching all subjects. The other volunteer teacher was ET1, teaches all Grade 4 mathematics classes, approximately one-hundred-and-sixty learners, has 35 to 40 years of experience in teaching mostly mathematics, as well as experienced in teaching all subjects.

School A had a mathematics team component, which included NT1, ET1, TM1, TM2 and TM3. After viewing the lesson episodes, the teachers reflected on their lesson with feedback from the team. Two of the team members were novice teachers (TM1 and TM2) and one of the team members (TM3) was the deputy principal of the school at the time, and the HOD of the mathematics department.

The data that came from School A for this thesis was from the post-training questionnaire from the entire mathematics team, the interview sessions with the two team members who volunteered and the feedback interview sessions with the mathematics team. The data also included the questionnaire from NT1 and ET1 after the final VSR interview session.

School B, located in the City of Cape Town in the Western Cape, is well-equipped and well-resourced. Due to the COVID-19 regulations at the time of video-recording the lessons, each teacher had 30 to 32 learners in their classes. School B also did not have a team component due to COVID-19 regulations and restrictions on gatherings indoors. Grades R to 5 attended school on a rotational basis and Grade 6 and 7 attended daily. NT2 teaches Grade 4 mathematics and has 5 to 6 years mathematics teaching experience. ET2 teaches Grade 6 and 7 mathematics and has approximately 30 years' experience in teaching mostly mathematics.

The collected data from School B was by another M-student working on the project, who is currently a teacher at School B. The data that came from School B for this thesis was the post-training questionnaire and the individual volunteer teacher interviews' transcriptions.

3.8.4 Assumptions and limitations

An assumption of the study was that participants would be honest in their responses to the interview questions. The limitations of the study were that there were unforeseen disruptions during the recording sessions. Special time had to be allocated and arrangements had to be made for the video recorded lessons. It was also limiting that a person was needed to operate the camera and that the researcher was not available to do the recordings. Another limitation was that not all parents gave consent for the learners to be video recorded. NT1 was not available to attend the first feedback session and in the final feedback session ET1 had to leave the session early. The full attendance of both teachers at both feedback sessions was imperative to the study. It was important to see how they reflected, and their presence for team feedback was also necessary. Due to COVID-19 staggered timetabling, learners attended school rotationally and missed video recording of lessons had to be postponed to a day later. The feedback sessions had to be scheduled when there were no after school activities, such as meetings and workshops. Teachers was not always willing or available to stay after school to attend the VSR interview sessions.

CHAPTER FOUR

4 Data Analysis and Discussion

4.1 Introduction

This chapter discusses the analysis of the data to answer the research question: To what extent did the teachers' use of VSR as a reflective practice tool enhance their professional development as individuals and as a group in selected South African primary schools? The data was collected from two participating schools with each of the following data collection instruments: a post training questionnaire, two video recorded lesson observations and two collaborative VSR interview discussion sessions with the mathematics team at School A. This was followed by a questionnaire after the final VSR interview discussion session at School A. Due to COVID-restrictions, regulations, and time constraints with data collection it was only possible to collect the following data at School B: the post-training questionnaire, two video recorded lesson observations and VSR interviews of the individual volunteer teachers. This chapter used the themes that derived from the data, to analyse it. The themes reflected the participants' views of mathematics teachers' professional development before the implementation of VSR as a reflective tool, the teachers' reflections using VSR, the team's feedback on the first and second episodes of the recorded lessons of the participating colleagues, and the advantages and challenges teachers experienced during the implementation of VSR.

4.2 *Participants' views of mathematics teachers' professional development before implementation of Video-Stimulated Recall (VSR)*

Before the implementation of VSR at the participating schools, a training session was held with the mathematics team to explain what the research, as well as the concept of video-stimulated recall, was about and how to implement it. When the VSR training session was completed, the mathematics team at School A and the two volunteer teachers at School B completed a post VSR training questionnaire to establish what kind of support mathematics teachers received in the past in terms of their professional development. The questions posed through the questionnaire can be viewed in Appendix 10. Aspects that the questionnaire revealed will be discussed now.

4.2.1. *The first question read as follows: after attending mathematics workshops, how do you find applying the knowledge gained, in the classroom on your return?*

Most mathematics teachers felt that attending workshops at the teachers training centre or at other schools hosting training and workshops were helpful, and they learnt new practices and

mathematics teaching and learning techniques from their colleagues and the workshop presenters. They also mentioned that after workshops they felt excited to apply new methods learnt and anticipated how learners would respond to and grasp these methods. One participant responded that application of these new methods was challenging to the type of learner they have.

4.2.2. *The second question was: Explain what kind of support you receive regarding mathematics teacher professional development at your school.*

They explained that they received support from colleagues by quarterly mathematics meeting discussions, online workshops, and informal one-to-one peer discussions. Furthermore, they explained that the grade group support each other, and are also supported by a private company that provides resources to the school.

4.2.3. *The third question in the questionnaire was: Explain how you reflect on your mathematics lessons taught.*

An example of reflection on mathematics lessons taught was verbal feedback from learners and learners' mathematics results through their term assessment performance. Weekly tests on Friday after the week's content had been covered, also gave an indication whether the topics should be revisited. Certain teachers also reflected by comparing their own lessons to what was being taught by other teachers, and what they see online.

4.2.4. *The fourth question was: As a staff member of the mathematics team at your school, how often do you meet regarding issues around the subject and how do you implement what was discussed in these meetings?*

Teachers at School B responded that they meet within their grade to discuss issues, though not often and do not meet as a mathematics department at all. Teachers at School A responded that they have regular, formal, and informal meetings. They observe and learn from each other. They discuss department standards set by the Department of Education, compared to the standards of the learners' standards, and learning difficulties faced by the different grades. They also discuss how to approach different teaching methods that can be used to accommodate the different learners, teaching strategies that may hinder the learners and how to overcome this by posing questions such as how, what, why and where. They also have subject meetings once each term, but do have informal discussions on a regular basis, and attend online courses from time to time. These discussions were incorporated in future lessons.

4.2.5. *The fifth question in the questionnaire was: What additional support do you think is needed at the school regarding mathematics teacher professional development?*

Mathematics teachers at School B responded that the school needed to provide more support for teachers to be able to discuss teacher professional development openly, critically and to be heard when this happens. The school needed to be open to change and allow a platform for

teachers to reflect and develop. They also expressed the need for workshops catering for what is needed for the school and for grades to improve. The mathematics teachers at School A felt that to support them in their practice, they needed to attend more workshops, that more regular mathematics meetings held could be helpful, more resources such as digital equipment (laptops, overhead projectors, and whiteboards), and concrete apparatus are needed.

4.2.6. *The last question was: If you had the opportunity, how would you implement VSR as a reflection tool in your school?*

The mathematics teachers at School A said they would view videos regularly, incorporate it in the IQMS process to reflect on areas that need to improve, do follow up lessons and discuss improvement. Teachers said they would find it a useful reflective tool, would use it to meet on a regular basis and collaboratively discuss with colleagues, how to improve on current practices. The teachers at School B said they would record lessons, sit, and meet in the grade, ask for tips and suggestions from colleagues on how to approach lesson topics that learners do not understand. Furthermore, they would use it as a tool to analyse gaps, find common trends within the grade and phase and, based on the best practices found, teachers could be upskilled to allow for consistency and reinforcement of new methods of teaching learnt.

According to the data from the questionnaires both School A and School B teachers agreed that when attending workshops and training sessions, they found it interesting, most beneficial and they were eager to try new teaching methods that were learnt. However, they also found that the workshops do not have options as to how to deal with the type of difficult learner both schools must deal with. Regarding the question on support in professional development, each school had a system of peer support within the grade they taught, by means of grade meetings or quarterly departmental meetings. When it came to reflecting on mathematics lessons taught, teachers relied on learners' performance in weekly tests and term performance. School A met on a regular basis as a mathematics department, to discuss issues around the subject of mathematics. School B, however, only met as a grade and not as a mathematics department. When it came to additional support teachers needed, both schools said they needed more mathematics workshops and resources, such as Information Communications Technology (ICT). Both schools' teachers agreed that given the opportunity to implement VSR at their schools, they would use it to video record lessons, analyse the lessons and collaboratively discuss the lessons within the mathematics department.

4.3 Reflections of teachers at School A on their own practice and feedback from their team members

Data was collected by having two cycles of lesson observation and video recordings per volunteer teacher. At School A, collaborative VSR interview sessions were held with the mathematics team as well. The supervisor of the research project was present at both collaborative reflection sessions. These sessions were held after each cycle of video recorded lessons of the two volunteer teachers, and the sessions were audio recorded.

The volunteer experienced teacher (ET1) was present at the first session. However, the volunteer novice teacher (NT1) was not available to attend the first session due to unforeseen circumstances. ET1 and the mathematics team reflected on the episodes of both lessons of the first cycle after it was viewed. A separate interview was held with NT1 on his first lesson. After ET1 reflected on her lesson the team members present then came in and gave their feedback on both ET1 and NT1's first lesson episodes. The team used the opportunity to collaboratively reflect on their colleagues' lessons and their teaching practice when viewing the episodes of the volunteer teachers.

The episodes selected for the first interview session was a scene where things went well in the lesson for ET1, and for NT1, a scene where some challenges were noted by the researcher. The episode for ET1 was selected by the researcher because it was a scene where teaching and learning took place during the lesson and ET1 managed the situation well. The lesson topic was on 'number patterns.' For the episode selected for NT1, the researcher felt the teaching and learning did not go very well and the situation was not managed well. The topic was on 'multiplication, using the column method for two-digit numbers.' In selecting these scenes, the researcher felt that NT1 could have learnt valuable lessons on how to manage such situations, if he had been present at the first team interview session. The selection of these scenes was significant for meaningful reflection by the teachers and discussion by the mathematics team. The selections of the episodes were decided by the researcher for the purpose of answering the research question.

The episodes selected for the second interview session, was an introductory lesson of each volunteer teacher where a new topic was introduced. The two teachers presented on the same topic, which was equivalent fractions. The reasoning for this selection was that it could have been seen to be interesting for the mathematics team to observe how different teachers present the same topic. This could also be a learning opportunity for the teachers to learn from each

other's lesson, the mathematics team could reflect on their lessons and might give valuable feedback.

4.3.1 Reflection by the experienced teacher (ET1) on the first cycle of video recorded lesson episode

The recorded lesson was with a Grade 4 class and the lesson was on number patterns, a mathematics topic that was covered in term two. The episode of the lesson that was shown to the team was a clip that the researcher felt went well in the lesson. The logic behind selecting this episode was that the researcher felt that after viewing the lesson of NT1 and the challenges faced during the lesson in terms of lesson presentation and learner understanding of mathematical concepts, NT1 could have benefited from ET1's teaching strategies.

In the episode, ET1 held up a flash card displaying a problem of twenty-seven divided by three and asked the learners to give the answer. One of the learners responded correctly by giving the answer of nine. Even though the learner answered correctly, ET1 chose to zoom in on the learner that responded correctly to the problem. ET1 took the learner step-by-step through how the learner arrived at the answer. She let the learner count in multiples of three on her fingers. The learner got stuck between fifteen and eighteen while counting. Then ET1 let the learner add in ones to get to eighteen, before getting to the correct answer, which was nine, on her fingers. ET1 did this so that the rest of the class could learn how to arrive at the correct answer. ET1 asked the class to check the answer.

In the interview ET1, was asked how she felt part of the lesson went. She said that she felt good about that part of the lesson and according to her she managed the challenge of bringing all the learners to the same place successfully. The learner had given the correct answer and she wanted the rest of the learners to follow the steps to arrive at the correct answer.

What I'm seeing right now is where I didn't just leave the kid there where she didn't know what was going on now. I brought her to the point where I wanted her to be and that she can understand how she got to that answer and while I was working on her, the other guys were also trying to get to the answer (ET1, Interview 1, 2021).

Furthermore, she explained that she could have left it and moved on. However, she noticed that the other learners might have felt that they did not know how to get to the correct answer. When asked how she could have improved the lesson, she responded that she noticed she did not let the learners read out the problem, when showing them the flashcards. Instead of just asking the

learners to give the answer, she could have asked the learners to read out the problem and then give the answer so that everyone could follow where they are in the lesson:

I flashed and they just said the answer and the others didn't know... what is the sum. Although I showed the sum, and everyone saw it, it would also have been beneficial if they read it aloud. So, it echoes (ET1, Interview 1, 2021).

The episode that was shown to ET1 was a clip of where the lesson went well however, ET1 still saw an opportunity in the episode where she could have improved on the lesson. Thus, ET1 used VSR as a reflective tool by noticing in a professional manner to identify her own actions in the episode and the mathematical thinking of the learners at the time in the lesson. Thomas, Jong, Fisher, and Schack (2017) claim that professional noticing is examined video-based professional development activities. By combining noticing skills and VSR this could lead to positively impact teachers' instructional practices. Therefore, ET1 used VSR as a reflective tool to identify where she could still improve her lesson. ET1 could notice more opportunities to enhance her teaching by reflecting on her lesson taught. She therefore used this opportunity constructively to improve her lesson in future. Hence, through teacher noticing, professional development took place.

4.3.2 Feedback from the team on ET1's first lesson episode

The mathematics team viewed ET1's episode and gave feedback and reflected on how they would conduct the lessons differently and certain procedures they would rather follow during their lessons. TM3 started off by explaining his teaching technique during the Mental Math session, which is a warmup session before the actual lesson. He suggested that to test and enhance learners' memory and listening skills, he would ask the learners in one row to start counting in sequence, then stop, then ask another row to continue where the last learner left off.

... 4, 8, 12 then I stop there, and the next person says the number again. So that they can listen and that they can know they can participate in this count, you understand. So, they will know what number follows (TM3, first team interview, 2021).

TM3 thus meant that ET1 could have implemented the Mental Math exercise to enhance learners' listening skills as this was an aspect that was lacking in his view. The Mental Math could assist learners to be more alert and how to count in consecutive numbers and not jump out of sequence as the learner did in the lesson.

TM2 agreed that learners forget where to continue during counting exercises when they are not listening. He continued to reflect that ET1 involved the learners nicely in her lesson. When ET1 stopped to focus on one learner, TM2 was interested in TM3's reaction to this part of the episode at the time it was being played. TM3 during viewing of the episode of ET1 had an interested look on his face and TM3 reflected that he was wondering how ET1 was going to bring the learner back to follow the correct sequence to the answer. TM2 noticed that the learner may have felt like she went blank because the spotlight was on her when ET1 guided her to the correct answer.

So, it's something good... I'm going to use a rugby analogy or cricket now – in the heat of the moment the heroes are born. So, I think that girl went there as a heroine and so on. I just must get on with it and help them through it (TM2, first team interview, 2021).

While ET1 was taking the learner through how she got to the correct answer, the learner became stuck while counting on her fingers. TM2 found it interesting how ET1 led the learner to the correct answer. The learner started off by counting in threes, then became stuck between fifteen and eighteen and then ET1 made her count in ones by adding three to fifteen. ET1 made sure that all learners were keeping up with her in the lesson. Even though she was focused on one learner, the other learners were still focused on her and tried to get to the answer.

TM3 here learnt from ET1's strategy of guiding the learner by his reaction to the episode, and his reflection on this moment in the episode. TM2 also learnt the importance of the teachers' role in guiding all learners to the correct answer and not just leaving the learners wondering. Thus, it can be said that both TM2 and TM3 learnt by noticing from ET1's lesson episode and her teaching strategies, how to guide learners to mathematical understanding.

TM1 was physically in the classroom during the first lesson of ET1's episode while it was being recorded and had the opportunity to sit through the entire lesson. TM1 was assisting ET1 with technology such as setting up her laptop, overhead projector, and PowerPoint presentation during her lesson recording. TM1 being a novice teacher, reflected on the environment of ET1's classroom and expressed that he was impressed with the equipment and resources ET1 had available in her classroom, many of which she made herself by laminating flash cards. He also noticed that ET1 was well in control of the classroom and the learners were focused on her; the discipline was good.

... the atmosphere feels I'm (in) a learning atmosphere – she makes the atmosphere, still those 'old schoolteachers' who create that atmosphere of you know ... let's go

learn today. So, you can see the atmosphere there you know we're doing math now you know – we count – we're serious – we're focused (TM1, first team interview, 2021).

