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**TITLE: Exploring the use of YouTube videos in the teaching and learning of fractions in Grade 4**

By

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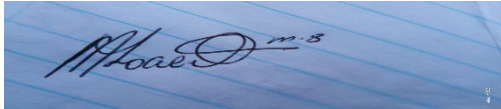
South Africa

**2023**

Supervisor: Dr Nkosinathi Mpalami.

## DECLARATION

I hereby declare that the project work entitled “*Exploring the use of YouTube videos in the teaching and learning of fractions in grade 4*” submitted to the Faculty of Education at the University of the Free State is my original work. I did not get any assistance from anyone except for the professional guidance provided by my supervisor. This dissertation is submitted in the fulfilment of the requirement of MEd Degree

A photograph of a handwritten signature in black ink on a blue-lined notebook page. The signature is written in a cursive style and appears to read 'Mokgasi B. Tsoela' with a small 'm.s.' or similar initials to the right.

Mokgasi Benjamine Tsoela.

Date: 12 January 2023.

## **DEDICATION**

I would love to dedicate this success to my beautiful wife Nthabeleng Portia Tsoela for her constant support through this uneasy journey. Whenever I am emotionally drained, she will always be there to support me, for that I am grateful for such effort.

Lastly let me dedicate this success Nomase Sarah Majong a fellow MEd degree student at the University of the Free State. She has been very helpful. During the hard times when this degree was very challenging, I would ask for her assistant, and she will guide me very friendly and quickly.

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**Mrs Nomase Sarah Majong**, a master's candidate under the supervision of Dr Makhasane, is my relative and a scholar like me. She has been helping me a lot; I would not be this far without her. She guided me very well; I wish her all the best in her master's degree.

**Mrs Nthabeleng Portia Tsoela:** lastly, I must thank and acknowledge the person who has been through thick and thin with me; even when I needed encouragement, she has been there. When my motivation was down, she helped me, read my work before submitting it. Through this rough journey, I would like to thank her.

## ABSTRACT

The purpose of this study is to explore the teaching and learning of fractions using YouTube videos in grade 4. The study focused on two schools in Bethlehem/Bohlokong location in Free State province South Africa. The use of YouTube videos is a very new way of learning in the South African context. This new teaching approach might prove to be exciting for young learners in grade 4 because it has many options like animations, colourful videos, and pictures. Even though YouTube learning is exciting and fun, its implementation has challenges such as teachers wanting to use chalk and board and finding it demanding to change, and secondly, currently in South Africa there is a load shedding that happens almost after every 4 hours. This study was guided by Technological Pedagogical Content Knowledge (TPCK).

The research participants in this research were two educators from different schools and 37 learners from School A (coloured dominated school) and 40 learners from School B (Zulu dominated school). The main key findings for this study are: Firstly, teachers find the teaching using YouTube videos very productive and helpful, as it makes their workload lighter. The YouTube videos are making learners to understand better and faster because it has options of **pause** and **play**, and learners can play them several times at home at their convenient time. Secondly this study has shown that learners enjoy learning by means of YouTube videos. Learners in school A and school B stated that they love the use of YouTube videos because they are colourful, they have pause and play options, one can play them at his or her convenient time. The implication for the teaching is that educators might have to plan thoroughly for lessons. Much time might be required during planning when they choose relevant videos and making snapshots. However, during teaching educators might play lighter role of pausing the video and explaining a few things. Lastly, the policies for the schools and department of education must be amended so that they can allow the use of gadgets in classrooms. It is recommended that, the use of YouTube videos in schools are good and can yield positive results for improvement of learning. Lastly these videos are loved by learners hence these learners are part of forth industrial revolution (4IR), and technology is a very important part of 4IR.

### Keywords:

1. **YouTube videos:** it is the main keyword used on this research, it refers to a website that has lots of videos most of these videos can be used for teaching and learning purposes.

2. **Gadget:** they are technological devices that are used in teaching and learning to support chalkboard.
3. **Chalkboard:** it is an old method of teaching and learning that has been used in many countries very effectively until Fourth Industrial Revolution (4IR).
4. **Fourth Industrial Revolution (4IR):** The fundamental shift in the way we live as humans, the shift in the way we work, and the way we learn and relate to one another. All these changes are brought to us by the technology.
5. **Fraction (s):** whether proper or improper, it has a number on top, a line beneath it (the middle), and another number below the line. For example,  $(\frac{1}{2})$ . The one on top is called a numerator, and the one below is called the denominator.
6. **Teaching and Learning:** it refers to an educational situation where learners learn, and educators teach.
7. **Technological Pedagogical Content Knowledge (TPCK):** is the knowledge of technology, how to use it to teach, and using YouTube videos (technology) to support teaching.
8. **Pedagogical Content Knowledge:** special knowledge that makes teachers teach effectively, example Mathematics teachers teach not Mathematicians.
9. **Technological Content Knowledge:** the knowledge that the technology teacher has in order to teach using technology.
10. **Covid-19:** it is a corona virus disease started in 2019, which affected the teaching and learning negatively globally.

# TABLE OF CONTENTS

DECLARATION .....	i
DEDICATION.....	ii
ACKNOWLEDGEMENTS.....	iii
ABSTRACT.....	iv
TABLE OF CONTENTS.....	vi
LIST OF ABBREVIATIONS.....	ix
CHAPTER 1 OVERVIEW OF THE STUDY .....	1
1.1 INTRODUCTION.....	1
1.2 RESEARCH INTEREST OR PROBLEM.....	2
1.3 RESEARCH QUESTIONS.....	2
1.3.1 Primary research question.....	2
1.3.2 Secondary research question(s).....	2
1.4 RESEARCH AIM AND OBJECTIVES .....	2
1.4.1 Research aim.....	2
1.4.2 Research objectives.....	2
1.5 THE VALUE OF THE RESEARCH.....	3
1.6 METHODOLOGY.....	3
1.7 LESSON OBSERVATION.....	3
1.8 LESSON REFLECTION .....	4
1.9 REFLECTIVE SESSION.....	5
1.10 PURPOSIVE SAMPLING .....	5
1.11 SELECTION OF GRADE 4 EDUCATORS.....	5
1.12 SELECTION OF GRADE 4 LEARNERS.....	6
1.12.1 Selection of schools.....	6
1.13 RESEARCH PARADIGM.....	6
1.13.1 The interpretivist paradigm.....	6
1.14 DATA ANALYSIS .....	6
1.15 TO-DO LIST: DATA ANALYSIS STUDY THE 7 STEPS OF DATA ANALYSIS	
7	
1.16 ETHICAL CONSIDERATIONS .....	7
1.16.1 Informed Consent.....	7

1.16.2	Permission to Collect Data.....	8
1.16.3	Confidentiality and anonymity .....	8
1.17	LAYOUT OF THE CHAPTERS. ....	8
CHAPTER 2 LITERATURE REVIEW .....		10
2.1	INTRODUCTION.....	10
2.1.1	How do grade 4 educators teach fractions utilising YouTube videos?.....	10
2.1.2	What are the views of grade 4 learners on the use of YouTube videos when learning fractions?.....	12
2.2	ACTUAL WAYS TO USE YOUTUBE VIDEOS .....	12
2.2.1	What possible limitations exist for teaching and learning fractions when using YouTube videos in grade 4? .....	13
2.2.2	Possible limitations to the use of YouTube videos in teaching and learning .....	14
2.2.3	More limitations regarding the YouTube videos.....	15
2.2.4	Complex challenges that undeveloped and developing countries experienced in terms of teaching and learning during the COVID-19 pandemic .....	16
2.3	SOLUTIONS FOR SOUTH AFRICA, GHANA, MOZAMBIQUE, LEBANON AND KENYA.....	19
2.4	THEORETICAL FRAMEWORK .....	20
CHAPTER 3 RESEARCH METHODOLOGY .....		23
3.1	OBSERVATION.....	23
3.2	METHODOLOGY.....	23
3.2.1	Research design and methodology.....	23
3.2.2	Lesson observation for two mathematics educators .....	24
3.2.3	Lesson reflection for learners as participants in two classes .....	24
3.2.4	Reflective session: For two mathematics educators .....	25
3.3	PURPOSIVE SAMPLING.....	25
3.3.1	Selection of Grade 4 educators .....	25
3.3.2	Selection of Grade 4 learners.....	26
3.4	RESEARCH PARADIGM.....	26
3.4.1	The interpretivist paradigm.....	26
3.5	DATA ANALYSIS.....	26
3.6	TO-DO LIST: DATA ANALYSIS STUDY THE 7 STEPS OF DATA ANALYSIS	
	27	

3.7	ETHICAL CONSIDERATIONS .....	28
3.7.1	Informed consent .....	28
3.7.2	Permission to collect data .....	28
3.7.3	Confidentiality and anonymity .....	28
CHAPTER 4 DATA COLLECTION PROCESS.....		29
4.1	INTRODUCTION.....	29
4.2	LESSON SYNOPSIS .....	29
4.2.1	School A.....	29
4.2.2	School B.....	32
4.2.3	Overall Impression of the researcher .....	34
4.3	DATA COLLECTED FROM OBSERVATIONS.....	355
4.3.1	Data Analysis .....	355
CHAPTER 5 SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS .....		48
5.1	INTRODUCTION.....	48
5.2	SUMMARY OF FINDINGS .....	48
5.3	CONCLUSIONS.....	500
5.4	LIMITATIONS OF THE STUDY	51
5.5	RECOMMENDATIONS .....	51-54
6.	REFERENCES .....	555-65
7 ANNEXURES		
7.1	ANNEXURE A TITLE REGISTRATION.....	66
7.2	ANNEXURE B ETHICS APPROVAL .....	67
7.3	ANNEXURE C RESEARCH INSTRUMENTS .....	68-70
7.4	ANNEXURE D TURNITIN REPORT (SIMILARITY REPORT) .....	71
7.5	ANNEXURE E LANGUAGE EDITOR CERTIFICATE.....	72

## **LIST OF ABBREVIATIONS**

4IR	Fourth Industrial Revolution
DoE	Department of Education
FS DoE	Free State Department of Education
MoE	Ministry of Education
MoH	Ministry of Health
POPIA	Protection of Personal Information Act
TPCK	Technological Pedagogical Content Knowledge
TCK	Technological Content Knowledge
PCK	Pedagogical Content Knowledge
COVID-19	The coronavirus disease 2019

# CHAPTER 1

## OVERVIEW OF THE STUDY

### 1.1 INTRODUCTION

This study explores the use of YouTube videos in teaching and learning fractions in grade 4. The Department of Education (DoE) (2007) states that fractions are a new experience for grade 4 learners because, at this level, they start to learn them by writing fractions. Unlike grades 1, 2 and 3, they study them with available physical materials such as lunchboxes, fruits, and charts. In grade 4, learners learn fractions in an abstract form. According to Rinantanti, et al (2017), fractions can be defined as showing the parts of the whole. If it is to be shared equally between two people, it must be cut in half ( $\frac{1}{2}$ ). According to Almadhoun (2018), a fraction, whether proper or improper, has a number on top, a line beneath it (the middle), and another number below the line. For example, ( $\frac{1}{2}$ ). The one on top is called a numerator, and the one below is called the denominator.

Developed countries, including Singapore, the United States of America, Europe, China, Finland etc., train their teachers intensively using YouTube videos/technology in teacher training schools (Ali, 2015). In South Africa, teachers are not prepared to use various digital technologies to support teaching and learning. Teachers receive training from different universities, but because they do not continuously use YouTube videos, tablets, computers and projectors, they use chalkboards Ahmad et al (2020). According to the Programme for International Student Assessment (PISA) (2017), which compares the educational systems in the world, all the top five countries rated high in the education system use YouTube videos. Most countries that excel in Mathematics from the lower to the top grades use the Internet and YouTube videos. These countries include Singapore, the United States of America, Finland and China (Tatesse, 2020). These countries use computers and soft boards to support the chalkboards to teach Mathematics across the grades. One advantage of technology (Soft boards, YouTube videos, tablets, and computers) is that it is not stagnant. We can quickly change the information and download new information when we experience difficulties during the lesson (Fill & Ottewill, 2018). It is of high importance that learners are taught in a manner that suits them. Learners' love using cellular phones, tablets and computers because this is

moving on with time and adapting to new changes of the Fourth Industrial Revolution (4IR) (Carrigan & Johan, 2022).

## **1.2 RESEARCH INTEREST OR PROBLEM**

Educators continue to conduct lessons in grade 4 (fractions) using traditional teaching tools such as the chalk-and-talk method. At the same time, learners remain stacked in a passive role of being recipients of knowledge. The continued use of the chalk-and-talk method is influenced by educators experiencing a lack of support, development, and inadequate access to technology such as YouTube videos (Thornton, 2017).

## **1.3 RESEARCH QUESTIONS**

### **1.3.1 Primary research question.**

How do grade 4 educators teach fractions utilising YouTube videos?

### **1.3.2 Secondary research question(s)**

- What are the views of grade 4 learners on the use of YouTube videos when learning fractions?
- What possible limitations exist for teaching and learning of fractions when using YouTube videos in grade 4?

## **1.4 RESEARCH AIM AND OBJECTIVES**

### **1.4.1 Research aim**

This study aims to explore using YouTube videos in teaching and learning of fractions in mathematics in grade 4.

### **1.4.2 Research objectives**

- To explore the use of YouTube videos by educators in teaching fractions in grade 4.
- To find out the views of grade 4 learners on the use of YouTube videos when learning fractions.
- To address the possible limitations that may arise while using YouTube videos in a grade 4 class when learning fractions.

## **1.5 THE VALUE OF THE RESEARCH**

The importance of this research is to explore the use of YouTube videos in learning and teaching fractions in Mathematics in grade 4. According to Thornton (2017), learners engage more and better when stimulated with new things outside the usual routine of doing something like the traditional chalk-and-talk methods. However, as educators, we have seen that learners become bored and do not enjoy traditional learning because this teaching does not match their learning styles and preferences (Howard, 2002). Through this research, the DoE will consider continuous training for educators using technology (YouTube videos). Learners will start to enjoy learning using technology (tablets, cellular phones, soft boards).

This study will inform the Free State Department of Education (FS DoE) that the time for chalkboards for teaching and learning has passed; the current cohort of young educators are Fourth Industrial Educators and are, thus, expected to teach learners using technology such as YouTube videos and any other means of technology. Furthermore, learners will learn that using technology such as YouTube videos in learning has many benefits; if they don't understand any complicated concept, they can get quick help from YouTube.

