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UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Constructing Knowledge is More Complex: Opposing the Uncritical Adoption of Pop Psychological Fads and Neuromyths in Education among teachers in private schools in Midrand, South Africa

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A thesis submitted for the fulfilment of the requirements of the degree of Doctor of Philosophy in Education in the Wits School of Education, Faculty of Humanities, at the University of Witwatersrand

APRIL 2025

DECLARATION

As Lizanne Leslie Jacob, I am aware of and agree that plagiarism is unacceptable. As a result, I hereby certify that: This PhD thesis is all my own original work.

All direct quotations and ideas/content that I have paraphrased have been properly credited. Furthermore, in compliance with the APA citing style, I have included an exhaustive, alphabetized list of references.

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Signed: 

Date: 06/4/2025

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ABSTRACT

This study examined the rise of pop psychological fads and neuromyths within education, which are false or misleading beliefs that lack scientific validation but are widely adopted. Pop psychology often offers quick solutions to complex problems, while neuromyths—misunderstandings about brain function—have become prevalent in educational practices. Teachers may also resort to these unproven concepts due to a lack of understanding of the complexities of learning, leading to ineffective teaching strategies. Although these beliefs may seem appealing, they can waste resources and time, and their uncritical adoption in classrooms can hinder evidence-based teaching methods and ultimately harm student learning outcomes. The study highlights the importance of moving beyond these myths to embrace more scientifically supported approaches in education. However, there is dearth of literature in South African context regarding adoption of neuromyths and fads among teachers, and this is the research gap that was filled by this PhD study.

This study aimed to investigate adoption of Pop Psychological Fads and Neuromyths in Education among teachers in private schools in Midrand, South Africa. The study was informed by two theories, Feuerstein's Mediated Learning Experience Theory and the Constructivist Learning Theory. Within an interpretivist paradigm, the study adopted a qualitative research methodology, and a multiple case study design was utilized. Data was collected from four private schools in Midrand, Gauteng, South Africa. The study sample size comprised 20 trained professional teachers from four private schools in Midrand, South Africa, with five teachers selected from each school. The teachers were chosen using purposive sampling method. Semi-structured interviews were used as tools to gather data. The four criteria—credibility, dependability, confirmability, and transferability—ensured the reliability and validity of qualitative data. Thematic framework was used to analyse the qualitative data from interviews.

The study findings indicated that many teachers, despite being aware of prevalent neuromyths like the left brain-right brain myth and learning styles, continue to incorporate these misconceptions into their teaching practices. The findings also reported that teachers gather knowledge from a range of sources, including professional development, media, and peer discussions, but often fail to critically evaluate the credibility of this information. Thus, many teachers believe in fads and neuromyths about learning and brain function, despite evidence against this. The findings also indicated that teachers acquired these fads from sources like professional development seminars and media. The study concluded that misinformation-based

strategies often do not improve learning outcomes compared to scientifically validated methods, emphasizing the importance of critical thinking and evidence-based decision-making. The study further concluded that many teachers, despite being aware of prevalent neuromyths, still incorporate these misconceptions into their teaching, often due to a lack of critical evaluation of the sources of information they encounter. The study findings have led to the development of framework for continuous professional development to help address misconceptions from neuromyths and fads, which aims to help teachers critically assess and eliminate unscientific practices, fostering a culture of evidence-based teaching to improve student outcomes.

Keywords: *educational fads, educational policies, neuromyths, professional development, teacher beliefs.*

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CHAPTER ONE

1.0: OVERALL INTRODUCTION

1.1: Introduction

In contemporary society, there is a growing prevalence of beliefs and practices that, while widely accepted, are unsupported by scientific evidence. These include phenomena such as "fake news" and, within the educational realm, often known to as pop psychological fads and neuromyths. The latter, often adopted by educators, have significant implications for teaching and learning, despite being largely based on misconceptions about psychology and brain function. Similarly, neuromyths are misconceptions about brain function, particularly within education, that have been widely disseminated despite being unsupported by neuroscience. Thus, pop psychological fads and neuromyths often find their way into educational practices, influencing teaching strategies and policy decisions in ways that may be counterproductive or harmful. Pop psychological fads are psychological ideologies that gain popularity due to societal trends, offering simplistic solutions to complex issues without scientific validation. This chapter introduces the issue of pop psychological fads and neuromyths in education, outlining the scope of the problem and presenting the rationale for addressing these misconceptions in the South African educational context.

1.2: Background of the study

There are certain beliefs that are not true, but which people adopt and perceive to be true. The range of such untrue beliefs, which include the contemporary phenomenon called "fake news", is staggering and consequently it is necessary to circumscribe the scope of the "untrue beliefs" which can be addressed. To this end, the PhD thesis is concerned with the phenomenon of pop psychological fads and neuromyths which have gained prevalence in contemporary educational discourse. Consequently, for the purpose of the research "pop psychological fads" was restricted to a term used for any psychological ideology that has gained popularity, however, its approaches are often distinguished by an emphasis of societal trends in popular culture, on feelings and personal techniques and therefore may not obtain any scientific research to validate whether the claims are supported by concrete evidence. Pop psychology concepts are used as a quick fix to solve difficult problems. According to Griffiths (1995, p. 455), "[a]s more people become aware of the ideas and theories of 'pop' psychology, it becomes not simply a part of cultural change but a catalyst for social change in itself… Another reason pop

psychology has prospered is because it offers assurances as to how we can live our lives and/or it provides an analysis of social reality."

"Neuromyths are false beliefs, often associated with education and learning, that stem from misconceptions or misunderstandings about brain function" (Betts, Miller, Tokuhama-Espinosa, Shewokis, Anderson, Borja, & Dekker, 2019, p. 5). Neuromyths are also the misconceptions generated by a misunderstanding to make sense of the way the brain is used. Neuromyths in education have grown over the years raising theoretical and pragmatic concerns (Pasquinelli, 2012, p. 89). Unfortunately, these fads and neuromyths are often invoked and and/or adopted by teachers as a way of dealing with the difficulties and complexity of the process of learning. One of the reasons for such adoption by teachers is because they have not moved beyond the behaviourist notion of learning and generally pay lip service to the idea of constructivism. While both approaches to learning may aid teachers to gain some insight into learning, the complexity of the process of learning still evades them and consequently they tend to resort to the various fads and neuromyths to make up for their lack of understanding of the complexities of the process of learning.

Although numerous neuromyths have greatly influenced teachers' understanding of learning and even their practice, there are numerous critics of the uncritical use of such neuromyths in education. According to Dekker, Lee, Howard-Jones and Jolles (2012, p. 1), "[t]he influence of these myths in the classroom is problematic because it wastes money, time, and effort, which could be better spent on the development of evidence-based practices". Therefore, teachers spend more time investing in the tasks related to these fads and neuromyths and less time on what students need to do to learn successfully in classrooms. In addition, in applying the 'neuromyths' in their classroom practice, teachers may not understand or even implement them correctly. In support of this contention Dekker, Lee, Howard-Jones and Jolles (2012) contend "[w]hen teachers are eager to implement neuroscientific findings but lack expertise in neuroscience and seek quick and easy solutions, they fail to recognize misconceptions" (p. 6). In other words, teachers may not be appropriately trained to implement such 'neuromyths' in the classroom, they are not equipped enough with the findings and practice of these 'neuromyths' to reduce misunderstandings (Dekker, Lee, Howard-Jones & Jolles, 2012, p. 1).

However, some teachers "might promote the circulation of myths and spread their ideas to teachers who are less engaged and acknowledged with brain research" (Dekker, Lee, Howard-Jones & Jolles, 2012, p. 1). There are teachers who may believe that students learn better when

they receive information in their preferred learning styles, for example: auditory, visual, and kinesthetic learning styles. Teachers also believe that the classroom setting is important as it affects the teaching and learning practices there in. For example, teachers may group learners because they believe that they would learn better when working with others, while some teachers prefer students to work on their own because it avoids distraction/ interruption, and this helps the student gain independence. Teachers also tend to adopt the idea of different learning styles. For example, some teachers are more practical in their lessons; other teachers only focus on the theory/content that needs to be covered; and still others adopt both strategies. Consequently, as Franklin (2006, p. 86) stated, "[i]t is crucial that teachers understand the processes of learning, in which language, inter- and intra-action, collaborative activity and using effective visual images, play an essential role. Of course, every individual is different, with different strengths, abilities and areas of difficulty. All the more reason to understand the learning processes, rather than label our pupils".

Krammer, Vogel and Grabner (2021, p. 54) asserted that "[n]euromyths have been discussed to detrimentally affect educational practice". They further opined that "the negative impact of neuromyths might be a neuromyth itself" (Krammer, Vogel & Grabner, 2021, p.54). In the study by Krammer, Vogel and Grabner (2021, p. 59), the findings suggested that students who believe the neuromyth that learning will solve brain-related learning issues do worse in their academic pursuits. In addition, whether or not these beliefs in neuromyths have an impact on practice, they should be reduced because they are in opposition to an evidence-based approach in learning. When teachers implement their beliefs of neuromyths into their teaching practices, they may not be adequately serving the academic needs of the students. In as much as neuroscience in education seeks to enhance learning, there appears to be lack of evidence in addressing the effect of belief on instruction and learning for many of these neuromyths. As we've shown above, accepting some neuromyths could have detrimental effects in the classroom.

According to a study conducted in Canada by Rousseau (2021, p. 1), "due to fatal mutations from kernels of truth, neuromyths are typically defined as distortions, oversimplifications, or abusive extrapolations of well-established neuroscientific facts". They further opined that given that neuromyths are erroneous extrapolations/oversimplifications of accepted neuroscience information, it is not unexpected that the authors of neuromyth surveys consistently propose neuroscience training as the best method for destroying them. The association between support for general knowledge (or "neuro-hits") assertions about the brain

and learning and support for "neuromyth" statements has been observed by authors of numerous published surveys. According to Grospietsch and Mayer (2019), the mere exposure to a neuroscience course merely indirectly exposes neuromyths to neuroscience information because they are firmly ingrained in personal belief systems. Explicitly demonstrating how current neuroscience knowledge conflicts with neuromyths is a crucial component of effective debunking. This is the fundamental tenet of interventions based on refutation (Rousseau, 2021, p. 3). Teachers have some, albeit "modest" defense against neuromyths because they have studied multiple brain-related or neuroscience courses in undergrad. To dispel neuromyths, teachers require adequate teacher training about the brain and neuroscience. Because teachers simply use what they have learned or have been persuaded will help their teaching practice, teachers are not to blame for their belief in neuromyths.

Coltheart and McArthur (2012, p. 215) suggested that "[t]here exists a plethora of commercial products that are claimed to be of assistance for children with educational difficulties, especially 'learning disabilities. Typically, these products are claimed by their originators to be based on something neuroscientific, or at least to be 'inspired' by neuroscience'. Coltheart and McArthur (2012) further asserted that many of these programmes have no real connection to neuroscience or only a weak one. However, neither parents nor even teachers are qualified to assess the relative advantages of such programmes or determine whether or not the fervent claims of efficacy made by the programme vendors are supported by the evidence. Moreover, Coltheart and McArthur (2012, p. 219), conclude that if the claim that neuroscience has nothing to say about education is true, then there are several parts of teacher preparation that should scare us since trainee teachers are given a totally different impression. A study of 158 recent graduates of teacher training who were ready to attend secondary schools was published by Howard-Jones (2011) in the UK. The study reported that 20% of teachers thought that if they drank fewer than six to eight glasses of water per day, their brains would shrink; 65% thought that physical coordination exercises could enhance the integration of left- and right-hemisphere functions; and 28% thought that studies of brain function supported the idea that teaching kids according to their preferred learning style could improve learning outcomes. Thus, teachers are not to be blamed for their beliefs in neuromyths and they only practice what they have learnt or are told that would benefit their teaching practice.

Rousseau (2021) also postulated that there is currently no evidence to support a causal relationship between educators' beliefs in neuromyths and the adoption of subpar teaching practices and/or a detrimental effect on students' academic achievement, despite the fact that

the high prevalence of neuromyth beliefs in educational settings poses a threat to the "evidence-based" movement in education. Although concrete evidence of the detrimental impacts of neuromyth beliefs on instruction may not yet exist, neuromyths already have an impact on educational practices, which may result in the wasteful spending of resources and money. Rogers and Cheung (2022, p. 206) asserted that "[f]ew would contest that teacher training programs should promote evidence-based teaching and learning practices. However, a number of recent studies, across a wide range of educational contexts, have provided firm evidence that teachers often possess poor educational literacy regarding effective teaching and learning practices". As a result, Rogers and Cheung (2022) suggested that it's critical to stand back and assess the extent to which teacher education programmes accomplish their goal of encouraging practices that are consistent with the science of learning.

According to Rogers and Cheung (2022), teachers from a wide range of educational contexts and experiences frequently embrace learning myths like learning styles as being true to a high degree. Concerningly, several research have gone further and discovered that the surveyed teachers also stated they commonly use these myths as a general guideline in their instructional practice. In addition, Rogers and Cheung (2022), asserted that studies that investigated the origins of these myths found that the participants cited a variety of sources, including the popular media, formal teacher training, and other professional training events, like conferences, as the cause of their belief in these myths. This is concerning because formal teacher training and other professional training events, like conferences, are important venues for professional development. Rogers and Cheung (2022) concluded that a bigger issue in assessing the extent to which evidence-based programmes are indeed evidence-based considering the high-profile nature of the university and its emphasis on evidence-based teaching and learning. They opined "[d]espite lip-service to evidence-based teaching and learning, myths and misconceptions may continue to be broadly promoted among teacher training programs" (Rogers & Cheung, 2022, p. 212). The findings presented in their study suggests that, at least in the specific setting in which this study was conducted, a teacher training programme does not have a positive impact on students' comprehension of successful teaching and learning practices. The study concluded that an extensive, concentrated effort may be required to eliminate course materials that overtly promote educational myths, overhaul curriculum, and, most importantly, re-train faculty, given worries that even teacher education programmes may not have the faculty to implement such reform (Rogers & Cheung, 2022).

There have been very limited studies conducted in South Africa regarding teachers understanding and practices of neuromyths in their teaching. Most recently, du Buisson-Narsai, Fisher, Morris and van Lill, et al., (2024) study in South Africa suggested that proactive attempts should be made to the advancement of the field of applied organizational neuroscience. However, there seems to be dearth of literature in area of fads and neuromyths among teachers, thus, to bolster the body of knowledge, this study would enhance the foundation of understanding teachers use of neuromyths and the emergence of their beliefs in South Africa.

1.3 Problem Statement

Previous research studies have indicated that there are various fads and neuromyths adopted uncritically in the education system today. The problem is that fads and neuromyths are not a long-term solution for teachers because learning is more complex than what is viewed at surface level since it involves various aspects such as comprehension skills, attention, memory, processing and organising, writing skills, and logical thinking. Learning is the process of making sense of and using new information and experiences. Children learn when they make connections between the experiences and knowledge they already have and new information they encounter, children learn from doing by active participation. However, teachers who experience difficulties in the teaching and learning process tend to adopt various fads and neuromyths to deal with the difficulties they experience in the classroom. Part of the difficulty they experience is due to fact that they have not grasped fully the complexity of the learning process and the role of teaching in that process. Teachers that adhere to these neuromyths use unsuitable learning practises. Due to teachers' misconceptions and incorrect beliefs about neuromyths, their medium of instruction is hampered when teaching, which is a serious worry in the teaching and learning environment.

This study adopts a qualitative research methodology, which is well-suited for exploring teachers' interpretations of their experiences and instructional practices. According to Merriam and Tisdell (2015), qualitative research aims to understand how individuals construct meaning from their experiences. Furthermore, Pathak, Jena, and Kalra (2013) emphasize that qualitative research adds a valuable dimension to interventional studies beyond quantitative measurement. Through online interviews, this study gathers in-depth insights from teachers who implement fads and neuromyths in their teaching practices, assessing their perceived effectiveness and

impact. This approach ensures flexibility in addressing research questions and enables a more intensive analysis of the collected data.

A multiple case study design was chosen for this research, allowing for an in-depth investigation of the phenomenon across multiple private schools. Merriam and Tisdell (2015) define multiple case studies as an approach that examines several cases to explore a broader phenomenon, population, or general condition. This study focuses on four private schools in Midrand, Gauteng Province, South Africa, addressing a gap in research regarding the prevalence and impact of pop-psychological fads and neuromyths in private schools. The case study approach provides a rich, contextual understanding of teachers' experiences, offering detailed descriptions and insights grounded in real-world settings (Lincoln & Guba, 1981).

This study is guided by two theoretical perspectives: Feuerstein's Mediated Learning Experience (MLE) Theory and the Constructivist Learning Theory. Feuerstein's MLE Theory emphasizes the role of mediation in shaping students' cognitive development, arguing that learning occurs through meaningful interactions with a knowledgeable mediator, such as a teacher. The Constructivist Learning Theory, on the other hand, posits that learners actively construct knowledge by integrating new information with their prior experiences. These theories provide a foundational lens for analyzing how teachers' misconceptions about learning influence their instructional approaches and the extent to which neuromyths shape their pedagogical decisions. By applying these frameworks, the study seeks to explore the relationship between teachers' instructional practices, their understanding of learning, and the role of fads and neuromyths in education.

This integrated approach strengthens the study by linking the problem statement to the research methodology and theoretical underpinnings, ensuring a comprehensive examination of the issue.

1.4: Rationale of the Study

The study of 'Constructing Knowledge is More Complex: Opposing the Uncritical Adoption of Pop Psychological Fads and Neuromyths in Education' is crucial because all the fads and neuromyths intend to give the pretence that life is easy, that learning is easy and that all that are required is an appropriate mindset or orientation to the world. However, this is not the case because in life we always experience difficulties and challenges (Bellert & Graham, 2013). Many theorists try to individualise problems and difficulties without taking cognisance of the

fact that most of the problems exist external to the individuals' reality and these are mostly not of our making because we are born into a social world with already existing rules and therefore ultimately lack the ability to change demands of the external world (Feuerstein, 1990). The research was necessary to educate South African teachers, who may unknowingly employ incorrect teaching methods due to their belief that implementing neuromyths would improve their instructional approaches (Kim & Sankey, 2018). Teachers in South Africa need to be made aware that the sources from which they derive these beliefs must be grounded in substantial evidence, rather than relying on inaccurate information from media sources (Grospietsch & Mayer, 2019). The study also has practical implications for teacher education, as they need to be trained and obtain concrete knowledge of the implications in implementing neuromyths into their teaching practices (Redifer &Jackola, 2022). Findings on an enhanced understanding of neuroscience would enable teachers to distinguish between scientifically supported facts and neuromyths, fostering more effective teaching approaches in the classroom (Kim & Sankey, 2018).

Thus, this PhD study contributes to new knowledge in Psychology of Education because there is limited research on neuromyths among teachers in South Africa. Moreover, most teachers and education practitioners have had little engagement with information about the brain as provided in previous research, thus this research has vast implications for neuroscience research in education. In addition, the findings from this PhD study would assist to enhance teachers' literacy on neuroscience, neuromyths, brain structure, and the understanding of functionality of the brain (Feuerstein, 1990). Furthermore, the findings from this PhD study helped to develop a framework to the teachers for the provision of knowledge of concepts and processes in neuroscience to inoculate against future neuromyths (Grospeitsch & Mayer, 2019). The framework which emanated from the findings of this PhD study provided insight to teachers on the working and development of the brain which would further provide them with responsive teaching practices in the classrooms (Kim & Sankey, 2018). Finally, the framework would help to shape the teachers understanding of their thoughts about the brain and how this would inform their teaching practices in schools (Redifer & Jackola, 2022).

1.5: Aim of the Study

This study aimed to identify the various major fads and neuromyths which have emerged during the twentieth century. In addition, the study sought to establish the extent to which the fads and neuromyths are incorporated into educational polices and concomitantly, into

classroom practice by teachers in private schools in Midrand, South Africa. Moreover, the study examined teachers' awareness of the various fads and neuromyths, what influences their belief of fads and neuromyths, their contributions to the application of the fads and neuromyths in the classroom, and the credibility of their source of knowledge among teachers in private schools in Midrand, South Africa.

1.6: Research Objectives

The research objectives of the study were:

(i) To explore the major fads and neuromyths that have emerged during the twentieth century.

(ii) To establish how fads and neuromyths are incorporated/adopted in educational policies.

(iii) To examine teachers' understanding of these major fads and neuromyths.

(iv) To find out the sources that teachers acquire these fads and neuromyths.

(v) To establish the grounds on which teachers accept these fads and neuromyths as true.

(vi) To explore how teachers use these major fads and neuromyths and examine if teachers adopt these fads and neuromyths in their practice, on what grounds do they claim these fads and neuromyths are effective in the learning process.

1.7: Main Research Question of the Study

The main research question of the study was stated as follows:

How are pop psychological fads and neuromyths adopted in education by teachers in private schools in Midrand, South Africa?

1.8: Specific Research Questions

The following specific research questions guided the study:

(i) What are the major fads and neuromyths that have emerged during the twentieth century?