As a novice teacher TM1 noticed many aspects of ET1's teaching practice as an experienced teacher with many years of experience. ET1 has become accustomed to certain methodologies and to creating a mathematical environment in her classroom space. However, with modern technology emerging in the education environment, ET1 may not be accustomed to this and TM1 had to assist her with setting up technology in her classroom to conduct the lesson. TM1 thus took this VSR opportunity to peer-partnership with ET1 to create an opportunity for himself, to develop professionally as a mathematics teacher. Therefore, through VSR, teachers, novice or experienced, can learn from each other by noticing and finding new ways of doing things and help each other to develop professionally.

4.3.3 Reflection of the experienced teacher (ET1) on second cycle of video recorded lesson episode

In the second video recorded lesson of ET1, she started her Grade 4 mathematics lesson on equivalent and comparison of fractions by revising fractions and by asking the learners what the definition of a fraction was. The learners responded by raising their hands and were eager to give an answer. ET1 selected a learner and the learner responded by answering that a fraction was a part of a whole. Then ET1 elaborated further and explained what a fraction was, and what could be used to demonstrate fractions. Then she told the learners what the lesson was about, namely was equivalent and comparison of fractions. Furthermore, she continued to demonstrate what equivalent fractions was by calling up learners to the front and making the learners stand in a line in the front of the class, after which the rest of the class compared them to each other. The learners were randomly selected.

In the video (episode being viewed) ... I demonstrated with the group, ... I had eight learners, because I actually wanted to have brought home with them that you can not only compare fractions to an object but also be able to do it in groups... if I have a bag of fruit, how many fruits are in the bag, there is a whole bag with so much fruit in it, now each fruit suggests a fraction of that whole... (ET1, Interview 2, 2021).

When ET1 was asked what went well in the lesson, she said she felt that she had concrete material for the learners to interact with, when conducting the lesson. She felt learners interacted well with physical participation when demonstrating pieces of a fraction. She continued:

(The) majority of the learners participated. There are a couple, I pointed them out that I know of their cooperation is not there, otherwise you must speak to them and now you have seen that I have pointed them out from the start (ET1, Interview 2, 2021).

When asked what did not go well, ET1 reflected on the introduction of the lesson and did not think it went well:

My introduction I wanted to give was to paste and cut first (different shapes) for each one, but I didn't get to it now. I did it with the other classes... That's what I missed, but I've now used the apple (shape of an apple cut out of a piece of colour paper) and did it that way now so they can see the two different parts and that it has equals (ET1, Interview 2, 2021).

ET1 first drew two figures of apples on the board, then proceeded to cut out a shape in the form of an apple on colour paper. She cut the apple-shaped paper in two parts and had two learners in front; she gave each one a half of the apple. Then she asked the rest of the class how many parts of a fraction each learner had and then told the two learners they should bring the two halves together. Then again, she asked the class how many parts of a fraction the two learners had. She made the two learners split the apple in half and then bring it together repeatedly, until the learners in the class understood the concept that two halves make one whole. The apple was not perfectly round, and this seemed like a tiresome activity, because ET1 had to repeat the exercise several times, and some of the learners still did not grasp the concept and some did. She was making it more complicated than it was and if she had a simple round object instead it might have made more sense to the learners.

During the lesson she reflected 'in action' and noticed that the learners struggled to grasp the concept of equivalent fractions. She had done the same lesson with the other classes, but it was not the same as she did with this recorded lesson. She wanted to focus on having the learners interact by cutting and pasting parts of the whole. Here she noticed from the video that the learners would have benefited from that interaction and felt they missed that in the lesson:

It would have been wiser for me and maybe... if I might now have an easy shape like a square where you can have filled it exactly even up, or maybe a rectangle or so. And then I can tell myself (the learners can tell themselves) how many parts it fills (ET1, Interview 2, 2021).

ET1 here reflected from what she viewed in the episode that the shape of the apple was not a good example to demonstrate equivalent parts, and she should have used a simpler shape like a square or a rectangle. ET1 then noticed in the episode that what she was trying to do, did not

go as planned. She noticed the learners were struggling to grasp the concept of equivalent fractions and she did not understand why. She made eight learners' line up randomly (and in no order); there were no two learners of the same length. Thus, this also did not really bring the concept of equivalent fractions across to the learners. Here she was trying to demonstrate that fractions can take any form, even in groups, but did not think this through.

At the time of viewing the episode ET1 used VSR to reflect 'on action' and noticed that at the time of the lesson she did not realise the examples that she was using was not being effective at the time. She noticed from the episode that she did not use good examples to explain equivalent fractions. The topic was equivalent and comparison of fractions. According to the figures below, equivalent fractions can be explained as fractions that represent the same value, even though they look different. Figures 1 and 2 are examples of these.

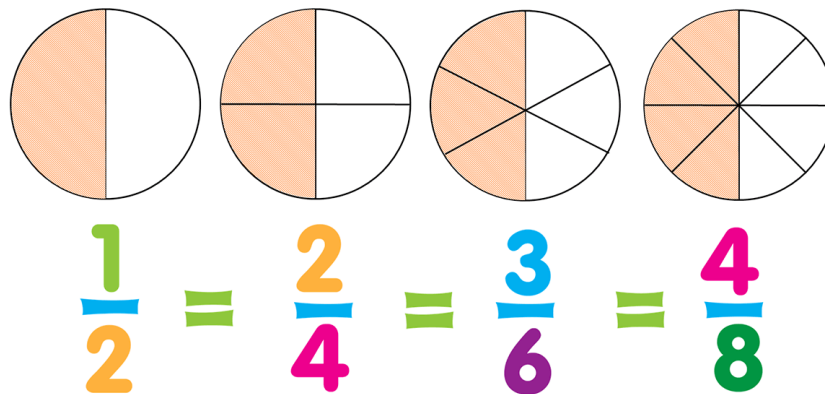


Figure 1: Example 1 Equivalent fractions
<https://teachablemath.com/teaching-equivalent-fractions/>

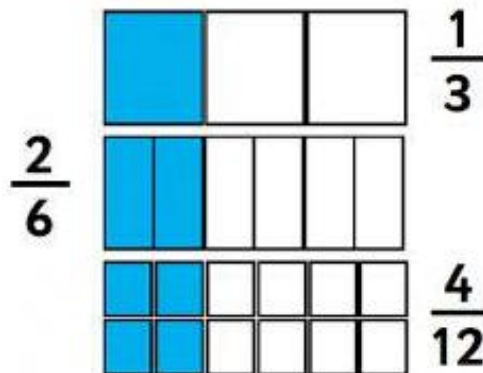


Figure 2: Example 2 Equivalent fractions
<https://www.theschoolrun.com/what-are-equivalent-fractions-and-simplifying-fractions>

Figure 1 shows four circles and the shaded parts in the four circles all represent a half, even though the circles are divided into different amounts. That means one half is equal to two quarters, three sixes and four eighths. The same with Figure 2 which shows three rectangles, all divided into different amounts; however, the shaded areas all represent the same amount, which is one third. One third is equal to two sixes and equal to four twelves.

ET1 had good examples of this pasted on the white board, such as a fraction wall in assorted colours and different examples of circles divided into fractions as shown in Figure 3. Figure 4 shows another example of a fraction wall pasted on the black board in her class. Figure 5 shows an example of a fraction wall taken from the internet.



Figure 3: Fraction walls and circles that was on the board in ET1's class



Figure 4: Another fraction wall on ET1's board

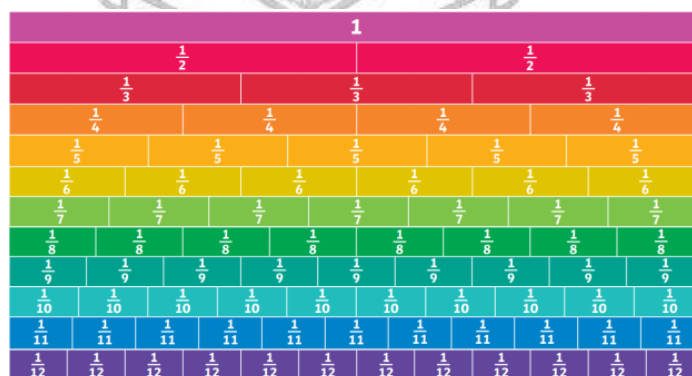


Figure 5: Example of a Fraction wall online

<https://www.twinkl.co.za/teaching-wiki/fraction-wall>

In the second interview ET1 reflected using VSR while incorporating reflection in terms of Schön's (1987) concept of reflection 'in action'. Knowing the lesson was being recorded, ET1 consciously had a plan of what she wanted the learners to gain from the lesson, which is that they should know that there are several types of fractions. The view of professional action is a series of steps in a decision-making process (Rodríguez, 2008, p. 93). Then, when viewing the episode, ET1 reflected 'on action' that involves looking back upon action sometime after it had

taken place (Bjuland, 2004). At the time of the lesson, ET1 reflected ‘in action’ according to Schön (1987), when she realised the learners were not grasping the concept of equivalent fractions. At the time of viewing the lesson she reflected ‘on action’ (Schön, 1987) and then realised why learners were not grasping the concept, because of the examples she was using. Professional teacher development is when teachers notice different things at various times, events that may have seem invisible in the past may be obvious now and things that may be invisible now may become blindingly obvious in the future (Mason, 2002). Through VSR, ET1 used teacher noticing to find what was lacking in her teaching practice, by noticing the learners’ mathematical understanding of the concepts.

In the two VSR interview sessions ET1 always had something she felt she could have improved on. Even though she had many years of mathematics teaching experience she was not complacent, and she used VSR as an opportunity to reflect, notice and be critical of her teaching practice. This enabled her to develop professionally.

4.3.4 Feedback from the team on ET1’s second lesson episode

The mathematics team viewed and reflected on ET1’s second episode and gave feedback on what they thought could have been improved upon. NT1 reflected that ET1’s lesson went well, with concrete material, the lesson flowed, according to him, and the learners understood and interacted well.

The lesson was fluid, the children understood, the language was all right - the children understood the language. The worksheets she had there I also used in my lesson... (NT1, second team interview, 2021).

NT1 used VSR here to reflect what, in his view, was important for a lesson to go well. He noticed from ET1’s lesson that he used the same worksheets that ET1 used in her lesson, which was the fraction wall, and by comparison, he felt it was a good thing.

TM2 noticed that the concept of equivalent fractions did not come through very well to the learners. He reflected that ET1 made a drawing of apples by hand on the chalk board, which he felt could not be divided up perfectly equally and that the learners should understand that fractions are something divided into equal parts; an apple could not make a good example of that if it were hand drawn.



Figure 6: The apples ET1 drew on the board

Furthermore, TM2 continued and noticed ET1's language usage and mentioned that even though the language of instruction of the class was English, ET1 switched between English and Afrikaans to ensure that those who had Afrikaans as a home language, could understand better. TM2 said that it was important for learners to understand what was being explained.

You must speak what the kids understand. So even if you convert to Afrikaans, you have a strong point, then you reach the children who are more Afrikaans. It's a strong point to convert to the language the children speak (TM2, second team interview, 2021).

TM2 believed that ET1's code switching between English and Afrikaans was a good thing. However, even though this was an English class ET1 was teaching, and learners may have had Afrikaans as their home language, it was still important to conduct the lesson in the language that latched onto the learners' home language.

This switching between languages could cause confusion for the learners as mathematics has its own language and terminology. Learners need to know and understand the mathematical language and concepts from the very beginning or else it would be difficult for them to grasp the mathematical language.

Another point raised by TM2 was that ET1 engaged with the learners in the lesson and addressed those learners who did not interact in the lesson, and it was just interesting for him to see how ET1 managed that in class.

... you can give lessons, but you talk alone, you only talk to a few kids... Of course, there are insecure ones with the equivalence story, and those who caught on... Equivalence is a difficult concept to teach... (TM2, second team interview, 2021).

Here TM2 reflected that classroom and lesson management of ET1 were vital. The topic of equivalent fractions is difficult, and learners may not grasp the concept and lose their conceptual understanding along the way and that is why ET1 wanted all learners to participate

in the lesson. TM2 learnt the importance of classroom management, more learner interaction and participation in a challenging lesson topic. TM2 used teacher noticing to reflect on ET1's lesson episode and noticed ET1's teaching strategies that he might take into consideration and take into his own classroom.

TM3 reflected that when teaching a lesson on fractions and making examples the teachers should choose their examples wisely. Using food as examples is not a recommended idea because the fractions would not be one hundred percent the same size.

...if you're going to cut a pizza into eight parts or into four parts, those four parts aren't going to be 100% the same size. There's the filling, too. But now one child is going to say but sir that portion has more meat than the other (TM3, second team interview, 2021).

TM3 here highlighted the importance of accuracy when demonstrating examples of equivalent fractions. Learners may become confused if they do not grasp the mathematical concept of equivalent fractions and that the idea is that they must understand that it must be equal parts of the whole. Therefore, the use of concrete structures such as fraction rods, and equal sized shapes that can fit into each other, could make the concept more visually understandable for the learner. The comment made by TM3 in the group gave an opportunity for all to learn from this.

The teachers present had an opportunity to reflect on different aspects of ET1's lesson episode. This team reflection was therefore an opportunity for all to learn, reflect, notice, and develop professionally.

4.3.5 Reflection of the novice teacher (NT1) on first cycle of video recorded lesson episode

NT1's first recorded lesson was a Grade 5 class on multiplication with two-digit numbers using the column method. The lesson started with Mental Maths, and the teacher revised the six times tables with the learners. Then he wrote a column method multiplication problem (Figure 7) of two digits on the chalkboard (twelve multiplied by twelve) and asked one of the learners to complete the problem on the chalk board.

	1	2
X	1	2

Figure 7: What NT1 wrote on the board

The learner found the problem challenging and was unsure of how to start, then NT1 asked one of the other learners in the class to assist him at the board. NT1 saw they were still finding it challenging and then saw the place values were not included in the problem so NT1 added the place value table with the H, T, U. He thought it would make it easier for them if they saw the place values. As the learners were working on the problem, NT1 assisted them as they became stuck with their two times table in terms of where to place the answers. During this time, the learners were blocking the board and what they were doing on the board, was not clear to the rest of the class. NT1 was guiding them as they were working through the problem and talking to the rest of the class. The rest of the class was lost, and some were fidgety and looking around. When the two learners were done at the board and stood away, the following (Figure 8) was displayed to the rest of the class.

H	T	U
	1	2
X	1	2
	2	4
+ 1	2	0
1	4	4

Figure 8: Example of two-digit multiplication using the column method

When NT1 was asked what he thought of the episode of the lesson he viewed, he responded as follows:

I think it was good and it gives me a good reflection on what I can improve on ... I think I could have had more interaction with the learners and the learners could have done more on the board ... I could have asked more learners to help each other ... (NT1, Interview 1, 2021).

Here NT1 reflected on what went well in his lesson. He noticed that the language usage was good, learners had good interaction with him, the lesson flowed, the learners were excited, and they understood the lesson content.

In this interview NT1 took the opportunity to use VSR to reflect on his classroom practices and noticed where he was lacking in his lesson. When using VSR to reflect, NT1 did not notice aspects of his lesson, such as the teaching and learning and whether the learners were grasping the mathematical concepts; he dealt with during the lesson episode. He was focused on technical aspects of the lesson such as language usage, classroom resources, interaction of

learners and so on. He did not reflect on his teaching style and whether learners grasped the mathematical concepts.

NT1 also viewed and reflected on ET1's first lesson episode and thought the lesson was well conducted, with good demonstration. He learnt and was impressed by the way ET1 conducted her lesson with the learner participation, and the way she guided the learners through the challenging episode in the lesson. He also reflected on this lesson by comparing his classroom to that of ET1 and which resources were available in the classroom to stimulate the learners mathematically. NT1 noticed how ET1 motivated the learners by positive reinforcement, and he also liked the mathematics classroom visuals such as the posters and flash cards displayed. When asked what he would use from ET1's lesson, NT1 said that he would use flash cards and have more tangible physical equipment for the learners to work with during his lessons. He noticed from the episodes that his own classroom had no mathematical content on the walls, such as in ET1's classroom.

Therefore, NT1 used VSR to reflect and notice from the episodes on different elements of his and ET1's lessons such as learner participation, interaction and learning materials in the classroom, (compared to what ET1 did, such as learner mathematical understanding). Thus, different teachers reflect on different things in their lesson that they may find important. Here NT1 used VSR to reflect on his own teaching practice as well as to notice and learn from ET1's lesson to develop professionally as a mathematics teacher. The intention of the researcher when selecting the episode was for NT1 to learn from ET1's lesson and her teaching strategies to have the learners understand mathematical concepts.