## **1.6 METHODOLOGY**

The chosen research approach for this study was qualitative research. The qualitative approach was selected to explore if learners are more likely to enjoy using YouTube videos. I used observations as a qualitative research technique to observe the natural behaviour of learners (Cresswell, 2007). This is relevant because it enables the researcher to observe their participation when engaging with YouTube videos.

## **1.7 LESSON OBSERVATION**

The type of observation that will be used is lesson observation; what will be observed are the fundamental movements and actions of the educator teaching fractions at that specific research site (school). Lesson observation will be used to monitor the teachers who are also participants. Oakley (2017) describes lesson observation as classroom observation as the practice of ensuring that learners get the best education they deserve. This is where the researcher is going to observe the whole classroom situation and the key actions that will be done by the educator when teaching fractions in a grade 4 classroom. At this stage, what will happen in the classroom is not known precisely; hence this research is conducted.

On the other hand, the fundamental movements will also be observed by the researcher. According to Dias, (2019) pedagogy in the classroom involves the following procedures: repeating the instructions, reading instructions in different tones, and moving between the learners to ensure they are indeed writing. As stated in the value of the research, the researcher is part of the 4IR educators who loves to use technology when teaching. The researcher will have his tool to record those key movements and critical actions that the educator will do during the classroom lesson. All the findings that the researcher will find from the research will be discussed during the reflective session with the educator who is part of the research. Furthermore, these findings will be used to answer this research's main question: *How do grade 4 educators teach fractions through YouTube videos?*

## **1.8 LESSON REFLECTION**

The purpose of teaching observation is to help educators to become more reflective and intentional. By observing one of the educators, the information received will help the educators to be more thoughtful, and therefore very effective teaching and learning will occur.

Lesson Reflection refers to the researcher's tool to get a general feeling and opinion about the research (Mann & Walsh, 2017). Based on this explanation, the researcher has developed a tool that is going to be used at the end of the teaching lesson:

Lesson Reflection: Tell us what you liked about this lesson on YouTube videos.

- How did the use of YouTube videos help you to understand fractions?
- Tell us about the things you did not like about using YouTube Videos.
- Would you recommend that your school use YouTube videos in the future for learning?

With this lesson reflection, they will help to answer this second research question and two other supporting questions" *What are the views of grade 4 learners on the use of YouTube videos when learning fractions?"* All the learners who participated in this research will get this lesson reflection to answer these four reflection questions. To avoid vulnerability and discrimination against other learners, all who participated in the research will fill out the lesson reflection. Learners will be kept in the Mathematics laboratory for the entire two periods. The first period is for teaching and learning; the educator will play the two videos. Each video will be 2-3 minutes long, and these two videos must become very short to avoid boring learners.

The DoE has prescribed through the Annual Teaching Plan (2021-2023) that addition and subtraction of fractions of the same denominator must be done in the third term. These two

periods will be within the regular timetable to ensure that the research does not disturb other teaching and learning sessions.

### **1.9 REFLECTIVE SESSION**

According to Anderson, (2019) reflective session is more based on what happened during the lesson; the reflective session aims to reflect. The information or data from this reflection will help the researcher, the school, learners, the community and educators to improve and get better learning results. The Reflective Session will consist of the following reflective questions:

- What did I learn from the event (YouTube session) that I did not know before?
- Can you recommend that your school use YouTube videos to teach and learn all subjects?
- What did you dislike about the use of YouTube videos?
- What did I like about this lesson about YouTube videos?
- Are there any other further comments based on the lesson?

The data that will be found from this reflective session will also be coming from the two educators from School A and School B. The researcher will use lesson observations to get in-depth information from the two participants. This is to help the researcher to answer this primary research question, “*How do grade 4 educators teach fractions utilising YouTube videos*” these two research questions are the main strength of this research.

### **1.10 PURPOSIVE SAMPLING**

Purposive sampling will be used in this study. It is also called judgement sampling, the deliberate choice of participants (grade 4 learners and two educators who teach Mathematics) due to the participant’s qualities. It is where the researcher selects his participants based on certain qualities needed for the research (Copsey., 2018).

### **1.11 SELECTION OF GRADE 4 EDUCATORS**

Specifically, two educators teaching mathematics in grade 4 will receive a YouTube training before they can teach learners. This training will be done in one of the research sites, by the researcher. All this training on the YouTube videos will be done by the researcher on these two research participants at the researcher’s own cost.

## **1.12 SELECTION OF GRADE 4 LEARNERS**

One classroom of grade 4 learners from one school and one classroom from the other school learners were selected. These two classes are all doing mathematics; on that selected two periods, learners will do fractions on additions and subtractions. This would not negatively impact other periods because the research will happen within the regular school timetable.

### **1.12.1 Selection of the schools.**

Both of the schools have been selected because they are found near each other in the same location which will make the research cost effective.

## **1.13 RESEARCH PARADIGM**

### **1.13.1 The interpretivist paradigm**

The interpretivist paradigm can often be confused with terms such as post-positivism (Yanow & Schwartz, 2018). It examines individual interpretations of social behaviour and focuses on gaining insight and experience on individuals or groups to obtain qualitative data (Hamood, 2016). The interpretivist paradigm is relevant to this study because it is more qualitative and focuses on learners' social behaviour. With this paradigm, the researcher will gain insight and experience about the participation of learners and two educators when learning and teaching occur with YouTube videos in grade 4. The researcher will also experience real feedback about their interest in learning through YouTube videos. The insight experience referred to here, will be learners' responses by answering lesson reflection and educators' reflective session.

## **1.14 DATA ANALYSIS**

The observed lessons will be transcribed. Thematic analysis will be used to look for the themes that will emerge from the data.

Data Analysis Qualitative data will analyse data by thematic analysis; the techniques used for the analysis mainly followed the approach suggested by Braun and Clarke (2022b). Braun and Clarke state that designs are accepted over a rigorous data acquaintance, theme development and revision process.

Interpretation and reporting once the data is collected from lesson observation and lesson reflection, data will be assembled and interpreted. The relevant information will be noted, recorded and reported separately to identify learners' performance with fractions in mathematics (Meyers, 2016). Lesson reflection (learners) and Reflective session (Educators) information will be used to inform the outcome of the research. Which is to benefit the Department of Education in Thabo Mofutsanyana by using technology in teaching and learning.

### **1.15 TO-DO LIST: DATA ANALYSIS STUDY THE 7 STEPS OF DATA ANALYSIS**

According to Meyers (2016), the seven steps of data analysis are:

1. Create a Study Map: Play the two videos based specifically on fractions.
2. Data Entry: The questions per video will be planned based on what needs to be learnt.
3. Check Data Integrity: Each video will have a specific lesson to learn, that is the true reflection of learning, what must be retained.
4. Univariate Analysis: Planned questions will be asked.
5. Bivariate Analysis: Ask verbal questions from the video and written questions from each video.
6. Multivariate Analysis: Engage more in asking them questions to observe their interest in learning with YouTube videos.
7. Write-up and Report: the final report will be written to give feedback on the observations and the lesson observation, reflective session, and lesson reflection questions as planned.

### **1.16 ETHICAL CONSIDERATIONS**

#### **1.16.1 Informed Consent**

The researcher will ask for permission from the University of the Free State and the ethics was granted. Ethics means doing what is right. Participants will get fair treatment without being hurt or harassed (Michael, Burroughs, Nikolaus & Barkauskas (2017). Ethical requirements indicate that all participants must confirm to participate in a research study. Participants will be adequately informed whether they agree to participate without being forced or threatened. Participants will be informed in advance about the purpose of the study, and details coming

from lesson observation, reflective interview, and lesson reflection will be recorded fairly without being pointed out to individuals (King, Horrocks & Brooks, 2018).

### **1.16.2 Permission to Collect Data**

Participants are grade 4 learners; therefore, the requisition letter for permission to conduct the research will be sent to the FS DoE in Thabo Mofutsanyana District. Consent forms will be given to the participants before they can participate in the study, informing them of the overall study purpose, and requesting permission from parents and guardians to allow their kids to participate in this research (Osbeck et al. 2018). Consent forms eliminate the researcher's chances of misusing the participants or using private information for unethical motives (Osbeck et al, 2018). The study purpose will be explained to the principal (headmaster) of the school.

### **1.16.3 Confidentiality and anonymity**

The participants' confidentiality will be assured, and the responses will be anonymous. Participants' names will not be disclosed to anyone, and where they give feedback, it will not require identification. Analysis and interpretation of data will be made without mentioning the names of the participants or, if needs be, the pseudonyms will be used (School A & B) (Sporre, 2019). How the results will be used will be deliberate to the participants so that it permits them to make well-versed choices on whether they agree to take part in the study. Data will be protected in accordance with the data storage act, which is the Protection of Personal Information Act (POPIA)

## **1.17 LAYOUT OF THE CHAPTERS.**

Chapter 1: Overview of the study.

Chapter 2: Literature Review and Theoretical Framework.

Chapter 3: Research Methods: The research methodology used for the study, design sample, data collection, data analysis and ethical consideration.

Chapter 4: Data Analysis and Research Findings.

Chapter 5: Provides a summary of the results, a draft conclusion, and proposes a recommendation for the study.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 INTRODUCTION**

The study aims to explore the teaching and learning of fractions using YouTube videos. This chapter is all about the literature review in an attempt to answer the following questions:

1. How do grade 4 educators teach fractions utilising YouTube videos?
2. What are the views of grade 4 learners on the use of YouTube videos when learning fractions?
3. What are possible limitations that may arise while using YouTube videos in teaching and learning?

The other part of this chapter will be the theoretical framework; the study will focus on why the Technological Pedagogical Content Knowledge (TPCK) is used for this study that is centralised around the use of technology/YouTube videos in teaching and learning fractions in grade 4.

In light of this study, DoE in the South African Educational system will learn to provide computer training to educators so that the educators cannot be the barriers between the learners and learning. The present study investigates the effectiveness of using YouTube videos in teaching and learning fractions in grade 4. Still, with this research, the benefits of this study will stretch across all subjects using YouTube videos in teaching and learning. The study attempts to answer the following research questions.

##### **2.1.1 How do grade 4 educators teach fractions utilising YouTube videos?**

Learners already have the basic knowledge from home for learning and dealing with fractions; this basic knowledge for fractions is a beginning stage; an example is that if a child has six sweets and the parent tells that child to give other two friends, the child will probably give the 2 for each child (Siegler, 2018). With this clear and simple fact about learners' prior knowledge, educators can and will be able to teach fractions using YouTube videos. This study will introduce the use of YouTube videos in learning more about fractions in grade 4. According to

Riley (2017), the kids begin learning some overall ideas about fractions, such as what the numerator is and what the denominator is and that increasing numerators implies that the fraction gets bigger and increasing denominators imply that the fraction gets smaller if you keep the numerator the same size. This kind of knowledge learners get from the school, and the mathematics educator teaches it.

According to Lin and Rosli (2017), the YouTube videos for learners in grade 4 must not be too long; the preferred length of the video can be no more than 2-4 minutes. This is because of the following reasons: learners' concentration span is concise, learners will probably become bored with watching one video for a longer time, and the time for assessment must be considered as soon as possible while learners still remember what they have observed (Rayna, 2016). In this case, the mathematics educator monitors and ensures that learners stay watching and concentrating on the relevant YouTube videos, which is where the assessment will come from.

Since the study needs to explore how grade 4 educators teach fractions through YouTube videos, according to Pope and Mayorga (2019), the following are the guidelines for using YouTube videos: make a playlist of videos you are about to use in lessons (this is where those two videos are going to be selected) motivate your learners to subscribe to relevant subject related channel, showcase students' work by creating a course channel, in place of a face to face presentation ask students to screencast their presentation with a voice-over, create how-to guides to introduce new concepts, produce video summaries of assessment briefs and the marking criteria, use video to give students feedback (this could be a screencast with voice-over), ask learners to reflect on this feedback as a video and embed in their digital portfolio. These guidelines will help learners to get relevant information on YouTube. YouTube has over a billion users – almost a third of all people on the Internet – and daily, people watch hundreds of millions of hours of YouTube videos and make billions of views. With these interesting statistics, it is clear that YouTube videos look to be the new way of learning faster and more efficiently (Yadav, 2018)

The study needs to explore the teaching and learning of fractions using YouTube videos. According to Spangenberg (2017), most of the views of YouTube videos are from mobile phones. This fact shows that YouTube can be used for learning. Furthermore, Spangenberg (2017) states that learners of grade 4 know how to use cellular phones; with this study, the intention is to include cellular phones and tablets as the learning platforms, like when books and chalkboards are used.

Davidson, et al (2019) say that educators should teach learners how to get into the YouTube website and how to use it to properly benefit them in their studies. Learners of grade 4 already have the basic knowledge of how to use this platform. However, they still have to be taught how to type on the search button by the researcher and stick to the aim of the research, which is learning fractions through the use of YouTube videos; this will help them to answer the complete problems.

### **2.1.2 What are the views of grade 4 learners on the use of YouTube videos when learning fractions?**

According to Wijeya (2017), YouTube videos are a straightforward platform for learners because these learners already use these videos at home but not for academic purposes. Learners watch videos on their cellular phones. Sherman, Richardson and Yard's (2019) article discusses two viewpoints evident in the present research literature on educational videos on YouTube. First, studies assume that watching educational videos changes the attitude or behaviour of the learners. Second, studies question whether education is much more effective than a chalkboard. Fennell and Karp (2017) state that even though learners interact with YouTube videos using home language, they are still learning. Home knowledge is embedded in using YouTube videos to get fast and effective information compared to reading the long text of information (for example, learner's games and mine-craft, the mother cooking and cleaning stains techniques mostly come from YouTube videos, and they are speedy).

The written texts are effective for learning, but for the learners of the 21<sup>st</sup> century, the written texts are questionable Cashion (2019). The reader usually takes a long time to understand what is happening and figure out the text's direction. Still, for YouTube videos of a few minutes, learners can get guidance and understand a complex concept faster (Kurniawan et al.2018).

## **2.2 ACTUAL WAYS TO USE YOUTUBE VIDEOS**

According to Noble and Smith (2020), YouTube videos can be used in these ways to benefit teaching and learning: On YouTube, participants have to type the required aspect to search, for example, *addition of fractions in grade 4*, and then the enter button has to be pressed. Lastly, a wide variety of videos will appear, and the researcher or a mathematics educator will decide

according to the planning which YouTube videos to be watched; the questions will follow based on the videos (Steinke,2013).

Learners in grade 4 already know how to write; this implies that typing is not a problem. This fact of typing is informed by the fact that learners in grade 4 can use their cellular phones, download games, delete some games, and install applications (Ubah & Basilal, 2018). With this fact, learners must be guided to use their existing technical skills to learn fractions in grade 4 through YouTube videos.