(ii) How are these fads and neuromyths incorporated/adopted in educational policies and teaching practices?

(iii) What are teachers' understanding of these major fads and neuromyths?

(iv)How and from which sources do teachers acquire these fads and neuromyths?

(v) Why do teachers believe these neuromyths and fads to be true?

(vi) If teachers adopt these fads and neuromyths in their practice, on what grounds do they claim these fads and neuromyths are effective in the learning process?

1.9: Operational Definition of Terms

The following operational definition of terms were defined as used in this PhD research:

Fads: A fad is a practice or habit that was pursued with excessive zeal for a period of time. In this study it refers to practices in education that achieve short-lived popularity but fade away.

Neuromyths: Neuromyths is a falsehood produced by misinterpreting, misreading, or misquoting information that has been scientifically proven to support the use of brain research in education and other settings. In this study it refers to the false belief or misconceptions generated by a misunderstanding or misquoting of facts scientifically established to make sense in an educational practice.

Psychological fads: Psychological fads are mean-reverting diversions from intrinsic worth brought on by psychological or social influences. In this study, it refers to the practices of the false deviations caused by psychological and social elements in education.

Educational polices: Educational polices are any laws, rules, and procedures created and put into place with the intention of achieving certain educational objectives are collectively referred to as educational polices. In this study, it refers to the principles, laws, rules and policy decisions that influence the field of the education system.

1.10: Structure of the PhD thesis

This PhD thesis is structured as follows:

Chapter One: *Overall Introduction*

Chapter one presents the overall introduction, which includes the background to the study statement of the problem; the aims of the study as well as the research questions posed; a rationale of the study; operational definition of the key terms used in the study and finally, the structure of the thesis.

Chapter Two: *Literature Review*

Chapter two consists of reviewed literature which gives a brief overview on the major fads and neuromyths that have emerged in the twentieth century, fads and neuromyths incorporated in educational polices, teachers' use of fads and neuromyths in their practice, teachers' understanding of these fads and neuromyths, sources which teachers acquire these fads and neuromyths to be true, and the effectiveness of using fads and neuromyths in the learning process.

Chapter Three: *Theoretical Framework of the Study*

Chapter three consist of an exposition of the theoretical framework which served as the explanatory framework for the research findings reported later in the thesis. The study focused on two theories, that is, Feuerstein's Mediated Learning Experience Theory and the Constructivist Learning Theory.

Chapter Four: *Research Design and Methodology*

Chapter four discussed the research design and research methodology adopted in this study. The aspects presented in this chapter include the research paradigm, research design, research methodology, research site, research sampling, data collection methods, trustworthiness of qualitative data, data analysis, and ethical considerations.

Chapter Five: *Findings of the Study*

Chapter five is devoted to a presentation and analysis of the findings of the research conducted. The findings are presented consonant with the research questions of the study.

Chapter Six: *Summary of Findings, Conclusions and Recommendations*

Chapter six summarises the most important findings of this thesis, key study conclusions and presents recommendation for practice, limitations of the study and finally, the suggestions for future research in this area of research.

1.11: Conclusion of the chapter

This chapter summarized the key aspects which included the background of the study, the problem statement, the rational of the study, the aims of the study, the research questions, the operational definition of terms used in the study, and the structure of the thesis. The next chapter, chapter two presents the literature review related to the aim and research objectives of the study.

CHAPTER TWO

2.0: LITERATURE REVIEW

2.1: Introduction

This chapter explored the rise of pop psychology fads and neuromyths during the twentieth century, focusing on their widespread appeal and influence, particularly in education. The chapter also delved into how these ideas have shaped educational policies, influenced teachers' practices, and examined educators' understanding of these myths. It further investigated the sources from which teachers acquire these beliefs and evaluates their effectiveness—or lack thereof—in enhancing learning outcomes. The chapter proceeds as follows.

2.2: Pop Psychology

According to Griffiths (1995, p. 455), 'pop-psychology' is defined as "'psychology which is non-academic'; 'the psychology you read about in the papers or see on TV'; 'simplistic psychology'; and 'psychology without all the jargon'". All of these claims appear to imply that "pop" psychology has no set subject matter and instead depends on the manner in which it is presented. 'Pop' psychology has become extremely popular due to the widespread from the media as it offers assurance to how it can be beneficial. In addition, Griffiths (1995), argue that there are numerous psychologists who excel in communicating with both the general public and their peers as well as at popularising their own work. When analysing how psychology reaches the general population, it is crucial to consider the function that academia performs in translating knowledge from its "scholarly" study into a more understandable (for instance, "popular") form (Griffiths, 2005). Misconceptions regarding the mind, the brain, and how people, particularly children, learn constitute educational neuromyths. Over the 20th century, educational neuromyths attracted more and more attention. The use of poor and non-evidence-based teaching programmes and methods is a concern since it could have major negative consequences on educational systems and learner outcomes internationally.

According to a study by Kakoma (2019) conducted in South Africa, one of the difficulties faced by mathematics teachers is that they have limited knowledge of how students achieve mathematical tasks and how they learn to do so. According to Kakoma (2019), teachers' comprehension and awareness of the processes that take place in the brain and mind as students struggle with mathematical ideas and facts may improve how teachers teach and communicate mathematical knowledge. Therefore, neuromyths, which are facts presented about the science

of the brain, memory, and learning that have little to no scientific foundation, are dispelled by teachers' expertise of educational neuroscience (Kakoma, 2019).

According to a study conducted in the United States by Mcdonald, et. al. (2017), a core collection of seven "classic" neuromyths (items pertaining to learning styles, dyslexia, the Mozart effect, the influence of sugar on attention, right-brain/left-brain learners, and utilising 10% of the brain) were discovered to factor together in an exploratory factor analysis. Mcdonald, et. al. (2017) further asserted that the results of the study imply that education and neuroscience training can lessen but not completely abolish belief in neuromyths. They concluded that although education and neuroscience training predict improved performance on neuromyths, such exposure does not completely dispel the myths. Instead, despite exposure to education or neuroscience, some of the most pervasive beliefs, such as those relating to learning styles and dyslexia, continue to be very popular. This conclusion is alarming given the time and money that many school districts may devote to educational strategies based on these neuromyths, which have scanted empirical backing (Mcdonald, et al., 2017).

According to Lithander (2022), correcting early false beliefs among teachers through the use of textual refutations may be a useful method. However, it is necessary to look into whether these tactics may be utilised to rectify misconceptions about teaching and learning in order to make substantial changes for instructors and students. Lithander (2022, p. 12) asserted that eradicating incorrect beliefs is a challenging task that depends on several variables. However, Lithander (2022) suggested that people did update incorrect ideas following the receipt of corrective information, but less so for misconceptions pertaining to their own political views. In other words, when new information contradicts people's pre-existing worldview, corrections become ineffective. Furthermore, even when individuals could identify whether material was untrue, this knowledge did not influence individuals' voting preferences. It can be challenging to correct inaccurate beliefs that are consistent with people's worldviews, and even when people admit the false information, it still has an impact on their intents and thinking (Lithander, 2022). Corrections may be more likely to be successful for misconceptions that aren't as closely tied to a person's worldview.

Lithander (2022, p. 12-13) stated that “[o]ne promising strategy for correcting misconceptions is to use refutations. With this method, the misconception is first provided (for example, “We only use 10% of our brains”), which is followed by the refutation (for example, “This statement is false. Although it is commonly believed that we only use 10% of the brain this notion is

false"). The refutation informs the person that the idea is incorrect". Refutation is a useful strategy for dispelling different kinds of misconceptions. Schreiber's (2024, p.1) study suggested that misconceptions derived from reading about the findings of studies and research on the human brain give rise to a collection of myths known as neuromyths, which are then utilized to support various behaviours in a variety of contexts, most notably schooling. When it comes to education, they are a novelty, the answer to a number of requests, and the opportunity to purchase alternative materials to solve certain issues. Schreiber (2024) presented some neuromyths in education; 10%of the brain, the left vs right brain, different learning styles, child development, the three-year myth, and the multiple intelligence theory. Schreiber (2024) argued that these neuromyths were wrong for the following reasons; with regards to the left-brain vs right brain, the myth stems from the idea that although the brain's two hemispheres receive information differently, there are multiple connections and exchanges between them that allow the hemispheres to work together to complete tasks. The consequences in education is to support the idea that educational practices should take these differences into consideration when working with children who lean more toward one or the other hemisphere (Schreiber, 2024). According to Schreiber (2024, p. 7), the different learning styles myth is "linked to the fields of neuroscience although it is a field of biology", efforts have been made to investigate if different learning styles exist, but the results of these studies have not been definitive. As a consequence in education, varied approaches employed by teachers would yield varied answers depending on a person's collection of qualities. For instance, employing questionnaires to pinpoint a learning gap or identify a person's knowledge limitations (Schreiber, 2024).

Consequently, in education, the appeal that this set would take the child to grow and develop has led industries to produce and sell materials, toys, and videos. Schools that purchase these products and promote propaganda as differentiated instruction are impacted by the same concept. Expanding early childhood education and its significance globally is thought to be important. the necessity for stimulating circumstances and stimulants to grow the full capacity for learning reasoning to dispel the myth that knowledge lost at that time can never be regained (Schreiber (2024). According to Schreiber (2024), an individual possesses several intelligences, each of which is housed in a distinct region of the brain. This notion, which has received a lot of criticism in scientific circles, is unproven in neuroscience. This is a theory that is untestable. As a result, it supported debates against IQ testing in education and led to the selling of numerous products for enhancing intelligence. Schreiber (2024, p. 5) strongly believed that "[n]euromyths have invaded the most diverse environments, including education,

where misinterpretations of neurological research have led to the creation of teaching strategies that can be disastrous".

The literature review begins by providing a brief overview of some of the fads and neuromyths that have been adopted in the twentieth century and the way in which these fads and neuromyths are incorporated/adopted in educational policies. Following this, the research looked at teachers understanding of these fads and neuromyths and how they use these in their classroom practice. Finally, the research discussed how and form which sources do teachers acquire these fads and neuromyths, the grounds teachers accept these fads and neuromyths to be true and if teachers adopt these fads and neuromyths in their practice, on what grounds do they claim these fads and neuromyths are effective in the learning process.

2.3: Major Fads and Neuromyths that have emerged during the twentieth century:

According to Hardiman's (2012, p. 15) 'Brain- Targeted Teaching Model', teachers gain valuable knowledge "from the neuro-and cognitive sciences in a form that can be readily understood and applied in practice". The model seeks to help teachers to understand the various 'brain targets' associated with the 21st century teaching and learning process, provides a guideline for planning and delivering instruction when teaching and in addition strives to help teachers reach their academic goals. However, "when educators have to try on their own to understand research conclusions and" translate" them into educational frames of reference, they become vulnerable to the possibility that much is lost in translation; they may misunderstand or overgeneralize" (Hardiman, 2012, p. 16).

Another study conducted in Australia by Hughes, et. al (2020) reported that "although factual knowledge was high, seven neuromyths were believed by" more than 50% of teachers, and teachers who affirmed neuromyths were confident in their answers of the survey and suggested that neuromyths were implemented into the curriculum (Hughes, et al., 2020, p. 3). The study concluded that although teachers obtained some knowledge of the brain and obtain neuroscience awareness, many teachers still strongly susceptible to believing neuromyths and incorporated their neuromyth beliefs into the classroom. The findings obtained from the study suggested that despite having a high level of factual information, more than 50% of the sample believed seven neuromyths. The most important neuromyths seem to be taught in schools. The study concluded that Australian teachers, like their international colleagues, are aware of some aspects of neuroscience but are more susceptible to neuromyths. The challenging issue of

separating brain facts from fiction might be addressed and teachers' help could be improved through a stronger collaboration with neuroscientists.

Van Dijk and Lane (2020) conducted a study in Florida, which asserted that there are many misconceptions regarding the brain and how it relates to education. A poll on the role of the brain in education was carried out to determine the level of belief in neuromyths. In the study conducted, respondents (n = 169) included preservice teachers (n = 34), in-service teachers (n = 63), higher education faculty (n = 39), and educational leaders (n = 33). The study findings reported that, just about one-third of the myths received the correct response from respondents on average. The findings further indicated that right brain-left brain myth, learning styles, and exercises to increase motor coordination to improve literacy abilities were the most frequently misdiagnosed myths.

Van Dijk and Lane (2020, p. 11), further opined that uncertainty about these neuromyths can harm children's development by including inefficient teaching strategies based on them and, in doing so, restricting scientifically validated strategies. In addition, Van Dijk and Lane (2020, p. 11- 12) reiterate that, schools are part of bigger educational organisations, and a district's culture can differ from that of a single school. To create a larger-scale culture shift, it could be required to incorporate these suggested courses into leadership development programmes and teacher professional development activities in addition to teacher training programmes. When deciding on and making plans for career development opportunities, more knowledgeable school leaders at the local, district, state, and even national levels may play a more important role. To help practising teachers modify ingrained views, professional development may need to be extremely carefully planned.

The findings from the reviewed studies revealed that due the vast beliefs in implementing neuromyths in my classroom, teachers need to be made aware due to the falsehood of what is being adopted in their teaching as there is no scientific evidence to support their beliefs in neuromyths. Teachers would be less inclined to practice neuromyths of they obtain specific knowledge of the emergence and how they came to be. This study addressed this research gap by providing empirical evidence on teachers' awareness of major fads and neuromyths that have emerged during the 20th century. Due to limited research conducted in Africa, further research was conducted that led to more updated findings regarding neuromyths that have emerged and how have they become so prominent in the educational sector within South Africa. The neuromyths and fads identified in literature are discussed as follows:

2.3.1: Left Brain Vs Right Brain

According to Dündar and Gündüz (2016, p. 1), "research on cerebral hemispheric dominance and specialization has prompted the myth that humans can be categorized as either right-brained or left-brained". It is believed that right-brained individuals are thought to be more creative and artistic, whereas left-brained individuals are thought to be logical and good at math and language. As a result of this belief, various types of strategies have been developed to assist individuals to use either the right-brain or left-brain effectively.

Dündar and Gündüz (2016, p. 1) asserted that "teachers' efforts to incorporate neuroscience finding in their educational practices are hindered by the complexity of neuroscience and the difficulty of transferring its findings to the classroom environment" which then led to the fundamental development of the neuromyth in question which has been publicized. The propensity for teachers to accept this media information may also be a sign that they don't understand it well enough or that they are unable to critically evaluate their own understanding of neuroscience. This shows that lack of critical thinking and inadequate neuroscience literacy among teachers may contribute to the development of neuromyths. Although little study has been done on the neuromyths that teachers have, there is some indication that they share three common myths being the VAK (Visual, Auditory and Kinesthetic) learning styles. Teachers tend to adopt the visual, auditory and kinesthetic learning styles which they believed has an impact on learning through hemisphere dominance to cater for right-brained and left-brained individuals.

The misconception of the hemispheric dominance myths based on an incorrect interpretation of studies on laterality. According to Dündar and Gündüz (2016, p. 3) and Goswami (2004), the reference to right- and left-brain learning processes is one of a number of troubling neuromyths. From a historical perspective, studies highlighting anomalies of information processing in split-brain patients were the original source of these misconceptions". Following this, Dündar and Gündüz (2016, p. 3) and Singh and O'Boyle (2004) demonstrated that the left and right hemispheres of the typical brain were very well integrated and that substantial conflicts between them were quite uncommon. This meant that the normal brain was not made up of two independently functioning hemispheres. According to the study conducted by Dündar and Gündüz (2016, p. 6), majority of the teachers reported that the neuromyth of the right and left brained hemispheric dominance which helps explain individual differences among students.

The findings generally revealed that is the neuromyth is indeed a misconception, yet it is being adopted by many individuals. This study addressed this research gap by providing empirical evidence on teachers understanding and belief of the left vs right brain neuromyth and if this is implemented in the teaching methodologies. Due to a lack of research in South Africa, further research should explore this aspect identifying the misconception of the neuromyth.

2.3.2: We only use 10% of our brain

Papatzikis (2017, p.87) asserted that "[o]ne of the most basic neuromyths existing out there is this one of the 10% performing capacity of the brain versus the 90% one", and there is no scientific based evidence. According to Papatzikis (2017, p.87), there are four reasons which disprove that we only use 10% of our brains; the first being that if we only use 10% of our brains, should there be some areas of the brain that is damaged, it should have no effect on us whatsoever. Secondly, from a perspective of human development, it is unlikely that we developed such a vital organ in which we only use 10% of. Thirdly, through brain imaging, we can see that even while we are asleep there are still areas of the brain that are not completely inactive. Lastly, the brain plays an important part as the brain controls and coordinates actions, reactions, movements, allows us to think and feel and enables us to have memories (Beyerstein, 1999). Having believe the neuromyth that we only use 10% of our brains, various training programs have been developed to increase the use of our brain. However, we do use each and part of our brain, we just do not use all parts simultaneously.

Geake (2008) opined that there is a vast number of research which tells us that the brain is perpetually busy all the time. As stated by Geake (2008, p. 127), the "absurdity has been pointed out by Beyerstein (2004): evolution does not produce excess, much less 90% excess" and with the availability of studies conducted regarding the brain, there is no evidence found on the unused portion of the brain (Beyerstein, 2004). According to Geake (2008, p.128), the myth that we only use 10% of our brain "seems to have begun with an Italian neuro-surgeon c.1890 who removed scoops of brains of psychiatric patients to see if there were any differences in their reported behaviours. The myth received an unexpected boost c.1920 during a radio interview with Albert Einstein, when the physicist used the 10% figure to implore us to think more. The myth received its widest circulation before the Second World War when some American advertisers of home-help manuals re-invented the 10% figure to convince customers that they were not very smart. Odd, then, that it has been so enthusiastically adopted by wishful-thinking educationists at the end of the twentieth century".

The findings generally revealed that this neuromyth is a major concern as many individuals adapt this. This study addressed this gap by providing empirical evidence on teachers understanding and belief of the 10% of the brain misconceptions. Due to limited research, further research should explore this phenomenon within South Africa.

2.3.3: Learning Styles

Hatami (2013, p. 488) describes a learning style as “a preferred way of using one’s abilities”. Since at least the middle of the 1970s, the learning style notion has been acknowledged in the field of education. Hatami (2013) suggested that learning styles are not permanent ways of conduct; they can be extended and modified based on various contexts and tasks, despite the fact that individuals may have certain strong style preferences and tendencies. Riener and Willingham (2010, p. 33) asserted that “there is no credible evidence that learning styles exist” and uncertainty about the subject could be harmful. The notion of ‘learning styles’ is represented that every student has a different learning style, which is a person's preferred method of taking in, processing, understanding, and remembering knowledge; being an auditory, visual or kinaesthetic learning style. We are aware that all students are different, and some students may have specific learning disabilities which can affect their learning, however, not providing them with the appropriate strategies can hinder their learning process. The preference of a visual-dominant student, information presented in visual formats, such as images, diagrams, and charts, helps visually dominant students recall it better. The preference of an auditory-dominant student is to listen to what is being delivered. For instance, in a lesson or group discussion, they respond well to voices. Another beneficial experience is hearing oneself explain something to a teacher. A kinesthetic student favours a tactile experience. Students who prefer a "hands-on" method and performs well when they can touch or feel a learning tool or object.

According to Riener and Willingham (2010, p. 34), many teachers who believe in this myth “do not consider the critical differences between styles and abilities. Teachers should take into account the differences in learners’ abilities. Moreover, adjusting a lesson not just to be appropriately pitched at the students’ level of ability but to consider their background knowledge and interests is surely an important first step in fostering learning. Second, a belief in learning styles fits into an egalitarian view of education: Everyone has value, according to the theory, and everyone has strengths. The corollary for some learning-styles theorists is that

if you think that the theory is wrong, you must think that all students are identical—which is obviously untrue". We concur that students vary and that every student is valuable, but we do not require the learning-styles theory to support it. The fact that learning styles myths are widely accepted provides an unfeasibly strong argument for believing it.

The degree to which people may modify or adapt their styles to fit a specific circumstance, however, differs. According to Hatami (2013, p. 489), in the classroom, learning styles can be assessed and used as a useful teaching tool and "[a]ccording to these scholars, by diagnosing students' learning styles and matching them to teaching methods (for example for a 'visual learner', presenting information through pictorial illustrations), learning can be greatly enhanced". Other academics, on the other hand, disagree with the importance of learning styles in educational practise and assert that teaching to each student's unique learning preferences does not improve learning outcomes (Hatami, 2013).

Papadatou-Pastou, Touloumakos, Koutouveli and Barrable (2021) stated that the idea of learning styles has some intuitive appeal; it believes that learning can be improved by giving knowledge through various but individually specific preferred modes in instruction. However, the idea has received harsh criticism. The misconception about learning styles has probably spread because it suggests that everyone can learn effectively as long as the material being learned fits their preferred learning style. According to Papadatou-Pastou et al. (2021, p. 512), "[t]he Educational Endowment Foundation (EEF 2017) reported that [learning styles] are not just an innocent misconception but can be harmful through the assignment of learners to groups or categories on the basis of a supposed [learning styles]". If students are classified based on their learning styles (LS), there is a risk that this will result in the assumption of fixed or rigid learning styles, which may discourage students from adapting, much alone looking for new challenges.