4.3.6 Feedback from the team on NT1's first lesson episode

After viewing the first episode of NT1's lesson in his absence, the team felt the lesson went well and had some input on how it could have been improved. TM1 reflected that the issue of learners not knowing their multiplication tables, was a general challenge, and it was a competency that learners need to work on at home. TM1 believed, before starting a lesson the teacher needed to start with Mental Maths to sharpen the learners' multiplication skills for the lesson to come. TM1 noticed that NT1 wanted them to work through the problem they were having trouble with. He said:

...because he doesn't want them to take out the times table (booklet) because he wants them to know the times table (by heart) – not to, you know, just not also to spoil them but for them to go back and review it because if you give them the answers, they're not

going to go back home and review again. So, he wants them... to challenge them to try and get the answer. So, I think that is a good thing. I think that's a good thing (TM1, first team interview, 2021).

TM1, being a novice teacher noticed what NT1 was trying to establish with the learners was a culture of learning and knowing the times tables. The importance of learners knowing the times tables would make it so much easier for learners when doing multiplication problems. That is why NT1 started his lesson with Mental Maths with multiplication of the six times tables. It may be viewed as a time when one member in the mathematics team noticed an aspect that he himself can reinforce in his classroom or where he received confirmation that revising times tables is an important exercise to do in class. This then can build team members' confidence in what they attempt in their classrooms.

During the lesson episode, NT1 asked a learner to do a task where twelve is multiplied by twelve using the column method on the chalkboard. ET1 reflected that, when seeing that the learners were finding the problem challenging, NT1 should have allowed the learner to use a different method, which might have been easier for the learner. ET1 said:

Where the learner may not have understood, perhaps another method could have been used that is at his level by breaking it up. For example, as twelve multiplied by twelve, I would have done a breakup method because he (the learner) is supposed to do the breakup method. It always come to his (the learner's) place values where he (the learner) knows the tens must be grouped and the ones is grouped (ET1, first team interview, 2021).

ET1 believed even though the lesson was about two-digit multiplication using the column method, the learners should have been allowed to use another method. A method such as the breaking up method (Figure 9), so that NT1 could have given the learners an opportunity to make links between the known and the unknown.

Tens	Units	X	Tens	Units
1	2	X	1	2
(10 + 2)		X	(10 + 2)	
10 X 10 =	100			
10 X 2 =	20			
2 X 10 =	20			
2 X 2 =	4			
+	144			

Figure 9: Example of two-digit multiplication using the breaking up method

They engaged on the use of different methods where the experienced teacher gave a tip in how to further enhance the lesson. Using VSR opened this opportunity for members to brainstorm on other ways of teaching and finding new ways of approaching challenges experienced, especially when learners had difficulties in performing tasks.

ET1 also noticed aspects of the lesson where the two learners were at the board:

... those two kids who stood there, they had nothing...- there was no discussion about how I got there and how did I get there ... for example, when they are struggling ... we also must get the child back – we did the six times table – go scroll through your times table list I gave you. And then there will be more children involved in the lesson (ET1, first team interview, 2021).

ET1 thus pointed out the importance of prompting learners to assist them in getting to the answers. In that way they were supported to enhance their conceptual understanding of concepts not yet mastered. ET1 also emphasised going back to the known that was covered in class and then scaffolding the concepts to allow the learners to build on existing knowledge. In this way the learners were then more involved in the lesson and more involved in their own development. This could thus assist all the learners in class as well as the learners that were standing at the board, to be helped along. Again, advice from a more experienced teacher was to assist others in their professional development when they open their classrooms and share it with colleagues.

TM2 agreed with points made by ET1 and added the following:

... maybe get the other kids a little involved too, not just those two in front of the board... But yes, look, we're trying — we can learn a little bit from each other, yes (TM2, first team interview, 2021).

TM2 reflected on the fact that the two learners were blocking the board and the rest of the class could not see what they were doing. Thus, the rest of the class theoretically were left behind on what was going on, looking around and being fidgety. TM2 thus added to the discussion and reflected that NT1 could have involved the learners more by not having them block the view of the rest of the class when they did the problem on the board. In that way the entire class could have benefitted more by seeing and hearing the discussion. The team was therefore made aware of the importance of supporting learners when they struggle, to include conversations where learners were actively involved in meaning making, and to ensure that all the learners can see what is explained on the board.

TM3 reflected on his own lesson and added to the discussion that when starting his lesson, he would have a more structured lesson by putting the topic of the lesson on the board for the learners to see. This can be done to ensure that the topic for that class is upfront for the learners during the lesson. He would also then include the twelve times table in his Mental Math's activity. Furthermore, TM3 also reflected on the resources available when doing a mathematics lesson. He suggested each learner to have their own mini white board available where they can individually do their own calculation on.

... I think you know getting resources that gives them that freedom – to go on their own and try the sum on their own you know. Challenge themselves – you just give the sum on the white board, and they do the challenge on the whiteboard or maybe on a page you know. Tell them to do the calculations on a page separately. I think that will work.

I think the main thing here is the resources (TM3, first team interview, 2021).

Here TM3 reiterated the importance of the use of resources and by allowing the learners to work on their own and independently, it would give them the opportunity to find the answer themselves and not just wait on the teacher to give the answer. He reiterated the importance of learners not being spectators in the class but enabling a more learner-centered approach in class, where all the learners attempt questions.

In this feedback session the team used VSR to reflect on their own practice and that of NT1. This session was a valuable feedback session, which NT1 could have learnt from if he were present. The team discussed aspects of the lesson episode viewed, such as the importance of the content of the mental math session that should relate to the lesson, the lesson topic should be made clear to the learner, the importance of learners knowing their times tables by heart, the importance of teacher guidance, discussion, and participation of other learners, while learners were attempting problems on the board.

4.3.7 Reflection by the novice teacher (NT1) on second cycle of video recorded lesson episode

NT1's second recorded lesson was a Grade 5 lesson on the topic of equivalent fractions. NT1 started the lesson by saying the topic of the lesson was a revision of the introduction to fractions. Then he started with a Mental Maths activity by randomly asking learners division questions such as "what is; eighteen divided by six, eighteen divided by three?" Then he switched to asking, "what is the inverse of division" and asking, "what is six times three and

three times six?” “If you divide eighteen by three, how much do you get?” The learners responded correctly to all the questions posed. He then continued by explaining that fractions were the same as division, it is when you share something. Furthermore, he explained that fractions were equal parts of a whole and *“when you divide one whole into two parts how many parts will there be?”*

NT1 then continued the lesson by explaining there were three types of fractions; a common fraction, an improper fraction, a mixed fraction, and then continued with playing a video to the learners on the introduction of fractions. The video explained what the numerator and denominator of a fraction was, fractions were a part of a set and fractions could be ‘like’ and ‘unlike’ fractions. NT1 then paused the video and went on to explain on the chalkboard the concept of the numerator and the denominator, by drawing and explaining the top part of the fraction was the numerator and the bottom part the denominator. He then went on to explain, by drawing an example of a ‘cake’ represented as a circle on the board, which he divided in to four equal parts and shaded three parts of the ‘cake.’ He then explained the denominator was the number of parts the whole was divided into, and the shaded parts the numerator, the number of parts being used, as illustrated in Figure 10.

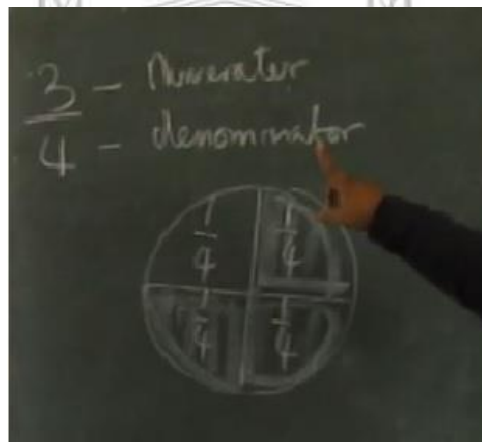


Figure 10: Illustration of what NT1 wrote on the board

NT1 was of the opinion from what he noticed in the episode that the lesson went well because of learners’ discipline, interaction, technology usage in the lesson and there were no technical errors in terms of playing the video in class. He also reflected that in this episode he was busy with a follow up of a previous lesson on the introduction on fractions and that the learners already had prior knowledge of fractions.

When reflecting on the lesson, NT1 focused on the fact that the video that he used in the lesson was from a website, and that it was displayed without any technical difficulties.

The videos were immediately available on the internet; so, the Wi-Fi and everything was right. It went well. ...it wasn't prepared, we just watched it at the same time. So,

you can't download videos before the time of the lesson, you need to watch videos immediately on the internet (NT1, Interview 2, 2021).

In this part of the interview NT1 seemed not to reflect on the teaching and learning and became more focused on the technology he used to bring the concept of equivalent fractions across to the learners. He felt that he used the technology effectively, even though NT1 admitted that there was a glitch with his phone. It kept on timing out causing the video, which was online, to start over. This repetition of the video made it seem as if NT1 was doing it on purpose for the learners to latch on to the concept of equivalent fractions. However, that was not the case.

When asked what did not go well, he noticed that there was less interaction by the learners than in the previous lesson. He again reflected on the same issues as in the first interview; that is, he did not have mathematical posters on the classroom walls, and he also noticed that learners were challenged when trying to find the equivalent fractions on the fraction wall they had in front of them. Due to these challenges, he decided to play another video to them:

There weren't many posters on the board for the kids, I should have put more flash cards...the kids did have a fraction wall in front of them... each had their own fraction wall... if I had shown it, they could see it too. They struggled to get the equivalent fractions on the line, with the ruler (NT1, Interview 2, 2021).

It became evident that NT1 did not act on what he noticed in the first lesson. He noticed that his class atmosphere would be enhanced by more posters on his walls, and the use of flash cards. However, this was not acted upon by him. NT1 also reflected on how he told the learners how to find equivalent fractions by using a ruler and the fraction wall, by moving the ruler lengthwise on the fraction wall to find fractions that are equivalent. Here NT1 saw what was lacking in his lesson and realised the importance of the availability of visual resources to stimulate the learners mathematically. Even though each learner had a fraction wall in front of them, it was not enough for them to understand the concept of equivalent fractions.

Furthermore, NT1 noticed that he had to repeat himself many times because the learners found the concept of equivalent fractions difficult to grasp. He explained that the fraction wall had a pattern they should be able to follow and could pick up quickly. He mentioned the following:

It is a pattern that they should be able to follow, if you start with the half, one is half of two and so three is the half of six, five is the half of ten, four is the half of eight, two is the half of four (NT1, Interview 2, 2021).

In this instance NT1 was not doing more to have the learners grasp the concept of equivalent fractions. Here he mentioned that the fraction wall showed a pattern, that he could clearly see and notice. However, he did not show the learners how to look for that pattern. He showed the learners a video on fractions. The videos NT1 played had a technical glitch. NT1 had YouTube on his phone and connected the phone to the overhead projector so that the learners could also view the video. However, his phone kept on timing out causing the video to stop and restart. This was not a very productive exercise, which just wasted time.

NT1 produced ideas on how he could improve on this lesson. He mentioned that in future lessons he would use more colourful fraction flash cards, more prepared videos, videos downloaded before the time and more examples:

...examples of the work, equivalences, more information, perhaps like real life, just the word equivalent alone, is equal, is equal. What the word means first, equal values... (NT1, Interview 2, 2021).

NT1 noticed that his classroom lacked resources to stimulate the learners mathematically. Even though NT1 had other resources, such as the fraction wall the learners had, the videos he played and his writing on the chalkboard, the learners were still having difficulty understanding the concept. Therefore, the resources that were being used during a lesson did not always guarantee the learners' mathematical understanding of concepts.

NT1 was absent from the first team interview, and he could have benefitted from the first collaboration session to be able to apply changes to his second recorded lesson. NT1 used VSR to reflect, however, he was reflecting on the same aspects from both episodes he viewed. In the second interview he also noticed technical aspects of the lesson such as technology, classroom resources, interaction of learners and so forth. In the second interview, NT1 used VSR to reflect on the learners' mathematical understanding; he noticed that even though he used videos, the learners were still struggling to understand the concept of equivalent fractions. Thus, in this case, it could be said NT1 had developed professionally by teacher noticing and reflected on what he would do differently in the next lesson, to assist learners with mathematical understanding. However, NT1 did not act on what he reflected on in the first lesson episode, such as the lack of use of flash cards and having posters on the wall.

4.3.8 *Feedback from the team on NT1's second episode*

The mathematics team viewed NT1's episode at the final feedback session after the last video recorded lessons. ET1 started by reflecting on NT1's episode, however she had to leave the feedback session straight after before hearing the rest of the team's feedback, due to unforeseen circumstances. ET1 reflected on NT1's episode and mentioned that the videos used in the lesson were good and that NT1 could go back to the video and replay it at certain sections where the learners got stuck.

... was good for me because he could always go back ... what did we look at there, what did you (the learner) hear there when he explained about the numerator and the denominator, so he could always have bounced back to it if the kids did not catch the concept... (ET1, second team interview, 2021).

At this point ET1 emphasized the fact that the use of technology became important for NT1 because those learners who did not understand the concept of the numerator and the denominator, could be further assisted by the video and it could make the concept more visual for the learner. NT1 used the video and referred to it all the time to consolidate the topic. Even though NT1 had a technical glitch with his phone and the video, it seemed to the rest of the team to be intentional, a strategy from NT1 to consolidate the lesson by repeating the information.

TM3 reflected on NT1's episode and suggested that the lesson could have been made more colourful by incorporating more 'construct' material such as fraction blocks and colourful fraction walls. TM3 mentioned that fractions were a very abstract concept and teachers needed to make it more hands on; there should be more learner involvement and interaction when using fraction blocks.

...he (the learner) can see how many thirds, how many quarters he (the learner) needs to have an eighth, ... I take two eighths now, how many quarters do I have to go and fill two eighths... there are different fractions that have the same value. And then maybe he (the learner) can go even further now, which ones can still fit into completing that equivalent fraction (TM3, second team interview, 2021).

TM3 reiterated that mathematics and fractions were very abstract and that learners needed to see more visuals for them to stimulate mathematical understanding. Learners also needed to see the fractions, and by using blocks and physical apparatus they could build their own fractions and see it relate to each other. The learners could even make their own fraction walls with the fraction blocks.

NT1 agreed with TM3's suggestion that different examples of assorted coloured shapes such as circles, squares, and rectangle fractions could demonstrate to learners how the shapes related to each other by placing the cut-out shapes on top of each other.

TM2 noticed in NT1's lesson that he did a bit of everything to make sure the learners were still on track with him. He explained a little, worked on the board, played a video clip, and had the learners look on their fraction wall for equivalent fractions. Initially it was not clear to TM2 what the topic of the lesson was, and he suggested that NT1 not dwell too long on the Mental Math section of the lesson and make the aim of the actual lesson clearer.

... sir played a piece of video and wrote on the board again afterwards, so it was nice. We know if a guy is talking in front and he's talking for half an hour now, then you switch off here at three minutes you switch off... (TM2, second team interview, 2021).

TM2 reflected here that he found it interesting that NT1 did not just talk during the whole lesson, and he could learn from this. NT1 used different, strategic means of resources to communicate the concept of equivalent fractions. This is an important teaching strategy to keep learners interactive and interested in the lesson. Thus, TM2 developed professionally by means of teacher noticing from NT1's lesson as he learnt different strategies to incorporate in his future lessons. So, colleagues uplifted each other through highlighting the good, and encouraged each other to do better by highlighting aspects that can still be changed in the classroom.

In this session the team members reflected on several aspects of NT1's lesson. Reflecting and noticing elements of NT1's lesson on how he could improve his lesson, what teaching strategies were used, what resources were used and what was lacking. This session reflected teacher professional development for both the team members and NT1. The different views of the members depended on their circumstances in their class. Having more ways to teach and brainstorm about it was a valuable professional development initiative where members could learn in this community of learning. Collaborative teacher reflection using VSR and learning from practices required that the teachers should hold themselves and each other, accountable, for actions in terms of their experiences and their professional knowledge (Steyn, 2008, Brodie & Shalem, 2011). When reflecting on classroom practices, and the teacher's continuing conversation with colleagues may lead to a renewal of reflection, or a cycle of reflective inquiry (Muir & Beswick, 2007).