This research will be easy because it will use YouTube videos that learners already use. The planned direction is to use the selected videos, which must be specified for learning fractions in grade 4.

### **2.2.1 What possible limitations exist for teaching and learning fractions when using YouTube videos in grade 4?**

Neumann (2022) states that the many problems and some of the difficulties are socio-politically inclined; for example, he wrote about new technologies and sometimes educators do not know what to do with technological resources they have at their disposal (example other educators cannot teach fractions with YouTube videos). Dias, (2020) says the latest technologies are more complicated by the new softwares that must be installed now and then. Furthermore, Dias (2020) emphasises the issue of being in the information-rich age, where people between 20-40 have several opportunities to learn these new technologies. On the other hand, the schools have many educators who had no opportunities in the past to learn these new technologies. These new technologies come only now, and this new change makes their lives very difficult to adapt to new technologies. It becomes very hard for other educators to teach mathematics or any subject using YouTube video.

Jill, Wang, & Mattia (2019) states that balancing educators who love new technologies (able to teach fractions using YouTube videos) and those who do not love (those who are unable to teach fractions with YouTube) new technologies will take a long time. Abel (2016) presents that the latest technologies have challenges, but better and better things are coupled with these challenges. Osbeck et al (2018) emphasises the issue of teacher training. Universities, colleges, and other institutions offering teacher qualifications should have intensified training for

educators to learn about the new technologies. One would anticipate that educators in this research should get proper training before having the lesson with learners.

According to Shanker et al (2019), 95% of educators use traditional teaching methods, including chalk and talk methods; computer laboratories are not used in most cases. If the computer centres in schools are not used, learners cannot learn mathematics or fractions using YouTube videos. If they are used (Mathematics laboratories and computer centres), they serve different purposes rather than the planned purposes. Achieving a balance between these and other factors challenges all educators.

### **2.2.2 Possible limitations to the use of YouTube videos in teaching and learning**

Michael, Burroughs & Ncolaus (2017) stated that videos have been used for many years in teaching and learning and further noted that understanding becomes faster when the learning is done with videos. These videos cannot replace real-life contact with educators. Even though learners can learn independently, they still need classroom contact with educators.

This research already pointed out that YouTube videos cannot replace real-life experiences. it can function as an aid/support for educators and as a component of the school curriculum (Moghavvemi et al 2018). Prihatini (2018) also pointed that that audio visuals are far better than a chalkboard and written texts because the learners can see and hear.

Even though not everyone can have these gadgets at home because of different economic reasons, it is clear that the South African government and other private educational stakeholders are doing their best to donate the needed gadget to different schools.

Social media offers a vast amount of information at less cost and very quickly; for this reason only, YouTube videos as one of the social platforms must be considered as a learning platform (Chintalapati & Daruri, 2017).

Another problem with YouTube videos, even though is very good, is that the inventors do not do the content; they only create the rules and guidelines, and the world's comprehensive people upload the content (Welbourne & Grant, 2016). With this fact, all other content can be uploaded. Some of the content does not meet the required standards of the DoE in South African Education (León & Bourk, 2018). Wolf (2015) argues the content that everyone can upload to the YouTube website, sometimes these videos not on the correct standard. That is

where the role of the educator comes in. During the preparation of the lesson plan, purposefully select appropriate videos for the lesson.

### **2.2.3 More limitations regarding the YouTube videos**

The producers of the channels tend to make a series of short movies rather than one video that lasts as long as a lecture at school. This means that, most likely, entire school curricula will never be displayed entirely on YouTube (Siahaan, 2021). In this case, the mathematics educator will only use two videos on addition and subtraction, which are all 2-3 minutes each, as previously stated.

Cahyana (2020) emphasises that an educator must use YouTube videos to download them for offline usage. This will help in the events such as load shedding (the no electricity period). Wilson (2015) states that multiple factors can disturb a learner working online, such as community protests, shortages of mobile data etc. Such factors can all be avoided by a simple step which is downloading the YouTube video.

Furthermore, Wilson (2015) wrote about the significant limitations of YouTube videos harming learner performance in the following ways. For example, no grammar competency in the ability to write well, and kids spend too much time on their gadgets. Ampera (2021) added on the disadvantages of these videos regarding the distribution of resources, supply of computers, access to these ICT resources and other issues like software licenses.

Teacher training on these resources remains a considerable problem because the DoE spent lots of money developing mathematics laboratories in countries like South Africa. Many computers are no longer used in those laboratories, and most are broken or taken (Liyanaawardena, Williams & Adams, 2013).

Williams (2013) recommends that as much as there are disadvantages to teaching and learning with YouTube videos, there are also many advantages coupled with the usage of YouTube videos. And further states that, it is the era where we cannot avoid using technology but adapt to the new age of technologies. Hence this research specifically emphasised the training of educators on the use of technology and YouTube videos by the DoE.

The movement towards new technologies is inevitable; there is more advantage towards new technologies. On that note, it is clear that the usage of chalkboards becomes challenging.

Educators and the entire education stakeholders must gradually adapt to the full use of the new technologies (Watson, 2013). On the other hand, Joosten & Cusatis, (2020) state that higher education institutions are using the new technologies across the country in South Africa, which implies that it is high time that the basic education should use this opportunity and new technologies. It is positive to move towards the positive light of technologies even though it is coupled with some challenges.

Abel (2016) states that educators have more opportunities today than in the past. They are softwares that can be installed in the computers that help them to adapt and innovate very quickly; an example is that universities have portals, course management systems and student portfolios, which could also be applied to basic education explicitly adapted for learners. Abel also states that this software comes at cheaper pricing. According to Coutts et al. (2007), there are questions to be asked based on the use of technology in classes.: When will these technologies be formally implemented, enforced and monitored?

On the other hand, is the issue of standardisation; if all the schools use the same technological equipment, this implies that the software that will be installed in the computers will be the same. Educators will have to get proper training and execute the same work to the learners. Learners will receive the same videos and materials for learning (Liestol, 2014). One would make an example with the usage of Blackboard at the University of the Free State; this blackboard is a communication platform between the lectures and the university students; that is where the lecturers can post the announcements and assignments and give feedback to the students.

#### **2.2.4 Complex challenges that undeveloped and developing countries experienced in terms of teaching and learning during the COVID-19 pandemic.**

This research dwells on these challenges because technology, YouTube videos, and self-directed learning could assist on this regard. Technology (YouTube videos) could be used during the most difficult times (pandemic) in different countries.

##### ***Ghana***

For this country to continue with academic activities, other universities such as University of Ghana, Wisconsin International University College, University of Education, Ashesi University and Kwame Nkrumah University of Science and Technology have turned to e-

learning online with the use of technology. The part of this technology included in this study is the use of YouTube videos (Anaba, 2020; Ashesi University, 2020). Lecturers were asked to create groups to talk with their students (Anaba, 2020). ANABA University had to give all students free mobile data during the difficult times when there was no student-lecturer contact session. This kind of initiative can be done on the school level in South African schools. Just like our DoE can give the learners the stationary, it can also provide each learner in South Africa with a tablet with monthly mobile data.

### ***South Africa***

In South Africa, during the difficult times of Covid-19. All the schools were closed to prevent the spread of this dangerous pandemic disease. Later, basic education was closed, but the universities opted for e-learning. It was easy for higher institutions to work online because that is what they are already doing; an example is the communication platform of the University of the Free State is currently using “*Blackboard*”. What the universities did is also possible for DoE schools. This will help to be better prepared for unforeseen circumstances like community protests and national shutdowns, which implies that teaching and learning can happen even under challenging conditions (Jonah & May, 2019).

### ***Zimbabwe***

Zimbabwe’s Competency-Based Curriculum (ZCBC) during the COVID-19 they did also experience difficulty during the COVID-19 pandemic, but on the other hand, they have agreed that the use of new technologies could help in improving the interaction between learners and their educators (Cruickshank & Fenner, 2012).

Furthermore, ZCBC has complained about inadequate teacher training based on the new technologies, as this research stated in chapter 1 that educators need to be trained in using the latest technologies. Professional training should be given to educators (De Houwer, Barnes-Holmes, Dermot & Moors, Agnes, 2013).

## ***Kenya***

The Ministry of Health (MoH) raised the critical issue of the impacts of COVID-19; the main one was in 2020, there was no contact between learners and educators, and it also suggested the use of e-learning. But also suggested the issue of those learners who are living in rural areas where there is not internet connection. Ouma, (2020) the other group of learners are the ones that come from disadvantaged learners who come from families that are not economically stable.

## ***Libraries***

Hauck (2020) states that the MoH tried to reduce the spread of COVID-19 by closing all the libraries, but this total shutdown has robbed many learners of the opportunity to learn. According to Kenya's Economic Survey (2020) libraries should benefit from now on, especially since they have learned that there are times like a pandemic. They should have the plan to use technology to provide everyone who wants to read a chance because no country can afford to shut down completely should anything as COVID-19 occurs again.

## ***Schools***

The schools help to give protection to learners, and the basic function of the schools are to educate learners, but during COVID-19, two years ago, the schools were shut down. Because of this pandemic. It is in the light of this study that should something similar to COVID-19 happen. Learners should continue their studies as normal; the educator will continue to be the constant supervisor and monitor for the learners in that social platform created (MoE, 2020). It is hazardous to go to school during the stages of COVID -19. Disaster Management in any country school understands that education is critical to avoid the knowledge gap. In this regard, it is crucial to consider e-learning, YouTube videos and internet which will highly help during such difficult times (MoE Disaster Management Policy, 2018).

## ***Unequal access technology***

Kariuki (2020) states that unequal access to educational resources for schools and learners creates a big challenge for already vulnerable learners and schools. Such an example is two schools where the research took place; you would find out that DoE had provided the e-learning

resources to be evenly distributed, but since the monitoring of the state resources is often a problem, those resources end up being unevenly distributed.

### ***Lebanon***

Lebanon's education was also affected negatively when the rest of the world was affected by the pandemic. Lebanon had also to close its schools. Education had to stop. Besides education sectors, the sector was closed except for those that deal with emergency sectors (Lane & Garrison et al., 2020). Lebanon Education had to organise extra classes for learners because the learners had lost a lot of academic time. Whittaker et al. (2020) say that the Lebanese should have chosen to implement e-learning to avoid being the victims of the COVID-19 pandemic.

It is in light of this study that the Lebanon Education System will also be advised to consider e-learning because with this e-learning, learners can learn from home with guidance from the educator, example will be to create a group WhatsApp where all communications will be posted, and the questions will be asked, and the nice thing about this is that learners are going to ask questions inside the group and typically one will answer the questions. This is going to make the work of the educator very easy.

Ratnam (2020) shows something remarkable about Lebanon. Lebanon has been significantly challenged economically "by the Syrian crisis" that political instability, economic collapse, and the explosion of the port of Beirut, which put a much strain on the already unstable economy.

Shantha (2020) presents the issue of the teacher strike; educators entered the long strike to increase better salaries. Educators demanded better living conditions; this has caused the education system to have more problems during 2020. In this case, e-learning could help in such a way that learners could be helping themselves in that created group.

## **2.3 SOLUTIONS FOR SOUTH AFRICA, GHANA, MOZAMBIQUE, LEBANON AND KENYA**

According to Yeh et al. (2019) and Hung et al. (2018), the governments of different countries need mobile resources; these resources will enable the countries to be sustained during the most challenging times. The impact of things like COVID-19 would not be this severe if all the

countries were equipped with all technological resources (e-learning, remote learning, internet and YouTube videos).

The advantage of e-learning, remote learning, internet and YouTube videos is that it gives learners the freedom to learn, sense of independency and autonomy. The learners have more control over their studies, they have an opportunity to do their work whenever they are. This prepares for difficult times such as the pandemic period, community protests and unrest in our South African communities.

## **2.4 THEORETICAL FRAMEWORK**

Technology is the most critical tool becoming influential daily inside and outside the schools. In the school, it can strengthen communication relationships. The current studies show that e-learning is taking over because of the current uncontrollable events happening, such as community protests, load shadings, pandemics etc. Lipetz (2020). This is further supported by the global pandemic that happened in year 2020, where every contact teaching and learning stopped completely.

This study will be guided by Technological Pedagogical Content Knowledge (TPCK), which emanates from the work of Koehler & Mirsha (2008). It was chosen because the teaching and learning in this study will involve YouTube videos as a specific part of technology in teaching fractions in grade 4. Technological Pedagogical Content Knowledge (TPCK) is the knowledge of technology, how to use it to teach, and using YouTube videos (technology) to support teaching Koehler & Mirsha (2008).

In this framework, Technological Knowledge (TK) is defined as a skill of how to use new technologies. This special type of knowledge is highly centralised around a certain age group. According to Anazifa, (2017) the entire world is on the fourth industrial revolution and with this, learners encounter technology on the daily basis. Therefore, the knowledge of technology in learning fractions and mathematics in general becomes like an entertainment for learners.

Technological Pedagogical Knowledge it is as conceived by Koehler & Mirsha (2008), it has been defined as understanding how to use technology to teach and make learners understand. Pedagogical content knowledge is the knowledge of activities and order to facilitate students learning. So in this study, specifically, it is the knowledge of teaching, knowing how to make learners learn, not only knowledge to the teacher about content but making learners understand that specific content (Mishra & Koehler, 2006).

On the other hand, Technological Content Knowledge (TCK) refers to a deep understanding of how to manipulate new technologies and their tools to get learning outcomes. Technological literacy is the ability to manipulate gadgets, so all these three parts refer to Technological Pedagogical Content Knowledge (TPCK) . Mishra & Koehler, (2006) Content Knowledge (CK) in this framework, content knowledge is simplified to specify understanding of the likely topic-specific representations (Example: Knowledge of fractions) in a given subject area. These representations might include deep expertise from the school or any learning institution about fractions. Mishra & Koehler, (2008) argues that teacher cannot have pedagogical knowledge without getting in contact with learners meaning interacting with them, because pedagogy and content knowledge are not the same. You can learn the content from the book, but pedagogy needs one to interact skilfully with learners.

With this study and approach of TPCK, researcher is introducing the use of YouTube videos in teaching fractions in mathematics in grade 4. YouTube will be used as a resource in grade 4 to guide, assist and support the educator.