Despite the complexity of the process of learning, Newton (2015) stated that "there are some concepts in education for which there is abundant clear evidence to show that they are not effective. One of these is Learning Styles, such as the 'VAK' classification, which classifies individuals as one or more of 'Visual, Auditory, or Kinesthetic' learners". In addition, a review conducted by Pashler et al. (2008) indicated that when students are identified as having a dominant learning style, they may decide not to pursue subjects that they believe are dominated by a different learning style or they may grow overconfident in their ability to succeed in subjects that they believe fit their learning style. The employment of poor approaches, like

Learning Styles, can distract from the application of strategies that are clearly beneficial, which is perhaps the most significant factor. However, despite this, many teachers strongly believe in this neuromyth.

Papadatou-Pastou, Gritzali and Barrable (2018, p. 1) stated that "[l]earning styles (LS) have dominated educational practice since their popularization in the 1970s. Studies have shown that they are accepted by more than 90% of teachers worldwide. However, LS have also received extensive criticism from researchers and academics, due to the poor theoretical justification of the theory, their problematic measurement, and the lack of systematic studies supporting them". The vast majority of educators continue to favour learning styles despite the paucity of evidence supporting the theory. They strongly believe that students' academic performance can be strengthened when information is presented in a person's preferred learning style. According to Papadatou-Pastou, Gritzali and Barrable (2018, p. 2) and "Rogowsky et al. (2015) no statistical significance was found in the relationship between learning style preference, mode of delivery, and learning aptitude". It was implied that teachers did not use a student's intellectual capacity to predict their preferred learning style. They concluded that the VAK learning style is frequently employed in primary classrooms, with one instructor evaluating each student's learning style.

Sun, et al., (2023) study among teachers in United States, Turkey, Portugal, China, Switzerland, the United Kingdom, and Latin America, opined that the most popular, but inaccurate, learning style models centre on the idea that children have a dominant learning style that is associated with a single learning modality, like visual, auditory, or kinesthetic/tactile learning (also known as the VAK model). Notwithstanding its widespread acceptance, there is insufficient data to substantiate the notion that individuals possess unique dominant learning styles that are associated with a single modality (Sun, et al., 2023, p. 1). According to Sun, et al. (2023, p. 1), "there is no evidence that VAK learning styles predict cognitive functioning or learning. VAK learning styles are unrelated to the evidence-based ways that researchers have successfully characterized individual differences in thinking". In addition, their study explored an overlooked, but probably significant, effect of the learning type myth: how knowledge about learning styles may affect how parents, educators, and kids view the potential of early students. They asserted that scientists have long maintained that the learning style myth's primary drawback is that it causes teachers to spend money on ways that don't work when they could be using ones that are supported by data (Sun, et al., 2023, p. 1). Sun, et al, (2023, p. 7), postulated that "[t]hese findings are the first to suggest that perceived learning style traits may

lead parents and teachers to make a host of specific (unwarranted) inferences about children's academic strengths and weaknesses. This behavior is concerning considering that learning styles are unscientifically founded seemingly arbitrary categories. It highlights that we should be wary of describing children as hands-on or visual learners as, despite any good intentions, these categories, similar to other social categories, are likely to trigger incorrect thinking about children's abilities by educators, parents, and their peers". As a result, Sun, et al. (2023) suggested that comprehending the linkages between these and learning style identities could be essential to constructing a comprehensive understanding of the categorization and stereotyping of young children in the classroom.

In the above reviewed studies, the findings revealed that is a major misinterpretation of neuroscience, and that there is lack of literature to address this aspect. The present study addressed this gap by providing empirical evidence on teachers in South Africa, their understanding and belief of this misconception.

2.3.4: Critical Periods: After critical periods of development, Learning shuts down

According to Nickerson (2021, p. 1), "[c]ritical period is an ethological term which refers to a fixed and crucial time during the early development of an organism when it is able to learn things which are essential to survival. These influences impact the development of processes such as hearing and vision, social bonding, and language learning". As the brain develops, both genetics and sensory input from the environment have an impact. Yet, how much the brain can change as a result of these events depends greatly on the stage of development that an individual is in (Nickerson, 2021). According to science, an individuals' brain becomes less pliable as they age. Early in childhood, before many important connections are established, the brain is very malleable; later in life the plasticity of the brain declines or decreases. Because of this, studies have shown that early experience is essential for the development of talents like language and music, which are harder to learn as adults.

Sriram (2020) asserted that critical periods are moments when a child's brain develops rapidly. The first one occurring about age 2 years and the second one happens during puberty. The number of synaptic connections between neurons doubles at the beginning of these periods. Adults have half as many synapses as two-year-olds do. The brain learns faster than at any other stage in life thanks to its twice as many synapses, the connections between brain cells where learning takes place. Children's experiences at this stage therefore have an ongoing impact on their development. According to Sriram (2020), around the age of two, the first key

stage of brain development begins, and it ends around the age of seven. It offers a fantastic chance to set the stage for children's comprehensive education. Encourage a love of learning, emphasise breadth over depth, pay attention to emotional intelligence, and stop viewing early childhood education as only a stepping stone to "real" learning are four strategies to make the most of this crucial time. In addition, Sriram (2020) opined that during this crucial stage, children's brains have a unique capacity for information absorption. Children between the ages of 2 and 7 might be the smartest people on the globe if intelligence is defined as the capacity for learning. According to research, some abilities cannot be learnt nearly as effectively after this crucial first stage of brain development. In order to grasp a second language to the same level as their original tongue, research indicates that youngsters in this age range are best prepared to learn the aspects of language development. But by the time they turn eight, children are less adept at acquiring new languages, and they speak second languages less fluently than they do their native tongues.

According to Lederberg and Spencer (2005, p. 2) and Newport et al. (2001) define a critical period as “a peak period of plasticity, occurring at some maturationally defined time in development, followed by reduced plasticity later in life” (p. 482)”. When there is an increase in sensitivity to environmental input at a particular stage of development, followed by a significant decline in the capacity to learn from that input, this is an indication of a critical period. Although this decline might sometimes happen suddenly at a certain age, it can sometimes happen gradually over a lengthy period. Lederberg and Spencer (2005, p. 2) redefined the meaning of ‘critical period’ by stating that “[r]ather than a period that is characterized by an abrupt end to learning ability, the ability to learn from environmental input is seen as declining more gradually”. Critical periods should be supported by experimental data demonstrating that the same experience at different phases of development leads to noticeable long-term variations in performance, behaviour, or brain anatomy (Lederberg & Spencer, 2005). It is not essential to demonstrate that learning is impossible beyond the crucial period; rather, it is sufficient to demonstrate that learning happens more quickly and with better organisation if it does so during a period of greater sensitivity (Lederberg & Spencer, 2005). Lederberg and Spencer (2005, p. 6) asserted that “[e]vidence for a critical period would include age of exposure effects on adult lexical knowledge or lexicon size, on the growth rate of lexical acquisition, on the ability to process the meaning of words and on word learning processes available to learn new words”. There may be variations in how children learn words that account for the effect of exposure age on lexical growth rate.

In addition, Howard-Jones and Washbrook (2011) postulated that the information from neuroscience is frequently misconstrued or excessively interpreted, leading to "neuromyths" that might affect the allocation of educational resources. The primary "neuromyth" is that spending money during the formative years of a child's growth is justified by neuroscientific knowledge of these "critical" or "sensitive" times. They asserted that "[t]he emerging evidence from neuroscience suggests all childhood is a special time for learning" (Howard-Jones & Washbrook, 2011, p.2). According to Howard-Jones and Washbrook (2011), it is undeniably true that early educational initiatives can have an impact on adults' lives for years to come. Numerous studies demonstrate that better outcomes in cognitive, linguistic, and social development are correlated with higher quality childcare.

In neuroscience, variations in the way neurons are connected are primarily used to explain how learning occurs. The majority of the neurons that we possess are developed within 3 months of conception, although significant alterations in their connectivity typically happen in stages throughout childhood. Howard-Jones and Washbrook (2011) suggested that these significant shifts in connectedness might be related to times when humans are especially susceptible to environmental influences. They further suggested that early brain development is conceptualised by neuroscientists as a progressive constraint of fate, and they believe there are times when the environment can have a significant impact on how a neuronal circuit develops. These intervals, which differ in various brain regions, are typically referred to as sensitive periods.

The above reviewed studies revealed the predominance of this misconceptions in the understanding of neuromyths. Therefore, the present study addressed this gap by providing empirical evidence that learning is continuous. Moreover, due to the limited research in South Africa, the present research provided grounds for further research on the complexity of learning and the misconception of critical periods of development.

2.3.5: Listening to Mozart will make your baby smarter

Swartz and Nilsson (2005) focused on research conducted which involved exposing students to 10 minutes of Mozart's Sonata and as a result, students' academic performance improved. According to Swarts and Nilsson (2005, p. 7), "Rauscher, drawing on this research, suggested that if music acts as a sort of "pre-language" of the brain, certain kinds of music (such as

Mozart's) might facilitate brain function, even on a short-term basis". The Mozart effect is controversially explained by the fact that doing spatial-temporal activities and listening to music do not appear to be related in any way, and neither is listening to music a highly active or involved activity.

To enhance students learning process, teachers will find effective strategies to aid their teaching practices. In this case, teachers strongly believed that listening to Mozart will help students retain information better. Lewis (2002, p. 1) asserted that "music is not played to enhance the learning environment. However, some studies have shown that when music is played during learning experiences there is more retention of the material". The study conducted by Lewis in Tennessee (2002) demonstrated that classical music was played in the background while the lessons were being taught in the enhanced learning environment. The researcher worked with 39 first graders in a suburban elementary school in East Tennessee over a period of six weeks, ranging in age from six to seven. The first lesson exposed the students to conventional teaching techniques. The students took a test to gauge their retention of the material after the first three weeks of instruction. The following three weeks of class were spent with classical music playing in the background. The students took another test to gauge their retention of the material after the treatment. The scores varied significantly from one another. This study demonstrated that retention of knowledge was more successful in the typical learning environment for teaching reading. This study also demonstrated that the improved teaching environment was more successful at helping students remember.

In addition, Hisama (2000, p. 101) opined that "students' intelligence increased as much as 10 points as a result of listening to sonata for two pianos, in D major (K448) by Wofgang Mozart". According to Hisama (2000), based on the underlying theory in this field, when one's environment is changed—for example, when we listen to music such as Mozart, our intellect rises in tandem—their level of intelligence grows. Strong environmental interventions have been shown in several studies to have an impact. However, they are not powerful enough to change one's inherited traits. Hisama (2000) concluded, how much of intelligence is determined by nature, nurture, and the interactions between them, and how much is it malleable? might be a more accurate question.

Schellenberg (2005) asserted that it has been suggested that learning music and listening to music offer intellectual benefits. Any link between music and cognitive function would only be noteworthy if it reliably benefited non-musical abilities and if music was specifically

responsible for the effects. The evidence that is currently available suggests that listening to music improves performance on a variety of cognitive tests, but that these effects are temporary and result from how music affects arousal and mood, which in turn affect cognitive performance. Other experiences also have similar effects. Schellenberg (2005) raises concern for teachers' eagerness to quick fix students learning process. Due to the widespread of the "Mozart Effect' in the media, teachers were led to believe that listening to Mozart will help students learn better. Although this belief seemed to benefit students, "[l]istening to music composed by Mozart does not have unique or special consequences for spatial abilities" (Schellenberg, 2005, p. 318). This emphasises that listening to Mozart is a short-term benefit.

In the above reviewed studies, the findings revealed that there is a concern regarding this misconception. Therefore, the present study addressed this gap by providing empirical evidence on teachers' view's in South Africa and their understanding of this phenomenon.

2.3.6: Kabat-Zinn's Concept of Mindfulness

The concept of Mindfulness arose in Buddhist philosophy and was later adopted by Jon Kabat-Zinn in 1979 in Western contexts. According to Kabat-Zinn (2009, p. 14), mindfulness was an ancient Buddhist practice which had been implemented in our current daily lives. Kabat-Zinn (2009, p.14) asserted that mindfulness means "paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally. This kind of attention nurtures greater awareness, clarity, and acceptance of present-moment reality. It wakes us up to the fact that our lives unfold only in moments. If we are not fully present for many of those moments, we may not only miss what is most valuable in our lives but also fail to realize the richness and the depth of our possibilities for growth and transformation". Kabat-Zinn (2009, p. 14) claimed that being unaware and not practicing mindfulness by not being present in the moment, can create unpleasant problems such as "our unconscious and automatic actions and behaviours, often driven by deep-seated fears and insecurities". He further postulates that over a long period of time these problems can accumulate if they are not dealt with and as a result, "we may lose confidence in our ability to redirect our energies in ways that would lead to greater satisfaction and happiness, perhaps even to greater health". Therefore, Kabat-Zinn (2009) argues that, by practicing mindfulness in our everyday lives we can improve our cognitive attention, self-regulation, self-awareness, self-efficacy, empathy, creative thinking, as well as our social and ethical competence.

According to Sun (2014, p. 3), 'mindfulness' had become a buzzword in the twentieth century which resulted in a vast interest in societal institutions such as the corporate world, medicine, schools, and psychology. Many people have become fascinated with the concept of mindfulness, however, there has been no attention given to the origins of the concept. Sun (2014, p.3), postulated that "[f]ew people outside of Buddhist communities or scholarship understand 'mindfulness' to be anything other than what it is popularly portrayed as: a helpful, secular technique that involves paying attention to the present moment in a non-judgemental way", however, thorough research is required to gain a deeper understanding of the meaning of 'mindfulness' and the implications of the practice of mindfulness. Sun (2014, p.4) further asserted that 'Mindfulness' has been abridged/ downplayed from its origin. The concept of mindfulness has become a panacea, in seeing that "mindfulness is operating within a context of modernity, characterised by a pervasive calculative rationality oriented towards profit, productivity and efficiency" (Sun, 2014, p. 20).

In the above reviewed studies, the findings revealed that by being mindful, we can learn better and absorb a lot more information, but there is scanty empirical evidence to confirm this assertation. This study addressed this gap by providing empirical evidence on the impact of mindfulness, such as implementing these strategies in teaching to help students obtain a better learning outcome.

2.3.7: Multiple Intelligence

Multiple intelligence was proposed by Howard Gardner in 1983. Gardner (1987, p. 25) defines intelligence as "an ability to solve a problem or to fashion a product which is valued in one or more cultural settings". It is of most importance to take into consideration that to understand the definition of intelligence, we need to include various cultures which will be valued in other cultural settings. Gardner (1987) postulated that there are nine different types of intelligences. The first is linguistic intelligence which emphasizes the use of language (the ability to use words). The second intelligence is logical mathematical intelligence which emphasizes the ability to use logic and mathematical reasoning. The third intelligence is musical intelligence which emphasizes musical talents. The fourth intelligence is spatial intelligence which emphasizes the ability to form representations of the world. The fifth intelligence is bodily kinesthetic intelligence which emphasizes the reliance of ones' body to solve a problem or express something. The sixth intelligence is interpersonal intelligence which emphasizes the

ability to understand other people. The seventh is known as the intrapersonal intelligence emphasizes working on ones' self. According to Gardner (1987, p. 35), "[w]e need to be able to draw on a much wider set of talents. There should be recognition of, and serious attempts to make full use of, all combinations of human intelligence. If we succeed in doing this, individuals will feel better about themselves". According to Derakhshan and Faribi (2015), the eighth intelligence is the Interpersonal Intelligence which is the ability to understand and interact well with others; such learners thrive in group discussions and cooperative learning, and Intrapersonal Intelligence, which refers to self-awareness and the ability to understand one's emotions and thoughts; learners with strong intrapersonal intelligence benefit from reflection and independent study (Derakhshan & Faribi, 2015, p.65 & 67). These various types of intelligence are what makes us individuals different.

The significance of Gardner's Multiple Intelligences (MI) theory lies in its ability to acknowledge diverse cognitive abilities beyond traditional IQ measurements. According to Derakhshan and Faribi (2015, p. 68-70), MI theory enhances language learning by accommodating different learning styles, thereby fostering student engagement and motivation. It promotes differentiated instruction, allowing educators to tailor their teaching methods to students' strengths, improving comprehension and retention. Additionally, MI supports holistic education, encouraging the development of various skills such as problem-solving, creativity, and interpersonal communication. By recognizing multiple intelligences, teachers can create inclusive learning environments that cater to individual differences, ultimately improving educational outcomes.

Gardner (1995) critiques of the way multiple intelligence has been interpreted in a way in which Gardner has not intended. The notion of multiple intelligence has become a 'myth'. In the process of rectifying these myths, Gardner (1995) engages in critiques of three myths. The first myth, Gardner is against the idea that there are tests to measure the seven intelligences. The second myth is equating intelligence with a domain, Gardner asserts that the idea of multiple intelligence in a new construct, not one that is attached to a specific discipline. The third myth is believing that intelligence is like a learning style, Gardner argues that there is a difference between multiple intelligences and learning styles. The fourth myth is that multiple intelligence lacks empirical support, however Gardner (1995) relied on research done to justify a particular intelligence. The fifth myth is that multiple intelligences oppose the notion of general intelligence tests. Gardner (1995) argues that there are no general intelligence in which multiple

intelligences emerges. The sixth myth is that the multiple intelligence notion by Gardner is too broad and Gardner (1995) argues against people who create additional intelligences.

The brain is essential for learning, but learning styles is just one of the many common neuromyths that are associated with education. The Dunn & Dunn Model is one of the oldest approaches to learning styles. Dunn & Dunn (1979) identified five dimensions on which students learning styles were different. The first learning style being the environmental elements, is based on "sound, light, temperature, and design" (Dunn & Dunn, 1979, p. 239). They further assert that students will respond differently taking into consideration these environmental elements. Some student can concentrate in a noisy/busy environment, while others need silence to work; some students work better when it is bright and others work better when it is dull; etc. (Dunn & Dunn, 1979, p. 239). It is suggested that the way in which the environment is organized can either influence some students positively, and others negatively. The second learning style is the emotional element which includes "motivation, persistence, responsibility, and a need for structure" (Dunn & Dunn, 1979, p. 239). This emphasizes emotional support and instruction of what is required of the students. By giving them an objective, they are well guided to complete the task given to them. According to Dunn and Dunn (1979, p.239), "[s]tructure is a vital element of learning style. [Students] who require specific directions, sequential tasks, frequent feedback, and continuing support usually achieve well using programmed learning". The third learning style is the sociological elements which involves "working alone, with peers, with an adult, or some combination" (Dunn & Dunn, 1979, p. 240). According to Dunn and Dunn (1979, p. 240), "[h]ow students respond to other people also contributes to the selection of a method through which they are likely to achieve". Some students work and learn best on their own, and some students work best with the help of their peers or their teacher/adult. The fourth learning style is the physical elements, which includes "perceptual strengths, intake, time of day, and a need for mobility" (Dunn & Dunn, 1979, p. 240). Some students work better when they fidget, eat or nibble while working, and other students may work better sitting stationary and not require any movement. This learning style asserts whether a student is an auditory learner, visual learner, tactual learners or kinesthetic learner. The fifth learning style is the psychological element which involves global, analytical, impulsive and reflectiveness. This focused on how students solve problems.

These dimensions can be applied/ incorporated in the learning process; however, these learning styles can be viewed as a myth. According to Curry (1990, p. 50), there are three problems in understanding the operations of learning styles; "(1) confusion in definitions, (2) weakness in

reliability and validity of measurements, and (3) identification of relevant characteristics in learners and instructional settings". He emphasizes that the implications in education are very unclear.

In the above reviewed studies, the findings revealed that intelligence is not a single, consistent talent that can be measured by conventional IQ testing. Rather, it includes a range of cognitive skills that individuals have varying degrees of, however, there is scanty empirical evidence in literature regarding this. This study addressed this gap by providing empirical evidence on teachers in South Africa's understanding of this misconception and their belief.

2.3.8: Emotional Intelligence

Daniel Goleman popularized the idea of "emotional intelligence". The notion of emotional intelligence is understood as the "ability to monitor one's own and others' emotions, to discriminate among them, and to use the information to guide one's thinking and actions" (Mayer & Salovey, 1993, p. 433). Despite the scholarly criticisms of emotional intelligence, it still remains as a popular notion amongst people.

Mayer and Salovey have been regarded as the first researchers who proposed their notion of "emotional intelligence". However, their definition changes over time, it does not remain the same. Salovey & Mayer (1990, p. 185) defined emotional intelligence as "a set of skills hypothesized to contribute to the accurate appraisal and expression of emotions in oneself and others, the effective regulation of emotion in self and others, and the use of feelings to motivate, plan, and achieve in one's life". This statement emphasizes that an individual must be able to accurately evaluate both ones' own feelings and the ability to understand when someone else expresses emotion.