4.4 Reflections of teachers at School B on their own practice

At School B the two volunteer teachers were individually interviewed on completion of the first and second cycle of the video recorded lessons and observation sessions. Their interviews were audio recorded and the audio recordings transcribed. No group reflection took place at this school due to constraints at the school as well, as due to the COVID-pandemic regulations followed by the school at the time.

4.4.1 Reflection of the novice teacher (NT2) on first cycle of video recorded lesson episode

The first interview with NT2 was conducted individually and she was asked what she noticed or picked up from the episode, after she watched the video recording of her lesson. The lesson was with a grade 4 class on the topic of, 'Time'. The researcher selected an episode of the lesson that stood out to him and to see how NT2 reflected and what she noticed from the episode. This episode stood out for the researcher, for the purpose of answering his research question.

In the lesson NT2 made use of a PowerPoint Presentation which was projected on a whiteboard from a laptop, as well as writing on the whiteboard while going through the presentation. On the chalkboard she also had a physical big red analogue clock hanging, that she made use of later in the lesson. NT2 started the lesson by doing a Mental Maths activity by revising the five times table and asking the learners randomly to answer by pointing at them. When asked what she noticed from the scene NT2 focused on the learners by noticing which learners were struggling to answer. NT2 reflected that VSR was a good tool to use to find out which learners were struggling and then she can go back to assist those learners.

NT2 reflected on her teaching strategy when a learner gave an incorrect answer, the question was what is five multiplied by four, the learner answered forty and she re-asked the question so that the learner could rectify himself.

So now if you rewatch it and then I can see now that I gave him an opportunity to rectify himself as opposed to, I'm thinking now like, I wonder if before this do, I actually do that but now I can see that I do (NT2, Interview 1, 2021)

NT2 noticed in the episode that she made use of this teaching strategy and reflected 'on action' on her teaching strategy and with VSR and after viewing the episode, confirmed to herself that she does it. She gave the learner an opportunity to adjust his answer instead of just moving to

the next learner and not telling the learner that the answer was incorrect. This teaching strategy is important for the learner to learn from mistakes, so that he does not do it again the next time.

NT2 further noticed from the episode a learner that was being restless in the class who she did not notice at the time of the lesson. The learner was causing a disruption, as NT2 was already struggling to hear learners because of the wearing of masks. NT2 reflected that when her back was turned and she was focussing on teaching, it was easy for learners not to focus on the lesson and be playful.

It is easy for them to do this, when your back is turned and then you don't notice what's happening in the other half of the class. I'm wondering now like what position should I stand in for me to have a clear ... what position would be the right place to stand in a class of thirty-five to be able to make sure that no one is doing whatever but at the same time you need to move around, and I moved a little forward (NT2, Interview 1, 2021).

Here NT2 noticed from the episode a certain learner's behaviour during the lesson, as the learner was taking advantage of the fact that NT2 had to turn her back on him. She could not hear the other learner because of her mask and had to go closer to the learner and ask her to remove the mask so that she could hear what the learner was saying. This made NT2 reflect 'on action' by what she noticed in the episode and think of an alternate way of standing in class while conducting a lesson. VSR assisted NT2 here to reflect on her teaching practice and think of other ways of doing things to accommodate all learners, which this is an indication that NT2 was developing professionally.

Furthermore, in the episode while doing revision on 'Time' and the analogue clock, NT2 was asking the learners questions on watches, "*where do you wear them, where else you would find them and how would you read an analogue clock?*" NT2 noticed from viewing the episode that she did not have control over the class when conducting the question-and-answer session.

It's like everyone is answering at the same time and I'm not having control of who it was, just like shouting out answers and maybe they, all, or most of them know (the correct answer) ... there is no way to tell ... which one (learner) has the correct answer? ...they're excited to just shout out answers and then I don't say okay put up your hand, I just kind of go with it (NT2, Interview 1, 2021).

NT2 reflected that when this happened in her lessons the learners would just shout out any answers without knowing if the answer was correct or they just listened to what their peers

shouted and repeated this. She would allow learners to shout out answers and she admitted that she knew she normally allowed this kind of behaviour. This is not a particularly good classroom practice. It is as if there is no control over the class and no order or classroom discipline.

Even though this was a revision session of work already covered, in this episode, there was a learner that was having difficulty understanding how to read an analogue clock. NT2 took the learner back to the basic beginning knowledge of 'Time' and wrote on the whiteboard, which side is 'past', and which is 'to' on the clock. The learner was struggling to get to the answer, NT2 was looking for, that was; twenty pasts.

I probably should have done the counting to fives, counting in fives to get to let him count with me as opposed to trying to like, because I had an expectation that he now will figure it out because I took you to that point (NT2, Interview 1, 2021).

NT2 here reflected 'on action' after viewing the episode, to help the learner with mathematical understanding of the analogue clock she should have revised the five times table with the learner. Then she also reflected that, if the learner still did not understand she should have taken the learner even further back and counted in fives with him. Through the video analysis the teacher noticed that she did not support the learner sufficiently. However, this only happened in hindsight. This noticing was a learning opportunity for NT2.

At the time of the lesson, NT2 reflected 'in action' and realised that the learners did not understand certain concepts of 'Time'. This section of the lesson was supposed as revision on what she had already taught them. NT2 noticed when viewing the episode, that she overprepared the lesson and was running out of time for what she wanted to teach, which was 'Elapse Time.'

I think that, fine I can overprepare but then while you're teaching you must adjust because you're picking up certain problems and then you not okay (NT2, Interview 1, 2021).

NT2 here highlighted that it was important for her, to ensure that the learners understood the concepts and did not just move on to the next topic as per her planning. Even though her intention was to get to 'Elapse Time' within the same lesson, there was still mathematical gaps the learners had, and she did not want to rush to get to the next planned topic before the concept was understood by most of the learners. Thus, NT2 assisted the learners with revision on the basic elements of the topic of 'Time' and helped them gain a clearer mathematical understanding in the concept, before moving on to 'Elapse Time'.

NT2 reflected on her lesson preparation and noticed that she wanted to do too much in one lesson by covering too many mathematical concepts.

And even though the four slides were revision I still went in and taught it which was required at the time but then I probably shouldn't have gone into the next concept and left it for another day. And then I don't know if I should do that much revision in a new lesson (NT2, Interview 1, 2021).

NT2 reflected on how the use of VSR helped her to reflect on her classroom management, lesson preparation and the learners' mathematical understanding of the concept of 'Time'. NT2 also noticed within her lesson the mistakes she made during her lesson such as not noticing things happening during the lesson. One learner that normally did not misbehave during class suddenly was acting the fool in front of the camera without her seeing him. NT2 saw in the scene the learner was putting on a jacket, making fun of someone and winking at the camera while she was not looking. Here NT2 realised that it is easy for learners to get distracted and restless during the lesson if the teacher was not focussed on the learners, but on other things.

NT2 also noticed from the episode, that she read the time incorrectly off the clock, during the lesson and only realised this when she watched the episode. The time was supposed to be read as twenty to ten, but she read the time was twenty to nine and then said nine forty instead of correcting herself. This made her reflect on the importance of accuracy during a lesson because they could be made by the learners as well. NT2 thus, used VSR to reflect on her classroom practice and what she could improve on to develop professionally as a mathematics teacher. NT2 learnt in the process that her focus should be on the learners, that she should not haste through a lesson, and to check if teaching and learning was taking place during a lesson.

4.4.2 Reflection of the novice teacher (NT2) on second cycle of video recorded lesson episode

NT2 was interviewed by the researcher after the second video recorded lesson to reflect on her experience with VSR and after viewing her second lesson episode. They analysed her lesson for the purpose of the research on how she could use VSR as a reflection tool. When viewing the episode NT2 became more aware of what she was thinking at the time of the lesson. The lesson was with a grade 4 class on the topic of '2-dimensional shapes' and the theme of the lesson was 'Transformations' and how to identify '2-dimensional shapes' from a 'Tangram'.

NT2 started the lesson with a Mental Maths activity and a revision on the topic of ‘Time’; she gave the activity on a worksheet to the learners. She gave the learners three minutes to complete the activity on their own. In the lesson NT2 made use of a whiteboard with images projected on it from a laptop, as well as writing on the chalkboard. She then instructed the learners that when they were done with all ten questions on the worksheet, they should put their hands on their heads. NT2 then proceeded to get the answers from the activity from the learners, wrote it on the whiteboard and had the learners do the corrections of the activity.

After this Mental Maths activity NT2 started her lesson on ‘Tangrams’ by asking questions on what a ‘2-D shape’ is. The learners were eager to answer and responded that flat shapes, have straight sides, can have curved sides, and closed shapes. NT2 continued to question the learners on different shapes named such as polygons, quadrilaterals, and other different shapes. Then NT2 proceeded to explain what a ‘Tangram’ was, and the learners had a worksheet of an activity of a ‘Tangram’ on it. The activity of the ‘Tangram’ was also displayed on the whiteboard in the front of the class.

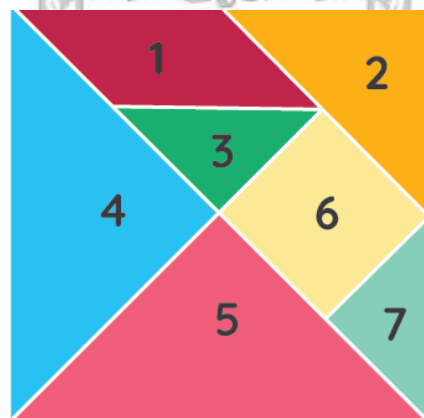


Figure 11: Example of a Tangram online
<https://www.cuemath.com/numbers/tangrams>

NT2 explained that a ‘Tangram’ is a puzzle or picture made of shapes, made of seven shapes of different sizes, and the total shapes make a square. Then NT2 continued, wrote on the chalkboard, and instructed that the learners should do the activity in their writing books, by writing the heading and numbering with the seven letters, and writing down the different shapes that make up the ‘Tangram’. In both activities NT2 allowed the learners to first attempt the activities before she started writing answers on the board. When NT2 completed the ‘Tangram’ activity with the learners she moved on to ‘Tessellation’ of shapes and continued with an activity on this. ‘Tessellation’ is when flat shapes are used to cover a space without any gaps

or overlaps; it is a kind of tiling used with only polygons in two dimensions. A polygon is the closed shape formed by joining several line segments such as triangles, squares, and hexagons.

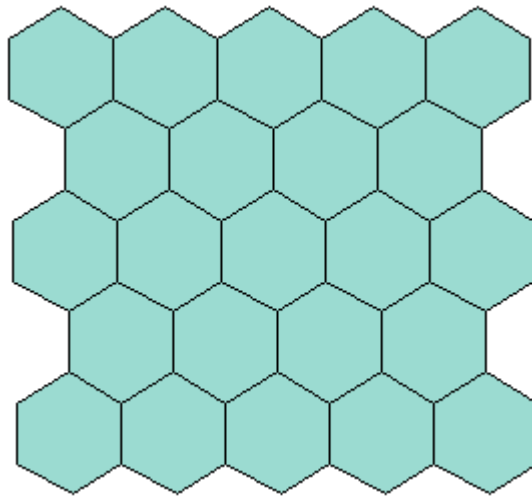


Figure 12: Example of Tessellation online
<https://sianellen.wordpress.com/2013/12/27/tessellation-shapes-in-packaging/>

shapes that will tessellate

Congruent shapes are shapes of exactly the same shape and size. Congruent shapes that tessellate include:

squares	rectangles	equilateral triangles	hexagons

shapes that will not tessellate

circles	ellipses

interesting tessellations or tilings

rhombille tiling 	floret pentagonal tiling
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Figure 13: More examples of Tessellation online
<http://www.amathsdictionaryforkids.com/qr/t/tessellate.html>

When interviewed NT2 firstly reflected on the previous viewed episode and compared it with the second video-recorded lesson and explained that the first lesson was in the morning and the second lesson was after break and the learners needed to settle down in the episode.

The learners basically came back from break, and they were a little bit more irritable or busy or energised and I needed to get them to focus... I did this, the last lesson we did was the morning. This is the afternoon, so I needed to just get them all to focus on me, to bring their attention back to me (NT2, Interview 2, 2021).

NT2 noticed from the first episode that she did not have good classroom management and in the second episode she used a tactic to calm the learners down to give her their attention. The tactic was a physical activity where she asked the learners to do what she says and not do what she does. Then proceeded to ask them to put their hands on their heads, knees, shoulders, ears and so forth.

NT2 used VSR as a reflection tool to improve on her classroom management skills and develop professionally.

I think I started a bit haphazardly the last time where I just said okay, today we're going to do and nobody was already paying attention to me (NT2, Interview 2, 2021).

NT2 reflected on her previous lesson and how she started the lesson, even though she had her lesson planned out with a lesson plan and a PowerPoint Presentation, she started the lesson with the learners not paying attention to what she was saying. In her second lesson she made sure that she had the learners' attention before she started the lesson. In this instance she reflected on her first lesson and amended to improve in her second lesson.

NT2 continued to reflect on this lesson and her classroom practices, in the previous lesson she only stood in front of the board and with the second lesson she chose to move around the class.

But I think I was just moving away from the front ... I wanted to move around the class, work the whole floor type of thing. Discovering everybody and there you'll see I'm walking forward as opposed to standing in front because otherwise I miss the ones at the back (NT2, Interview 2, 2021).

VSR assisted NT2 to improve on her classroom presence by making her realise she needed to move around the class more and interact with the learners. NT2 reflected on aspects of her classroom practice, such as when moving around the class she could engage with more learners, even the ones at the back, and give them more attention and opportunity to respond to her questions; not just the ones sitting in front.

I kind of scan like whose hands are up and then I decide who I am going to use for that question, who is going to take the lesson forward, and if it's also like one (learner) that I think might struggle for that question then I can elaborate. But also, just giving

everybody a fair chance. And not just sticking to the front of the class, the ones that always answer (NT2, Interview 2, 2021).

Another teaching strategy of NT2 was that, when scanning whose hands are up, eager to answer, she would select the one she thinks will struggle or give an incorrect answer, so that she could elaborate and explain how to get to the correct answer.

While having the learners complete the activity on the ‘Tangram,’ NT2 noticed that the learners seemed to have been struggling with the mathematical concept. NT2 reflected on her teaching strategy where she was just explaining verbally so that the learners can use their imagination. She then reflected ‘in action’ and realised at the time that the learners were struggling with the concept, and she then switched to writing on the chalkboard to make the lesson more visual for the learners.

I've tried to first assess to see who's struggling and how many is following. And then if I find that it's more than one or quite a few learners that's not actually with me, and then I went to the board eventually too, but I also want to like to give them opportunity to get there themselves before I just go up and do because then they'll just copy from the board and without actually giving it (a) ago (NT2, Interview 2, 2021).

NT2 here reiterated that her teaching strategy here was to not let the learners just copy her work off the board. She wanted to give them an opportunity to attempt the problem by themselves, and in this way, she could see who was struggling to understand the mathematical concepts. Only when she saw that the learners were struggling then she would re-explain and show them examples on the board.

The ‘Tessellations’ activity (Figure 14) NT2 projected on the whiteboard, then explained how to complete the activity to the learners; she then instructed them to complete it on their worksheet. During this time NT2 was walking around the class checking on them. She circled the classroom and helped learners who were struggling. After five minutes she went to the whiteboard and started showing them how to complete the ‘Tessellation’ for the square shape.

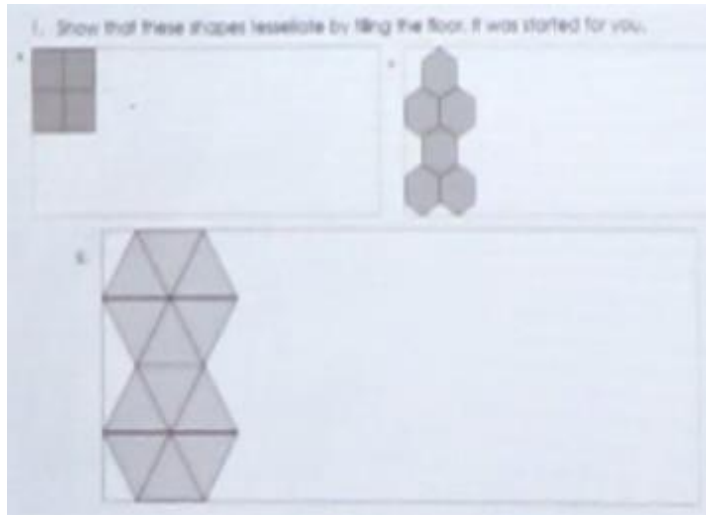


Figure 14: Tessellation of shapes activity NT2 had displayed on the white board

When viewing the episode, NT2 noticed from the scene that she used a ruler to draw lines on the whiteboard and could not recall why she did that.