Harlinda, (2019) propose that the use of YouTube videos in teaching and learning fractions in Mathematics in grade 4 is what other educators should consider, maybe not specifically fractions but to teach using technologies such as YouTube videos, based on the reason that learners are now part of fourth industrial revolution (YouTube videos). For example, a grade 4 learner can help an educator install any application on their phone easily. This research anticipates a learning environment that is very effective and enjoyable using YouTube videos in teaching and learning of fractions. According to Remler (2018), most of educators were trained from old teachers' colleges and were not well trained to use YouTube videos or technology in general. They prefer to use the chalkboard because that is how they were trained in their teachers' colleges. With this fact Remler (2018) state with will have a major challenge for application of technological content knowledge (TCK) because these types of educators only have pedagogical content knowledge (PCK). Cahyana, (2020) states that the department of education in South Africa in making many attempts to train educators to be able to teach with technology. Furthermore, he states that the educators without the knowledge of technology must accept and attend the workshops and trainings that the department of education is offering them. This will help develop the technological content knowledge of such educators.

Learners need to have all educators to have knowledge of technology (TCK) so that they can be motivated to come to school and enjoy learning all the subject using all the technological resources (Siahaan, 2021). Furthermore, Parwanti, (2022) states that learners cannot fully benefit fully if they are only taught fractions by use of technology but rather all educators be involved in teaching their subjects using technology.

Copsey (2018) also studied how to teach fractions in grade 4 using the internet source, but this research is deeply focusing on one internet sources such as YouTube videos. Albahiri et al (2020) argues that based on previous experiences when we teach using the old teaching style, researcher should observe how learners react to the chalkboard, chalk and talk methods. According to Alkathiri (2019) learners watch television daily. They see countries like Singapore, Finland, America, Japan and other Western countries that use YouTube videos to aid their entire teaching and learning (Thorbe, 2015).

TPCK is going to enhance the skills that learners have. According to Harlinda, (2019) 8 out of 10 learners encounters YouTube videos inform of their entertainment. They watch minecraft, cartoons, tiktalk etc. Thornton, (2017) stated that, the use of technology in classrooms must be implemented because if teachers does not do so. They will be contradicting the normal daily routine of learners (learners gets to YouTube platform every day).

# **CHAPTER 3**

## **RESEARCH METHODOLOGY**

### **3.1 OBSERVATION**

Observations can be defined as the method of collecting data on the teaching and learning environment where the prior experience is known (Cresswell, 2017). The prior experience in this research is the use of the chalkboard. According to Guest, Bunce, & Johnson (2006), the goodness of the observation is that it allows the researcher to study people from their native environment. DiCicco-Bloom and Crabtree (2006) said that observation requires the researcher to spend some time in the field to get accurate outcomes about the study and the participants. For this study specifically, learners were observed because these learners are traditionally taught without the use of YouTube videos; the main aim was to see if they are going to be excited while learning or not; lesson reflection (a particular type of observation) was a tool for data collection, it was used for this research. Also, the learners' worksheets and reflective sessions for educators assisted in collecting data for this study.

### **3.2 METHODOLOGY**

#### **3.2.1 Research design and methodology**

The research method aimed to explore the use of YouTube videos in teaching and learning fractions in grade 4; hence, by confidence, a qualitative research approach was adopted to explore if learners are more likely to love the use of YouTube videos. The researcher used lesson observations, reflective sessions to be answered by educators and lesson reflection to be answered by learners.

A qualitative research technique where researchers observe participants' ongoing behaviour in a natural situation was also used (Creswell, 2017). This is relevant because it enables the researcher to observe their participants when engaging with YouTube videos.

### **3.2.2 Lesson observation for two mathematics educators**

The type of observation that was used is lesson observation; what will be observed are the key movements and actions of the educator teaching fractions at that specific research site (school). Lesson observation was used to observe the teachers who are also participants. Oakley (2017) describes lesson observation, it is a practice where the lesson is followed just to check if the learners are receiving quality teaching. The educators did these key actions (Pause and play, asked questions and emphasize some of the points) when teaching fractions in a grade 4 classroom. On the other hand, the researcher observed the key movements of the teacher. According to Corbin and Morse (2003), pedagogy in the classroom involves the following procedures: Repeating the instructions, reading instructions in different tones, and moving between the learners to ensure that they are indeed writing.

### **3.2.3 Lesson reflection for learners as participants in two classes**

A lesson reflection aimed to help educators become more reflective and intentional. Observing one of the educator's information helped the educators be more reflective, and therefore very effective teaching and learning has happened.

Lesson Reflection refers to the researcher's tool to get a general feeling and opinion about the research (Gray, 2009). Based on this explanation, the researcher has developed a tool that was used at the end of the research:

Lesson Reflection: Tell us what you liked about this lesson on YouTube videos.

- How did the use of YouTube videos help you to understand fractions?
- Tell us about the things that you did not like about the use of YouTube Videos
- Would you recommend that your school use YouTube videos in the future?

With this lesson reflection, it helped to answer this second research question” *What are the views of grade 4 learners on the use of YouTube videos when learning fractions*”? All the learners who participated in this research got this lesson reflection to answer these four reflection questions. Vulnerability and discrimination were avoided against other learners, all learners who participated in the research completed lesson reflection. Learners were kept in the Mathematics laboratory for the entire two periods. The first period was for teaching and learning. Educator played the two videos; one videos for addition and the other for subtraction.

The DoE has prescribed through the Annual Teaching Plan (2021-2023) that addition and subtraction of fractions of the same denominator must be done in the third term. These two periods will be within the regular school timetable. This ensures that the research does not disturb any other teaching and learning.

### **3.2.4 Reflective session: For two mathematics educators**

According to Remler (2018), reflective interviews are based on what happened during the lesson. A reflective interview aims to reflect the information or data from this reflection to help the researcher, the school, learners, the community, and DoE improve and get better learning results.

The Reflective Interviews consisted of the following reflective questions:

- What did I learn from the event (YouTube session) that I did not know before?
- Can you recommend that your school use YouTube videos to teach and learn all subjects?
- What did you dislike about the use of YouTube videos?
- What did I like about this lesson about YouTube videos?
- Are there any other further comments based on the lesson?

## **3.3 PURPOSIVE SAMPLING**

Purposive sampling was used in this study. According to Copsey et al (2018), the purposive sampling technique, also called judgement sampling, is the deliberate choice of participants (grade 4 learners and two educators who teach Mathematics) due to the participant's qualities.

It is a technique that does not need any theories; it is up to the researcher to choose the kind of participants that are required, and these chosen people should be able to provide information willingly (Copsey et al, 2018).

### **3.3.1 Selection of Grade 4 educators**

Specifically, two educators teaching mathematics in grade 4 received a YouTube training before they can teach learners. The training was done in one of the research sites. All this training on the YouTube videos was done by the researcher on these two research participants

at the researcher's own cost. This is due to the fact that the researcher uses YouTube videos in many occasions and is a mathematics and technology educator.

### **3.3.2 Selection of Grade 4 learners**

One classroom of grade 4 learners from one school and one classroom from the other school were selected. These two classes (learners) are all doing mathematics. On that selected two periods, learners did fractions on additions and subtractions. This did not negatively impact other periods because the research happened within the regular school timetable and the arrangements were made with teachers.

## **3.4 RESEARCH PARADIGM**

### **3.4.1 The interpretivist paradigm**

The interpretivist paradigm was used with words such as post-positivism, naturalistic paradigm, qualitative research, and constructivism (Yanow & Schwartz, 2018). It checked the individual's interpretation of social behaviour and focused on getting the insight experience on individuals or groups to get qualitative data (Hamood, 2016).

With this paradigm, the researcher will have gained insight and experience about learners' participation when learning fractions with YouTube videos in grade 4. The researcher also experienced real feedback about their interest in learning through YouTube videos. The insight experience referred to here, was the responses that learners gave by answering structured questions presented by the Mathematics teacher.

### **3.5 DATA ANALYSIS.**

The observed lessons have been transcribed in the following chapter. The researcher used thematic analysis, which means looking for the themes that emerged from the data. The key events that happened during the teaching and learning of fractions in grade 4 have been recorded by the researcher in order to ask the educators questions during the reflective interview. (By the key movements in the research, it refers to pause and play moments, asking of questions, emphasizing of important information so the ensure understanding).

Thematic analysis (TA) is a method for identifying, analysing and interpreting patterns of meaning ('themes') within qualitative data. TA is unusual in the canon of qualitative analytic approaches, because it offers a method - a tool or technique, unbounded by theoretical commitments – rather than a methodology (a theoretically informed, and confined, framework for research). This does not mean that TA is a theoretical, or, as is often assumed, realist or essentialist. Rather TA can be applied across a range of theoretical frameworks and indeed research paradigms. There are versions of TA developed for use within (post)positivist frameworks that foreground the importance of coding reliability (Braun & Clarke, 2006, 2017)

Qualitative data was analysed by thematic analysis; the techniques followed the approach suggested by Braun and Clarke (2014). They further state that designs are accepted over a rigorous data acquaintance, theme development and revision process.

Interpretation and reporting once the data is collected from lesson observation and lesson reflection, data was assembled and interpreted. The relevant information was noted, recorded and reported separately to identify learners' performance with fractions in Mathematics.

### **3.6 TO-DO LIST: DATA ANALYSIS STUDY THE 7 STEPS OF DATA ANALYSIS**

According to Meyers (2016), the seven steps of data analysis are:

1. Create a Study Map: Two videos have been played based specifically on fractions.
2. Data Entry: The questions per video were planned based on what needs to be learnt.
3. Check Data Integrity: Each video had a specific lesson to learn. That was the true reflection of learning, what must be retained.
4. Univariate Analysis: Planned questions were asked.
5. Bivariate Analysis: Educators asked verbal questions from the video and written questions from each video.
6. Multivariate Analysis: Educators engaged learners more to observe their interest in learning with YouTube videos. Through this research it is now at this stage that learners enjoy the use of Technology formally (at school) and informally (at home). The school is there to take advantage of the fact that they love technology (YouTube videos)
7. Write-up and Report: The final report to give feedback on the observations and the lesson observation, reflective session, and lesson reflection questions as planned.

## **3.7 ETHICAL CONSIDERATIONS**

### **3.7.1 Informed consent**

The permission was requested from the University of the Free State and the ethical committee. Ethics means doing what is right. Participants got fair treatment without being hurt or harassed (Litchman, 2016). Ethical requirements indicate that all participants must confirm to participate in a research study. Participants were informed in advance whether they agree to participate without being forced or threatened. Participants were informed in advance about the purpose of the study (King, Horrocks & Brooks, 2018).

### **3.7.2 Permission to collect data.**

Participants were grade 4 learners; therefore, the requisition letter for permission to conduct the research were sent to the FS DoE in Thabo Mofutsanyana District. Consent forms were given to the participants before they can participate in the study, informing them of the overall purpose and requesting permission from parents and guardians to allow their kids to participate in this research (Jackson, 2011). Consent forms eliminate the researcher's chances of misusing the participants or using private information for unethical motives (Litchman, 2016). The purpose of the study was explained to the principal (headmaster) of the school.

### **3.7.3 Confidentiality and anonymity**

The participants' confidentiality was assured, and the responses were anonymous. Participants' names and their schools were not disclosed to anyone, and where they give feedback, identification was not required. Analysis and interpretation of data was made without mentioning the names of the participants, or if need be, the pseudonyms were used (Avery, 2017). Data was protected in accordance with the data storage act, which is the Protection of Personal Information Act (POPIA).

Trustworthiness is an ethical principle where all people involved in the research must be trusted with the information they give or receive Avery, (2017). In this case, the researcher must be trusted with the information he receives and not violate the participants in any way.

# CHAPTER 4

## DATA COLLECTION PROCESS

### 4.1 INTRODUCTION

The chapter consists of the outcomes and the negotiations of the data found through the following tools lesson reflection of learners, the worksheets for learners consisting of subtraction and addition of fractions and reflective sessions of educators.

The data was collected from two schools in Bethlehem, Bohlokong; the first school is (Research site A, and it is combined because it starts with grade R to grade 12. The school consists of people of colour and uses Afrikaans as a medium of instruction), the second school is Research site B and is mixed in terms of learners and uses IsiZulu and Sesotho as a medium of instruction. Bohlokong/Bethlehem has many schools that has more than one mother tongue.

The research explores the use of YouTube videos in teaching and learning fractions in grade 4. According to the Annual Teaching Plan for the Department of Education (2020-2023), additions and subtractions of the fractions of the same denominator should be made in the third term. Hence the data collection is done in this third term. The training was provided to educators. (on YouTube videos) by the researcher. Special arrangements were made in order to avoid disturbing the teaching and learning time.

### 4.2 LESSON SYNOPSIS

#### 4.2.1 School A

##### *What happened in school A?*

The research participants were 37 learners and one mathematics educator. The mathematics educator in this school was white, and the learners were people of colour. These learners and their educators used Afrikaans during teaching and learning. The language preference is Afrikaans because Afrikaans it is their mother tongue, and from grade R to grade 3, they used their mother tongue. The educator while the session of teaching was continuing, he tried by all means to use his pedagogical skills to make them speak English and also interpret so as to accommodate the researcher. The educator in this school received training based on using

YouTube videos in teaching and learning. However, this educator had five years of experience using technology in teaching; this educator taught at a private school where technology is often used. With this fact, the training took lesser time than expected. The educator was given the two videos that were supposed to be watched and the following research instruments: Lesson reflection for learners, worksheets for learners' assessment and reflective session instruments. These three tools were designed to collect the data on this first school. The educator was given these tools a day before the lesson so that he could prepare for the lesson that was coming the next day. Data collection for one school lasted only one hour. The first period was 30 minutes, and it was for teaching and learning through videos supervised by the educator. The second period was also 30 minutes for filling those research instruments mentioned above.

During the training, the educator was told to teach how he is used to teaching with all his normal strategies but using YouTube videos. Hence the educator will move amongst the learners to check if they are doing the work, and the educator will keep pausing and playing to elaborate on some of the missed critical points.

#### ***During the addition session in School A***

The research session was scheduled to be within the normal timetable not to disturb the teaching and learning in other classes.

The educator in this school introduced addition and subtraction in the following style:

*“Morning learners, today we are going to learn about the fractions of the same denominator (addition and subtraction), but I am not going to teach you like usual, but you are going to watch your favourite television (Projector), and later on, you will answer the questions.”*

Then the educator played the YouTube videos he had seen the day before and made preparations. The video was two minutes long. While playing these videos, learners were super excited; they were pleased to see animated videos with a child's voice teaching them about fractions. Other learners wanted to stand up, while others could not hold their happiness. The educator tried to stop them from becoming over-excited, but they could not hide their joy, and the reprimanding was not instructional. It was for discipline purposes.