In 1993, Mayer and Salovey (1993, p. 433) modified their definition of emotional intelligence as "a type of social intelligence that involves the ability to monitor one's own and other emotions, to discriminate amongst them, and to use the information to guide one's thinking and actions". This emphasizes that the individuals have the ability to monitor their feelings and the feelings of others, and what makes this definition more important is that it does not focus on relating other individuals' emotions but rather on ones' self. The various definitions postulate that emotional intelligence involves skills to evaluate, monitor and express emotions

within ones 'self and others. Goleman (1995) further presented emotional intelligence in a popular way.

Given these different definitions, researchers have produced different models of emotional intelligence. Salovey and Mayer (1990, p. 200) provides a diagram which postulates the conceptualization of emotional intelligence. The diagram illustrates that appraisal and expression of emotion, regulation of emotion and the utilization of emotion is seen as being the three major dimension of the concept of emotional intelligence, however, each dimension consists of entities within it. In terms of appraisal and expression of emotion it deals with both ones' self and others, regulation of emotion also deals with ones' self and others, and the utilization of emotion involves the capacity for flexible planning, creative thinking, redirected attention and motivation. Salovey and Mayer (1990, p. 200) further focus on the appraisal and expression of emotion within ones 'self in which they see either verbal or non-verbal and similarly in regulation of emotion, they view it as non-verbal perceptions as well as empathy. These dimensions make up the Salovey and Mayer (1990, p. 200) model of emotional intelligence which is viewed as a mental ability model which "by integrating this research conceptually, its contribution to psychology will be readily grasped". Therefore, this involves various psychological processes. The process involves perception and evaluation of emotions which involves mental processes and not feelings. Secondly, the use of emotion to aid thought involves the assimilation of emotional experiences into mental life so that emotions can become an aid to thinking. Lastly, the ability to understand and reason about emotions which involves the understanding of emotional problems.

The process of the verbal and non-verbal expression of emotions in ones' self and others. In terms of emotion in ones' self, the verbal aspect is "[o]ne medium in which emotions are appraised and expressed in language" and the non-verbal aspect is the "[o]ne reason the appraisal and expression of emotion have been overlooked as mental abilities may be that they often take place on a nonverbal level" (Salovey & Mayer, 1990, p. 201- 202). In terms of emotions in others, the non-verbal perception of emotion asserts that it is "important that people be able to perceive emotions not only in themselves, but also in those around them" and the aspect of empathy which focuses on expressing empathy and "the ability to comprehend another's feelings and to re-experience them oneself" (Salovey & Mayer, 1990, p. 203 – 204).

In contrast to their model, the Goleman (1995) model proposes four main emotional constructs which includes self-awareness (being self-confident and assess emotions), self-management

(adaptability and emotional self-control), social awareness (empathy) and relationship management (influences and able to manage conflict) (Waterhouse, 2006, p. 216). Such constructs "will often lead to the effective regulation of affect within themselves and others, and so contribute to well-being" (Mayer & Salovey, 1993, p.440), which is what made Goleman's notion popular.

Given the different conceptions of emotional intelligences, researchers have developed various techniques to assess and test for emotional intelligences. Salovey and Mayer (2000) believe that emotional intelligence is a 'cognitive ability' and they view it similar to IQ, if we are able to measure ones' emotional intelligence, they come up with something similar to ones' IQ and they call that the EQ. Most of the tests that researchers developed, involves self-report measures/ inventories is based on the notion of introspection, which is a type of psychological test in which an individual completes a questionnaire about their thoughts and behaviour.

In terms of the conceptual clarity of the concept of emotional intelligence, Waterhouse's research shows that the concept of emotional intelligence is constantly being refined and elaborated by different researchers. Thus, the notion of emotional intelligence becomes a collection of concepts. According to Waterhouse (2006, p.217), "[n]o research has yet validated the notion of a unitary EI". Emotional researchers assert that it is possible to measure an individuals' emotional intelligence, however, emotional intelligence is not easy to measure. Waterhouse (2006, p. 217) postulates that emotional intelligence was based on "observations and self-report surveys. Locke (2005) claimed that EI was defined too broadly to ever be adequately tested". Self-report tests "leads to the idea of EI as a personal trait, whereas potential maximum performance measurement would lead to ideas of EI as a cognitive ability" (Furnham, 2012, p. 12), therefore these are two different constructs. Most processes implemented to test EI was primarily ability tests which allow individuals to solve emotional problems. According to Mayer and Salovey (1993, p. 434), traits "involve dispositions toward behaviour; intelligence involves organismic abilities to behave". A trait emphasizes the social skill which is a behavioural preference rather than acknowledging another individuals' emotions which is considered as a mental ability (Mayer & Salovey, 1993, p. 435). Thus, emotional intelligence can be easily misunderstood. "A major difficulty with the measurement of ability EI is that emotional experiences are inherently subjective and, consequently lack the objectivity required to make them amenable to robust, valid and reliable maximum performance measurement" (Furnham, 2012, p. 12).

Furnham (2012, p. 12), further asserts that although the trait EI and ability EI are different constructs, many people still develop both types of tests. There are various tests that exist such as a personality test (trait test) and tests which measures individuals' ability. According to Furnham (2012, p. 12), "[t]he well-established measure is called the MSCEIT". The MSCEIT measures four factors including "perceiving and identifying emotions…, using emotions to facilitate thought…, understanding emotions…, and managing emotions" (Furnham, 2012, p. 12). This test asks individuals to identify their own emotions and emotions of others, "generate a mood and solve problems with that mood", define various causes of different emotions and understanding them, and "determine how to best include emotion in our thinking in situations that involve ourselves or other people" (Furnham, 2012, p. 12). These measures can be problematic because the scoring is rather objective. It is difficult to assess which tests are accurate and reliable. Mayer, Salovey and Caruso (2008, p. 514), assert that the MSCEIT is popular and is seen useful to measure emotional intelligence, however, "[a]t the same time, we acknowledge that the test has important limitation, and thus some invalidity. Goleman's (1995) notion of tests are adequate but are based on small samples, therefore the validity is unclear because of the "lack of adequate data" (Furnham, 2012, p. 13). According to Goleman (1999, p. 642) "[s]elf-evaluations are vulnerable to skews from people wanting to look good. And when it comes to assessing emotional competence, there is the question of whether someone low in self-awareness can be trusted to accurately evaluate her own strengths and weaknesses. While self-evaluations can be helpful (and candid) if people trust that the results will be used for their own good, without this trust they can be less reliable". A negative result can allow a person to lack confidence and obtain a low self-esteem which can impact their life in the long run and it is seen as their weakness (may include subconscious insecurities), whereas a person who performs well in this test will have great confidence and a high self-esteem.

Goleman believes that emotional intelligence influences success in life, however, Waterhouse (2006, p. 217) argues that "there was no validation of the claim that EI was critical for real-world success". According to Waterhouse (2006, p.218), "Landy (2005) argued that EI cannot be considered a scientific theory because some datasets proposing evidence for EI cannot be evaluated because these datasets are privately owned". Waterhouse (2006) emphasizes that the lack of evidence to validate the notion of measuring emotional intelligence. Teachers have always been interested about the behaviours of their students. According to Mayer and Cobb (2000, p. 170), teachers had found a way to link emotional intelligence and education. Teachers were quick to believe that "emotional intelligence was required to learn and to behave well",

and “emotional intelligence predicted success” (Mayer & Cobb, 2000, p. 170). The popularity of the concept of emotional intelligence improving academic performances have studies supporting it but is misunderstood and has been criticized in places.

Furnham (2012, p. 8) asserts that the implication of emotional intelligence can be viewed as a “management fad”. Some of the fads include academic discovery, in which we tend to believe that notions such as emotional intelligence is beneficial and would add value in our lives. However, according to Waterhouse (2006, p. 219), there are three reasons in which people believe in the notion of emotional intelligence ideas even though it lacks supporting evidence. The first is ‘credo consolans’ in which “an unproven idea may be comforting if it predicts a good outcome”, the second is ‘immediate gratification’ in which “an unproven idea may be attractive if it offers instant solutions for difficult problems”, and lastly, “easy explanations” which is “an unproven idea may be accepted if it offers a simple story about something that is difficult to understand” (Waterhouse, 2006, p. 219). Emotional intelligence tends to provide comfort which encourages teachers to implement emotional intelligence because of the predicted positive outcome. The emphasis is on improvement of students’ performance and to reduce the classroom problems. This becomes popular as it “offers an easy explanation of cognitive processes” (Waterhouse, 2006, p. 219).

There is no evidence of data to support whether emotional intelligence in education can be beneficial. According to Cherniss (2000, p. 7), much research has suggested that “emotional intelligence is important for success in work and in life. Both Goleman (1998) and Mayer, Salovey and Caruso (1998b) have argued that by itself emotional intelligence probably is not a strong predictor of job performance”. The notion of emotional intelligence misleading and it is a concept that is too broad and has many elements that have not much relevance to the development the notion of emotional intelligence within itself. Thus, it becomes difficult to apply this notion of emotional intelligence in education without substantial evidence. Teachers tend to easily accept notions such as emotional intelligence because it appeals to their situation at schools. Many teachers apply such notions to deal with problems that occur within their classroom environment. Teachers find it interesting, because it appeals to their own sense of liberalism.

“Jorgenson (2003) claimed that educators have shown a “carelessness in misinterpreting and decontextualizing the findings of brain research” amounting to “educational malpractice”” (Waterhouse, 2006, p. 220). Teacher’s training has not been sufficient and Waterhouse (2006,

p. 220) postulates that "[t]eachers' beliefs about how students learn are strongly influenced by their educational training". Seeing that emotional intelligence lacks evidence, it is unlikely to be productive and valuable in enhancing the learning process within the classroom.

Although the notion of emotional intelligence rests on a firm foundation and is popular, there are many critiques as mentioned above. Emotional intelligence "is theorized to be a multipurpose processor solving no particular problem but focused on one domain: social skills" (Waterhouse, 2006, p. 222). It is difficult to test ones' intelligence. People continuously develop and their emotions can be influenced on what they experience as they encounter certain situations. Tests are not a true reflection of a persons' emotional intelligence. According to Mayer, Salovey & Caruso (2008, p. 514), if the notion of emotional intelligence needs to be rescued, sufficient research needs to be done (such as literature) to guide their thinking; we need clear conceptualization and definition; sufficient research on the 'ability' conception of emotional intelligence is needed, studies must include "emotional knowledge measures, emotional facial recognition ability, levels of emotional awareness, emerging research on emotional self-regulation, and related areas", so that there will be sufficient evidence and the gaps can be filled. Great attention needs to be given to the issues of testing emotional intelligence. "Such distinctions will help pave the way for a healthier, more convincing, and better understood EI, one that best can serve the discipline of psychology and other fields (Mayer, Salovey & Caruso, 2008, p. 514). However, there is no empirical research to suggest that these findings hold true.

In the above reviewed studies, the findings revealed that emotional intelligence (EI), is regarded as the capacity to identify, comprehend, control, and make good use of one's own and other people's emotions, but scanty evidence is available in literature. This present study addressed this research gap by providing empirical evidence on the truth of this phenomenon from teachers views in a South African setting.

2.4: Fads and Neuromyths incorporated in Educational Policies

According to Gardner (2020, p. 1), "[w]ithin the educational world, a "neuromyth" typically refers to a claim that a certain practice is based on "solid" evidence from brain research—and yet that claim does not withstand scrutiny". Gardner (2020, p. 1) further asserted that these 'myths' are usually held in firm belief and have not been challenged and criticized. In addition, Gardner (2020) postulates that it is evident that individuals should not accept or pass on neuromyths, however, it is still implemented in education. Individuals who strongly believe in

neuromyths, need to obtain in depth knowledge and understanding of the scientific research, as some 'myths' that are being implemented is unjustified and should be dismissed, some 'myths' are uncertain and some may have some truth, however, substantial research is essential to determine the "truthfulness and usefulness in various educational situations" (Gardner, 2020, p. 2). Gardner (2020, p. 3) argued that when the 'scientific claims' have been made, it needs to be clarified, in other words "those making the claim should clarify the exact basis of the claim" and it is important to take into consideration the validity of the conditions by specifying the population. Gardner (2020) concluded that many years ago there worth in recognising 'myths' in education, however, the practice has been misunderstood and become problematic as implementing the neuromyths in the education system is no longer helpful.

Hughes, Sullivan and Gilmore (2020, p. 4) asserted that "[e]ducational neuromyths are misconceptions about the mind and brain and how people, especially children, learn". Their study focused on Australian in-service teacher's beliefs on neuromyths and the impact of neuromyths on their teaching practice. In the study conducted, teachers were given seventeen brain facts and fifteen neuromyths. According to Hughes, Sullivan and Gilmore (2020), the knowledge teachers obtained about the brain was high, however, teachers who believed in neuromyths also implemented the myths into their practice. While teachers have "good factual knowledge of the brain", they "are also susceptible to believing many neuromyths" (Hughes, Sullivan & Gilmore, 2020, p. 15). To address this issue, the education polices need to conscientiously design the system to avoid any risks as it is difficult to distinguish a neuromyth strategy from formal educational systems. Geake (2008, p. 124) mentions that some of the examples of neuromyths include: that we use 10% of our brain, multiple intelligences, the left and right brained thinking and the VAK learning styles. These neuromyths have greatly influences the learning process in education, however, there are critiques that argue against these notions.

According to Geake (2008, p. 127), "[t]here is overwhelming evidence that the brain is perpetually busy, and that even when any of our brain cells are not involved in processing some information, they still fire randomly. As an organ which has evolved not to know what is going to happen next, such constant activity keeps our brain in a state of readiness". The process of evolution is designed to optimize every space of the brain or a function/ a thought process to make it more efficient, therefore the notion that evolution would create a brain that large, and we only use 10% does not seem logical. Evolution is designed to help us adapt to adjust to situations which occur over time. Therefore, by this notion and by analysing the thought that

we only use 10% of our brain, does not work hand in hand and it seems to contradict the theory that we use 10% of our brain. Countless number of studies have been done around the world on the brain and no one has conclusive evidence to prove that there is no unused portion of the brain. While it would be an advantage if we did have extra capacity in the brain to capitalize, this is not the case. The ability of the brain to adapt to change is possible for both young and old individuals, it should not be underestimated, however, this does require mental stimulation for the brain to learn and adapt, as well as develop further skills. Therefore, if this theory of individuals only using 10% of their brain was true, we would not be a functional human being as we are now.

Geake (2008, p. 128) further focuses on the notion of the left and right brain thinking. It is believed that the brain can be spilt into two hemispheres, the left and the right and this was founded upon studies in which patients had medical issues, and they had to distinguish the problem between the two. The studies had found that the processing of left hemisphere of the brain was reported (Geake, 2008, p. 128). However, this is a myth in suggesting that we have left and right brained thinking because these patients had abnormal brains and some illnesses. While the study was observed in this set of circumstances, upon further research, the findings is that the brain is one complete unit and it cannot be divided into a left and a right hemisphere, they function together, and they function simultaneously and they are integrated to produce the thinking ability and the cognitive thoughts (Geake, 2008, p. 128). The left and right hemisphere of the brain does not work in cross purposes, but rather as a joint entity to produce an outcome. There is a false notion suggesting that one is responsible for the other.

Geake (2008, p. 130), focuses on the notion of the VAK learning style, "the idea is that children can be testes to ascertain which is their dominant learning style, V, A or K, and then thought accordingly". There are individuals who can be categorized as visual student who learn through vision (using visual aids), an auditory student who prefers listening to new information rather than reading new information, and a kinaesthetic student who could use ones' body in skills ways (Franklin, 2006, p. 84). This requires teachers to adapt their teaching strategies. However, it is difficult to cater for every student by adopting this learning style. It becomes problematic for teachers to accommodate all the different students, how would a teacher deal with the auditory and kinesthetic students in an art lesson, or how would a teacher manage the visual and auditory student in a gym class, etc. This learning style therefore becomes rather complex.

In addition, Hughes, Sullivan and Gilmore (2021, p. 1) asserted that neuromyths are "distorted ideas from neuroscience about the brain and learning". They postulated that according to the Organisation for Economic Cooperation and Development (OECD), the term neuromyths refers to the common "misconceptions about the brain "generated by a misunderstanding, a misreading or a misquoting of facts scientifically established" (OECD 2002, p. 111) (Hughes, Sullivan & Gilmore, 2021, p.2). Due to the popularity of 'neuromyths', there has been a great influence of neuromyths being implemented in the teaching practices and educational programs (Hughes, Sullivan & Gilmore, 2021, p.2). According to Hughes, Sullivan and Gilmore (2021), teachers do not receive neuroscience training and therefore lack knowledge in neuromyths. Without receiving training, it is possible for teachers to be influenced by the neuromyths, and it will result in effecting their educational practices. On a cognitive level, teachers do not seem to question a belief, instead they accept a 'quick fix' notion provided by neuromyths (Hughes, Sullivan & Gilmore, 2021, p. 2). Some of the neuromyths endorsed by teachers included; individuals learn better when they receive information in their preferred learning style (that being auditory, visual, and kinesthetic), the differences in hemisphere dominance (the left or right brain) can help explain individual differences among individuals, exercises that rehearse coordination of motor-perception skills can improve the individuals literacy skills, short periods of coordination exercises can improve integration of the hemispheric brain function (left and right brain), environments that are rich in stimulus improve the brains of young children, the use of fatty acid supplements (such as omega -3 and omega-6) have a positive effect on academic achievement, and children are less attentive after consuming sugary drinks or snacks (Hughes, Sullivan & Gilmore, 2021, p. 12). Hughes, Sullivan and Gilmore (2021, p. 16) opined that by accepting neuromyths into educational practices, there is a possibility of damaging the credibility of the teaching profession, as teachers should be able to understand and obtain knowledge of the brain in learning and to implement evidence-based research into their practices and not neuromyths. We cannot dispute that neuromyths are present, however, it is of utmost importance to identify, prevent, and challenge the misunderstandings and misconceptions about the brain and learning because learning is much more complex than it seems.

Another research conducted by Sullivan, Hughes and Gilmore (2021) reported that educational neuromyths "are incorrect ideas about the brain and learning" (p.1). These misunderstood ideas of neuromyths can be considered a risk as they can negatively affect learning outcomes. According to Sullivan, Hughes and Gilmore (2021), educational neuromyths can not only have

an influence but can also extensively change teaching and learning. Neuromyths seem to be strongly held by teachers and although it is difficult to correct, it may also be implemented to "justify practices or policies on schools", seeing that the concept of neuromyths draws attention and seems helpful to the learning process (Sullivan, Hughes & Gilmore, 2021, p.4). However, the implementation of neuromyths in education is challenging and by correcting the misunderstandings and misconceptions, teachers will be able to prevent the use of neuromyth practices, programs and policies in schools. Sullivan, Hughes and Gilmore (2021) suggested that rising educational neuromyth awareness can greatly improve the educational system.

Similarly, Torrijos-Muelas, et al., (2021) asserted that Neuroscience in fact has an influence in education. The study, which was conducted in Spain, focused on the prevalence on neuromyths in education. According to Torrijos-Muelas, et al., (2021, p. 1), "neuromyths as the consequence of a lack of scientific knowledge, a communicative gap between scientists and teachers, and the low-quality information sources consulted by teachers". The concept of neuroscience and the influence it has in education have converged to "Neuroeducation". The term 'neuroeducation' was intended to "bridge the gap between the most theoretical part of the neurosciences and their practical contributions for education" (Torrijos-Muelas, González-Víllora & Bodoque-Osma, 2021, p. 3). According to Torrijos-Muelas, et al., (2021, p. 3), the concept of neuroeducation was considered useful by teachers and students in their school practices, however teachers and students can be affected when implementing neuroeducation. As a result of the study, Torrijos-Muelas, et al., (2021, p. 11) postulated that "[m]yths can be more believable than non-myths, and people seem to be more willing to transmit them" and teachers lack knowledge about science and the brain.

Grospietsch and Mayer (2020) asserted that teachers are very interested in neuromyths can consider the implementation into their practice useful. Although teachers are considered to be 'experts' on learning, teachers are still strongly held on applying neuromyths in their practice. According to Grospietsch and Mayer (2020, p. 64), there are various neuromyths that are implemented in education, which include; the existence of different learning styles, the effectiveness of brain gym, specific storage locations, differences due to hemispheric domains, best learning before the age of 3, logic on the left brain/ creativity on the right brain, critical time periods for learning, only using 10% of the brain and learning while you sleep. Implementing neuromyths in education can "negatively affect teachers' effectiveness, students' learning performance or their perceived self-efficacy" (Grospietsch & Mayer, 2020,

p. 68). This can also become problematic because of teachers leading on incorrect "neuroeducation" content which can cause ineffective learning in their practice.