I must have gone very skew and realised and then I was also, I think I was explaining to them how to use, to use the ruler and then to do it with a ruler and then I was like, this is hell. You do have that even though it it's grade 4, they still don't know how to. It was more just me thinking on my feet and adapting because I realised that if I write freehand, they're probably just going to follow and I was going skew anyway (NT2, Interview 2, 2021).

Then she reflected 'on action' through VSR, that she must have gone skew when drawing on the whiteboard with her free hand. Then realised, that at the time of the lesson she must have reflected 'in action,' that she should use a ruler because it is grade 4 and the learners would follow what she is doing.

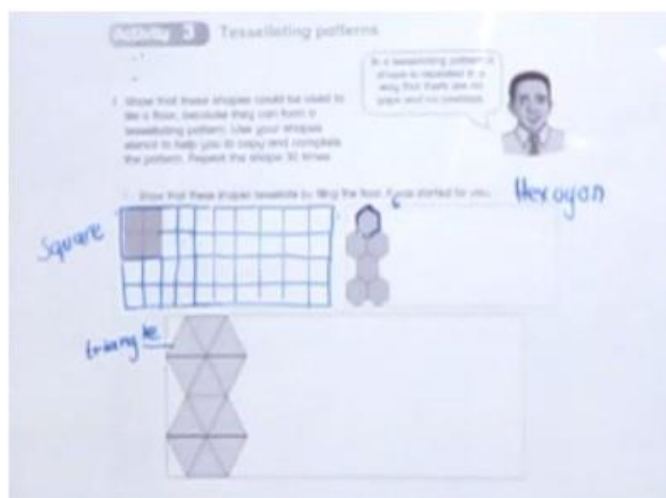


Figure 15: The activity NT2 completed on the whiteboard with the learners

Figure 15 displays the activity NT2 completed on the whiteboard, and it shows the lines she drew freehand, followed by the lines she drew when using a ruler. Through noticing, NT2 reflected that she would adapt her lessons to use a ruler in future lessons as well.

Furthermore, NT2 continued to reflect on her practice that with VSR she noticed that the first lesson was more of a lecture and found that she had to re-explain concepts in the revision section of the lesson, losing time in the process. In the second lesson she adapted strategies learnt, which she did not use in the first lesson. Through VSR and reflection on that lesson she adapted the lesson to achieve more because of the lost time in that lesson. Her lesson thus changed from teacher-centred to being more learner-centred.

NT2 used VSR as a reflective tool to develop professionally in her mathematics teaching. She reflected ‘on action’ what she noticed through VSR in the first lesson, and consciously made significant changes to her practice. She compared her first lesson to her second and was reflecting on the teaching strategies that she was using, which was an improvement from her first lesson. On viewing the second episode NT2 still found ways she could improve her practice, for example, when she used the ruler at the board, something she had not done before but would adapt her lessons to do it in future. Also, she could implement the strategy she adapted from the first lesson to move around the classroom instead of standing in front; in the second lesson has worked for her to reach and engage with more learners. Thus, NT2 continued to use VSR to reflect and develop professionally as a mathematics teacher.

4.4.3 Reflection of the experienced teacher (ET2) on the first cycle of video recorded lesson episode

The experienced teacher ET2 at School B was interviewed individually by the researcher after the first cycle of video recorded lessons. ET2 taught grade 6 and 7 mathematics at School B and had thirty years of experience in teaching mathematics. He was probed by the researcher on his teaching methods and how he reflects on his lessons. The lesson was on ‘Constructing and Measuring Angles,’ ET2’s episode was a scene after a Mental Maths session and the learners has just completed a test. ET2 was revising the Geometric tools in learners’ mathematical set. The focus was on the protractor. The protractor is an instrument used to measure angles. It is made of transparent plastic and can be in the shape of half- discs or full circles. In the lesson ET2 made use of the chalkboard, workbooks, and a protractor which he

demonstrated with. He started the lesson with explaining about angles, the inner and the outer scale of the protractor.

When probed to reflect, the focus of ET2's reflection on his lesson episode he reflected on the learners' response and interaction during the lesson episode, and he was not reflecting on if teaching and learning took place during the lesson. In the episode he was explaining to the learners the varied sizes of protractors, how to measure using a protractor and the difference between his large protractor and the learners' protractor they had in their mathematics set.

To show them that, what they're using and what I'm using is the same thing although the sizes vary. I mean mine is big for the apparent reason. So that when they work from the board then they can see the measurement ... that's the reason why mine is so much bigger (ET2, Interview 1, 2021).

In the episode ET2 was explaining to the learners how to use a protractor. He reflected on his past lessons by explaining to the researcher his reasoning for explaining to the learners how to use a protractor. ET2 remembered that he had another protractor that is 360 degrees that he forgot and should have used that in the lesson as well. He explained that he felt it was important for learners to know that there are distinct size protractors and that they measure in the same way.

Just to show, so now so when I do call them, they must take them (the protractor or compass) they can do it on the board you... that is why I do a comparison between the protractor in their mathematical set and my protractors (ET2, Interview 1, 2021).

ET2 reflected on experience and why he went into detail with his lesson about the protractor and the compass. He said:

What I've noticed when comes to measuring on the ruler ... There are some learners here that don't know how to measure on a ruler. They will always start at one and not on zero. And that's the reason why I elaborated on that to ensure that your needle of your compass is on zero all the time. I have noticed here is they'll always ask me, Sir must it be on one, then I say no. You start at zero (ET2, Interview 1, 2021).

ET2 reflected on the importance of accuracy when using mathematical tools. When teaching learners how to use the tools correctly the first time, even when using rulers, will prevent learners from making errors when measuring angles.

Furthermore, in the episode the researcher noticed that ET2 made a note on the board and was curious what that was about. ET2 reflected that he referenced the sources he used in his lessons,

and he said that he always put it on the board. ET2 remarked that it is something he learnt from the mathematics subject advisors.

Whenever you do a maths lesson you've got to put the source, you know where it is taken from and that is the reason why I always, you will see all my work, in all my work you know, I will always you know indicate where I took it from. You know because there are times that I use about maybe four different textbooks (ET2, Interview 1, 2021).

Here ET2 reiterated the importance of resources in a lesson and referencing these resources. Using different resource materials in mathematics such as using a variety of textbooks does not limit where you receive your information from. Each resource may have a distinct way of explaining the topic being presented.

Furthermore, the researcher noticed ET2's teaching methods and commented that he is very practical and confident in his lessons. ET2 reflected by saying:

You see to me it's all about confidence, once you know how to use the equipment then it goes so easy. It's all about gaining confidence and when they gain confidence and that is why you know I always elaborate from the easy towards the more complex you know. The more practical you make it the better it becomes for the learners (ET2, Interview 1, 2021).

Here ET2 reiterated the importance of making mathematics practical and demonstrative because mathematics is a very abstract subject. Teachers should familiarise themselves and be confident in the equipment they use in class. This will make it easier for the learners to understand the mathematical concepts by the teacher making the lesson more practical.

In ET2's first interview he reflected on his teaching strategies, how practical the lesson was and the teaching resources he used in the lesson. However, he did not use VSR to notice any key teaching areas in his lesson episode he could have improved on, such as if teaching and learning was taking place.

4.4.4 Reflection of the experienced teacher (ET2) on second cycle of video recorded lesson episode

The second recorded lesson of ET2 was done with a grade 7 class on the topic of 'Three-Dimensional Shapes.' In the lesson ET2 was making use of the chalkboard and different physical containers of 'Three-Dimensional Shapes' and revisited the properties of 'Two-Dimensional Shapes'. ET2 demonstrated how to build 'Three-Dimensional Shapes' with the

use of ‘Two-Dimensional Shapes.’ The episode that was selected by the researcher was viewed by ET2 in conjunction with the researcher and he reflected on the lesson. In the lesson episode ET2 was taking his time to explain in detail each ‘Three-Dimensional Shape’, explaining and writing on the chalkboard how each shape is made up of faces, edges, and vertices. When he was done with this he continued with a verbal test, the learners had to complete in their workbooks.

When interviewed ET2 reflected by comparing his first lesson to his second lesson and noticed from the episode that he was more aware of his actions because of the camera. Thus, he felt that he had to be more aware of his surrounds and what the learners are up to during the lesson. He reflected that in the first interview the researcher made him more aware of the learners that was standing around in the class. He did not realise that they were doing that at the time of the first lesson but noticed it when viewing the episode. He reflected on the second lesson as follows:

They seem to be more glued to their desk. I’ve noticed yes. And of course, paying more attention to what I was saying, yes, and how I was pronouncing certain things. I tried to get them all glued to what I’m doing in comparison to the first lesson, you know they were a bit more, free (in the first lesson) (ET2, Interview 2, 2021).

Here ET2 believed that the learners were more interested in the second lesson than in the first lesson. He noticed the learners’ body language in the second episode when viewing the episode. According to him they paid more attention to what he was saying and how he was pronouncing certain things in the second lesson. He reflected that in the first episode the learners were walking around a lot more than in the second episode. He was reflecting that he had the learners’ attention more in the second episode than in the first episode.

Furthermore, ET2 reflected that VSR made him more aware of his lesson preparation and the importance of making the second lesson more practical and keeping the learners always interested during the lesson.

In particularly, the demonstration parts. You know it was real. They could relate, they could see you know what I’m talking about. And they could also experience the different shapes (ET2, Interview 2, 2021).

The demonstration parts ET2 was referring to here, was when he demonstrated when drawing on the chalkboard how he used the ‘Two-Dimensional Shapes’ to build the ‘Three-Dimensional Shapes.’ He was making the lesson practical for the learners to understand the mathematical

concepts of ‘Three-Dimensional Shapes.’ ET2 was reflecting on the learners’ experience of the lesson. By him making it more practical and demonstrative (Figure 16), they could see how the different shapes relate to each other and transform from ‘Two-Dimensional Shapes’ to ‘Three-Dimensional Shapes.’



Figure 16: 'Three-Dimensional Shapes' ET2 constructed on the chalkboard.

The resources that ET2 had available in this lesson was different kinds of plastic ‘Three-Dimensional Shapes.’ He constructed ‘Three-Dimensional Shapes’ by drawing on the chalkboard the different ‘Two-Dimensional Shapes’ and connecting it together to make ‘Three-Dimensional Shapes.’ ET2 believes that a lesson should be made practical for learners to gain mathematical understanding.

I had to break it down to show them without any two-dimensional shapes there could be no three-dimensional shapes. I tried to make it more interesting for them. By breaking the shapes down, individually, and then of course then putting it together. My whole thing was to see, for them to see that there is a connection between two dimensional shapes and three-dimensional shapes (ET2, Interview 2, 2021).

Here ET2 was reflecting on his teaching strategy and how he used ‘Two-Dimensional Shapes’ to construct ‘Three-Dimensional Shapes’. This was to help learners to connect the mathematical concept that ‘Three-Dimensional Shapes’ is constructed from ‘Two-Dimensional Shapes.’

ET2 was reflecting on the same aspects from the first interview which was his teaching strategies, how practical the lesson was and the teaching resources he used in the lesson. In the lesson he had concrete material to show the learners and he reflected on how the learners responded in the lesson. He made the second lesson more practical for the learners and believes that that is important in a mathematics lesson. ET2 was reflecting mostly on the technical

aspects of the lesson such as learner behaviour and how practical the lesson was. In his first lesson he was explaining mostly about the elements in the mathematics set and from experience felt that learners need to know how to use these tools. He used VSR as a tool to reflect and improve on his lesson with learner interaction and behaviour. ET2 believed that he improved his lesson by being more in control of the lesson, making it more interesting and more practical for the learners. However, once again he did not use VSR to notice any key teaching areas in his lesson episode he could have improved on, such as if teaching and learning was taking place.

4.5 Reflection on VSR as a tool to improve mathematics teacher professional development

The teachers at School A were asked during the interview sessions, to reflect on their experience with VSR. They had the following to say:

TM2 was one of the team members who gave feedback on the viewed episodes from the volunteer teachers, reflected that it was a wonderful experience. He said that if he were given the opportunity to have his lesson recorded, he would also have learnt a great deal. TM2 explained he would have learnt about where his short comings were and where his strengths were. He felt it would have been a positive experience for him to learn and grow.

The contribution from everyone here I think has been incredibly positive - there are many things you think and what I think is good (TM2, first team interview, 2021).

During the collaboration sessions the team was able to view colleagues' lesson episodes and give feedback because the setting was one of no judgement and an environment to be able to learn from colleagues.

ET1 reflected that having her lesson recorded made her more conscious about preparing and conducting a lesson. After the first recorded lesson she said that she already started reflecting on how there could have been an improvement in the lesson. ET1 felt that the VSR process was a useful exercise and that she also learnt valuable information what to improve on, from the feedback given by her colleagues.

Furthermore, ET1 reflected that when conducting her lessons that was recorded, she had to hold herself back a bit. Then she noticed that this was an effective way of conducting a lesson because putting on a performance for the learners does not always mean the learners understand what is being taught.

... it is good to watch – on the other hand you can be relaxed then you are not learning either... sir (TM1, first team interview, 2021) made a good point – he could see it was a learning environment – he could see the kids were focused – you could see discipline – so that is everything ... (ET1, first team interview, 2021)

In an environment where you know that you are being observed or recorded you may feel intimidated, however, you may feel you should be on your best behaviour and giving the best performance, knowing others are watching. In the process also being intentional about what is being taught and if the learners are learning and understanding the mathematical concepts.

The rest of the mathematics team also agreed that VSR was a useful tool and that they have learnt to reflect on their own practice by means of their colleagues' VSR experience and the collaborative feedback session.

At School B the teachers were asked during their interviews to reflect on their experience with VSR.

ET2 reflected that he would reflect on his teaching, in the past, by means of the learners' test results and informal assessment. He reflected on VSR and said that he enjoyed the project, and it helped him in the following aspects of his teaching:

It helped me along, along the way. I became more aware of myself as a teacher actually, whereas before you know I wasn't so much aware of what I was doing. This brought out, the better part of things for me (ET2, Interview 2, 2021).

ET2 noticed that there was an improvement in learners' behaviour in the second lesson, that they were more motivated, glued to their seats, and listening.

You know there was no negativity, like maybe like in the previous lesson when you told me, were you aware of them walking around. So, I told you no, I wasn't so aware of them but now this time around I mean they were more focussed (ET2, Interview 2, 2021).

In the second lesson ET2 believed that everything went well, he felt in control of the class because he noticed from the episode there was no learners walking around. Thus, that means ET2 felt there was an improvement in his classroom management skills, because the researcher had to point out to him the learners were walking around in the class during the lesson.

He also reflected that he felt that he improved on his second lesson by making it more practical and interesting for the learners to stay glued to their seats.

I prefer making things practical for them to teach, because by making it practical it is concrete, it is there, they can visualise and of course, it makes sense to them... I always took it for granted you know but now being part of the programme has made me realise you know that this provides a stimulus as a point of departure as far as future lessons are concerned (ET2, Interview 2, 2021).

Here ET2 reflected on VSR, that it made him more aware of his classroom practices and what he can improve on in his lesson presentation. He believed making the lesson more practical is important for learners to grasp mathematical concepts. VSR made him more focussed about what is happening during the lesson and future lessons.

NT2 reflected on previous training and reflection on lessons, and she explained that when she would attend workshops in the past, she felt it was an information overload and none of what she learnt she would put into practice. She believed that:

It would require a lot of planning and I think it would take longer because you probably would have to sit down now and think about how you're going to change the way you do things (NT2, Interview 2, 2021).

NT2 believed that when coming from workshops or training sessions she would need to sit and strategize how she would incorporate new teaching methods learnt, into her lesson plans. She felt that this would be time consuming and require additional planning to change her teaching methods.