During the addition lesson done via YouTube video and supervised by the educator, the educator used to pause and play. When he was asked during the reflective interview, he said he had to, so that he could emphasise some of the essential things. Furthermore, still in this lesson, this educator paused and moved between the rows to ensure that these learners wrote what was expected from them. He said that the learners are still young, and one needs to monitor them to ensure they write. The first addition of the fraction that was displayed is  $\frac{3}{8} + \frac{2}{8}$ . Through the animated pictures and video, through the child's voice explaining the addition of this fraction, learners understood all other fractions that followed. The main lesson was that one needs to add the numerators and leave denominators as they are. The educator's work was to facilitate, and learners were taught by their favourite "Television", that projector. Because of the excitement, learners will be shouting the answers before the educator can ask them. But for discipline purposes, the educator will reprimand them for speaking when chosen.

#### ***During the subtraction in School A***

At the end of the addition of the fractions, the educator used the tool, the researcher gave him to assess for additions. And then they moved on to subtractions. The educator was the supervisor, and the YouTube videos were the primary source of information doing the actual teaching. The first subtraction problem that they saw was  $\frac{5}{9} - \frac{2}{9}$ . The video made it clear that, they are dealing with subtraction this time. And one needs to keep the denominators just the way they are and only subtract the numerators. The role of the educator was to facilitate the whole process to ensure that learners answered the questions in sequence and followed instructions from the educator; 90% of learners got correct answers.

The educator stated that there is a learner who never participates in class and never says anything, but through the use of YouTube videos, this specific learner was very active. She also got the questions right. The educator also helped and facilitated the session of making corrections.

#### **4.2.2 School B**

##### ***What happened in school B?***

The other research site is school B, the school has Isizulu, and the Zulu learners dominates this school. From this school, 40 learners participated and one educator. The educator was also speaking IsiZulu. The educator in most of the cases enforced the learners to speak English and translated in order to accommodate the researcher. The educator received training based on using YouTube videos in teaching and learning. The training lasted longer than on research site A because the educator in this school B is not well conversant with technology in teaching learners. The educator has over ten years of experience teaching learners with chalk and talk method. The educator was given the following research instruments: two videos to be watched, Lesson session documents for educators, lesson reflection for learners, and worksheets for learner assessment. The purpose of this information was for her to familiarise herself with the content and plan appropriately for learners. Even though the educator was not computer literate, the training provided helped her cope very well with teaching with the support of YouTube videos.

During the training, the educator was told to teach the way she is used to teaching, with all her normal strategies but incorporate YouTube videos. Hence the educator will move amongst the learners to check if they are doing work, and the educator will keep pausing and playing to elaborate on some of the missed critical points.

##### ***During the addition session in School B***

The educator in school B is a Zulu person, and her learners are also from a Zulu background. Therefore, at some stages, she had to speak IsiZulu when she explained some problematic parts of fractions. There were 40 learners and one educator; this educator was given training on using the YouTube videos a day before the actual session. Even though the educator is not used to YouTube videos in teaching learners, she stated that she used the videos to equip herself before going to the classroom now she just has to take them to the classroom, not only for preparation (lesson plan).

The educator played the video for the learners, and the learners were excited to have been taught by the animated videos with the voice of a child like them. The educator used to pause and play the video to ensure that all learners understood; she would pause and ask the questions

during the lesson to check that they were not just happy but also understand. She will play the video to continue the lesson. The educator is over ten years of teaching mathematics with the chalkboard. When she tries to explain and learners don't understand, she will use the chalkboard.

The first addition of the fraction that was displayed is  $\frac{3}{8} + \frac{2}{8}$ . Through the animated pictures and through the voice of the child explaining the addition of this fraction, learners understood all other fractions that followed. The main lesson was that one needs to add the numerators and leave denominators as they are. Learners were very excited and correctly answered all the questions provided in the video. The educator was given the worksheet with subtraction and addition questions; these worksheets were also given to all learners to answer. In the same video, the educator paused and asked learners to answer all the questions about the additions. During the answering session, the educator moved between the rows to ensure learners responded to questions as expected. Another thing she did was to question learners, knowing that learners in grade 4 are very young and need to be fully guided.

All learners enjoyed the lesson and got the questions on addition, most of them right. When asked about the lesson reflection, most of them indicated that the YouTube videos are more exciting because they have pictures and use “*popai*”, meaning cartoons, which they love.

### ***During the subtraction in school B***

The educator made a pause between addition and subtraction; when the educator started playing the video on subtraction, learners picked it up very quickly that subtraction means taking away, not adding and it was clear from the video that it was well explained. The educator will pause to emphasise some of the essential issues from the video. The worksheet had a tiny mistake which a brilliant learner picked up. The educator corrected the error in the whole class, implying that the educator's availability is essential to clear misconceptions. She will often go between the rows to ensure learners write the correct answers. If one learners are not answering right, she will stop the whole class and explain to the entire class. Most importantly, the educator realised that there was something not right during this subtraction lesson that learners did not understand well. Because of the long experience using the traditional method, the educator quickly used the chalkboard to explain that problem.

### 4.2.3 Overall Impression of the researcher

**Presence of Educator during teaching and learning:** Looking at school A and school B, it is clear that the presence of YouTube videos cannot replace educator. Educator will always have to be there as a constant supervisor. The educator will guide the class, pause and play the video, plan which video is appropriate for the lesson, keep discipline in the classroom, and move between the rows, as both educators stated.

**Chalkboard:** It is evident that the use of the chalkboard is old and no longer relevant to the current learners, but the chalkboard cannot be replaced, as it was clear from educator of school B, who used it during the YouTube lesson to explain a complex concept that learners did not understand. Even though they cannot be replaced, the soft board will serve just a similar purpose to the chalkboard.

**YouTube videos (Technology):** As it emerges after data collection, it is clear that both school A & B learners were delighted to engage with YouTube videos since learners got very impressive marks, even the learner who is not participating in most of the cases, this shows that YouTube videos especially animated once are doing an excellent job for teaching and learning.

**Educators using YouTube videos:** Both educators were thrilled to use the new platform, YouTube videos. Even though they come from two different technological backgrounds, they are very positive about using YouTube videos in the future. One stated that she was already using them just to equip herself for the class (lesson preparation), and the other had been using them for the past five years of his experience, so this informs the researcher that the use of technology in teaching and learning is good and need to be used for all grades.

## 4.3 DATA COLLECTED FROM OBSERVATIONS

### 4.3.1 Data Analysis

The data that is collected is going to be analysed in 2 phases.

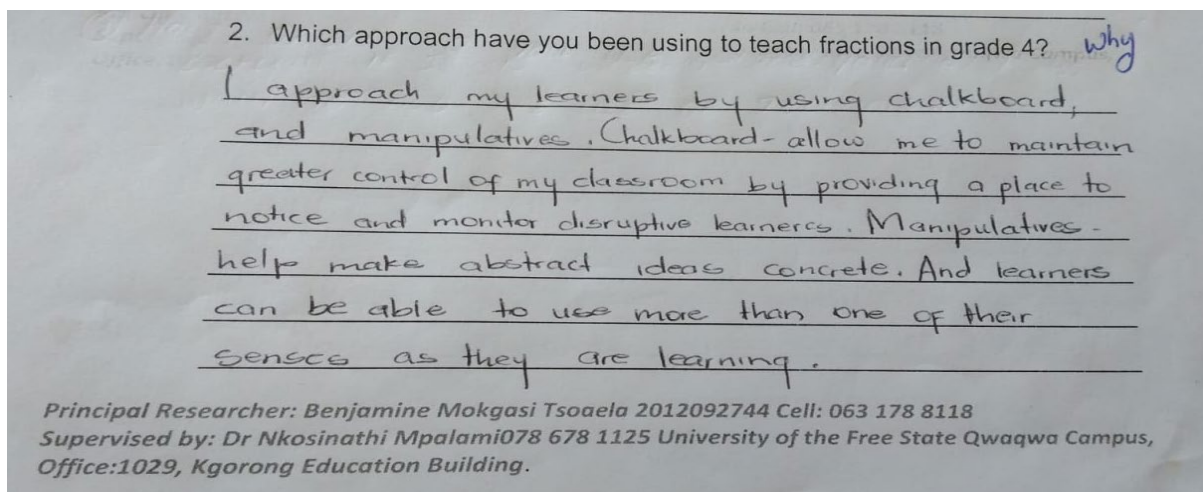
*PHASE 1: Analysis of data that is collected through observation using the reflection worksheets for educators.*

#### *Theme 1: Educators' use of chalkboard*

Koehler & Mirsha (2008) argues that one cannot have this pedagogical knowledge without being in the physical classroom and interacting with learners for some time, seeing how they learn, the problems they encounter. According to Koehler & Mirsha (2008), educators must have physical contact with their learners and know and interact with them. The screenshot from the school B educator shows that she knows what is best for her learners and the kind of learners she has. See the figure 1.

It is clear that the educator also uses manipulatives for mathematics during regular class sessions.

Figure 1



During the reflective session given to both educators, the educator from school B was asked why she used the YouTube videos and the chalkboard. What is said below is precisely what Koehler & Mirsha (2008), also talked about learners' knowledge.

*“The knowledge of learners is very important to an educator; that knowledge makes educator know what to do when and how to do it” (Educator, School B).*

### ***Theme 2: Use of textbooks***

Educators in school A have not used the textbooks at all, and this might be because the educator indicated that he has experience teaching learners using technology. Keeping in mind that during the educator’s training in school A, the educator stated that he has been teaching in private, white-privileged schools where technology is used. He said that he has six years of from grade 4-7 experience teaching using technology.

In school B also, the educator did not use any textbooks because of the presence of the YouTube videos; she also indicated that she usually uses manipulatives for her learners. Because she was using the YouTube videos for this session, she did not use manipulatives as indicated. But it is fascinating that she used the chalkboard and when she was asked,

*“I have used the YouTube video and chalkboard because the questions from the test paper were written like  $(\frac{1}{4} - \frac{1}{2})$ , and my learners used to write fractions like  $(\frac{1}{2} - \frac{1}{4})$ , so I have used the chalkboard to make them understand”.*

This challenge shows that most educators have limited skills to deal with technology and are more confident in teaching using the chalk-and-talk method; this happened because the education system that does not fully implement the idea of making the use of technology possible in South African schools. This is a reality from the educator in school B, this shows that the chalkboard cannot be replaced, and they are still needed in classes; the only issue that must happen is that the educators must be trained more on how to use the technology so that they can be more relevant to the learners they teach.

Furthermore, the chalkboard was used to rectify the mistakes that were made during the session of fractions that was conducted through the YouTube videos and supervised by the educator in school B. Educator in school B said,

*“The way the fractions were written in the test paper has confused my learners. I ended up using chalkboard because my learners were not used to writing the fractions like that”  $(\frac{1}{4} - \frac{1}{2})$  in grade 4 the small fraction cannot subtract the big fraction.*

Figure 2

Grade 4 Research Questions  
 Addition and subtraction of Fractions of the same denominator  
 From the Animated YouTube videos that you have watch answer the following additions of fractions of same denominators.

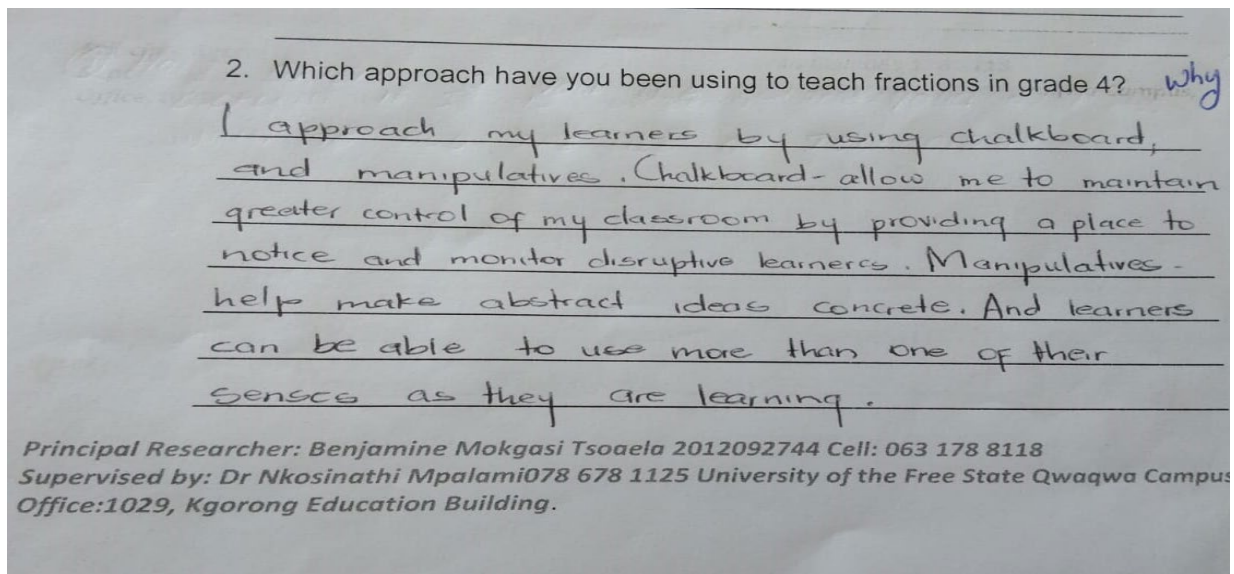
	Addition	Subtraction
	$\frac{1}{4} + \frac{2}{4}$ $= \frac{1}{4} + \frac{2}{4}$ $= \frac{3}{4}!$	$\frac{1}{4} - \frac{2}{4}$ $= \frac{1}{4} - \frac{2}{4}$ $= \frac{1}{4} \checkmark$
Final Answers	$\frac{3}{4}$	$\frac{1}{4}$

This statement made by the educator tells us that the chalkboard has been used for a very long time, and it will be there to assist them whenever they find a problem during the teaching and learning session.

As Novarwam (2021) stated, the professional training of educators is significant for technology; they further furthermore he states that it is not that educators do not want to use the technological resources in their schools, but they are not thoroughly skilled. Even educators believe that through the use of YouTube videos, learning could be better.

Furthermore, based on the textbooks: The written texts are effective to learn, but for the learners of the 21<sup>st</sup> century, the written texts (books) are questionable Cashion (2016). The reader usually takes a long time to understand what is happening and figure out the text's direction. For YouTube videos of a few minutes, learners can get guidance and understand a complex concept faster (Kurniawan et al.2018). Kurniawan (2018) emphasise that written texts like books and chalkboards learners understand. They cannot understand them quicker and better than using the videos to learn and understand faster. It is evident from the collected data that learners like to watch television. As the educator of school A stated, they love to see cartoons; now, during data collection, this research aimed to use animated YouTube videos because participants love the cartoons because they are learners.