Grospietsch and Lins (2021) postulated that when neuromyths are implemented in education, the school systems time, money and effort is wasted. According to Grospietsch and Lins (2021, p. 2), when neuromyths gain popularity, it can be consolidated by the "backfire effects" which include; the familiarity backfire effect, the overkill backfire effect and the worldview backfire effect. The familiarity back fire effect is a reference to an unforgettable scientific myth can lead to a long-term retention. The overkill backfire effect is when a scientific myth is presented, one will reject complex arguments and reinforce their pre-existing belief in a simple but incorrect myth that is easier for them to understand. The worldview backfire effect is when individuals are strongly held of a scientific myth, and despite new contradicting information, their beliefs on the myth are strengthened when others attempt to debunk the myth.

According to Grospietsch and Lins (2021), tests to establish students learning styles are not reliable. Various learning styles cannot describe the learning process seeing that learning is more complex. A number if studied have been conducted in England, the Netherlands, Switserland, Spain, Italy, Portugal, Turkey, Greece, Morocco, China, Australis, Canada, United States, Germany, and Latin America which demonstrated the endorsement of neuromyths among teachers (Grospietsch & Lins, 2021, p. 6). Teachers conform to neuromyths in both academic and practical training. According to Grospietsch and Lins (2021, p 7), teachers are encountered by neuromyths during their practical training in schools, emphasizing that many teachers have implemented unproven myths in their practices.

In the above reviewed studies, the findings revealed that even though there is little empirical research on neuromyths being cooperated in education, it is not sufficient to be able to reduce or prevent the misconceptions of the learning process. The knowledge many people retain about neuromyths is from old research, teachers do not only need to be well equipped but also well informed about updated research. This study addressed this research gap by providing empirical evidence on how teachers in South Africa incorporate neuromyths in their educational policies.

2.4.1: Teachers' use of Fads and Neuromyths in their practice

According to Alekno's (2012) research on teachers' beliefs and practices regarding neuromyths, indicated many neuromyths which had emerged about false findings of neuroscience being implemented in the teaching and learning process. Alekno (2012) conducted a study in the USA to explore the extent teachers' beliefs regarding education contained neuromyths and how it has affected teachers' practices. 161 teachers participated in the study and more than half of the teachers agreed with the following neuromyths: "(a) left-brained/right-brained thinking (77.7% agreed), (b) the ten percent myth (88.8% agreed), (c) visual, auditory, and kinesthetic learning modalities (93.7% agreed), (d) multiple intelligences that are tied to brain differences (72% agreed), and (e) differences in female and male learning that result from significant differences in male and female brains (57.1% agreed)" (Alekno, 2012, p. ii). Alekno (2012, p.2) asserted that many neuromyths were applied in the curriculum and instruction of teaching, therefore, teachers were guided to adapt these neuromyths into their teaching and subsequently adopting these neuromyths into their teaching may unknowingly negatively affect the learners.

A study conducted by Bissessar and Youssef (2021, p.1) in Trinidad and Tobago reported that, due to the misleading information of neuromyths in the media, teachers frequently lacked accurate information, and educational methods used in the classroom have little foundation in reputable studies. They further asserted that "[r]esearch from numerous developed countries have demonstrated a high level of belief in neuromyths among teachers" (Bissessar & Youssef, 2021, p.1). In their best efforts, teachers often seek out strategies and tactics that would enhance their students' learning, thereby making them more vulnerable to neuromyths. Bissessar and Youssef (2021, p.2) research focused on assessing teachers of primary and secondary schools' beliefs in neuromyths and how their beliefs influenced their teaching. The study concluded that teachers who have not undergone specialised training in educational neuroscience are less able to differentiate between the true and false material they have been exposed to, making them more vulnerable to neuromyths. Although teachers are very interested in neuroscience-based education, they have limited knowledge of the subject. To dispel deeply ingrained misconceptions about certain aspects of education, such as learning styles and how the brain affects learning, targeted training interventions are likely necessary. Teachers are required to reflect upon how their beliefs impact their teaching and the desired educational outcomes. Beyond simply recording the existence of these beliefs, more emphasis must now be given to

what happens in the classroom and the development of effective instructional educational approaches.

Goswami's (2006) study conducted in the United Kingdom reported that teachers are at the receiving end of numerous 'brain-based learning' packages, some w of which contain alarming amounts of misinformation, yet such packages are being used in many schools. The learning packages Goswami (2006) refers to are brain-based learning in schools in which teachers attend workshops or conferences that encourage them to attend brain-based learning courses. These courses suggest strategies that could possibly help teachers in their educational practices. According to Goswami (2006, p.2), these courses suggest that "children should be identified as either 'left-brained' or 'right-brained' learners, because individuals 'prefer' one type of processing". Teachers are informed that the left-brain processes language, logic, numerical formulas, sequences, linearity, analysis, and unrelated factual knowledge to a greater extent than the right brain. In contrast, it is believed that the right brain predominates in the processing of shapes and patterns, manipulation of space, rhythm, images and pictures, daydreaming, and relationships in learning. To prevent a mismatch between learner preferences and learning experiences, teachers are recommended to make sure that their classroom activities are always "left- and right-brain balanced". Other courses advised teachers that a child's learning style should be identified as either a visual, auditory or kinaesthetic and that in educational practices, the VAK learning style suits the needs of all students and impacts their learning process.

According to Goswami (2006), neuromyths must be dispelled in schooling, and that the predominance of these fallacies conceals the significant advancements being made in many fields related to education by cognitive neuroscience. Goswami (2006, p.6) further asserted that "class teachers would take on new initiatives if they are sold on the benefits for the children". Goswami (2006) postulated that the interest teachers have for neuroscience stems from teachers desperately wanting to find solutions to better help their students learning process and they are eager to learn about new discoveries which would contribute to their teaching. In addition, neuroscientists may not be the best to provide teaching strategies as they are focused on 'experimental manipulations and providing data and do not necessarily apply to education (Goswami, 2006, p. 6).

The study of neuroscience has the potential to significantly influence educational research and practise. According to Bellert and Graham (2013), even though teachers are very interested in the results of cognitive neuroscience, it is important to proceed with caution when

implementing this new knowledge. In particular, programmes that make exaggerated claims about the efficacy of their brain-based learning methods should be questioned. They further opined that "research emerging in the last decade suggests that neuroscience may deliver findings relevant to how students learn and how teachers teach" (Bellert & Graham, 2013, p.7). Applying results from cognitive neuroscience directly to teaching and learning interactions requires prudence when evaluating claims about learning and teaching in education. Learning styles, educational kinaesthetics, neurolinguistic programmes, and other brain-based learning strategies lack a solid foundation in either neuroscience or educational research. The influence of these strategies as educational approaches suggests that teachers need to become more knowledgeable about secure ways to engage with new brain research discoveries (Bellert & Graham, 2013, p.7 & 8). There should be constant interaction between scientists, psychologists and educational researchers to better help teachers to avoid the misinterpretations of neuroscience. Bellert and Graham (2013, p. 15), suggested that teachers attempt to fill a void in helping students learn was to implement neuromyths into their practices. These limits teachers' beliefs of effective student achievements as many teachers are not aware of the falsity of the neuromyths they use within their classroom.

Papadatou-Pastou, et al. (2021) asserted that although learning styles have been identified as a neuromyth, they continue to be an educational truism. The fact that the name "learning style" has been employed in theories that describe them using entirely distinct conceptions and categorizations is cause for concern. The idea of learning styles has some intuitive appeal and proposes that delivering information through many but individually specific preferred modalities in education might enhance learning. However, Papadatou-Pastou, et al. (2021, p. 512) argue that this idea has received a lot of criticism due to the misinterpretation of the VAK learning styles neuromyth. They further asserted that the notion of learning styles focused on the vast differences amongst children with special needs and require special education and will be accommodated for through various learning styles. Through the adoption of the learning style myths, teachers think that if the VAK learning method is adapted to the child's preferred learning style, all children can learn. "If individuals are categorised according to learning styles, the danger looms that this can lead to the assumption of fixed or rigid learning styles, which can demotivate students from adapting, let alone seeking new challenges (Education Endowment Foundation 2017). Moreover, adopting learning styles could limit the modes of presentation of material for certain students, leading to diminished opportunities to learn" (Papadatou-Pastou, et al., 2021, p. 512)". Learning styles have, in fact, frequently been utilised

by teachers in unhelpful ways, more as a technique to categorise and label students than in a positive approach to enhance learning experiences.

In the above reviewed studies, the findings revealed that many teachers implemented various neuromyths in their teaching methodology, but very scanty literature is available in South Africa context. This study addressed this research gap by providing empirical evidence on teachers in South Africa's use of neuromyths in their everyday practice. It is essential for teachers to be aware of the neuromyths so that they can adequately adopt appropriate learning strategies so benefit students to help them reach their full academic potential to excel. It is important for teachers to acknowledge the complexity of learning and there is no quick fix to helping students learn.

2.5: Teachers' understanding of these Fads and Neuromyths

According to Hardiman (2012, p. 31), "[a]fter interviewing educators on the use of neuroscience in education, Howard-Jones, Pickering, and Diack (2007) reported that teachers felt a sense of embarrassment and even betrayal when they discovered that programs they thought were grounded in neuroscience research actually lacked scientific support". Teachers were encouraged to apply various neuromyths into their classroom practice without fully understanding the phenomena. A study conducted in Turkey by Dündar and Gündüz (2016) indicated that the failure to properly incorporate neuroscience into educational practices has given rise to several such misinterpretations. Neuromyths has become problematic in the implementation of education. Although teachers understand neuromyths have been derived from a scientific basis, the content has been wrongly interpreted. As a result, various forms of training are available to help teachers understand the scientific content and to use the knowledge of the brain effectively. Dündar and Gündüz (2016, p. 212) asserted that "teachers' efforts to incorporate neuroscience findings in their educational practices are hindered by the complexity of neuroscience and the difficulty of transferring its findings to the classroom environment", thus leading to the misuse of neuromyths in education. Some of the neuromyth assertions that teachers believed included;

> students learn better when they receive information in their preferred learning style (auditory, visual or kinesthetic), environments that are rich in stimulus improve brains of young children, fatty acid supplements have a positive effect on academic achievement, differences in hemispheric dominance can help explain individual differences, learning problems

> associated with developmental differences in brain function cannot be remediated b education, children are less attentive after consuming sugar substances, to learn to do something it is necessary to pay attention to is, children must acquire their native language before a second language is learned, brain development has finished by the time children reach secondary school, there are critical periods in childhood after which certain things can no longer be learned, information is stored in the brain, academic achievement can be affected by skipping breakfast, there are sensitive periods in childhood when it is easier to learn things, drinking less than six to eight glasses of water a day can cause the brain to shrink, we mostly use 10% of our brain, boys have bigger brains than girls, the brains of boys and girls develop at the same rate, and many more assertions are strongly held by teachers (Dündar & Gündüz, 2016, p. 218-219).

The result of teachers' strong belief in neuromyths proves that teachers lack adequate knowledge of the content and therefore they are unable to implement neuromyths in a critical way. "This suggests that neuromyths may in part develop as a consequence of teachers' inadequate neuroscience literacy and critical capacity" (Dündar & Gündüz, 2016, p. 213). The study concluded that teachers do not have much knowledge on the concept, yet they adopt neuromyths and it is being practiced in education. It is evident that teachers have misconceptions of the content and deeper research is required to prevent the misuse of neuromyths so that effective learning can occur.

A study conducted in England, McMahon, et al., (2019) asserted that there are several evidence of teachers' beliefs of neuromyths across many countries. They postulate that there are strong beliefs that "teaching should be tailored according to a pupil's learning style and that cerebral hemispheric dominance explains differences between learners" (McMahon, Yeh & Etchells, 2019, p. 3). The basis of the neuromyths is not based on a deeper understanding of how the brain functions. According to McMahon, et al. (2019), teachers who have taken neuroscience classes are infatuated with the content and only individuals who obtain a degree in cognitive neuroscience is able to identify the falseness of the explanations of the content as they are able to see the irrelevance. Initial teacher education sets the foundation in terms of the values, beliefs and ideas that teachers take with them throughout their professional careers. McMahon, et al. (2019) postulated that teachers receive information and ideas from other teachers rather than conducting research. Teachers tend to belief neuromyths without questioning or challenging

the phenomena. The study conducted an intervention which involved collaboration with initial teacher education tutors and trainee teachers (McMahon, Yeh & Etchells, 2009). The main focus of the intervention was a 90-minute workshop which involved neuroscience content and the anatomy of the key brain areas. The intervention took place over a three-week period and the participants took a survey before and after the intervention. As a result of the study, McMahon, et al. (2019, p.9) found that "overall there was no impact on general knowledge of the brain and a slight reduction in belief in neuromyths". The most prevalent neuromyths were identified in the survey conducted before the intervention and this established that there was a reduction of teachers' beliefs after the intervention. Teacher education should allow teachers to engage with various research findings from neuroscience to that they are able to effectively challenge and criticize the notion and thereafter implement their knowledge gained effectively in their teaching practice.

Another study conducted in Switzerland by Tardif, et al., (2015, p. 50) asserted that there are various "so-called brain-based educational approaches have been strongly criticized for their lack of empirical support and occasionally for their use of pseudoscientific concepts". The study conducted a survey with both teachers and student teachers which focused on their neuromyth beliefs. Teachers believe that neuromyths contribute to education, however they do not consider the risks. According to Tardif, et al., (2015, p. 50) "[w]hat can appear confusing is that, although such authors present facts about the brain that are often accurate and offer advice that can indeed be of interest for teaching, the research data they rely on may be misunderstood. It is also possible that the authors interpret the results differently or that they extrapolate too much". To understand teachers' beliefs would be beneficial to create better teacher training programs to that their misunderstandings of neuromyths can be reduced. Tardif, et al., (2015, p. 57) established that some teachers were more likely to belief in neuromyths than other teachers and therefore it is possible that some teachers used neuromyths in their education practices and some teachers did not as they did not find neuromyths relevant in education. Due to teachers having interest in the functioning of the brain, they considered neuromyths to be relevant to education. However, teacher training in cognitive neuroscience needs to be adopted in teacher training curriculums to help teachers obtain a better understanding of scientific phenomenon. Tardif, et al. (2015, p. 57) suggested that "neuroscience should be regarded as a means to better understand a number of topics relevant to education rather than as a prescriptive tool for teachers". When young teachers join a school, they may be influenced by teachers who are more experienced, and because these teachers are

more experienced, the young teachers will then consolidate their own beliefs. As a result, teachers could greatly benefit from appropriate training.

Idrissi, et al. (2020) postulated that immense effort has been made to understand neuroscience that supports learning. Various studies established that the "lack of brain knowledge; difficulties in translating the brain knowledge into learning situations and a widespread of neuromyths among teachers, which generates negative effects on student learning" (Idrissi, Alami, Lamkaddem & Souirti, 2020, p. 2). Teachers' education choices are influenced by the neuromyths and therefore they are prevented from effective educational practices. Idrissi, et al. (2020) conducted a study in Morocco in which they assessed teachers' knowledge about the brain and its implications un the learning process, and the prevalence of neuromyths among teachers. The study findings indicated that most teachers lacked knowledge about the brain, and this was associated with the neuromyths that teachers' belief.

A study conducted in Greece by Papadatou-Pastou, et al. (2017) found that teachers believed that 'neuroscience knowledge' was beneficial and useful for teachers. They asserted that there is a major concern regarding the limited brain knowledge that teachers obtain therefore resulting in teachers' beliefs of neuromyths. Neuromyths are being used to bridge a gap in education, however, Papadatou-Pastou, et al. (2017, p. 2), "in 1997 Bruer argued that education and neuroscience are "a bridge too far"". From this finding, it can be argued that Bruer believed neuroscience and education were two very different disciplines, and it is difficult to create a meaningful explanation of neuroscience being adopted in education, psychology needs to be taken into consideration to explain the phenomena. Papadatou-Pastou, et al. (2017, p. 2) asserted that "[i]t has even been claimed that an interface can be constructed between educational psychology and cognitive neuroscience, with the benefits of this interface being comparable to those accrued when a paradigm shifts from a behaviorist orientation to a cognitive perspective in the 1960s and 1970s took place". It is extremely difficult seeing that neuroscience has its own complexity therefore many misunderstanding and wrongful interpretations are made and these neuromyths should not be implemented in education. Research about neuroscience have suggested that it can be beneficial to teachers. The concept of neuroscience suggested that without taking psychological studies into consideration, teachers can benefit from teacher preparation, and if teachers obtain knowledge about the brain and the nervous system, they can better understand their students' behaviour and support the learning that occurs in the classroom (Papadatou-Pastou, Haliou & Vlachos, 2017, p. 2). As a result of the study, a large perception of neuromyths were believed by teachers and they

obtained good knowledge of neuroscience literacy. Papadatou-Pastou, et al. (2017, p. 7) postulated that "[g]eneral knowledge about the brain was the only significant predictor of neuromyths". Teachers strongly believed that it is necessary to acquire knowledge about the brain function and neuroscience as it should be embedded in the education curriculum. However, it is important to take note that neuroscience is constantly changing and developing, therefore teachers need to be equipped to follow the new findings and effectively evaluate the development.

Rato, et al. (2013) study in Portugal indicated that, a major concern was that neuroscience information was being "manipulated directly to fit the classroom milieu". As a result, teachers are then exposed to the misconceptions as they learn invalid information to improve their teaching. Rato, et al., (2013, p. 444) suggested that teachers who have been teaching for a long period of time and have gain more experience obtain better scientific knowledge and are therefore more resistant to accepting any myths. The results of the study suggested that teachers failed to distinguish the myths from facts. According to Rato, et al. (2013, p. 449), "teachers' level of knowledge did not suffice to allow for the recognition of the difference between brain facts and brain myths". Teachers need to be more resistance to the acceptance of myths on shallow grounds. Teachers obtain the misconceptions from information gathered from other teachers, media, training, the internet and teachers need to access scientific journals that can be useful to their practices. If teachers need to become familiar with scientific concepts as it can serve as a guide to their practice and they can use their knowledge to prevent any teaching errors (Rato, Abreu & Castro-Caldas, 2013, p. 450).

Another research conducted in Italy by Tovazzi, et al. (2020) indicated that knowledge about neuroscience is not covered adequately in teacher trainings, therefore, teachers tend to misinterpret the phenomena. "[L]imited knowledge of and high interest in the subject of psychology may lead teachers to develop naïve ideas about brain functioning on their own, thus increasing the likelihood that they will subscribe to neuromyths" (Tovazzi, Giovannini & Basso, 2020, p. 188). As a result of the study, many teachers were susceptible in accepting neuromyths. Due to the lack of effective teacher training, teachers had difficulty distinguishing myths from facts.

Ferrero, et al. (2016) study among teachers in Spain asserted that "a lack of sufficient knowledge, poor communication between educators and scientists, and the effective marketing of dubious educational products has led to the proliferation of numerous 'neuromyths'". They

further opined that teachers found neuromyths to be beneficial as a great way to improve and enrich their teaching. However, there is a gap between teachers and the researchers which caused various misinterpretations. Over a long period of time through research, cognitive neuroscience has been a challenge in adopting the notion to learning. According to Ferrero, et al. (2016, p.6), "results obtained in this study showed that Spanish teachers believed a considerable number of the neuromyths". Half of the teachers who participated in the study had completed a course about the brain and learning within their own school, and this emphasizes the influence a school can have on accepting neuromyths.

In the reviewed studies above, the findings revealed that majority of teachers strongly believe in neuromyths and as a result adopt them in their teaching methodologies. However, very scanty literature is available on South African context. The present study addressed this research gap by providing empirical evidence on teachers in South Africa's understanding and belief in these neuromyths. From the literature reviewed above, it is important that teachers are offered effective training and programs about the brain based on solid scientific evidence and not neuromyths. If teachers obtain the adequate and sufficient knowledge of the emergence of the neuromyths, they will be less likely to implement these practices of neuromyths in their teaching.

2.6: Sources from which teachers acquire these Fads and Neuromyths to be true

Although teachers all over the world are very interested in the subject of neuroscience, there appears to be a significant gap between this interest and the teachers' real capacity to deal with neuroscientific results in a professional manner. It has been demonstrated that teachers who have a strong understanding of brain science are more prone to believing in neuromyths. Due to the prevalence of neuromyths, many teachers adopt the use of neuromyths which influence their practice in the classroom. According to Bellert and Graham (2013, p.14), the findings "indicated that information about neuroscience and education was of high interest to teachers, that teachers gained information from a range of sources including conferences, books, media and commercial products, and that while teachers are keen to be active partners in future collaboration between neuroscience and education, their perceptions of applying neuroscience to education were somewhat confounded by their acceptance of neuromyths".

According to Lethaby and Harries (2017) study in Canada and USA, 30% of teachers believed in the neuromyth that we only use 10% of our brain, 91% of teachers believed that individual students show preferences for the mode in which they receive information, thus being the visual, auditory or kinaesthetic learning style, and 66% of teachers believed that the differences in hemispheric dominance (left vs right brain) can help explain individual differences among students. There was a vast majority of teachers who believed in neuromyths and thought that it is an effective method of helping students learn effectively.