NT2 reflected on her experience with VSR and had the following to say:

It assisted me with the way I deliver the lesson and then the topics that I choose and how I am going to deliver them. The methods that I used to teach and then also just my own self-awareness of how I conduct myself in the class (NT2, Interview 2, 2021).

NT2 felt that VSR assisted her in her lesson preparation and how she would present a topic. It helped her in being more aware of how she conducted herself in the classroom, her awareness of the learners and if teaching and learning was taking place in the classroom.

Furthermore, NT2 reflected that with VSR the feedback on lessons taught is more instant and that it suited the context of her classroom and what she was teaching. When she watched the video of the lesson, she would change what she needs to change for the next lesson.

It's not somebody else's objective of the way of teaching should be and it's more subjective for me to adapt what I'm doing because I don't necessarily agree with someone telling me this is a way you should teach maths when there is so many other options that's suited to me and my classroom. (NT2, Interview 2, 2021).

Here NT2 reiterated that every teacher's classroom was different and VSR allowed her to adapt her lessons to her classroom environment. She felt that someone else should not be telling her how she should be teaching. There were different resources and other options for teaching mathematics and relevant to one's own classroom. There was no fixed rule on how to teach mathematics.

NT2 reflected that she would make use of VSR again in her teaching practice. She reiterated that it was more centred around her and her classroom, what she was doing wrong and how she could fix it.

The feedback is instant, you can immediately recognise, pick up on things, you can easily just make changes for the next lesson or the next term or the next year and then know exactly what it is you do wrong. Just since this works or how this works, I would say I am extremely keen to use it again (NT2, Interview 2, 2021).

As a novice teacher, NT2 was keen and excited to make improvements to her teaching practice. NT2 gave positive feedback on VSR and how it assisted her with lesson preparation and classroom management. She used it to improve on her lesson delivery, how she taught the content, and it gave her an opportunity to make changes.

4.6 *The advantages and challenges mathematics teachers experience in the implementation of Video-Stimulated Recall (VSR)*

After the final VSR interview session, the two volunteer teachers at School A completed a questionnaire to describe how they experienced the VSR process. They said that the challenges they found during the video recording of their lessons was that the learners often overreacted, were over excited and eager to participate. At times they found that learners were too quiet and withdrawn and did not actively participate in the lesson, because the camera was a distraction. When asked how easy it was to implement video recordings in their lesson, they responded as follows: they found that the use of the equipment was easy and user-friendly.

The teachers were asked what was challenging in the final VSR session and what they took away from the session. NT1 felt that he was a bit stiff, and he felt that due to the camera he did not perform at his best. He also said that he felt the discussion was helpful and he believed he needed the feedback. When asked to name advantages of having VSR in the mathematics team, they responded that: after viewing the video recorded episodes, they felt that learners respond well to a lesson when they are engaged in technology and when they watch videos. When asked to what extent VSR had made a noticeable difference to their teaching, they said that the fact that they could see their performance and the video could be replayed, meant they could adjust

their teaching style in future lessons. They also felt that it made them more aware of their language usage, behaviour and they were now more mindful of their performance.

The teachers at School B did not complete a questionnaire; however, during their interview they had an opportunity to respond about their experience. NT2 mentioned that a challenge was time management and time constraints and having to analyse the video. It would require time to sit down and re-watch the lessons offline and that would be in their own time, not on school time. Furthermore, NT2 mentioned that VSR is an instant way of feedback on lessons taught and when reflecting on errors in the lesson, immediate changes could be made for the next lesson. ET2 mentioned that VSR was an enjoyable experience for him and that it made him more aware of his classroom presence and his shortcomings.

4.7 Conclusion

The data collection process for this research project was successfully concluded at the two schools during the COVID-19 pandemic of 2021. This chapter discussed the data analysis of the data collected to answer the research question: to what extent did the teachers' use of VSR as a reflective practice tool enhance their professional development as individuals and as a group in selected South African primary schools? The themes that derived from the data was analysed. The themes were the participants' views of mathematics teachers' professional development before the implementation of VSR as a reflective tool, the individual teachers' reflections using VSR, the team's feedback on the first and second episodes of the recorded lessons of the participating colleagues, the participants' reflection on VSR as a reflective practice tool and the advantages and challenges teachers experienced during the implementation of VSR.

CHAPTER FIVE

5. Findings, Conclusion and Recommendations

5.1 Introduction

The research project aimed to answer the research question: to what extent did the teachers' use of VSR as a reflective practice tool enhance their professional development as individuals and as a group in selected South African primary schools? The data was collected from two schools located in the Western Cape in South Africa, one school in the Cape Flats area and the other located in the city centre of Cape Town. One of the school's Mathematics teachers functioned as a mathematics team (School A) and this included two participating volunteer teachers, while the other school's two volunteer Mathematics teachers (School B) did not function as a mathematics team but worked more according to 'grade.' The data collected was analysed and discussed to show what significant impact VSR may have had on mathematics teacher professional development, as well as that of the mathematics team. Following the data analyses and discussion the findings will now be discussed.

5.2 Findings

5.2.1 Teachers' views on mathematics teacher professional development initiatives before the intervention started

The questionnaire that was conducted after the VSR training session revealed that before the implementation of VSR at the schools, teachers would attend workshops hosted at training centres and found these to be useful and informative. They also received support from colleagues through meetings, online workshops, and group mathematics department quarterly discussions. Teachers also used learner performance as a way of reflecting on their lessons. Teachers mentioned that they would need more support through attending more workshops and expressed the need for more Information and Communications Technology (ICT) training to be provided. This can be interpreted in the following manner: the teachers already participated in PD initiatives before the start of the VSR exposure. The participants also expressed the need for more support in terms of their professional development, especially in terms of ICT. The questionnaire also revealed that after the VSR training session, the participants were willing to give VSR a try; they would make use of it to reflect on lessons and have collaborative discussions around the improvement of lesson presentation and professional development.

As maintained by Ono and Ferreira (2010) and Steyn (2008) it is questionable whether long term professional development programmes are most effective when it is designed with the teachers' needs in mind, these programmes need to be suitably planned, have follow-up opportunities, such as supportive observations and feedback, peer dialogue and coaching.

5.2.2 School A's teachers reflecting individually

The data revealed that with VSR as a reflective practice tool, different teachers reflect in different ways on their teaching practice. There are various aspects of teacher noticing that teachers observe during the VSR interview sessions.

NT1 took the opportunity to use VSR to reflect on his classroom practices, during which he noticed technical aspects of where he was lacking in his lesson. There were also aspects that he did not notice, which could be improved. He was interviewed individually in his first interview and when using VSR to reflect, but NT1 did not notice aspects of his lesson such as the teaching and learning, or whether learners were grasping mathematical concepts. For example, when the learners were standing at the board struggling, he did not allow them to use a different method to solve the multiplication problem. He was absent from the first team interview where the mathematics team gave critical feedback on what they noticed in his lesson episode. He could have benefitted from this feedback to be able to improve on his second lesson. When he was interviewed in the second team interview, NT1 again reflected on the same aspects from his first lesson episode and interview. He noticed technical aspects of his lesson, such as resources used, learner engagement and lesson presentation. In the final VSR session he noticed the same aspects in the lesson episode he could have improved upon. When engaged with the team discussion regarding his second lesson episode NT1 recognised the same aspect from his first episode, which he did not improve on in his second lesson. NT1 made no improvement from his first lesson to the second one regarding his lesson presentation.

After hearing the feedback from the team, he improved on this reflection by stating that if he saw that learners were not grasping mathematical concepts, he would try different tactics and not use the same resources all the time. Furthermore, he reflected that he would, in future, use things from the real world to explain the concept of equivalent fractions when seeing the learners were struggling to understand the concept of equivalent fractions. Thus, NT1 developed professionally by improvement on his reflection on what he could do differently in

future lessons. However, there was still much room for improvement when it comes to reflection and teacher noticing on his viewed lessons.

This indicates that when engaging in a team discussion, teachers get different perspectives on their lesson presentations, and this gives them additional ideas regarding improvement. The emphasis is on improvement and development in a professional capacity. Thus, the team discussion assisted NT1 with improved reflection.

The use of VSR as a reflective practice tool revealed that ET1, the experienced teacher at School A, noticed aspects from her practice that she could improve upon. Even with ET1's years of experience in the field of teaching, she still took the opportunity in the VSR sessions to reflect on her lesson and think of ways she could have improved it. During her first lesson episode she demonstrated her skills as a teacher to maintain discipline in the class and made sure all learners were focused on her, teaching, and learning. When some of the learners went off-track, she made sure she brought them back. This alluded to her capabilities as an experienced teacher, aspects which the rest of the team could use in their own practice during their exposure to her lesson presentations.

The classroom setup of ET1 was one which enhanced teaching and learning, as mathematics resources were displayed in the classroom; the use of technology was also clearly displayed in the first lesson. ET1 was one of those 'old schoolteachers', as she was willing to learn, not being well versed in technology, and asked a colleague to help her present a quality lesson. The second lesson showed engagement with the learners, and when learners were struggling with the concept of equivalent fractions, she used different methods to bring the concept across. In the first VSR interview she recognised where she could have improved, by having learners read out the problem and not just give the answer.

In the final VSR interview, ET1 reflected that she realised the learners were struggling with the concept of equivalent fractions. She noticed from the episode that she wanted to make it more interactive for the learners. However, she did not notice that the concept of equivalent fractions was not coming through clearly to the learners. Professional teacher development is when teachers notice different things at various times, events that may have seem invisible in the past may be obvious now and things that may be invisible now may become blindingly obvious in the future (Mason, 2002). Here ET1 learnt some valuable lessons from the team discussions on how to get the concept of equivalent fractions across to the learners more

effectively. ET1 displayed that she was set in her ways in terms of the examples for equivalent fractions she was using, and it did not enhance conceptual understanding on the part of the learners. The team elaborated on the fact that using food as examples was not effective and the use of solid shapes such as circles, squares and rectangles would have been better. Also, the examples used for displaying equivalent fractions should be able to divide up equally and fit into each other, to demonstrate that they were equivalent. This insight was gained by reflecting collaboratively as mathematics team.

ET1, even though she is an ‘old schoolteacher’, still displayed a willingness to learn from her mistakes and improve on future lessons. This she demonstrated by her improvement on her second lesson, by making the lesson more interactive and participatory for the learners. In the second lesson, the team delivered constructive feedback, and this discussion made ET1 realise where she had gone wrong.

ET1 also appeared to be an asset to the team, with valuable insight on colleague’s lessons. When ET1 was reflecting on her colleague’s lessons, she gave valuable input that the team and novice teachers benefitted from and could use in their own lessons.

5.2.3 Team component and School A

The mathematics team component at School A revealed meaningful results of the use of VSR to develop the mathematics team. The team used VSR to reflect on their own practice and in collaboration, reflected on colleagues’ lessons and teaching practice. They used VSR as a reflective practice tool to reflect and enhance the mathematics team by sharing ideas and classroom experiences. This was a learning experience for novice teachers to learn from experienced teachers’ practice. Even the experienced teachers used the opportunity to find ways to improve and learn from their own and others’ lessons. Furthermore, the team component helped to engage in more meaningful discussion during the team interview. Each teacher gave their input and gave suggestions according to their experience and perspective from their classroom environment.

The Head of department (HOD) of the mathematics department was a member of the mathematics team (TM3) and this revealed to add value to the team membership. Studies reflect that team members may feel that they may need support from their leaders, and this could be critical to successful collaboration. The HOD would know what advice could help the team

members to work together. Teachers may feel reassured to engage in new initiatives if they received support of colleagues in leadership roles. If leaders were involved during team meetings, this could encourage team members during uncomfortable moments when teachers may be hesitant to engage in conversations, or in the case of personality conflicts (Slavit et al, 2011; Jao & McDougall, 2016; Krammer et al, 2018).

The advice given by TM3 was an opportunity for the mathematics team to learn from leadership. TM3 gave valuable advice on how the Mental Math exercise could enhance learners' listening skills. TM3 stressed the importance of the use of resources; also, by allowing learners to work independently, they would have the opportunity to find the answer themselves and not just wait on the teacher. TM3 highlighted the importance of accuracy when demonstrating examples of equivalent fractions, and TM3 reiterated that mathematics and fractions were very abstract, and that learners need to see more visuals for them to stimulate mathematical understanding. Learners also needed to see the fractions and by using rods, blocks, and physical apparatus they could build their own fractions and see how these relate to each other. The input given by TM3 could be seen as valuable feedback from a leadership role, which team members could take back to their classrooms and implement. The feedback also focussed on teaching and learning and making the teaching practice more learner centred.

The team interviews also revealed valuable input from the mathematics team such as:

Advice given from a more experienced teacher (ET1), to assist others in their professional development: Allowing learners to use a different method, which might have been easier for the learner, when you find that learners are struggling. Giving learners an opportunity to make links between the known and the unknown when teaching specific methods. Prompting learners may assist them in getting to the answers. Learners who were more involved in the lesson became more involved in their own development.

Team members such as TM1 and TM2, who were also novice teachers, took the VSR interview sessions as an opportunity to learn from colleagues' lessons and to put this knowledge in practice in their own classrooms. TM1 learnt from ET1's mathematical classroom environment regarding the resources and her classroom management and learner discipline. Even though ET1 was accustomed to certain methodologies, she was also willing to learn from TM1's ability to use and incorporate technology in a mathematics lesson. TM1 advised from what he viewed in NT1's episode, that before starting a lesson, a teacher needed to start with Mental Maths to

sharpen the learners' multiplication skills for the lesson to come. TM1 learnt how to instil in learners a culture of learning and knowing the times tables, based on NT1's lesson.

Furthermore, the VSR team interview revealed that TM2 also learnt from both ET1's and NT1's team discussion. TM2 learnt the importance of the teachers' role in guiding all learners to the correct answer and mathematical understanding. TM2 believed that ET1's code switching between English and Afrikaans was a good thing. TM2 learnt from how ET1 engaged with the learners in a lesson and how she addressed the learners who did not interact in the lesson.

TM2 also learnt valuable teaching strategies from ET1 that he could implement in his own teaching practice. TM2 also learnt from NT1's teaching strategies by means of resources to communicate the mathematical concepts to the learners.

The findings presented that a mathematics team could add value to the VSR interview sessions. According to studies by Steyn (2008) and Brodie and Shalem (2011) collaboration among teachers develops their strengths, knowledge, and skills, while also stimulating reflection and broadening perspectives. In the team discussion team members discussed and shared ideas that all colleagues could have seen as useful. This gives rise to more effective teaching and ownership of their professional learning. Teacher collaboration through VSR became a vehicle to support teacher externalisation and reflection of their thinking about their practice and about their learners' thinking. (Steyn, 2008, Brodie & Shalem, 2011).

VSR was used as an effective reflective tool for teachers to reflect on lesson episodes and notice what was good or lacking in the lessons. Teachers could look at their own practice with a fresh eye and can be able to consider more closely and reflect on 'incorrect' pedagogical methods. The teachers could experience the VSR sessions as useful in helping them to evaluate which teaching goals could be best achieved during lessons (Schmid, 2011).

5.2.4 School B's teachers reflecting individually

As with School A, the data revealed at School B that different teachers reflect in different ways on aspects of their teaching practice that they regard as important. The data was analysed to investigate if teacher noticing was used to assist teachers to reflect and develop professionally in the teaching of mathematics. The teachers at School B were interviewed individually and there was not a team component.

NT2 effectively used VSR as a reflective practice tool to amend her practice and improve professionally. In the first interview NT2 critically viewed the lesson episode and used teacher noticing to find what was lacking in her lesson. The aspects NT2 found in her lesson that she could have improve upon, was her classroom management skills, learner interaction and participation, teaching strategies, learner behaviour or discipline, lesson time management and whether the learners understood mathematical concepts.

In the second lesson NT2 made significant changes to her teaching practice and recognised this from viewing her second lesson episode. In the second lesson she had more classroom management, as she grabbed learners' attention from the beginning of the lesson. She also insisted from the start of the lesson that no learners should be shouting out answers. She also gave clear instructions on what she wanted the learners to do such as: the activity should be done in three minutes, and they should put their hands on their heads when done. Her classroom presence improved due to her movement around the classroom and by involving all learners in the lesson, so no learner had a chance to be able to play the fool. Then as per the previous lesson she noticed she over prepared and wanted to do too many things in one lesson. She improved upon this by not rushing the lesson and giving the learners an opportunity to attempt the activities on their own, instead of just giving them the answers.