Figure 3

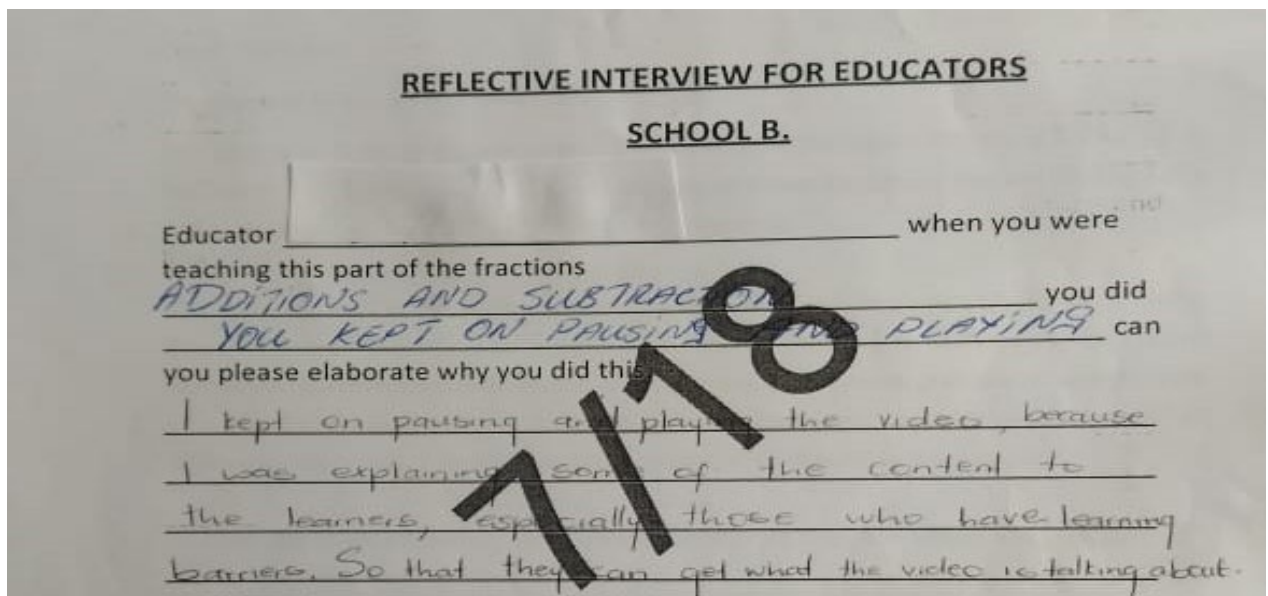


### ***Theme 3: Educator's movement in the classroom***

Nziramasanga et al. (2018) emphasise that YouTube clips are available anytime and anywhere, they have high-quality showing content, and offer the potential of repeating, stopping, or completing at any other time. The main problem will be the pressure of learning very fast. One would remember that learners complemented the YouTube videos about this clarity and the voice of the child that is used to make sure that information is passed. Also, learners commented that YouTube videos are more precise than the chalkboard. To further Nziramasanga's argument from this research, educators from both schools had the pausing and the playing of the videos when teaching learners subtraction and addition of fractions. The feature of pausing and playing helps the educator to explain the essential parts of the lesson that the educators might think learners usually miss. Then for learners, it gives them the time to internalise what has been said from the video; if they missed a certain point they can rewind and get what is displayed. One would testify that repeating a video is not the same as asking a person to repeat it 3-4 times, but this becomes very easy for YouTube videos.

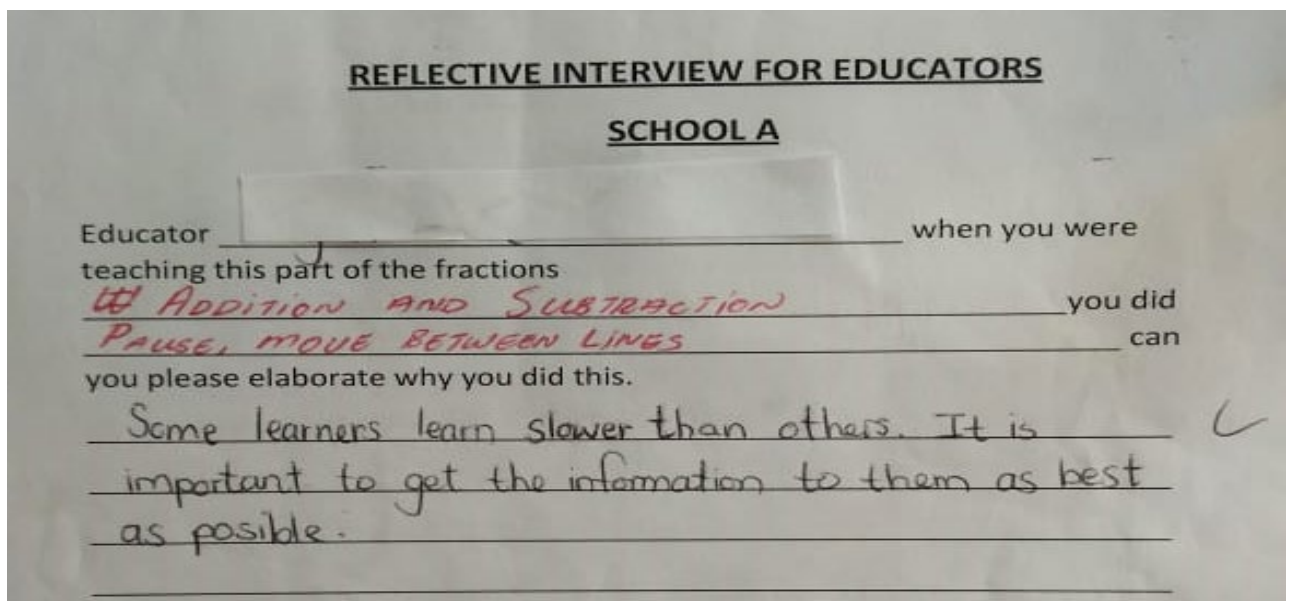
Figure 4a

**Pause and Play from school B**



**Pause and play from school A**

Figure 4b



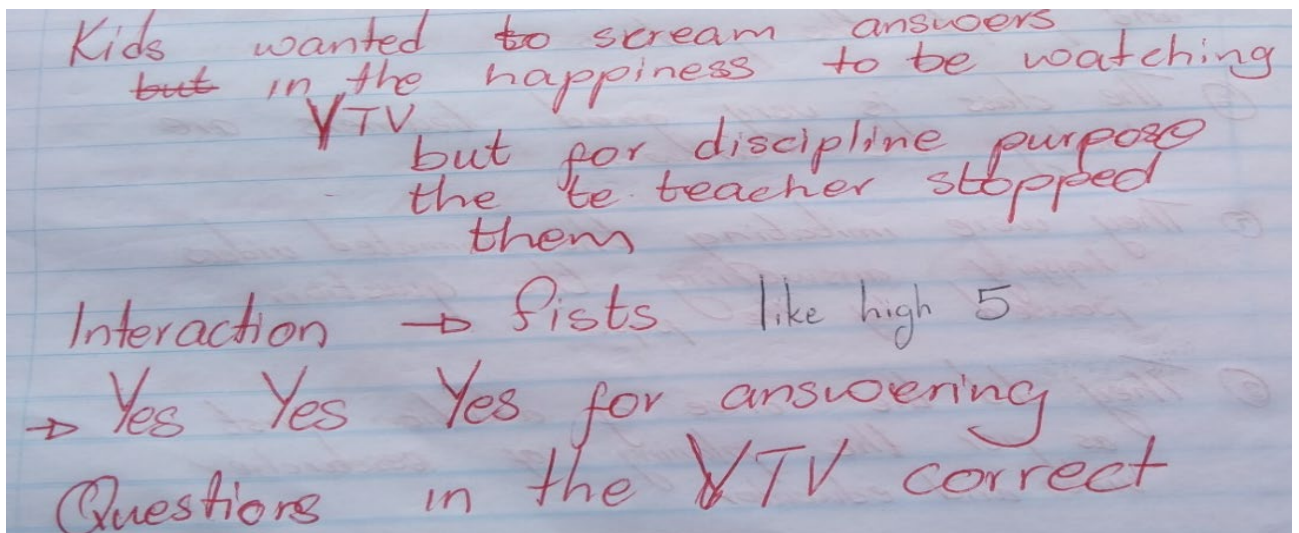
**Theme 4: Educator's interaction with learners**

Fennell and Karp (2017) state that learners are activated and stimulated by engaging in things that are more related to them. Through the data collected, it is evident that learners enjoyed

using technology; they watched the videos and answered the questions without the educator asking them to answer; this shows their love for the things like computers and televisions at home. According to Fennell and Karp (2017), these learners come from home knowing television, computers and cellular phones; what has to happen is to re-direct this energy into teaching and learning.

At some stage in the school, learners shouted answers in the happiness to show that they understood without being told to answer. Learners were very excited such a way that they made a noise, and the educator had to reprimand them not to make noise. The reprimanding was for discipline purposes, not for instructions. When the educator was asked during the reflective session, he said learners who are too excited could make you to go out of the planned activities, so he had to call them nicely into order.

Figure 5



**Theme 5: Educator's explanation of concepts.**

The explanation of concepts was often done during the pause moments, example educators in both schools stated that whenever they pause the YouTube videos, they want to do the following: Explain complex concepts, check the understanding, and confirm the understanding by posing some questions and ensure that learners still behave well.

Technological Pedagogical content Knowledge (TPCK) it is as conceived by Koehler & Mirsha (2008), has been researched extensively. They explained it as an understanding of strategies. Pedagogical content knowledge combines knowledge of activities (or strategies) and

knowledge of representations to facilitate learners learning. So, in this study specifically, this knowledge is the knowledge of teaching, knowing how to make learners learn, not only knowledge to the teacher about content but making learners understand that specific content. What was said by Koehler & Mirsha (2008) is now told by the two educators from different schools in the knowledge of learners, the knowledge of the needs of educators' learners. That is why the educators will pause and emphasise some of the concepts because they know that even though learners are happy for the YouTube videos, some concepts have to be explained in detail.

Figure 6

**REFLECTIVE INTERVIEW FOR EDUCATORS**

**SCHOOL A**

Educator \_\_\_\_\_ when you were teaching this part of the fractions \_\_\_\_\_ you did \_\_\_\_\_ can you please elaborate why you did this.

*AT ADDITION AND SUBTRACTION  
PAUSE, MOVE BETWEEN LINES*

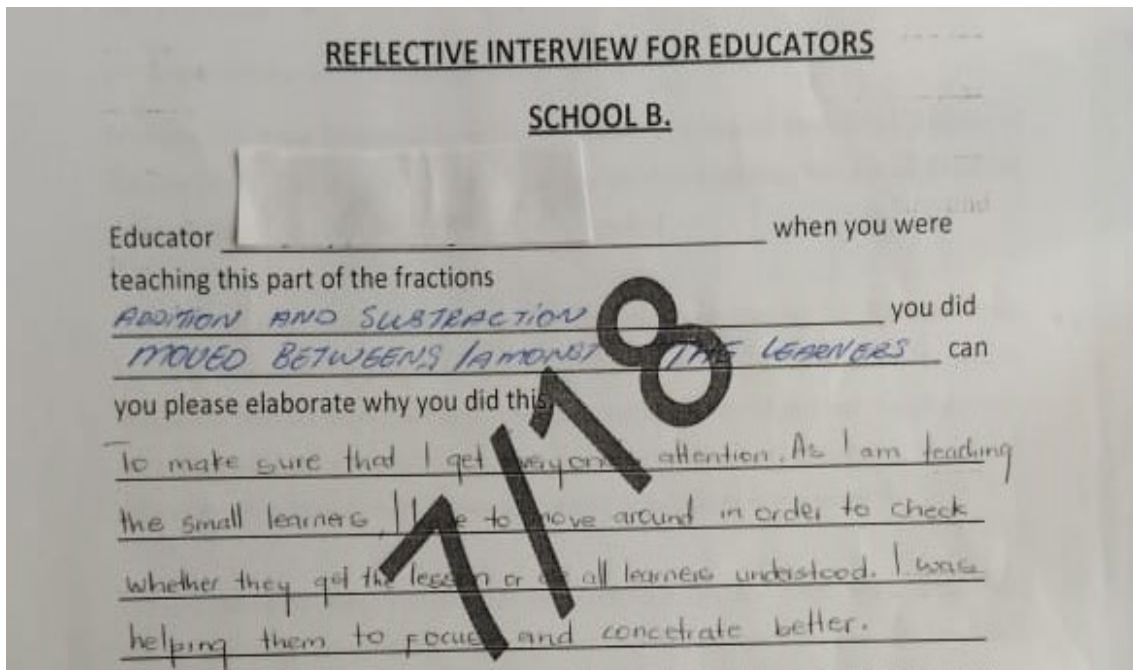
Some learners learn slower than others. It is important to get the information to them as best as possible. ✓

General recommendation on the use of the YouTube videos in teaching and learning of Mathematics in grade 4 or the rest of the grades ahead.