Grospietsch and Mayer (2019, p. 2), postulated that the results of neuroscience research have piqued the interest of teachers across all subject areas, who find it valuable to apply them in their lessons and medium of instruction. Once neuroscientific explanations are provided, even poorly understood research findings become quite appealing. Grospietsch and Mayer (2019, p. 2) asserted that "[m]edia and even educational programs make use of this effect; they are filled with bold and eye-catching yet empty promises like 'learn while you sleep' or 'innate intelligence through Brain Gym'. Money, time, and effort are expended integrating so-called "neuromyths" into the school system". They further suggested that it is understandable that those who are unfamiliar with the discipline of neuroscience could find it difficult to tell facts from myths. However, teachers are supposed to be considered as experts on learning having received the appropriate teacher training, although they still seem to endorse the misconceptions about neuromyths and base their practice and medium of instruction on neuromyths. Many teachers acquire these neuromyths from media which tries to simplify learning and introduce learning programs which claim to benefit the learning process. "Neuromyths often originate from overgeneralizations of empirical research… and [c]ultural differences between countries seem to have an influence on which neuromyths spread" (Grospietsch & Mayer, 2019, p. 2). Grospietsch and Mayer's (2019, p.4) study in Germany found that having knowledge about neuroscience or having attended neuroscience courses reduced the endorsement of neuromyths. Although reading scientific articles or studies can reduce the endorsement of neuromyths, "teachers tend to use pop-science sources like TV and the Internet as their main sources of information for neuroscientific facts" (Grospietsch & Mayer, 2019, p. 4). Having to complete a course in educational psychology merely enhances one's understanding of neuroscience; it does not lessen one's belief in neuromyths.

Kim and Sankey (2018), study which was conducted in Sydney, Australia, focused on the sources of neuromyths. The findings indicated that teachers believed that they acquired the neuromyth VAK learning styles from their schoolteachers and asserted that "teachers at school

used to emphasise the existence of a variety of learning styles, especially in senior school, which made [them] believe it was correct" (Kim & Sankey, 2018, p.6). Teachers had reported that the source of their belief was courses at their university and was influenced by "a combination of teachers, lecturers and educational organisations/groups which ran activities on this idea" (Kim & Sankey, 2018, p.7). According to Kim and Sankey, (2018, p.8), school teachers frequently spread the misconception that some students are Left- or Right-Brained and one of the teachers stated that "[i]n high school I heard that different sides of the brain were used for different strengths, e.g., creative vs. mathematical. I therefore thought that if one side was dominant it would explain why people were good at learning some things and not others'; 'This is really common knowledge that explains the difference between students which I always consider true". Kim and Sankey (2018, p. 9) postulated that neuromyths seem to serve as a useful to teachers and "[r]ather like placebo medicine, neuromyths have no efficacious content, but they work because teachers and their pupils believe in them". They further asserted that the credibility of the teaching profession is another connected issue; parents and society at large should assume that teachers are well-informed and do not base their methods on false assumptions.

Redifer and Jackola (2022, p. 1) asserted that the "[b]elief in neuromyths can lead to harmful decision and behaviours". They stated that according to proponents of the myth of learning styles, each person learns best while using a certain sense such as auditory, visual or kinaesthetic and consequently, teachers will be convinced and strongly believe that a student can only perform well with their preferred learning style. Such notions may have a detrimental effect on motivation in learning contexts if students' chosen "learning styles" are not being used. Teachers that adhere to neuromyths may use them to guide their lesson plans and the feedback they give to students, which could lead to less effective education.

In a study conducted in USA, Redifer and Jackola (2022, p. 2), argued that "[b]eliefs about the origins of learned information, like other metacognitive judgments, are prone to distortions Remembering refers to having a specific memory of an event (recollection), whereas knowing consists of awareness of information (familiarity) without being able to recall its origins". Even though people can have beliefs in which they have no memory of the origins, they normally have more confidence in beliefs for which they can recall a source. Therefore, if a person can recollect a particular memory of acquiring a neuromyth, they may display a stronger belief in that information. Teachers believe that they have received information from a reliable source, and they could be less willing to reconsider their opinion than someone who cannot recall

where they heard it. Redifer and Jackola (2022) concluded that the intensity of belief in neuromyths may vary depending on an individual's perception of themselves as learners and the sources and personal relevance of numerous neuromyths.

In the reviewed studies above, the findings revealed that the source in which teachers acquire the neuromyths are not from credible research. Moreover, teachers relied on false information from the radio, television, their peers and the internet, in which they assumed would be beneficial in their teaching practices. However, there is very scanty empirical evidence on the South African context which is the critical research gap obtained in literature review. To fully understand neuromyths, teachers should obtain concrete information from the validity of scholarly articles and research conducted which provides ample evidence. The present study addressed this research gap by providing empirical evidence on the sources of which teachers acquire these various neuromyths to be true or effective within South Africa.

2.7: Effectiveness of using Fads and Neuromyths in the learning process

Howard-Jones (2019) suggested that there is a gap between neuroscience and education. Although both fields are very interested in how we learn, communication between them has been hampered by their disparate languages and conceptual frameworks, which has allowed neuromyths to flourish. Thus, impacting the teaching and learning process. It is necessary to more carefully translate neuroscientific knowledge into education in a timely, scientifically sound, and educationally significant way. This transfer could help clear up misunderstandings and motivate additional educational strategies that are supported by science.

In a study conducted in Canada, Lawrence, et al. (2020) asserted that learning and teaching is not about learning styles. They stated that one of the most pervasive and widely held educational myths involves learning styles. The premise behind the concept is that every student may be categorised according to their unique learning style, and that students learn best when teachers adapt their lessons to fit their preferred learning style. Numerous learning scientists have disproven this widely accepted idea. “Learning styles theory reduces sophisticated and complex processes like teaching and learning into overly simple categories and labels students in ways that can limit their potential” (Lawrence, Ntelioglou & Milford, 2020, p. 1). Scientists that study the brain and education have established through their research that learning and teaching are significantly more complex than merely adapting instruction to

the learning preferences of each individual learner. The theory of learning styles simplifies complex processes like teaching and learning into overly simplistic categories and labels students in ways that may limit their potential, making the belief in learning styles potentially detrimental. According to Lawrence, et al. (2020, p. 3), "[i]t is appealing to assume that students could learn more easily if instruction was simply changed to match their individual learning styles, but the way the brain processes information is much more complicated than that".

The neuromyth of learning styles can be extremely troublesome since it simplifies the processes of teaching and learning to the point that they do not actually aid students in learning more effectively. Many teachers continue to hold on to this belief even though it has been disproven. As stated by Lawrence, et al. (2020, p. 4), "learning involves underlying thinking processes and relies on our experiences. We know that students' background knowledge, abilities, and interests are central to their learning, not learning styles". Scientists that research learning are still learning about and figuring out how learning occurs as well as the complex relationships between our bodies and brains.

Clement and Lovat (2012) postulated that an extensive body of literature has been produced in the field of educational neuroscience that has called attention to a variety of epistemological and conceptual problems relevant to the endeavour to convert the results of neuroscientific research into knowledge that can be applied to enhance curriculum practise. According to a study conducted in Australia, Clement and Lovat (2012, p. 537) "[t]o consider neuroscience to be foundational to education would mean that neuroscience would need to offer knowledge, in terms of content, description or explanation that is not available from other sources". Neuroscience has not yet proven to be a magic bullet that will solve all of education's problems, and it shouldn't be expected to. Clement and Lovat (2012, p. 538) asserted that "it is by no means universally accepted that neuroscience has relevance for education". To avoid overstating conclusions obtained from the neurosciences, teachers must keep in mind that learning and development are influenced by both biological and cultural factors. They further stated that "neuroscientific descriptions of the working of the brain have appeal for teachers. Teachers considered that this knowledge aided their decisions about educational processes in general, but not specifically about matters of curriculum. It emerged, however, that many of the popular brain-based educational programs had not been validated by research, and that teachers were pragmatic in their selection of teaching strategies, basing their decisions more on their skill and experience rather than on research findings" (Clement & Lovat, 2012, p. 540).

What became apparent was that teachers lacked the basic knowledge necessary to assess the claims made by brain-based education. There is a risk of misinterpretation of neuroscientific discoveries without the critical approach implied in interdisciplinary collaboration, leading to what have been characterised as neuromyths.

Neuromyths have become a very common belief among many teachers, which could be a concern because it encourages individuals to spend money on futile research techniques and spread false information. According to Lithander, et al. (2021, p. 1) study which was conducted in Massachusetts, teachers' misconceptions on neuromyths "can lead teachers and students to spend time and resources on ineffective strategies". Having incorrect assumptions about learning can be problematic because they may cause teachers to spend time and money on ineffective methods to promote learning rather than adopting techniques that have been proven to work.

A study conducted in Baltimore by Murtaugh (2016), suggested that teachers' beliefs in neuromyths greatly impacted their teaching practices and methods of instruction. According Murtaugh (2016), neuromyths that aren't enshrined in brain-based curriculum or software are more related to teacher efficacy myths and may have a subliminal or indirect connection to academic success for students. Teachers that are curious about the brain and learning report that the brain sciences alter their teaching methods by making them more understanding, upbeat, and professional with their pupils as well as more credible to their peers. In light of this, although the existence of neuromyths among teachers is well-established, little is known about the origins and educational implications of these beliefs. Murtaugh (2016) concluded, while effective teaching that raises student achievement does not often look the same from one classroom to the next, student success may suffer if teachers use methods that are founded on false assumptions about the science of learning.

In the above reviewed studies, the findings revealed that neuromyths can negatively impact the teaching and learning process. Teachers who incorporate their neuromyth beliefs into their lesson plans may not be providing students with the academic support they require. For several of these neuromyths, there is a lack of empirical studies addressing the impact of belief on instruction and learning, more so, on the South African context. Accepting some neuromyths could have negative repercussions in the classroom, as we've demonstrated above. The present study addressed this research gap by providing empirical evidence on the effectiveness of teachers adopting these neuromyths in South Africa.

2.8: Conclusion of the Chapter

This chapter reviewed literature in the domain of the major fads and neuromyths that have emerged in the twentieth century, fads and neuromyths incorporated in educational polices, teachers' use of fads and neuromyths in their practice, teachers' understanding of these fads and neuromyths, sources which teachers acquire these fads and neuromyths to be true, and the effectiveness of using fads and neuromyths in the learning process. Critical research gaps have been identified in literature which were filled by the present research findings in South African context. The next chapter focuses on the theoretical framework that was adopted to guide the study.

CHAPTER THREE

3.0: THEORETICAL FRAMEWORK

3.1: Introduction

This chapter presents the theoretical framework that underpins the study. A theoretical framework serves as a foundational structure that guides research by providing a lens through which key concepts, relationships, and phenomena are examined and understood. It helps to contextualize the study within established theories, offering a basis for interpreting findings and drawing meaningful conclusions. For this study, two key theories were considered: Feuerstein's Mediated Learning Experience (MLE) Theory and the Constructivist Learning Theory. Feuerstein's MLE Theory emphasizes the role of intentional mediation and structured interactions in enhancing cognitive development, highlighting the importance of guided learning experiences in fostering higher-order thinking skills. Meanwhile, Constructivist Learning Theory posits that learners actively construct knowledge through experience, interaction, and reflection, rather than passively absorbing information. Both theories provide a critical lens for analysing how teachers' beliefs in neuromyths influence their instructional practices. Additionally, this chapter provides a justification for the selection of these theories, demonstrating their relevance to the study and their role in shaping the research framework.

3.2: Feuerstein's Mediated Learning Experience Theory

Feuerstein's mediated learning experience theory was developed over the period of 1950 to 1963 as Feuerstein worked with children who revealed intellectual and academic dysfunction. Feuerstein and Lewin-Benham (2012, p. 26) stated that mediated learning experiences are interactions between the adult and the way they intervene in the child's learning experience. Mediation includes various intervention strategies guided by an adult to assist the child during a task or learning experience "is the catalyst for changing thinking and causing the child to learn" and it involves cognition and motivation (Feuerstein & Lewin-Benham, 2012, p. 28). The basis for the theory of mediation learning experience is the "belief that the brain is capable of change" and Feuerstein argued that "mediation changes cognitive structure" (Feuerstein & Lewin-Benham, 2012, p. 27).

According to Feuerstein and Lewin-Benham (2012, p. 9), learning is something all human beings do throughout their lives and they further asserted that "[p]sychologists agree that proof of learning is that we retain, understand and use knowledge to actively build new

relationships". Feuerstein postulated that the teacher is the mediator who intervenes in the children's learning experiences and that most children who advance from a low cognitive function to a higher cognitive function have been mediated (Feuerstein & Lewin-Benham, 2012, p. 10). In addition, Feuerstein and Lewin-Benham (2012, p. 11) opined that mediation involves displaying how children can use a tool, encouraging children to think and make meaning of content and transcendent ideas, asking children to explain something in their own words, seizing the opportunities of a teachable moment when a child shows interest or is curious, and posing leading questions that guide children to think logically. Therefore, Feuerstein strongly believes that adult/teacher interventions (mediation) is essential to children's learning.

According to Kozulin and Presseisen (1995, p. 70) and Feuerstein (1990) focused on three criteria's being intentionality/reciprocity, transcendence and the mediation of meaning which elaborated mediation between the teacher and the learner. Without these three criteria's, there will be interaction but there will be no mediation. The first criterion is the intentionality/ reciprocity criterion, in which Feuerstein (1990) asserted that "[t]he major contribution of the mediating adult is to turn the interactive situation from incidental into intentional" (Kozulin & Presseisen, 1995, p. 70). This criterion indicates that the interaction between the teacher and the learner becomes 'intentional', in which the teacher has the intension to mediate new knowledge to the learner through activities. The focus on reciprocity makes emphasis on healthy interaction between the teacher and the learner, therefore, learning occurs in both ways in which the teacher presents the new information, and the learner reciprocates that they understand what was being taught. The second criterion is transcendence, which suggests that the teacher needs to go beyond what is required of the task. It is important to always present extra information to the learner and use the 'scaffolding functions' to complete the task and reach the end goal. Teachers are required to go beyond the textbook to allow learners to think broad and expand their learning experience. The third criterion is meaning, in which mediation "becomes possible when stimuli, events, or information are infused with meaning by the mediator" (Kozulin & Presseisen, 1995, p. 70). The learner gains new knowledge, understands the concepts and is able to build psychological processes. Therefore, for mediation to occur, intentionality, transcendence and meaning is necessary.

Within the classroom, learners have the freedom of asking questions to ensure that they have understood the concept taught correctly and to ease their curiosity. According to Stewart (1993, p. 7), "'facilitating learning' refers to a non-interventionist strategy that is largely about

teachers backing off, freeing children from the 'imposition' of instruction and respecting their individual 'autonomy'". For facilitation to occur, teachers make the teaching environment comfortable for the learners. According to Stewart (1993, p.5), "to facilitate" is to make something less difficult or easier to achieve". Teachers need to break down the big task into smaller steps for learners to achieve their end goal successfully, to provide learners with external materials that make the tasks easier, however, if there are no additional resources, learners would still be able to complete the task and achieve the end goal. The teacher needs to be "motivating, guiding, and counselling" towards the task at hand (Stewart, 1993, p. 6). "A facilitating condition enhances the occurrence of learning but is one whose absence would not make it impossible, only more difficult" (Stewart, 1993, p. 6). This facilitation condition emphasizes that learners should still be able to work independently without the teacher.

Feuerstein and Lewin-Benham (2012) questioned what confounded learning. They asserted that "[m]yths overlook the role of mediation in learning, but perpetuate the belief that simply having experiences, we are thinking", however, learning is not that simple, it is a more complex process (Feuerstein & Lewin-Benham, 2012, p. 25). Feuerstein and Lewin-Benham (2012, p. 25) postulate that children do not learn when they are instructed to work with unfamiliar content, they do not learn if the adult who is acting as the mediator has mistaken beliefs of what learning actually is, and lastly, without mediation, children do not learn through discovery, exposure, and motivation.

The purpose of study mediated learning applications is to help teachers and educators actively change the critical thinking skills of underprivileged students. Mediated learning experiences allow learners to develop and alter their capacities through controlled learning, where they pick up new abilities, behavioural patterns, knowledge, and a variety of strategies that may then be generalised to new situations and stimuli. By engaging with students, teachers can facilitate learning in the classroom and aid in improving student learning. By developing interesting assignments and activities and enticing students to participate in pair and group projects, he or she can promote relationships amongst students.

3.3: Constructivist Learning Theory

Constructivism is the newest buzzword in education, and it refers to both learning theory and epistemology, or the study of how individuals learn and the nature of knowledge (Hein, 1991). Hein (1991, p.1) stated that the term 'constructivism' refers to "the idea that learners construct knowledge for themselves---each learner individually (and socially) constructs meaning---as

he or she learns. Constructing meaning is learning; there is no other kind". In addition, Hein (1991) opined that the impact of the viewpoint of constructivism is significant in two ways; When considering learning, we must put the learner's needs first (rather than the topic or lesson that needs to be taught), and there is no knowledge that is not contingent on the interpretation that the student or community of learners give to experience.

If learning about the real world is what knowledge is all about, then our primary goal as teachers is to comprehend that world, arrange it in the most logical way possible, and communicate it to the student. The objective is always to make the learner aware of the structure of the world independent of the learner, even while this viewpoint may still encourage us to give the learner activities, hands-on learning, and opportunities for experimentation and manipulation of the objects of the world. We assist the learner in comprehending the world. Yet, we don't ask him or her to create their own universe.

According to Hein (1991), there are 9 principles of learning. These principles of constructivist thinking act as an aid for teachers, as a teacher's role is to help students learn effectively. The first principle is that "[l]earning is an active process in which the learner uses sensory input and constructs meaning out of it" (Hein, 1991, p. 3). This emphasises that the more common way of expressing this concept uses the phrase "active learner," which emphasises that the learner must take action and that learning is not simply accepting information that is "out there" but rather involves the student interacting with the outside world. The second principle is that "[p]eople learn to learn as they learn: learning consists both of constructing meaning and constructing systems of meaning" (Hein, 1991, p.3). The third principle is "[t]he crucial action of constructing meaning is mental: it happens in the mind" (Hein, 1991, p.3). This suggests that even though hands-on activities and physical acts are often required for learning, especially for young children, they are not adequate; instead, we must offer activities that stimulate the mind as well as the body. The fourth principle is that "[l]earning involves language: the language we use influences learning" (Hein, 1991, p.3). The fifth principle is that "[l] Learning is a social activity" (Hein, 1991, p.3). This highlights that our ability to learn is strongly linked to the relationships we have with other people, including our teachers, friends, family members, and even strangers like those standing in front of or next to us at the exhibit. If we acknowledge this idea rather than try to prevent it, our efforts to educate people will have a higher chance of success. The sixth principle is that "[l]earning is contextual" (Hein, 1991, p.4). This emphasises that we do not acquire isolated knowledge of theories and facts in a mental realm that is remote from the rest of our life; rather, we acquire knowledge in relation to other things we already

know, our beliefs, biases, and anxieties. The seventh principle is that “[o]ne needs knowledge to learn: it is not possible to assimilate new knowledge without having some structure developed from previous knowledge to build on” (Hein, 1991, p.4). This hightlights that we can learn more as we get more knowledge. Because of this, each attempt to teach must be related to the student's current situation and must give the learner a way into the subject based on their prior knowledge. The eighth principle is that “[i]t takes time to learn: learning is not instantaneous” (Hein, 1991, p.4). This emphasises that to truly learn something, we must go back and think about it. Examine, engage with, and put them to use. The nineth principle is that “[m]otivation is a key component in learning” (Hein, 1991, p.4). This suggests that motivation not only facilitates learning, but it is also necessary for learning. The notion of motivation as it is presented here is generally interpreted to include an awareness of potential applications for the information. Without understanding "the reasons why," we could not be very engaged in applying the knowledge that has been imparted to us. even by the strictest and most direct instruction.

Learning can be aided by the constructivist principles, which are becoming more and more prevalent in how classrooms and school curricula are set up. The principles resonate with how we understand learning and knowledge in contemporary society. In order to put these concepts into effect, teachers must examine their own practices.

In addition, according to Bada and Olusegun (2015, p. 66), a significant limitation of learning is that students must actively develop knowledge in their own brains; teachers cannot simply transmit knowledge to them. In other words, they gather and alter data, compare fresh data to old, and update rules when they are no longer applicable. According to the constructivist theory of learning, the learner is viewed as an active participant in the process of acquiring new knowledge. Constructivism is a learning theory that can be found in psychology that describes how individuals may learn and acquire knowledge. As a result, it directly relates to education. According to the theory, people derive knowledge and meaning from their experiences. Constructivism is not a single pedagogical approach. Constructivist learning theory developed by Piaget has had a significant influence on educational ideas and instructional practices and is a core principle of numerous reform movements.

Bada and Olusegun (2015, p. 67) postulated that constructivism is essentially a notion about how people learn that is based on research and empirical evidence. It asserts that humans build their own knowledge and understanding of the universe via personal experience and reflection.