According to Ono and Ferreira (2010) and Steyn (2008) teachers may make links with classroom practice over an extended period. Long term professional development programmes are most effective when it is designed with the teachers' needs in mind, and must be suitably planned, have follow-up opportunities such as supportive observations and feedback, peer dialogue and coaching. This can contribute to a general improvement in teaching. NT2 was a novice teacher and was eager to learn; NT2 used VSR to reflect on all aspects of her lessons. She was more critical of herself and wanted to improve on lesson presentation and classroom management. She also reflected that VSR was not like the workshop she attended in the past, which she felt was someone else's opinion on how a mathematics lesson should be taught. She felt that teaching methods should be relevant to one's own classroom environment. Thus, she felt that VSR was more immediate in terms of feedback and own reflection on lessons. According to NT2, VSR allows individual teachers to make corrections in their lessons almost immediately.

The data revealed that based on the interview and ET2's reflection on his first lesson episode, he was focused on learner response and interaction, and not if teaching and learning was taking place during the lesson. Being an experienced teacher of more than thirty years, ET2 seemed to be an 'old-school' teacher. His teaching pedagogy was one of being teacher-centred, where he did all the talking. When viewing the episode, the researcher had to point out to ET2 that learners were standing around during his lesson, a fact of which he was not aware. His teaching style was one of 'talk-and-chalk.' In his first lesson there appeared to be no learner interaction and the learners were bored, doing other things while he was teaching.

The focus of his reflection was the content of the lesson, the tools he used to present the lesson, the textbooks used and reference notes he made on the chalkboard. ET2 could have reflected more on his own teaching practice because his lesson was not very interactive. There was no learner participation and reflecting more proactively could have benefitted him in making improvement on his future lesson presentation. In the lesson episode, the learners seemed nonresponsive, as ET2 was doing most of the talking, reading from the textbook and writing on the board showing the learners how to use the protractor and how to measure angles. He reflected on past experience that he needed to do a lesson on the protractor, because learners do not know how to use it correctly.

When viewing the second lesson episode ET2 reflected again on learners' response and interest in his lesson. In the second lesson episode the learners seemed more responsive to ET2's lesson content. He had more control over the class and the learners were paying more attention - even responding to his questions. When reflecting on the episode he focused on the learners' body language and reflected that he noticed from the first episode that learners were walking around more then. He also noticed from the episode that he was more aware of the camera in the second lesson. He believed he made the lesson more practical by drawing the shapes on the board and showing the learners the physical 'Three-Dimensional Shapes.' ET2 was not very critical on his lesson presentation, and he mostly focused on how demonstrative the lesson was, as in his opinion this makes the lesson more practical. This hindered his professional development and making improvements on his lessons.

ET2 who was a more experienced teacher and was reflecting on how he could make the lesson more practical. In his experience he believed that making the lesson more practical make the

learners understand the mathematical concepts better. The aim of reflection and reflective practice was to develop life-long critically reflective teachers (Muir & Beswick, 2007).

5.2.5 Comparisons of the two schools

Similarities between the two schools

The two schools that participated in the research study were both located in Cape Town in the Western Cape. The data was collected during the COVID-19 pandemic during 2021, which made it more difficult to collect data during this time. Both schools had rotational timetables which meant half the class's learners would attend the school every second day. The teachers at both schools had been participating in professional development activities, such as attending workshops and training sessions at the training centre, at their schools and online. They had years of teaching experience in mathematics and good content knowledge. Both schools were well resourced and had technology available to present lessons with.

Differences between the two schools

School A had a mathematics team component and the mathematics teachers at the school supported each other in terms of teaching the subject. School B had no mathematics team component and no support in terms of professional development as a mathematics teacher. School A made effective use of technology in lessons such as showing learners videos and presenting PowerPoint presentations. At School B, only NT2 made use of technology and presented both lessons on an overhead projector.

The four teachers all used different teaching pedagogies; they had different teaching styles, and their interaction with learners was distinct. The classroom discipline also varied between them, and the learners were of different ethnic backgrounds. There was also a difference in how learners responded in class and in learner participation. ET2's classroom was of a teacher-centred environment and NT2 changed from teacher-centred to learner-centred. Teachers reflected on various aspects of their lesson episode, such as how to improve lessons or what to do differently next time, technical aspects, learner interaction and participation.

5.2.6 Reflection of participants on VSR as a reflective tool

The participants were asked to reflect on their experience with VSR and the data from the interviews found that teachers at School A, had a positive experience with the team component. They felt that the setting was one of no judgement and an environment where they were able to learn from colleagues. VSR caused them to be more conscious of their lesson preparation

and how to conduct a lesson. Colleagues could reflect on own practice, and they could learn from colleagues valuable feedback on how to improve on lessons. They also felt that using VSR as a reflective tool could improve the process of being more intentional about their teaching practice and what is being taught, and if the learners are learning and understanding the mathematical concepts.

The teachers at School B felt that VSR made them more aware of themselves and their teaching practice and presentation in the classroom. They felt that VSR helped improved their classroom management skills, their classroom discipline and lesson preparation. Furthermore, they felt that VSR was versatile and allowed the teacher to adapt it to their own personal classroom environment. It was a subjective process centred around their own classroom. School B's teachers gave positive feedback on VSR, it helped them to improve lesson delivery and it gave them an opportunity to make improvements.

5.2.7 Advantages and Challenges faced with implementation of VSR

The questionnaire to the volunteer teachers at School A, questioning during the first team interview at School A, combined with responses the from the final interviews at School B revealed the advantages of VSR and the challenges faced during the project. They found that the equipment was user-friendly and easy to set up. They found that VSR helped them to reflect on and improve on lessons. It also made them more aware of themselves, in terms of language usage and classroom management. They found that VSR made them aware of what activities learners respond to more, such as making the lesson more practical and using videos in a lesson.

Challenges that arose from the project was, time management and time constraints, having to analyse the videos, some learners being unresponsive or over excited during lesson recordings, and teachers being stiff and not being able 'perform' as usual on camera.

5.2.8 Limitations of the study

The study encountered some limitations that hindered the data collecting process at School A. The issue of time constraints was a limiting factor of the study. Time had to be made between after school meetings and commitments to organise the mathematics team to meet for the VSR interview sessions. Teachers were not always willing to stay after school to stay for a meeting because of other after school commitments. For professional development to occur within a mathematics team, teachers need to be willing to stay and commit to the feedback sessions.

The video recordings of the lessons had to be done by colleagues or other students that were available at the time to operate the camera. The researcher who was a teacher at School A was not able to record the videos personally. Thus, the researcher did not have a first-hand account of what happened during the lesson, only afterwards, when watching the videos.

NT1 was not available to attend the first feedback session, which was limiting because it was vital for NT1 to attend to, hear the valuable feedback from the mathematics team. This feedback could have been instrumental to NT1 developing and making improvements to his practice in his second recorded lesson.

In the final feedback session ET1 had to leave the session early. ET1 gave feedback on NT1's second lesson; however, she did not hear what the mathematics team had to say about the lesson. This feedback could have assisted ET1 as well, seeing that they taught the same lesson topic however, her lesson did not go as well either.

The full attendance of both teachers at both feedback sessions was imperative to the study. It was important to see how they reflected, and to be present for team feedback. Due to time constraints the sessions may have seemed rushed because people had to leave and lock up the school.

The questioning technique could also have been more probing, for teachers to be able to expand on how VSR could be more beneficial to professional development. Teachers might also have felt intimidated by being judged and by sharing their ideas in the sessions. Thus, not giving a full account on what they taught or what ideas could improve lessons, became a limitation, as everybody might not have benefitted fully from the feedback.

The teachers that agreed to participate as volunteers initially in the study were not willing to stay for the VSR feedback sessions. The questionnaire at the end of the final feedback session was not completed as agreed upon initially, it was completed by one volunteer teacher. The question was to establish the advantages and challenges by implementation of VSR in the school. Information regarding this was extracted from the individual interviews at School B as well as some questions posed during the first team interview at School A.

The limitations at School B were that the data had to be collected by another M-student working as a teacher at School B, who had been working on the project. Thus, the researcher did not

have first-hand account on what transpired during the lessons and the VSR interview sessions. It was limiting to have only the data from the transcriptions and the videos, as the researcher was not a teacher at School B and did not know the dynamics of the participating teachers. The transcriptions of ET2's interview was not clear on the reflection of ET2, and he was not open to reflect on his own practice or critically analyse his lessons.

5.3 Conclusion

The research study was aimed at answering the research question: to what extent did the teachers' use of VSR as a reflective practice tool enhance their professional development as individuals and as a group in selected South African primary schools? The sub-questions were 1) How did the implementation of VSR as a reflective practice tool enhance the development of the mathematics teams in the different schools? 2) In which ways did the teachers' use of VSR as a reflective practice tool enhance the professional development of individual mathematics teachers in selected South African primary schools? 3) What were the advantages and challenges that mathematics teachers experience in the implementation of VSR?

The data was collected, analysed, discussed and the findings revealed the following: Teachers had been participating in mathematics teacher professional development initiatives. These initiatives for example included having meetings once a term as the mathematics department or grade to discuss learner performance, workshops at training centres once a year or even informal discussions with colleagues. These initiatives may not have been adequate to address teachers' professional development needs. Teachers used learner performance as a way to reflect on lessons and teaching practice; however, more support in professional development was needed. After the training session on the VSR study with the mathematics team at School A the team agreed to meet as a group and discuss colleagues lesson episodes viewed. Thus, VSR allowed the team component in School A for teachers to share ideas and reflect on colleagues' and own practices so that individual teachers could take lessons learnt, back to their classrooms.

This study focussed on professional teacher noticing to establish which aspects of the lesson episode teachers noticed and focused on more during the VSR interview. During the VSR interviews and using this time to reflect, teachers noticed different aspects of their lessons that they found as important to them in a lesson, such as learners' mathematical understanding, interaction or behaviour, classroom resources or management, lesson content or preparation,

or even reflecting on own practice and behaviour. Even though teachers had years of experience teaching the subject of mathematics, VSR allowed them to still find ways in which to improve on their lessons. Teachers used teacher noticing to notice key moments or incidents in their lesson episodes, things that they might not have known about themselves before. After noticing these aspects, teachers made changes to their practice to improve their lessons.

The advantages of VSR were that participants felt that VSR was not like when going to a workshop, feedback was instant and when viewing and reflecting on lessons, corrections could be made almost immediately. Teachers also became more aware of their surroundings and the learners participation. During the study challenges were faced, such as time constraints, when recording needed to take place and when interviews had to be conducted. As well as on occasions where the mathematics team members were not able to attend the VSR interview sessions, due to other commitments. Team members or even teachers being interviewed not participating by not adequately reflecting on teaching practice and lesson episodes viewed. The study was completed successfully and proved that VSR can be used as a reflective practice tool to enhance mathematics teachers' professional development.

5.4 Recommendations

If the department of education was more involved with professional development of mathematics teachers, then, in the future studies in the field of VSR, it should be recommended that more time should be allocated to do the research, such as doing a thorough information or training session on VSR, incentivised by the department. This would also make teachers more willing to participate in the research. Also, creating time slots for feedback sessions after school, on a Saturday or during school time and making assistants available to take care of classes, are added recommendations. The full attendance of all teachers at VSR interview sessions are important for teachers, to get the full benefit from the feedback. It should also be reiterated that when preparing to be recorded, teachers should not put on a 'show' but rather to do lessons as they normally would. When creating interview questions, it should be more probing and allow teachers to reflect on their own practice and express their honest feeling about the lesson without being judged. Teachers should also feel free to expand on knowledge gained from experience and be open to criticism.

A mathematics team in all schools should be a part of schools' in-house professional development plan. The use of VSR can be incorporated in the mathematics team as a reflective

practice tool to create a community of learning. Weekly or bi-monthly meetings or discussions sessions should be held to view and discuss lessons of colleagues. These sessions should rotate teachers' lessons being discussed and dates should be predetermined before the start of the term so that all teachers have a chance to have their lessons recorded and discussed by the team. Discussions should take place amongst the mathematics team members and not just as grade meetings or quarterly subject meetings. In addition, these discussion sessions could be done outside of the school to schools in the same district, where best practices could be discussed, and ideas could be shared. In this way a bigger community of learning could be created among schools from the same social background. Thus, these conversations would be more relatable when dealing with the same type of classroom issues and what was expected of teachers to teach. This professional development plan could be incentivised, by allowing teachers to earn SACE (South African Council of Education), CPD (Continuous Professional Development) Points for attending these sessions.



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Appendix 1

INFORMATION LETTER TO THE SCHOOL PRINCIPAL/ GOVERNING BODY

DATE: 6 April 2021

Dear Sir or Madam

My name is Janice Petersen. I am a Master of Education Student at the University of the Western Cape. I am doing research on the use of video-stimulated recall as a reflective tool for professional development of the Mathematics team in the development of individuals. I would like to ask your school to participate in the study. The title of the study is:

An exploration of how teachers' use of video-stimulated recall as a reflective practice tool enhances mathematics teacher professional development

My research involves doing a training session with the mathematics team on the use of Video-stimulated recall as a reflective tool. The team will also be asked to assist by completing a questionnaire at the end of the training session. I would also ask two Mathematics teachers to volunteer and be more active in the research where video-recordings will be made of two to three of their lessons where footnotes will also be made, but the lesson will in no way be interfered in – only video recorded. This will be followed by a face-to-face interview where a section of a recorded lesson will be shared with the teacher involved. After a period, another videorecording of a lesson or two will be conducted with a following interview. I would like to audio-record the interviews. The aim of the video-recordings is to allow for self-reflection on the teacher's own practice by watching their own lessons afterwards. The teachers whose lessons will be recorded, will be asked to identify a peer in the mathematics department to also watch the lesson with the researcher and then assist the teacher in the reflections at another time and day after this. All of this will be done according to the school's timetable to cause minimal disturbances.

The running of the school will not be interrupted at all, and the teachers and learners will not be disadvantaged in any way. Timeous prior arrangements will be made with your HOD, and teachers involved. There are no foreseeable risks in participating in this study. Consent will be asked from the school, the teachers involved, the learners in the mathematics classes that will be video recorded as well as their parents. Participants are free to withdraw from the study at any point of time without any consequences. The identity of the school and the teachers involved will be always kept anonymous and in all academic writing about the study. The data will be kept confidential as they will stay secured in a locked-up cupboard on the university's premises and on my password-protected computer.

All research data will be destroyed within 5 years after completion of the project.

Please let me know if you require any further information. You can also contact my supervisor Dr Benita Nel at 021 959 3796 or email bnel@uwc.ac.za or the or the Humanities and Social Sciences Research Ethics Committee on 021 959 4111 or email research-ethics@uwc.ac.za if you have any concerns or complaints that have not been adequately addressed by me. I look forward to your response as soon as is convenient.

Yours sincerely,

Ms. Janice Petersen

3308167@myuwc.ac.za

Cell nr: 0725539804

Appendix 2

INFORMATION LETTER TO THE TEACHERS

DATE: 6 April 2021

Dear Sir or Madam

My name is Janice Petersen. I am a Master of Education Student at the University of the Western Cape. I am doing research on the use of video-stimulated recall as a reflective tool for professional development of the Mathematics team in the development of individuals. I would like to ask your school to participate in the study. The title of the study is:

An exploration of how teachers' use of video-stimulated recall as a reflective practice tool enhances mathematics teacher professional development

My research involves doing a training session with the mathematics team on the use of Video-stimulated recall as a reflective tool. The team will also be asked to assist by completing a questionnaire at the end of the training session. I would also ask two Mathematics teachers to volunteer and be more active in the research where video-recordings will be made of two to three of their lessons where footnotes will also be made, but the lesson will in no way be interfered in – only video recorded. This will be followed by a face-to-face interview where a section of a recorded lesson will be shared with the teacher involved. After a period, another videorecording of a lesson or two will be conducted with a following interview. I would like to audio-record the interviews. The aim of the video-recordings is to allow for self-reflection on the teacher's own practice by watching their own lessons afterwards. The teachers whose lessons will be recorded, will be asked to identify a peer in the mathematics department to also watch the lesson with the researcher and then assist the teacher in the reflections at another time and day after this. After the time period, an engaging discussion session will be held with the team and the volunteer teachers to reflect on the video recorded lessons. All of this will be done according to the school's timetable to cause minimal disturbances.