*(You) should prepare as thorough as you can, then it will be a good success. We are working with a new age of learners. We should look at the future and use this as a pillar to reach the learners full potential.* ✓

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Figure 7

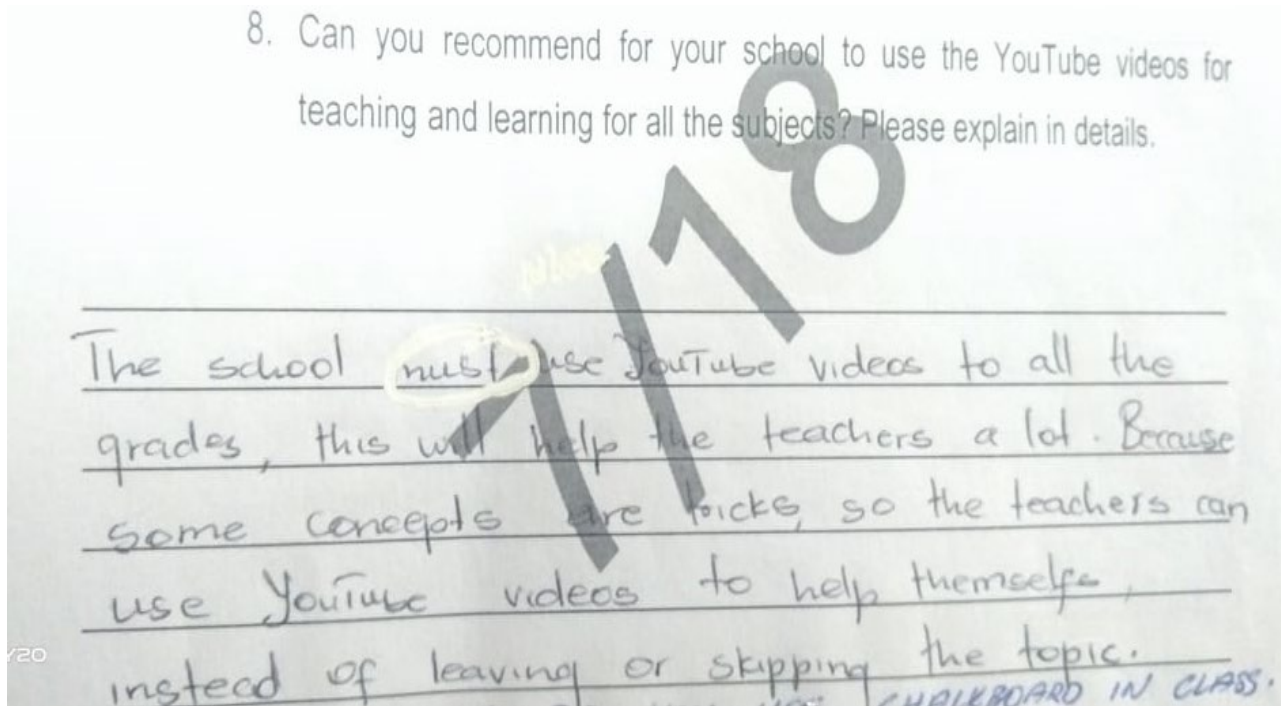


***Theme 6: A general feeling of Educators on the use of YouTube videos.***

Lipetz, (2020) have realised that social media can be used for educational purposes. According to Programme for International Student Assessment (PISA, 2017), the countries that have the best educational systems. These countries make use of social media; they use technology in most of the times. Technology through YouTube videos helps learners to be independent and problem solvers. On the other hand, Gbolahan (2017) emphasises the use of YouTube videos that makes the work of educators very easy because learners can do most of the things by themselves.

The two educators have indicated that they are happy with using YouTube videos in teaching and learning. This is due to the reason that YouTube videos make their lives in classrooms to be very easy and makes the learning process very easy and understanding very quickly.

Figure 8



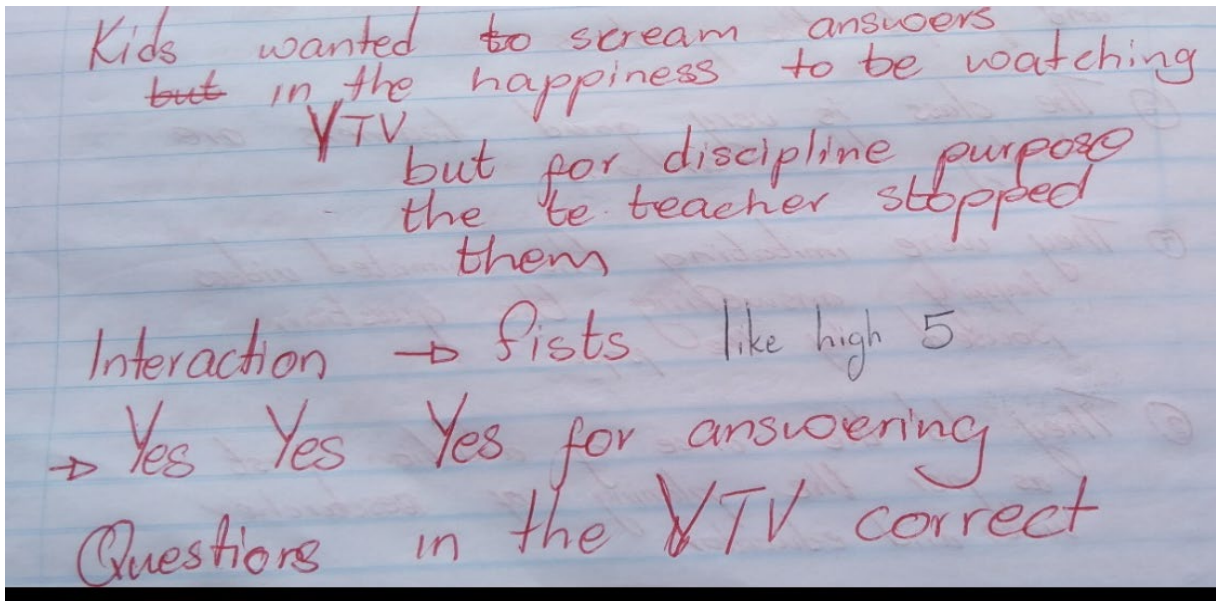
***PHASE 2: Analysis of data collected through observation using the learner worksheets (Activities of learners) and lesson reflection for learners.***

The following are the themes that emerged.

***Theme 1: Learners interact with the educator during the YouTube videos session***

It was evident during the data collection that learners were thrilled; the reader might have to remember that the educator in School A, many times, has tried to reprimand learners from shouting the correct answers; the educator was aware that they were enjoying but also making noise and for a normal class session this is perceived not to be right, learners are supposed to raise their hands and only then when they are picked they can tell the whole class their answer.

Figure 9

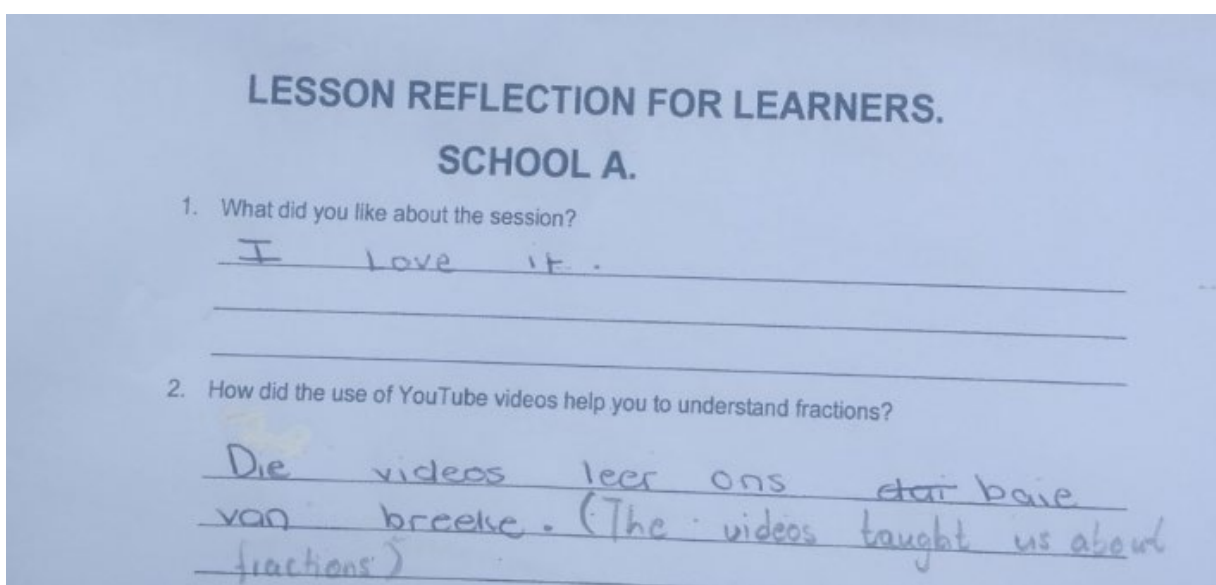


These notes taken from the researcher, where he was recording his observations clearly showed that learners could not be stopped from enjoying and learning through the use of YouTube videos.

### ***Theme 2: The preferred method of learning***

Zemmsky (2004) states that the learners engage in an unforgettable learning experience with various characteristics and several benefits for the educational process. The picture below shows the enjoyment and happiness showed by the learners learning through the use of YouTube videos.

Figure 10



YouTube videos must inspire learners by viewing encouraging messages. A small video can make a huge difference; learners can understand very quickly (as seen from both schools, a 2-3-minute clip has made learners get answers correct and even shout them). Sims (2019) states that videos can be used as breaks to charge the learner's energy; if they get breaks, they can better understand.

**Theme 3: The effectiveness of YouTube videos in teaching and learning**

Besides the enjoyment of the learners when they were shouting the correct answers, learners wrote tests based on addition and subtraction, and it has to be said that most learners did very well in the written test. In one instance, the educator from school A said there was a learner who did not usually say anything and did not get the answers right, but now that there was a YouTube session, that learner was participating, and she also passed.

Figure 11

Grade 4 Research Questions  
Addition and subtraction of Fractions of the same denominator  
From the Animated YouTube videos that you have watch answer the fo  
of same denominators.

	<p><b>Addition</b></p> $\frac{1}{4} + \frac{2}{4} = \frac{3}{4} \checkmark$ $= \frac{3}{4} \checkmark$	<p><b>Subtraction</b></p> $\frac{3}{4} - \frac{2}{4} = \frac{1}{4} \checkmark$ $= \frac{1}{4} \checkmark$
Final Answers		
	<p><b>Addition</b></p> $\frac{1}{6} + \frac{2}{6} = \frac{3}{6} \checkmark$ $= \frac{3}{6} \checkmark$	<p><b>Subtraction</b></p> $\frac{2}{6} - \frac{1}{6} = \frac{1}{6} \checkmark$ $= \frac{1}{6} \checkmark$
Final Answers		
	<p><b>Addition</b></p> $\frac{2}{5} + \frac{1}{5}$ $= \frac{2}{5} + \frac{1}{5} = \frac{3}{5} \checkmark$ $= \frac{3}{5} \checkmark$	<p><b>Subtraction</b></p> $\frac{2}{5} - \frac{1}{5}$ $= \frac{2}{5} - \frac{1}{5} = \frac{1}{5} \checkmark$ $= \frac{1}{5} \checkmark$
Final Answer		

The test above is a sample of many learners' difficulties in schools A + B. This shows the outstanding work that the learners do when learning through the help of YouTube videos.

**Theme 4: What made YouTube learning to be unique?**

Many learners from school A and school B stated that they loved YouTube video sessions because they are colourful; they use the voice of a child like them and use fascinating pictures.

Henseberry, Morre and Perkins (2015) state that YouTube clips snap students' attention by inserting sound clips of comedy or inspiring and motivating videos to the class while covering any particular topic.

Figure 12

**LESSON REFLECTION FOR LEARNERS.**  
**SCHOOL B.**

1. What did you like about the session?  
*Yes, a lot*
2. How did the use of YouTube videos help you to understand fractions?  
*It was faster*
3. What challenges did you come across during the lesson?  
*We can watch lots of cartoons,  
we do not do our homeworks*
4. Between using the YouTube videos and the chalkboard method which one do you prefer and why.  
*I prefer, YouTube. beacuses you  
can seach any they that you  
love.*

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The learners took the screenshot, and it is one of many research participants who were very happy about using YouTube videos in the learning process; this tool is called lesson reflection.

***Theme 5: Limitations to YouTube video sessions experienced by learners from schools A+B***

It is quite interesting to notice that although almost every participant was optimistic about using YouTube videos in teaching and learning, one participant indicated that the session went well; he liked everything about the YouTube session, but since the research is done in the Thabo Mofutsanyana district in the Free State Province in South Africa, which is often affected by load shedding, which leads to community protests. Clearly, this specific learner thought very critically hard about the issue of load shedding, pandemic and community protests. This is because in 2020, all the schools were not functional, learners had to sit at home, and academic activities stopped. And during the community protests, learners cannot continue with their studies.

## **CHAPTER 5**

### **SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS**

#### **5.1 INTRODUCTION**

This chapter presents the summary and conclusion derived from the study's conduct, which has the following title: *Exploring the use of YouTube videos in the teaching and learning fractions in grade 4*. This study will probe the following stakeholders: Learners to use YouTube videos in learning mathematics and other subjects, educators to use YouTube videos in teaching mathematics and other subjects, parents will be advised to allow their children to have cellular phones and use them for their academic purposes, schools will be advised to amend their cell phone policies because currently learners are not allowed to come to school with their cellular phones, and DoE will be advised to intensify the educator training for the use of technology in classrooms. This study also provides the recommendations that can be pursued to assist all stakeholders in education mentioned above and also the limitations of the study.

The study was conducted in Bethlehem schools; the first school is School A, which starts with grades 1 to 12. Thirty-seven (37) learners and one educator from this school participated. The second school B, 40 grade 4 learners and one educator participated. Both educators and their learners were selected using purposive sampling because the research, as stated above, focuses on grade 4 learners during the third term when fractions are done according to the Annual Teaching Plan 2020-2023. The study employed the qualitative approach; the following research tools were used to obtain data collected and analysed in the previous chapter: Reflection sessions for Educators, worksheets for learners (tests), and lesson observation for learners and thematic analysis was also used.

#### **5.2 SUMMARY OF FINDINGS**

The study findings were modified according to the problem statement mentioned in Chapter 1.

Educators continue to conduct lessons in grade 4 (fractions) using traditional teaching tools such as the chalk-and-talk method. At the same time, learners remain stacked in a passive role of being recipients of knowledge. The continued use of the chalk-and-talk method is influenced by educators experiencing a lack of support, development and inadequate access to technology

such as YouTube videos. Lastly the basic reliance to the chalk and talk method has taken over other methods such as technology (Thornton, 2017).

The findings of this research indicate that educators from both schools are very optimistic about using YouTube videos as a teaching platform to teach learners in regular classrooms. The analysis has deeply shown that educators love the use of YouTube videos in teaching learners. Both have stated that learners need to be exposed to the use of YouTube videos as these videos make learners understand very fast and thus make their work as educators very easy. On the other hand, the data collected in Chapter 4 reveals that educators do not want the complete abolishment of the chalkboard because they are more used to it. It helps them explain more complex information to the learners. Furthermore, educators also explained that their learners love using gadgets, so they have to use the resources they enjoy most. According to Programme for International Student Assessment (PISA) (2017), the western countries have the best educational systems e.g. Finland, Singapore and China. These countries make use of social media; they use technology many times. Because technology through YouTube videos helps learners to be independent and problem solvers. On the other hand, Gbolahan (2017) emphasises the use of YouTube videos that makes the work of educators very easy because learners can do most of the things by themselves. Still this study has shown that two educators during data collection they were not teaching but supervising.

Both educators have commonly stated their experience with using YouTube videos in teaching and learning. The other educator had zero experience in teaching with YouTube videos. She coped very well because she received the YouTube training a day before the actual session, but in the end, she was pleased to be teaching learners something they enjoyed and understood very fast. On the other hand, the other educator was much more experienced because he taught for five years in a private school where YouTube videos are used daily. This educator was very happy at the end of the session; this educator also stated that there is a learner who hardly writes or says anything in the classroom. On that day of the research (data collection), the learner answered questions correctly and was very happy. This simply shows that educators and learners, enjoys the use of YouTube videos.