When we learn something new, we have to reconcile it with our prior beliefs and knowledge. This may require us to revise our opinions or to disregard the new information as insignificant. They further opine that we actively create the knowledge that we have. To do this, we must investigate, evaluate our current knowledge, and raise new ones. The constructivist theory of learning might suggest a variety of instructional strategies in the classroom. In its broadest definition, it typically refers to motivating students to employ active learning strategies to expand their knowledge, and then to reflect on and communicate how their understanding is evolving (Bada & Olusegun, 2015). According to Bada and Olusegun (2015), the founding principle of constructivism is that knowledge is built by learners as they build new information on top of prior knowledge. Contrary to the notion that learning is the passive transfer of information from one person to another, the focus here is on receiving rather than creation. The straightforward concept of produced knowledge is surrounded by two significant ideas. The first is that students build new understandings on top of what they currently comprehend. There is no blank slate upon which new information can be inscribed. Instead, pre-existing information influences the new or modified knowledge that students will generate from new learning experiences since they bring that knowledge to learning circumstances. The second idea is that learning is not passive but active. The new learning environment forces learners to challenge their understanding in light of what they find there. If what students experience conflicts with what they already know, their understanding may adapt to take into account the new information. Students remain engaged throughout this process by applying their current understandings, noting pertinent details in new learning situations, evaluating the consistency of prior knowledge and newly acquired knowledge, and making modifications to their knowledge depending on their evaluation.

Bada and Olusegun (2015) asserted that there are various benefits of constructivism. When children actively participate in their education rather than simply listening, they learn more and enjoy it more. When learning is centred on thinking and comprehension rather than rote memorization, education is at its most effective. The focus of constructivism is developing critical thinking and comprehension skills. Transferable learning is achieved through constructivism. Students develop organisational ideas in constructivist classrooms that they can use in various learning environments. As learning is founded on students' questions and inquiries, and since they frequently participate in the assessment design process, constructivism offers students ownership of what they learn. Constructivism motivates and engages students by setting learning activities in an actual, authentic setting. In constructivist classrooms,

students are taught to challenge ideas and use their inborn curiosity to explore the world. By creating a learning environment that values cooperation and the sharing of ideas, constructivism fosters social and communication skills. By participating in group projects, students can practise communicating their ideas clearly and working efficiently as a team. Pupils must consequently learn to "bargain" with others and to assess their contributions in a way that is acceptable to society. They must also learn to communicate ideas. This is crucial for success in the real world because it prepares them for the range of situations they will encounter there, where they will need to work with people and navigate among their views. The two constructionist theories psychological constructivism (Piaget's Individual Constructivism Theory) and social constructivism (Vygotsky's Social Constructivism Theory) are discussed below:

3.3.1: Piaget's Individual Constructivism Theory

Piaget's individual constructivism emerged in 1936, in which his theory focused on cognitive development and explained how a child constructs a mental model of the world. Piaget's theory is often seen as providing an explanation of development which emphasizes internal developmental processes while minimizing external factors. In Piaget's account of development, he showed that development proceeds through phases of differentiation and re-integration. Piaget adopted an epigenetic conception of development, the gradual process of changing and acquiring adult maturity over time. He postulated that in order for development to occur, there needs to be continuous interaction between the environment and the organism.

Piaget (1964, p.19) postulated that "development being a spontaneous process tied to embryogenesis, learning being provoked by external situations" emphasizes that development should be seen in terms of both biology (nature) and psychology (structures of development over time). By that Piaget suggested that our psychological development is related to our biological development. There is relationship with what nature has given us and the psychological functions and structures we develop over time. To illustrate his contention Piaget then focused on the development of knowledge and he says that to understand the development of knowledge we should first understand the notion of "an operation". According to Piaget (1964), "an operation" is an "internal or interiorized action", an action which makes up our logical structures, therefore because the "action" is internalized and abstract it is reversible (p. 20). The operational structures which we construct by ones internal or interiorized actions which forms the basis of knowledge. Piaget (1964) contends that there are four stages of

development which consists of the sensori-motor, pre-operational, concrete operations and formal operations.

The sensorimotor stage is the first of the four stages which extends from birth to the acquisition of language. The first stage being the sensori-motor stage (birth to 2 years) has six sub stages. The fist sub stage is the use of reflexes (birth to 1 year) which entitles coordination of sensation and action through reflexive behaviours. Piaget asserted that "once we have a scheme, we also have a need to put it to active use" regardless of the automatic reflexes (Crain, 2014, p. 124). The second sub stage is the primary circular reactions (1 to 4 months) which Piaget postulates that a "circular reaction occurs when the baby changes upon a new experience and tries to repeat it" (Crain, 2014, p. 125). The third sub-stage is the secondary circular reactions (4 to 8 months) in which Piaget asserts that the "secondary circular reactions occur when the baby discovers and reproduces an interesting event outside herself" (Crain, 2014, p. 125). The fourth sub stage is the coordination of secondary schemes (8 to 12 months) which asserts that "the infant's actions become more differentiated; he or she learns to coordinate two separate schemes to get a result" (Crain, 2014, p. 126). The fifth substage is the tertiary circular reactions (12 to 18 months) in which the infant "experiment[s] with different actions to observe the different outcomes" (Crain, 2014, p. 126), and lastly the sixth sub stage (18 months to 2 years) which asserts that "children seem to think out situations more internally, before they act" (Crain, 2014, p. 126).

In the second pre-operational stage, we focus on the beginning of language, symbolic function, and thought. At this stage, "[c]hildren begin to use symbols when they use one object or action to represent an absent one" (Crain, 2014, p.129). The child's thinking is still egocentric, and a child is unable to distinguish between their own perspective and that of another person (Crain, 2014, p. 130). The concrete operational stage is the third stage of Piaget's theory which emphasizes the appropriate use of logic. During this stage, a child's thought processes become more mature in which "children can think systematically in terms of mental actions" (Crain, 2014, p. 140). The final stage is known as the formal operational stage which contrasts with the concrete operational stage in which in this stage "thinking soars into realm of the purely abstract and hypothetical", in other words, an increase in the ability to think in abstract terms and develop egocentrism (Crain, 2014, p. 140).

Piaget disagreed with the idea that intelligence was a fixed trait, and regarded cognitive development as a process which occurs due to biological maturation and interaction with the

environment. According to Crain (2014), Piaget recognized that "children pass through his stages at different rates, and he therefore attached little importance to the ages associated with them…, however, … children move through the stages in an invariant sequence-in the same order" (p.122).

Piaget (1964) contended that there are four main factors that can be used to explain this process of development: maturation, experience, social transmission, and equilibration. These four factors drives the development from one stage to the next. He asserted that maturation of the nerve system is involved and has to be taken to account in the process of development but it is not sufficient as an explanation of development, emphasizing that one cannot focus on biology on its own to understand development. It is necessary when explaining development but it is not sufficient. Development cannot be reduced to just the one factor being maturation. If development was purely developed on only biology, we all share the same biology therefore we should all be developing in the same way, but we aren't. Some individuals mature faster than others. For Piaget, experience also plays an important role for development to occur and what causes an individual to develop is their experience. He asserted that experience is a necessary factor for development, however, it alone cannot explain development. Individuals must experience a variety of things in the world and through that experience they will gain some things from the world but that is not sufficient to explain development. Piaget (1964) further focused on social transmission, he asserted that the transmission of information from the social environment is a necessary whether it is done purely through language or through education, it is necessary, but once again it alone cannot explain development. Piaget (1964) elaborates that one can explain something to a child using language, but it does not mean that because it was explained, the child will necessarily understand the logic behind what is being said. Piaget (1964) lastly focused on equilibrium, this factor, according to Piaget, is the most fundamental factor in explaining development, it brings maturation, experience, and social transmissions together. In other words, a child has reached a certain level of maturity, a range of experiences and is then confronted through process of teaching with some kind of social information. This is an internal process, and this is significant because it emphasizes that the child is ultimately responsible for their own understanding and the way they come to it is through equilibrating, bringing all the three factors together.

According to Piaget (1964), we are born with a scheme, "an organized pattern of behaviour", it reflects a particular way of interacting with the environment. Objects and stimuli from the environment get assimilated into the reflect and at the same time the reflex accommodates the

objects/environment. The reflex, because of the assimilation and accommodation now becomes a "scheme", an 'interiorized action'. Objects and stimuli from the environment get assimilated and accommodated into a scheme. A reflex becomes a scheme as a consequence of assimilation and accommodation, this creates, in Piaget's understanding a 'relative equilibrium' between the scheme (the individual) and the outside world. According to Crain (2014), Piaget asserted that "[c]hildren are constantly exploring, manipulating, and trying to make sense out of the environment, and in this process, they actively construct new and more elaborate structures for dealing with it" (p. 123). This emphasized Piaget's belief that children construct an understanding of the world around them, experience discrepancies between what they already know and what they discover in their environment, then adjust their ideas accordingly.

3.3.2: Vygotsky's Social Constructivism Theory

Vygotsky's social constructivism theory emerged in 1968. Vygotsky's theory states that language and culture are the frameworks through which humans experience, communicate and understand reality. Vygotsky (1978) argued that social interaction is crucial for cognitive development. According to Vygotsky the child's learning always occurs in a social context. This social interaction provides language opportunities and Vygotsky considered 'language' as the foundation of thought and development (Duckworth, 1996). According to Duckworth (1996), Vygotsky postulated that "[t]he acquisition of speech is of major importance to the growing child; it enables the child to participate intellectually in the social life of his or her group" (p. 237). Vygotsky further asserted that it also "facilitates the child's own, individual thinking", and this emphasizes the development of a child through language.

According to Vygotsky, "[w]hen humans use signs… they engage in mediated behaviour. That is, they do not just respond to environmental stimuli; their behaviour is also influenced or 'mediated by their own signs" (Duckworth, 1996, p. 237). Vygotsky asserted that there are two other important sign systems, that being the writing and numbering systems and these sign systems are a great achievement of development (Duckworth, 1996, p. 237). Apart from these sign systems, Vygotsky argued that "cultural sign systems have a major impact on cognitive development" (Duckworth, 1996, p.238). Vygotsky disagrees with Piaget in asserting that development occurs within the child alone, "from the child's inner maturations promptings or spontaneous discoveries". Vygotsky does acknowledge the importance of 'internal' processes of development, however, as the child grows, "the growth of the mind is increasingly influenced by… the sign systems that culture provides" (Duckworth, 1996, p. 238).

According to Vygotsky, thought emerges from signs which are social created which is imbedded in speech and language. Vygotsky (1929, p. 69) stated that "[w]e have reason to assume that the invention and use of these signs, as an auxiliary means for the solution of any

task set the child, present from a psychological standpoint an analogy with the invention and use of tools". Therefore, it is through the sign systems that we come to have a certain consciousness. If a material situation presents us with a particular set of signs, it will influence and shape the nature of an individual's consciousness. Sign systems emerge out of a material reality and for that reason, consciousness (thought), emerges because of the signs and sign systems that we are exposed to.

Vygotsky argued that cognitive abilities are socially guided and constructed. For example, traditions, the environmental factors and "culture serves as a mediator for the formation and development of specific abilities, such as learning, memory, attention, and problem solving. It is proposed that culture-specific tools play an integral role in the way children organize and think about the world" (Moore, 2011). This emphasizes that social interaction is an important factor that contributes to the development of a child, therefore it is important for individuals to socialise with members of society that will aid the knowledge of the young individual. The role of the child is to encounter social interactions, it is important to interact with their peers, family and their socio-cultural environment which can help them to solve problems.

Vygotsky introduced the ZPD concept, which is known as the zone of proximal development, in which it is said that Vygotsky (1978), explains it as "… the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (p.86), emphasizing the distance between what a child can do on their own and what they can do with the help of another, however this is not true, it is rather a role to point to an important place and moment in the process of child develop and Vygotsky elaborated "… in determining the actual level of development, we actually determine only that part of the total picture of the development of the processes, functions, and properties that have matured at that time [. . .that is ...] the result, the attainment of development for the period passed" (Vygotsky, 1998, p. 200). Vygotsky asserted that 'the actual level of development' are the 'fruits of development', which emphasizes what the child has already achieved mentally. The mental structures that the child has already constructed.

3.4: Justification of the theoretical framework

These theoretical frameworks have been adopted to inform this study. This study was informed by a "combination" of the theories discussed above. The mediation theory is relevant to this study because the aim of mediated learning applications is to assist teachers and educators in actively changing the critical thinking abilities of poor students. Through controlled learning in which individuals acquire new skills, behavioural patterns, information, and a variety of methods that may subsequently be transferred to novel circumstances and stimuli, learners can develop and alter their capacities through mediated learning experiences. Teachers can enhance learning in the classroom and help students learn more by interacting with them. He or she can foster relationships amongst students by coming up with engaging tasks and activities and motivating students to work in pairs and groups on projects. Therefore, having the avoidance of adopting neuromyths into the teaching practices.

The importance of the Constructivism theory is that it reveals, one of the important concepts in education and it has significant effects on how teachers educate students and develop their teaching practises. The main contribution of constructivism to education to this point may very likely be its emphasis on student-centered learning. Teaching and learning can be influenced by the constructivism ideas, which are becoming more and more prevalent in how classrooms and curricula are set up in educational institutions. The effectiveness of interaction between the individual and the environment is reflected in the mediated experience. By choosing stimuli that are most appropriate for the learner's improved and productive functioning, mediating agents support the quality of these interactions. Whereas, adopting the neuromyths into teaching practices does not cater to the needs of the students, does not adopt a mediating learning experience and students would not be able to effectively learn. Intentionality/reciprocity, transcendence, and meaning are three requirements of mediated learning experiences that are essential to the growth of an individual's modifiability. Feuerstein claims that change is at the heart of mediation.

The concepts are in opposition to conventional techniques but appeal to our contemporary conceptions of learning and knowledge. In order to put these concepts into effect, teachers must examine their own practises. Students are continually encouraged to evaluate how the activity is advancing their learning by constructivist teachers. In a constructivist classroom, students are encouraged to challenge themselves and their learning methods in order to develop into

"expert learners." They now have a wider range of learning resources thanks to this. The students acquire the ability to learn in a well-designed learning environment.

Thus by “combining” Feuerstein’s Mediated Learning Experience Theory and the Constructivist Learning Theory we have a greater explanatory framework to engage with, and explain, how learning occurs and how teachers can better aid their teaching in the classroom.

The theoretical framework integrates these theories to comprehensively address the research questions. Feuerstein’s MLE Theory focuses on the mediational role of teachers and the distortion caused by fads and neuromyths. Constructivist Learning Theory (both Piaget and Vygotsky) provides a foundation for understanding how teachers internalize these concepts individually and socially. Together, these theories offer a robust lens for examining the origins, perpetuation, and impact of neuromyths and fads, as well as strategies for addressing them in policy and practice.

Feuerstein’s Mediated Learning Experience (MLE) Theory explains how mediators, such as teachers, influence the learning process, and how their misconceptions can introduce distortions. The emergence of fads and neuromyths, such as "learning styles" and "10% brain usage," reflects the mediational role of educators and other influencers in spreading these unverified ideas. From a constructivist perspective, Piaget’s Individual Constructivism highlights how these myths align with teachers’ cognitive schema, making them readily adopted without critical reflection. Vygotsky’s Social Constructivism further explains how these misconceptions are socially reinforced through cultural narratives, professional networks, and media, perpetuating their acceptance within the educational community.

Feuerstein’s MLE Theory underscores the significance of teachers as mediators who directly shape students' learning experiences. When teachers adopt fads or neuromyths, their mediation can misdirect the learning process, highlighting the need for professional development and critical reflection. Piaget’s Individual Constructivism explains how teachers’ personal understanding of these concepts—shaped by their existing schema—affects their instructional choices. Without critical evaluation, teachers risk perpetuating these practices in their classrooms, reinforcing misconceptions and reducing teaching efficacy.

Vygotsky’s Social Constructivism Theory is particularly relevant to this question, as educational policies often reflect collective societal beliefs, which can include unverified ideas. These policies are shaped by social interactions within educational institutions, reinforcing fads and neuromyths through systemic adoption. Feuerstein’s MLE Theory supports this by

emphasizing the role of policymakers as mediators who either enhance or distort the quality of educational content. Policies that incorporate neuromyths illustrate a gap in critical evaluation and intentional mediation, underscoring the need for evidence-based frameworks to guide policy formulation.

Piaget's Individual Constructivism Theory provides insight into how teachers' understanding of fads and neuromyths is constructed through their cognitive processes and prior knowledge. Teachers may accept these concepts as true if they align with their existing beliefs or cognitive schema. Feuerstein's MLE Theory further emphasizes the importance of professional development in reshaping these understandings. Effective mediated learning, such as structured training or workshops, can correct these misconceptions and help teachers align their practices with evidence-based methods.

Vygotsky's Social Constructivism Theory explains how teachers acquire fads and neuromyths through social interactions, such as professional development workshops, peer discussions, and media influences. These social processes often reinforce misconceptions, making them appear credible. Feuerstein's MLE Theory highlights how the quality of these mediations—such as the content of training or professional development—affects teachers' beliefs. This underscores the need for interventions to ensure that the sources teachers rely on promote evidence-based practices rather than perpetuating myths.

Constructivist Learning Theory emphasizes the importance of aligning instructional methods with learners' developmental needs and cognitive processes. From Piaget's perspective, many fads fail to align with students' developmental stages, leading to limited effectiveness. Similarly, Vygotsky's Social Constructivism Theory points to the importance of collaboration and social interaction in learning, which some fads may neglect. Feuerstein's MLE Theory highlights how neuromyths and fads compromise the mediator's role, reducing the overall quality and effectiveness of the learning process. These theories collectively underscore the need for evidence-based methods to optimize learning outcomes.

3.5: Conclusion of the Chapter

This chapter focused on two theories, viz., Feuerstein's Mediated Learning Experience Theory and the Constructivist Learning Theory which both help in understanding the complexity of the learning process. In the next chapter the research design and research methodology adopted in this study are discussed.

CHAPTER FOUR

4.0: RESEARCH DESIGN AND METHODOLOGY

4.1: Introduction

In the previous chapter, I discussed the theoretical framework adopted in this study. This chapter presents an overview of the research design and research methodology adopted in this study. An overview of the research paradigm, research design, research methodology, research site, research sampling, data collection tools, trustworthiness of qualitative data, data analysis and ethical considerations are presented.

4.2: Research Paradigm

A research paradigm is a philosophical view in which people share their perspective or interpretation of researched data (Kuhn, 1962). This study was located within the interpretative research paradigm. “Interpretive research, which is where qualitative research is most often located, assumes that reality is socially constructed, emphasizing that there is no single, observable reality. In this paradigm, there are multiple realities, or interpretations, of a single event” (Merriam & Tisdell, 2015, p. 8). Therefore, the interpretivist paradigm attempts to understand the world through social constructions. This paradigm was relevant for this study because it helped me to understand teachers’ notion of the fads and neuromyths and if teachers adopt these fads and neuromyths in the classroom, on what grounds do they claim these to be effective in the learning process.

A research paradigm consists of the following four components namely, the axiology, ontology, epistemology and methodology, which are discussed as follows:

4.2.1: Axiology

The word "axim" (meaning value) in Greek is the source of the word "axiology." The axiological value pertains to appropriateness, goodness, and appropriateness of knowledge (Rokhmah,2021). The study of norms or values is known as axiology. These principles, such as right and wrong, fair and unjust, and good and bad, can be applied to daily life. The knowledge that traces a value's nature in terms of philosophy is known as axiology (Rosida, et al., 2023, p. 16). Axiology, the branch of philosophy that studies values, including what is good, bad, right, and wrong, can significantly influence the study of neuromyths in education.

To adopt an axiological approach in this study means to consider the value implications of these myths, evaluating their impact on educational practices, policies, and outcomes based on ethical, social, and educational values.

4.2.2: Ontology

The Greek terms "Ontos" and "Logos" are the source of ontology. Whereas Logos signifies "knowledge," Ontos denotes "that exists." This leads to the definition of ontology as a field of philosophy concerned with the nature of existence, encompassing the existence or non-existence of things (Rokhmah, 2021; Rosida, et al., 2023, p. 14). Examining the nature of these myths and the reality they represent within the educational setting is a key component of adopting an ontological approach in the study of neuromyths in education. The study of ontology, the area of philosophy that addresses the nature of existence and being, aids in examining the meaning of neuromyths, their role in educational settings, and the underlying presumptions they highlight regarding knowledge and learning. In the end, the ontological position in this study helps to direct efforts to match educational practices with knowledge that has been scientifically proven by exposing the institutional structures and ingrained presumptions that enable the persistence of these myths.

4.2.3: Epistemology

According to Rosida, et al., (2023, p. 15), the foundation of epistemology discusses how to carry out scientific activities using a process, steps, and knowledge-based activities. In the field of philosophy, epistemology is a theory of knowledge or cognition that addresses the composition, history, reliability, processes, and methods of forming human knowledge. When investigating neuromyths in education, an epistemological approach entails analysing the type, reliability, and sources of the information that the general public and educators possess on brain function and its effects on education. The philosophical discipline of epistemology, which addresses knowledge, its boundaries, and formation, can offer a framework for comprehending the creation, dissemination, and acceptance of these myths as well as teaching people how to discern between untruths and information backed by empirical evidence.