The running of the school will not be interrupted at all, and the teachers and learners will not be disadvantaged in any way. Timeous prior arrangements will be made with your HOD, and teachers involved. There are no foreseeable risks in participating in this study. Consent will be asked from the school, the teachers involved, the learners in the mathematics classes that will be video recorded as well as their parents. The consent will be requested from the entire mathematics team and the volunteer teachers to engage in a discussion session that will be held to reflect on and view the video recorded lessons. Participants are free to withdraw from the study at any point of time without any consequences. The identity of the school and the teachers involved will be always kept anonymous and in all academic writing about the study. The data will be kept confidential as they will stay secured in a locked-up cupboard on the university's premises and on my password-protected computer.

All research data will be destroyed within 5 years after completion of the project.

Please let me know if you require any further information. You can also contact my supervisor Dr Benita Nel at 021 959 3796 or email bnel@uwc.ac.za or the or the Humanities and Social Sciences Research Ethics Committee on 021 959 4111 or email research-ethics@uwc.ac.za if you have any concerns or complaints that have not been adequately addressed by me. I look forward to your response as soon as is convenient.

Yours sincerely,

Ms. Janice Petersen

3308167@myuwc.ac.za

0725539804

Appendix 3

INFORMATION SHEET TO THE LEARNERS

DATE: 6 April 2021

Dear Learners

My name is Janice Petersen. I am a Master of Education Student at the University of the Western Cape.

I am doing research on the use of videos as a tool for professional development of teachers. I would like to ask your school to participate in the study. The title of the study is:

An exploration of how teachers' use of video-stimulated recall as a reflective practice tool enhances mathematics teacher professional development

My research involves me video recording a maximum of four of the mathematics lessons that you will be a part of. The lesson will not be disturbed in any way besides the fact that someone will be at the back of the classroom, video recording the lesson. Your faces will not appear on the recording. If, accident it does happen, we will blur your face out in order not to reveal your identity.

The running of the school will not be interrupted at all, and the teachers and learners will not be disadvantaged in any way. Timeous prior arrangements will be made with your school. There are no foreseeable risks in participating in this study. The identity of the school, the teachers and the learners involved will be always kept anonymous and in all academic writing about the study. The data will be kept confidential as they will stay secured in a locked-up cupboard on the university's premises and on my password-protected computer. Learners that do not consent to participate in the research, as well as learners whose parents does not give permission for their children to participate in the research, will be catered for as follows:

- Learners will be allowed to sit with another class while the lessons are being recorded.
- Learners will be given the opportunity to catch up with the content of the missed lesson where a repeat lesson will be scheduled for them.

All research data will be destroyed within 5 years after completion of the project. I am therefore asking you to join in this study.

Please let me know if you require any further information. You can also contact my supervisor Dr Benita Nel at 021 959 3796 or email bnel@uwc.ac.za or the Humanities and Social Sciences Research Ethics Committee via Me P Josias at 021 959 4111 or email research-ethics@uwc.ac.za if you have any concerns or complaints that have not been adequately addressed by me. I look forward to your response as soon as is convenient.

Yours sincerely,

Ms. Janice Petersen

3308167@myuwc.ac.za

Cell nr: 0725539804

Appendix 4

INFORMATION LETTER TO THE PARENTS

DATE: 6 April 2021

Dear Sir or Madam

My name is Janice Petersen. I am a Master of Education Student at the University of the Western Cape. I am doing research on the use of video-stimulated recall as a tool for professional development and the support of the Mathematics team in the development of individuals. I would like to ask your child's school to participate in the study. The title of the study is:

An exploration of how teachers' use of video-stimulated recall as a reflective practice tool enhances mathematics teacher professional development

My research involves me video recording a maximum of four of the mathematics lessons that your child will be part of. The lesson will not be disturbed in any way besides the fact that someone will be at the back of the classroom, video recording the lesson. Your child's faces will not appear on the recording. If, accident it does happen, we will blur his/her face in order not to reveal his/her identity.

The running of the school will not be interrupted at all, and the teachers and learners will not be disadvantaged in any way. Timeous prior arrangements will be made with the school. There are no foreseeable risks in participating in this study. The identity of the school, the teachers and the learners involved will be always kept anonymous and in all academic writing about the study. If any of the learners decide not to partake in the study, other arrangements will be made to accommodate those in another venue, and we will ensure that your child will not miss out on any work in the process. The data will be kept confidential as they will stay secured in a locked-up cupboard on the university's premises and on my password-protected computer.

All research data will be destroyed within 5 years after completion of the project.

Please let me know if you require any further information. You can also contact my supervisor Dr Benita Nel at 021 959 3796 or email bnel@uwc.ac.za or the Humanities and Social Sciences Research Ethics Committee on 021 959 4111 or email research-ethics@uwc.ac.za if you have any concerns or complaints that have not been adequately addressed by me. I look forward to your response as soon as is convenient.

Yours sincerely,

Ms. Janice Petersen

3308167@myuwc.ac.za

Cell nr: 0725539804

Appendix 5

Teacher Consent Form

Please fill in the reply slip below if you agree to participate in my study called:

An exploration of how teachers' use of video-stimulated recall as a reflective practice tool enhances mathematics teacher professional development

My name is: _____

Permission to partake in the VSR training session

Circle one

I agree to be involved in the training session of the mathematics team. YES/NO

Permission to video recorded lessons

Circle one

I agree that a few of my Mathematics lessons can be video recorded. YES/NO

Permission to conduct questionnaires and interviews

Circle one

I would like to do the questionnaires and the interviews for this study. YES/NO

I give consent that the interviews can be audio-recorded. YES/NO

I know that I can stop the interview at any time and do not must answer all the questions asked. YES/NO

Informed Consent

I understand that:

- my name and information will be kept confidential and safe and that my name and the name of my school will not be revealed.
- after the time period, an engaging discussion session will be held with the team and the volunteer teachers to reflect on the video recorded lessons.
- I do not have to answer every question and can withdraw from the study at any time without any negative consequences.
- all the data collected during this study will be destroyed within 3-5 years after completion of the project.

Sign _____ Date _____

Appendix 6

Parent Consent Form

Please fill in the reply slip below if you agree to participate in my study called:

An exploration of how teachers' use of video-stimulated recall as a reflective practice tool enhances mathematics teacher professional development

My name: _____

My child's name: _____

Permission that some of my child's Mathematics lesson can be video recorded

I give consent that my child's lessons can be video recorded.

Circle one

YES/NO

I am aware that I can change my mind at any time throughout the project without any negative consequences.

YES/NO

Informed Consent

I understand that:

- my child's name and information will be kept confidential and safe and that my child's name and the name of the school will not be revealed.
- I can withdraw from the study at any time.
- if I do not give consent for my child partaking in the project, he/she will be placed in a different venue for that period of time of the recording and that lesson will be made up at a different time.
- all the data collected during this study will be destroyed within 3-5 years after completion of the project.

Sign _____ Date _____

Appendix 7

School Consent letter

I,, the principal of
give consent that the mathematics team may participate in the following study at our school:
**An exploration of how teachers' use of video-stimulated recall as a reflective practice
tool enhances mathematics teacher professional development**

I give permission that:

The mathematics team can be supported as a team

I agree that teachers' lessons can be video recorded.

I agree that two of the teachers can be interviewed.

Circle one

YES/NO

YES/NO

YES/NO

Informed Consent

I understand that:

- my school's name and information will be kept confidential and safe and that the teachers' names and the name of my school will not be revealed.
- The teachers can withdraw from the study at any time without any negative consequences.
- all the data collected during this study will be destroyed within 3-5 years after completion of my project.

Sign _____ Date _____

Appendix 8

Learner Assent Form

Please fill in the reply slip below if you agree to participate in my study called:

An exploration of how teachers' use of video-stimulated recall as a reflective practice tool enhances mathematics teacher professional development

My name: _____

Permission that my Mathematics lesson can be video recorded

I give consent that my lessons can be video recorded. YES/NO

I am aware that I can change my mind at any time throughout the project without any negative consequences. YES/NO

Informed Consent

I understand that:

- my name and information will be kept confidential and safe and that my name and the name of the school will not be revealed.
- I can withdraw from the study at any time without any negative consequences.
- if I do not give assent for partaking in the project, I will be placed in a different venue for that period of time of the recording and that lesson will be made up at a different time.
- all the data collected during this study will be destroyed within 3-5 years after completion of the project.

Sign _____ Date _____

Appendix 9

Interview Schedule with the teachers

1. How do you think did this part of the lesson go that you just watched?
2. Why do you think this went well/badly? (Depending on the previous response.)
3. How do you think can this lesson be improved?
4. What recommendation can you make in other aspects of the lesson that can be improved in future?



Appendix 10

Questionnaire

Questions for after the training session

1. After attending mathematics workshops, how do you find applying the knowledge gained, in the classroom on your return?
2. Explain what kind of support you receive regarding mathematics teacher professional development at your school.
3. Explain how you reflect on your mathematics lessons taught.
4. As a staff member of the mathematics team at your school, how often do you meet regarding issues around the subject and how do you implement what was discussed in these meetings?
5. What additional support do you think is needed at the school regarding mathematics and teacher professional development?
6. If you had the opportunity, how would you implement VSR as a reflection tool in your school?

Questions for after the second cycle of VSR interview sessions

1. After experiencing VSR first-hand, what challenges was experienced in the classroom at the time of lesson observation and recordings.
2. How easy was it to implement video recording in your lesson in the classroom?
3. In the follow-up VSR interview sessions what was challenging and what did you take away from these sessions?
4. Give suggestions of what support is needed for the school to implement VSR on a regular basis.
5. Name a few advantages that you can think of, of having VSR in the mathematics team.
6. To what extent have VSR made a noticeable difference to your teaching?

Appendix 11

Classroom Observation Form

Educator code: _____ Learning area: _____

Researcher or Peer code: _____ Date: _____

Framework for reflection for lesson observed.

Review Section	Description/Comments
<p>1. SUBJECT MATTER CONTENT (shows good command and knowledge of subject matter; demonstrates breadth and depth of understanding)</p>	
<p>2. ORGANISATION (organizes subject matter; evidence preparation; is thorough; states clear objectives; emphasizes and summarizes main points, meets class at scheduled time, regularly monitors on-line course)</p>	
<p>3. RAPPORT (holds interest of students; is respectful, fair, and impartial; provides feedback, encourages participation; interacts with students, shows enthusiasm)</p>	
<p>4. TEACHING METHODS (uses relevant teaching methods, aids, materials, techniques, and technology; includes variety, balance, imagination, group involvement; uses examples that are simple, clear, precise, and appropriate; stays focused on and meets stated objectives)</p>	
<p>5. PRESENTATION (Establishes online course or classroom environment conducive to learning; maintains eye contact; uses a clear voice, strong projection, proper enunciation, and standard English)</p>	
<p>6. MANAGEMENT (uses time wisely; attends to course interaction; demonstrates leadership ability; maintains discipline and control; maintains effective e-platform management)</p>	

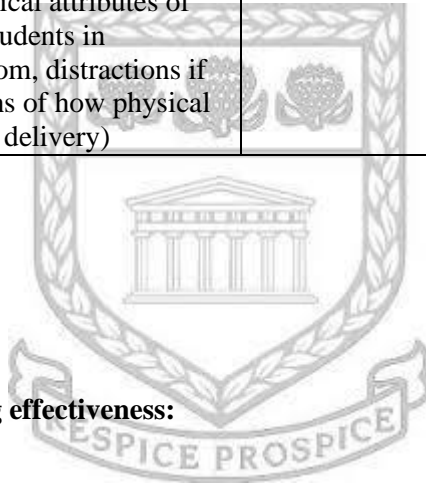


Review Section	Description/Comments
7. SENSITIVITY (exhibits sensitivity to students' personal culture, gender differences and disabilities, responds appropriately in a non-threatening, pro-active learning environment)	
8. ASSISTANCE TO STUDENTS (assists students with academic problems)	
9. PERSONAL (evidence self-confidence; maintains professional comportment and appearance)	
10. PHYSICAL ASPECTS OF CLASSROOM (optional) (State location and physical attributes of classroom, number of students in attendance, layout of room, distractions if any; list any observations of how physical aspects affected content delivery)	

Strengths observed:

Suggestions for improvement:

Overall impression of teaching effectiveness:



Appendix 12

WCED Ethics approval letter



Directorate: Research

Audrey.wyngaard@westerncape.gov.za
tel: +27 021 467 9272
Fax: 0865902282
Private Bag x9114, Cape Town, 8000
wced.wcape.gov.za

REFERENCE: 202103011-1551
ENQUIRIES: Dr A T Wyngaard

Ms Janice Petersen
7 Sirrocco Plaza
Corma Street
Sirrocco Village
Bellville
7530

Dear Ms Janice Petersen

RESEARCH PROPOSAL: AN EXPLORATION OF HOW VIDEO-STIMULATED RECALL CAN BE USED AS A TOOL TO ENHANCE MATHEMATICS TEACHER PROFESSIONAL DEVELOPMENT

Your application to conduct the above-mentioned research in schools in the Western Cape has been approved subject to the following conditions:

1. Principals, educators and learners are under no obligation to assist you in your investigation.
2. Principals, educators, learners and schools should not be identifiable in any way from the results of the investigation.
3. You make all the arrangements concerning your investigation.
4. Educators' programmes are not to be interrupted.
5. The Study is to be conducted from **03 April 2021 till 30 September 2022**.
6. No research can be conducted during the fourth term as schools are preparing and finalizing syllabi for examinations (October to December).
7. Should you wish to extend the period of your survey, please contact Dr A.T Wyngaard at the contact numbers above quoting the reference number.
8. A photocopy of this letter is submitted to the principal where the intended research is to be conducted.
9. Your research will be limited to the list of schools as forwarded to the Western Cape Education Department.
10. A brief summary of the content, findings and recommendations is provided to the Director: Research Services.
11. The Department receives a copy of the completed report/dissertation/thesis addressed to:

**The Director: Research Services
Western Cape Education Department
Private Bag X9114
CAPE TOWN
8000**

We wish you success in your research.

Kind regards.
Signed: Dr Audrey T Wyngaard
Directorate: Research
DATE: 12 March 2021



UNIVERSITY of the
WESTERN CAPE

Appendix 13

UWC Ethics approval letter



UNIVERSITY of the
WESTERN CAPE



11 May 2021

Ms JA Petersen
SMME
Faculty of Education

HSSREC Reference Number: HS21/2/26

Project Title: An exploration of how video-stimulated recall can be used as a tool to enhance mathematics teacher professional development.

Approval Period: 07 May 2021 – 07 May 2024

I hereby certify that the Humanities and Social Science Research Ethics Committee of the University of the Western Cape approved the methodology and ethics of the above mentioned research project.

Any amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.

Please remember to submit a progress report by 30 November each year for the duration of the project.

The permission to conduct the study must be submitted to HSSREC for record keeping purposes.

The Committee must be informed of any serious adverse events and/or termination of the study.

Ms Patricia Josias
Research Ethics Committee Officer
University of the Western Cape

NHREC Registration Number: HSSREC-130416-049

Director: Research Development
University of the Western Cape
Private Bag X 17
Bellville 7535
Republic of South Africa
Tel: +27 21 959 4111
Email: research-ethics@uwc.ac.za

FROM HOPE TO ACTION THROUGH KNOWLEDGE.



Appendix 14

Language Editor Certificate

Creative Communication
Carol C Ashley BA (Hons) MMSc MPhil PhD
76 Queen Victoria Street
Cape Town 8001 27 662857507

creativecommunication@mail.com
<https://www.linkedin.com/in/carol-charmaine-edson->

11 November 2022

To Whom it May concern

RE: EDITING OF DISSERTATION – J A Petersen

**AN EXPLORATION OF HOW VIDEO-STIMULATED RECALL CAN BE USED AS A TOOL TO
ENHANCE MATHEMATICS TEACHER PROFESSIONAL DEVELOPMENT**

Student Number: 3308167
Supervisor: Dr BP Nel
Magister Educationis

This serves to confirm that the above-named document has gone through the process of copy-editing, proof reading and coherence of language. No factual content or authorial intention have been disrupted during editing.

The editor is suitably qualified and experienced and holds a Masters Degree in Linguistics.

Best regards

C.A
Dr Carol Ashley

Academic Author/Developer/ Editor/ Linguist: On Editorial Board: Science Publishing Group



Appendix 15

Turnitin Report

11/11/22, 7:08 PM

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