Learners from both schools were pleased to encounter the use of YouTube videos in school; one would remember that our learners at home enjoy using cellular phones. It is clear from the data collected those learners most of them from schools A and B liked doing fractions with the aid of YouTube videos; on the last 30 minutes of two periods during the lesson reflection

majority of learners from both schools indicated that they loved YouTube videos because of the colours they show, the voice of the child that is used to explain complicated concepts and the animated video itself. They indicated that such videos are relevant to them.

Fennell and Karp (2017) state that learners are activated and stimulated by YouTube videos because from YouTube videos they get fast and effective information compared to reading the long text of information (for example, learner's games and mine-craft, the mother cooking cleaning stains techniques mostly come from YouTube videos).

Through the data collected, it is evident that learners enjoy using technology; they watched the videos and answered the questions without the educator asking them to answer; this shows their love for things like computers and televisions at home. According to Fennell and Karp (2017), these learners come from home knowing television, computers, and cellular phones; what has to happen is to re-Direct this energy into teaching and learning.

### **5.3 CONCLUSIONS**

The purpose of this study was to collect data from two educators in different schools and their mathematics learners of grade 4 to explore the use of YouTube videos in teaching and learning of fractions. This study revealed that despite their diverse backgrounds, educators liked using YouTube videos in teaching and learning. It also revealed that even though they liked videos to help them teach mathematics, they preferred not to let go of their traditional method chalkboard.

It is also evident from the collected data that learners are delighted to use YouTube videos in learning fractions in grade 4. The findings from both schools, learners revealed that those 27+40 learners were pleased to use YouTube videos in learning. Furthermore, these learners revealed that what they enjoyed the most was that their selected YouTube videos used the following: the learner's voice to explain to them, animated pictures, and colourful videos and lastly, they like the pause and play moments in this study since it gives them the multiply replay time to understand. Videos are very short, colourful and uses the child's voice to explain difficult concepts and therefore interesting. It was revealed that one participant complained that they spend much time on the gadgets, and these gadgets somehow make them not pay much attention to important things like their grammar and spelling errors as the technology fixes these for them.

This study revealed that educators need training based on using YouTube videos and training to manipulate technological devices such as laptops, desktop computers, tablets and even cellular phones. And this YouTube videos and technologies involved, they are not to replace the chalkboard but to support it in order to accommodate the fourth industrial revolution learners.

#### **5.4 LIMITATION TO THE STUDY**

The study is all about the use of YouTube videos in teaching and learning. The study is conducted in 2020 to 2023. In these times in South Africa, it is the times of load shedding (The no electricity time) and it goes on for intervals of two-four hours for three times a day.

The teaching and learning is affected negatively by this common factor. Beside the common problem that South Africa is having.

According to DoE (2020) here are other additional limitations to YouTube videos relevant to teaching and learning.

- Inappropriate content also uploaded.
- Not easy to concentrate on a single topic.
- Learners sometimes without the help of teacher they get lost on what to watch.

#### **5.5 RECOMMENDATIONS**

This study revealed the effectiveness of YouTube videos in teaching and learning Mathematics for all grades starting from grade 4 to higher education. The intention of the study was not to remove the use of chalkboards but to aid the chalkboard because it was clear from this study that learners love to use YouTube videos instead of the chalkboard. These learners find themselves in this because of the Fourth Industrial Revolution (4IR). In this regard, the following recommendations are hereby presented.

**Educator Training:** It is evident that educators become reluctant to use the available resources of technologies available in schools because they have limited knowledge from the teacher training institution based on technology. Even our schools, in most cases the township and the government schools, do not use YouTube videos. Their most-trusted teaching method is using chalkboard, not because they want to, but because that is what has been done for years and can hardly be changed easily.

**Implementation of Educator Training:** The DoE would win this war on technology illiteracy if:

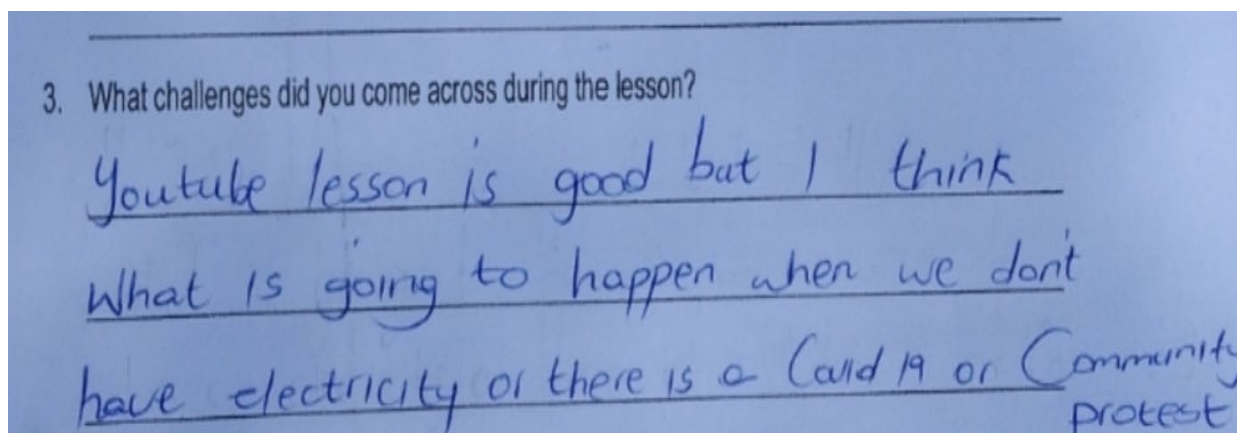
1. They can kindly monitor the mathematics laboratories to watch the functionality of mathematics laboratories they have made for the schools.
2. Establish a strong relationship amongst the universities and other educator training institutions, to intensify the seriousness of how to teach using technology.
3. School Management Teams could intensify their efforts to ensure that all what the DoE has planned on using technology is manifested accordingly. This can be done by creating internal policies and monitoring tools to ensure that technological resources are utilised as intended.
4. The DoE could encourage educators through staff development educators could empower themselves by knowing how to manipulate technological resources.
5. According to the findings of this study, it is evident that learners, after all the processes, will be actively waiting to receive help from their educators.

**The teaching and learning (T&L) using YouTube videos:** It is evident that learners are waiting for the DoE and all directly involved stakeholders to make technology happen in schools; once this is done, learners are more likely to be ready to use gadgets to learn.

**Implementation of T&L using YouTube videos:** Educators could use the opportunities presented to them by the DoE as these helps learners to use in learning something they really love. Learners will be ready to accept the teachings based on YouTube videos because the learners are very active members of the Fourth Industrial Revolution (4IR).

It is with a with a kind request for future studies to emerge and supplement and intensify the usefulness of the use of YouTube videos in teaching and learning because the generation of learners today and the world entirely uses YouTube videos (technology) to support educators.

Figure 13



To the problems posed by the participant above regarding electricity, community protests, and country lockdown.

Implementation: It is quite clear this is a more significant problem, but learners should do the following while trying to learn during these challenging times:

- Save the YouTube videos so they can still work offline when the electricity is off.
- Download the videos.
- Save the conversation they did have with their educators.
- Ensure at all times that their cell phones batteries are fully charged.
- Use their cellular phones mainly for educational purposes.
- Ensure they have the power banks to sustain their educational purposes while electricity is off.

Bonk (2017) states that educators should be able to download the videos so that they can function well when the electricity is off, and they can use their gadgets; educators should also be conversant with the policies that guide these videos meaning they should check this videos along with the Department of Education Annual Teaching Plan 2020-2023. To localise this problem in South Africa, we often experience load shedding (no electricity time), so the downloaded videos will help.

Chapter 3 shows that technology is also used in higher education at all times and which helped them to cope during covid 19 in 2020: **In Ghana** also had problems in education, but to solve this problem, they have resorted to the use of technologies, an example is the University of

Ghana that implemented the e-learning. It was easier to do in Universities than in basic education (Anaba, 2020; Ashesi University, 2020).

This research was all about the use of YouTube videos in teaching and learning so that South African learners can be supported if any unforeseen circumstances like pandemic can occur. If the face-to-face contact session are not possible the online, self-directed and dependent learning can still happen.

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7.1 Annexure A



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13 March 2022

APPLICATION FOR TITLE REGISTRATION


**Applicant:** Tsoela, MB  
**Student Number:** 2012092744  
**Discipline:** Curriculum Studies  
**Study Code:** Masters' (EDCI8900)

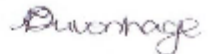
Dear Mr Tsoela

*Your registered title is as follows: "Exploring the use of YouTube videos in the teaching and learning of fractions in grade 4"*

All of the best with your studies.

Yours sincerely,

  
Prof Patrick Mafora  
Chair: CTR committee

  
Ms CS Duvnhage  
Secretary: CTR committee

## 7.2 Annexure B



### GENERAL/HUMAN RESEARCH ETHICS COMMITTEE (GHREC)

01-Sep-2022

Dear Mr Mokgasi Tsoela

#### Application Approved

Research Project Title:

**Exploring the use of YouTube videos in the teaching and learning of fractions in grade 4.**

Ethical Clearance number:

**UFS-HSD2022/0436/22**

We are pleased to inform you that your application for ethical clearance has been approved. Your ethical clearance is valid for twelve (12) months from the date of issue. We request that any changes that may take place during the course of your study/research project be submitted to the ethics office to ensure ethical transparency. Furthermore, you are requested to submit the final report of your study/research project to the ethics office. Should you require more time to complete this research, please apply for an extension. Thank you for submitting your proposal for ethical clearance; we wish you the best of luck and success with your research.

We strongly recommend that you do another revision for spelling, grammar etc editing on the information and consent documentation. There are still several issues.

Yours sincerely

**Dr Adri Du Plessis**

**Chairperson: General/Human Research Ethics Committee**

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7.3 Annexure C



**REFLECTIVE INTERVIEW FOR EDUCATORS**

**SCHOOL B.**

Educator \_\_\_\_\_ when you were  
teaching this part of the fractions  
\_\_\_\_\_ you did  
\_\_\_\_\_ can  
you please elaborate why you did this.

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General Recommendation on the use of the YouTube videos in teaching and learning of Mathematics in grade 4 or the rest of the grades ahead.

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*Principal Researcher: Benjamine Mokgasi Tsoela 2012092744 Cell: 063 178 8118  
Supervised by: Dr Nkosinathi Mpalami 078 678 1125 University of the Free State Qwaqwa Campus,  
Office: 1029, Kgorong Education Building.*

Grade 4 Research Questions

Addition and subtraction of Fractions of the same denominator

From the Animated YouTube videos that you have watch answer the following additions of fractions of same denominators.

	Addition	Subtraction
	$\frac{1}{4} + \frac{2}{4}$ = =	$\frac{1}{4} - \frac{1}{4}$ = =
Final Answers		

	Addition	Subtraction
	$\frac{1}{6} + \frac{2}{6}$ = =	$\frac{1}{6} - \frac{1}{6}$ = =
Final Answers		

	Addition	Subtraction
	$\frac{2}{5} + \frac{1}{5}$ = =	$\frac{2}{5} - \frac{1}{5}$ = =
Final Answer		

Principal Researcher: Benjamine Mokgesi Tsonela 2012092744 Cell: 063 178 8318  
 Supervised by: Dr Nkosinathi Mpolami 078 678 1125 University of the Free State Qwa-qwa Campus,  
 Office-1070, Kanyo Education Building



# LESSON REFLECTION FOR LEARNERS.

## SCHOOL B.

1. What did you like about the session?

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2. How did the use of YouTube videos help you to understand fractions?

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3. What challenges did you come across during the lesson?

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4. Between using the YouTube videos and the chalkboard method which one do you prefer and why.

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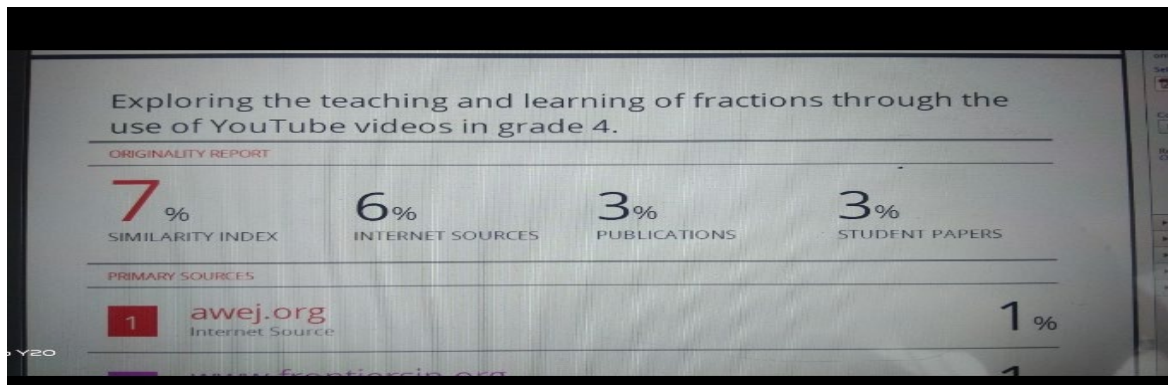
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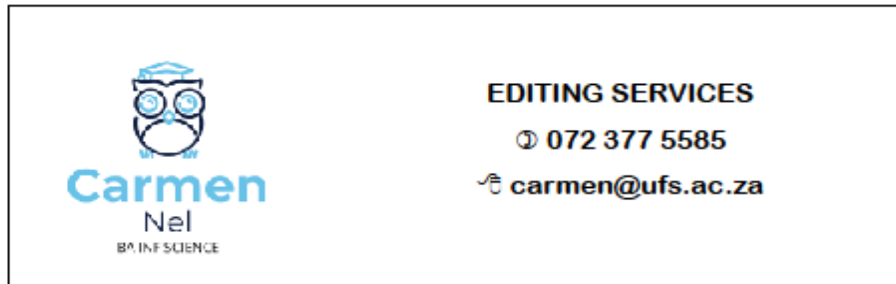
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## Annexure D



Annexure E



**CERTIFICATE OF EDITING**

This letter certifies that I have edited the work detailed below for language, as well as technically.

**Title:**

Exploring the use of YouTube videos in the teaching and learning of fractions in grade 4.

**Author:**

Mr Mokgasi Benjamine Tsoaela  
Student no. 2012092744

Regards

Carmen Nel

27 November 2022

Professional editing of articles, thesis, dissertations and books