4.2.4: Research Methodology

This study was guided by qualitative research methodology. The “[q]ualitative researchers are interested in understanding how people interpret their experiences, how they construct their

worlds, and what meaning they attribute to their experiences" (Merriam & Tisdell, 2015, p. 5). According to Pathak, Jena and Kalra (2013, p. 1), "qualitative research is now recognized for its ability to add a new dimension to interventional studies that cannot be obtained through measurement of variables alone". The qualitative methodology adopted was relevant for this study because through the online interviews being conducted, it obtained the in-depth experiences of teachers who implement the fads and neuromyths into their practice, as well as the effectiveness of the implementation and this allows for flexibility throughout the research when answering the research questions and helps the researcher to analyse the data more intensively.

4.3: Research Design

The design chosen for this study was a multiple case study. According to Merriam and Tisdell (2015, p. 3), in a "multiple case study a number of cases are studied to investigate a phenomenon, population, or general condition". Lincoln and Guba (1981) assert that case studies are an appropriate way of evaluating data, further opining that "case study is best because it provides thick description, is grounded, is holistic and lifelike, simplifies data to be considered by the reader, illuminates meanings, and can communicate tacit knowledge" (Merriam & Tisdell, 2015, p. 49). By conducting a multiple case study design, this study involved collecting and analysing data from several cases, in this case, four private schools in Midrand, Gauteng Province in South Africa. The multiple case study design was appropriate for this study because, the context was on private schools, and there was limited research done in private schools in South Africa, Gauteng regarding the pop-psychological fads and neuromyths.

4.4: Research Sampling

The study focused on four private schools in Midrand, South Africa. This study focused on twenty trained professional teachers (20) who teach in the four private schools in Midrand. Thus, in each of the 4 selected schools, 5 teachers were sampled to participate in this study. The participants in my study were teachers with relevant training and years of teaching experience. These qualified teachers were interviewed to obtain the necessary data required for this study. This study employed purposive sampling technique to obtain the 20 teachers. This sample size of 20 teachers was appropriate for my study as recommended by Mason (2010, p.1), which report that in qualitative studies smaller sample sizes are employed because

“qualitative research is very labour intensive, analysing a large sample can be time consuming and often simply impractical” (p.1). Mason, (2010) study further recommends that for qualitative studies, a sample size of 10-50 participants would enhance saturation of interview data. Moreover, Guest, Bunce, and Johnson (2006) study recommend that for qualitative studies, 15 participants should be the smallest acceptable sample size that would lead to data saturation. This study adopted purposive sampling technique because it helped to obtain teachers of varying years of experience, gender and age. The demographic profile of participants is presented in the next sub-section.

4.4.1: Demographic profile of participants

The study participants comprised of 20 teachers who teach primary learners from four selected private primary schools in Midrand, in the Gauteng province of South Africa; five teachers were selected from each school. The teachers selected for this study were both male and female and ranged in age from 24 to 58.

Teacher participant 1: The teacher was a female teacher of Indian race. She was 32 years of age and had 11 years of teaching experience. Her job title is foundation phase head and grade 2 educator. She taught grade 2 at a Montessori school for a year and a half. She started at her current school in 2014. She taught grade 1 from 2014 to 2020. She was moved to grade 2 in 2021 and she is currently teaching grade 2. She became head of the foundation phase in September 2021. Her qualifications obtained is matric and a B. Ed degree.

Teacher Participant 2: The teacher was a female teacher of Black race. She was 48 years of age and had 23 years of teaching experience. Her job title is the Head of Science. She is teaching Grade 4 to Grade 7 Science. She also specialises in teaching Business and Economics. Her qualifications obtained is a BA degree.

Teacher Participant 3: The teacher was a female teacher of White race. She was 30 years of age and had 6 years of teaching experience. Her job title is a Teacher of English. She started her teaching experience in South Africa as an assistant teacher at a mainstream high school with inclusion for deaf learners, which was her main focus point. She worked there for one year. Thereafter she thought English as a second language to high school learners in Japan for just over two years. Currently she is in her third year of teaching English Home Language to learners aged 11 to 13 in South Africa. Her qualifications obtained is BA undergraduate degree and PGCE (post graduate certificate in education).

Teacher Participant 4: The teacher was a male teacher of Black race. He was 58 years of age and had 28 years of teaching experience. His job title is a teacher of mathematics. He has experience in teaching at both Primary and Secondary schools, teaching mathematics and economics and management science. His qualifications obtained is a Diploma in education-mathematics, B.Ed. degree (leadership), Masters in Business Administration, and Masters in Education (Leadership).

Teacher Participant 5: The teacher was a female teacher of Indian race. She was 48 years of age and had 26 years of teaching experience. Her job title is a Phase Head. She is a Social Science teacher, teaching grade 5 to 7. Her qualifications obtained is a Post Graduate Diploma (M+S).

Teacher Participant 6: The teacher was a female teacher of White race. She was 26 years of age and had 2 years and 8 months of teaching experience. Her job title is a teacher of the Intermediate Phase. She has taught grade 1 for 1 year and currently teaching Natural Science to grade 4 and 5. She also teaches PE from grade 4 to 7. Her qualifications obtained is a B.Ed. Degree in Foundation Phase Teaching.

Teacher Participant 7: The teacher was a female teacher of Indian race. She was 35 years of age and had 14 years of teaching experience. She is a teacher of the intermediate and senior phase. She started teaching at a government high school in Kwa Zulu Natal, and at a Secondary for 6 years teaching Natural Science, Life Orientation, Social Sciences, Physical Science, Biology, Chemistry and Accounting. Her qualifications obtained is BEd (Hons).

Teacher Participant 8: The teacher was a female teacher of White race. She was 42 years of age and had 8 years of teaching experience. Her job title is Educator of Intersen and Senior Phase in the Faculty of Humanities. She has taught at Primary School, High School and University Level. Her qualifications obtained is BA Tourism Development, BA (HONS) Historical Studies, PGCE.

Teacher Participant 9: The teacher was a female teacher of White race. She was 29 years of age and had 7 years of teaching experience. Her job title is Teacher of grade 1, Foundation phase. She teaches all subjects to grade 1. Her qualifications obtained is a B.Ed. Degree.

Teacher Participant 10: The teacher was a female teacher of White race. She was 29 years of age and had 6 years of teaching experience. She is a teacher of Afrikaans. She has been teaching at a variety of schools in the intermediate phase. She has also taught at private schools,

departmental schools and online. She has mostly been teaching Afrikaans FAL for grade 4 - 6. Her qualifications obtained is B. Ed. Intermediate Phase.

Teacher Participant 11: The teacher was a female teacher of White race. She was 29 years of age and had 7 years of teaching experience. Her job title is Creative Arts Head Teacher of Junior and Senior Phase. she taught Creative Arts for Grades 1-7 at a Primary school for 5 Years ; she taught Visual Art Gr 4-7 at another Primary school for 1 year, Currently at her present primary school for the 2nd year. Her qualifications obtained is_BA Degree in Dramatic Arts , Post Graduate Certificate in Education (FET) Dramatic Arts.

Teacher Participant 12: The teacher was a female teacher of Indian race. She was 46 years of age and had +-22 years of teaching experience. She is the Head of Subject: Mathematics and Grade 4 Mathematics & IT Teacher.

Teacher Participant 13: The teacher was a female teacher of Black race. She was 40 years of age and had 10 years of teaching experience. She is a teacher of Science. Her qualifications obtained is her PGCE.

Teacher Participant 14: The teacher was a female teacher of Indian race. She was 53 years of age and had 29 years of teaching experience. She is a teacher of English. She has taught in private and public schools, from Grades 2 to 6. Her qualifications obtained is a 4 years Higher Education Diploma.

Teacher Participant 15: The teacher was a female teacher of Indian race. She was 49 years of age and had 28 years of teaching experience. Her job title is an HOD of Junior Phase. She has taught at a government school before her current post. Her qualifications is Higher Diploma in Education.

Teacher Participant 16: The teacher was a female teacher of White race. She was 28 years of age and had 5 years of teaching experience. Her job title is the Head of Sports. She was teaching at a government school both Afrikaans then English before moving to a private school in 2021. Her qualifications obtained: BEd Human movement sciences and sports management

Teacher Participant 17: The teacher was a female teacher of White race. She was 31 years of age and had 7 years of teaching experience. Her job title is the Subject Head. She teaches Afrikaans and her qualifications obtained is B.Ed. Intermediate Phase.

Teacher Participant 18: The teacher was a female teacher of White race. She was 24 years of age and had 3 months of teaching experience. She has recently joined the school and is teaching intermediate phase. She is currently finishing her teacher training degree.

Teacher Participant 19: The teacher was a female teacher of Black race. She was 24 years of age and had 4 years of teaching experience. Her job title is teacher of English Intermediate Phase Educator. She has been teaching for four years and have a broad experience in terms of teaching in the Intermediate and Senior Phase.. During her teaching experience, she realised that passion drives and individual to be able to teach learners, who are the next generation. Teachers make a lasting difference for generations and are a bright light, a friendly face and a gentle guide. Her qualifications obtained is Bachelor of Education In Intermediate Phase Teaching.

Teacher Participant 20: The teacher was a male teacher of Black race. He was 28 years of age and had 6 years of teaching experience. His job title is Sports Coordinator. He teaches Life Skills from grade 4 to 7 as well as PE from grade 1 to 7. His qualifications obtained are Sport Couching Science and PGCE in Foundation Phase Teaching.

4.6: Data Collection Tools

This study employed semi-structured interviews as the tool for data collection. In such interviews "all of the questions were more flexibly worded or the interview is a mix of more and less structured questions. Usually, specific information is desired from all the participants, in which case there is a more structured section to the interview. But the largest part of the interview is guided by a list of questions or issues to be explored, and neither the exact wording nor the order of the questions is determined ahead of time. This format allowed the researcher to respond to the situation at hand, to the emerging worldview of the participant, and to new ideas on the topic." (Merriam & Tisdell, 2015, p. 90). The interview between the interviewer and the participants allowed for a comprehensive discussion of the relevant topic at hand. The interview questions focused on answering the research questions of the study which were included in the interview schedule. According to Louise Barriball and While (1994, p. 330), "in this type of interview, validity and reliability depend, not upon the repeated use of the same words in each question, but upon conveying equivalence of meaning (Denzin 1989). It is this equivalence of meaning which helps to standardize the semi-structured interview and facilitate comparability". Due to the geographical constraints, the interviews were conducted virtually (as the interviewer resides in the United Kingdom and the participants resides in South Africa).

The interviews were audio recorded, which was done using an online platform such as Zoom or Microsoft Teams, with permission from the participants, and these interviews were transcribed and analysed. Data was also collected using email and telephonic communication, in addition to online meetings. The duration of interviews varied between 50 minutes and 1 hour.

4.7: Data Analysis

Thematic analysis was adopted to analyse the qualitative data. According to Braun and Clarke (2006) "[t]hematic analysis is the process of identifying patterns or themes within qualitative data" (Maguire & Delahunt, 2017, p. 3352). Nowell, Norris, White and Moules (2017) outline the six phases of thematic analysis. The first step is to familiarize oneself with the interview data obtained and keep a record of all raw data collected. The purpose of this step was to immerse oneself in the data to gain a deep understanding, to read and re-read the data (interview transcripts), making initial notes and notice any emerging concepts or trends. In this study, the researcher read through the semi-structured interview data from the 20 teachers. The second step was to generate initial codes from the qualitative data by using audit trails and peer debriefing. The purpose of this step was to systematically organize data into meaningful groups by studying the data and emphasising the parts that look significant or fascinating, give these sections codes, or brief labels, that encapsulate their contents. The researcher kept codes broad at this stage, capturing all potential themes. The third step was to search for themes, it is important to make sense of theme connections. The purpose of this step was to collate codes into potential themes by the examining of the codes and find any connections or patterns among them, to create broad themes, group codes that are related together and to put the topics in a hierarchical order, taking into account the major and supporting themes. The fourth step is to review the themes. The purpose of this step was to refine and validate the themes identified by checking the themes against the dataset to ensure they accurately represent the data. Split, combine, or discard themes as necessary and create a thematic map to visualize the relationships between themes. The fifth step involved defining and naming themes to clearly define each theme and articulate its scope and focus. This is done by writing detailed analyses of each theme, explaining what it captures and its significance. Identifying the essence of each theme and the aspects of the data it represents. Choosing concise, informative names for each theme to facilitate understanding. Lastly, the sixth step is producing the report which employs

member checking and peer debriefing in the final write-up (Nowell, Norris, White& Moules, 2017, p. 4). The purpose of this step was to present the findings of the thematic analysis in a coherent and compelling way by writing up the analysis, weaving together the themes to tell a coherent story. Including evidence from the data to illustrate each theme. Relating the findings back to the research question and literature, highlighting the significance and implications of the themes.

4.8: Trustworthiness of Qualitative data

According to Lincoln and Guba (1985), trustworthiness of qualitative data through research done earnestly is important in ensuring the validity and reliability of the research findings for future readers and researchers. The concept of trustworthiness employs the criteria of credibility, dependability, conformability and transferability which help identify how a trustworthy thematic analysis is conducted (Nowell, Norris, White& Moules, 2017, p. 3). The four aspects of trustworthiness in this research are discussed below:

4.8.1: Credibility

The credibility of a study refers to the truth and reality of the research findings ensuring that the participants' perspective is accurately interpreted and represented by the researcher. In order to increase trustworthiness and to ensure credibility, the study adopted member checking which allows the participant to verify the accuracy and resonance of the data and peer debriefing, allowing a qualified peer researcher to review and assess transcripts (Nowell, Norris, White& Moules, 2017, p. 3). This study established credibility in six stages as described by Richie and Lewis (2013);

- **Stage 1:** Arrival and introductions – It was important to establish an ethical relationship in the introduction process by creating a comforting atmosphere.
- **Stage 2:** Introducing the research – The research topic was introduced clearly and considerations including ethics, informed consent, anonymity, and confidentiality, is reaffirmed. This was provided to the participants as they were given the participation information sheets.
- **Stage 3:** Starting the interview – Demographical information and further background information from the participants was obtained, and the interviews were audio recorded and later transcribed in detail.

- **Stage 4:** Interview process – The research aimed to probe and direct the conversation to obtain adequate data to answer the research questions.
- **Stage 5:** Closing the interview – The participants were allowed to express any unmentioned or incomplete points.
- **Stage 6:** Post interviews- Appreciation showed to the participants.

4.8.2 Dependability

The dependability of the study refers to the consistency of the research findings by tracing the study's process. Lincoln and Guba (1985) believe that to demonstrate dependability, the process of the study should be audited, which provides future readers and researchers with raw data and transcripts of the research findings "creating a clear audit trail" (Nowell, Norris, White& Moules, 2017, p. 3). The dependability of this study demonstrates the consistency and reliability of the research findings and the degree to which the research procedures are documented, which allows an external person to follow, audit and critique the research process. In this study, dependability was ensured by developing a clear audit trail of data from semi-structured interviews.

4.8.3 Confirmability

The confirmability of the study focuses on the researchers' establishment of description on conclusions and interpretations of the research findings, emphasizing the understanding of "how and why decisions were made" (Nowell, Norris, White & Moules, 2017, p. 3). The data collected from this study fully reveals participants perspectives highlighting objectivity. The researcher ensured confirmability of data in this study by checking and confirming that the procedures were documented for checking and rechecking the data throughout the study to which others can confirm or corroborate the results.

4.8.4 Transferability

The transferability of the study refers to the "generalizability of inquiry" (Nowell, Norris, White& Moules, 2017, p. 3). To assist with transferability in the study, an in-depth descriptive detail of data received was provided for each situation the mainstream schools. The results

obtained of a qualitative nature from this study can be transferred to other contexts as it provides detailed description of results that can be generalized. The data collected thoroughly describes the research context so that the behaviours and experiences become meaningful to an outsider. Transparent reporting of the data collected achieved transferability so that outsiders can evaluate whether the findings are applicable to other contexts (Kyngäs, Mikkonen & Kääriäinen (2019).

To ensure transferability in my study, I employed strategies that demonstrate how the findings can be applied or adapted to other contexts. I did rich, thick descriptions, by providing detailed descriptions of the study context, participants, and processes, allowing readers to determine whether the findings can be applied to their own settings. In addition, I adopted purposeful Sampling, which involved selecting participants or cases that represent a variety of perspectives or experiences relevant to the phenomenon being studied, which increases the potential applicability of the findings to other contexts.

4.9: Ethical Considerations

All ethical protocols were taken into consideration during this study. Ethical clearance was first applied for from the University of Witwatersrand Ethics Research Committee. Secondly, permission to conduct the research in schools were obtained from the Gauteng Department of Education, after which the researcher sought permission from principals to visit the selected private schools. The participants were informed regarding the purpose of the study and they were provided with the proof of registration of the researcher and the ethical clearance document. Due to the geographical constraints' placed on face-to-face research interviews, interviews were done using online platforms such as Zoom and Microsoft Teams. To ensure voluntary participation, the participants were provided with consent forms, which they signed to have the interviews recorded. To ensure anonymity of teachers, their names were not mentioned in the description of the research. To ensure confidentiality, the participants and schools remained anonymous, and the researcher secured the management of data access ensuring that the access is only authorized and granted to those in the process of this research avoiding the exposure of data findings.

4.9.1: Permission Obtained from relevant authorities

Ethical clearance was first applied for from the University of Witwatersrand Ethics Research Committee. Secondly, permission to conduct the research in schools was obtained from the

Gauteng Department of Education, after which the researcher sought permission from principals to conduct interviews at the selected private schools. The participants were informed regarding the purpose of the study, and they were provided with the proof of registration of the researcher and the ethical clearance document. Due to the geographical constraints that was placed on face-to-face research interviews at the time of data collection, the interviews were done using online platforms such as Zoom and Microsoft Teams.

4.9.2: Informed consent

To ensure voluntary participation, the participants were provided with consent forms, which they had to sign to have the interviews recorded. Informed consent is permission granted by the participants with full knowledge of information about what it means for them to participate in the study, and they voluntarily gave their consent before participating in the study, highlighting that the data was used for research purposes only. According to Kadam (2017, p. 108) an "informed consent process can be termed as complete, valid, and meaningful if all four criteria of information disclosure, competence, comprehension, and voluntariness are effectively satisfied".

4.9.3: Anonymity

To ensure anonymity of teachers, their names were not mentioned in the description of the research. According to Whelan (2007, p. 2) anonymity can be "conceptualized as "the degree to which the identity of a message source is unknown and unspecified; thus, the less knowledge one has about the source and the harder it is to specify who the source is among possible options, the more anonymity exists" (Scott, 2005, p. 243)". All data collected from the participants were kept anonymous as their identities were not revealed.

4.9.4: Confidentiality

Confidentiality "means that information about individuals is protected from inadvertent disclosure to others by physical means, such as a locked cabinet, legal means, such as signed confidentiality statements, or methodological means, such as the use of coded files" (Whelan, 2007, p.3). To ensure confidentiality, the participants and schools are not identified by name and the researcher secured the management of data access ensuring that the access is only authorized and granted to those in the process of this research avoiding the exposure of data

findings. Moreover, the data would be stored in a computer whose password would be kept by researcher and the data would be destroyed after 5 years from the last date of data collection.

4.11: Conclusion of the Chapter

This chapter focused on the research paradigm, research design, research methodology, research site, research sampling, data collection methods, trustworthiness of qualitative data, data analysis and ethical considerations of this study. The next chapter discusses the findings of the study.

CHAPTER FIVE

5.0: FINDINGS OF THE STUDY

5.1: Introduction

In the previous chapter I explained the research design and methodology and supported my choice of qualitative data collection and data analysis techniques. This chapter presents the research findings based on the data collected. The study aimed to explore and identify the various major fads and neuromyths that have emerged during the twentieth century. In addition, the study sought to establish the extent to which the fads and neuromyths are incorporated into educational polices and concomitantly, into classroom practice. Moreover, the study examined teachers' awareness of the various fads and neuromyths, what influences their belief of fads and neuromyths, their contributions to the application of the fads and neuromyths in the classroom, and the credibility of their source of knowledge. The next section of the chapter is a presentation of the findings of the study.

5.3: Findings of the study

5.3.1: Findings on major fads and neuromyths that have emerged during the twentieth century

The study examined major fads and neuromyths that have emerged during the twentieth century. The findings (themes) obtained from teachers indicated that the major fads and neuromyths included the following: belief in utilization of 10% of the brain, Left Brain vs Right Brain, Visual, Auditory and Kinaesthetic (VAK) learning styles, brain exercises, critical periods of development, Mozart, multiple intelligence and emotional intelligence. These are all discussed in detail below:

Theme 1: *Belief in utilization of 10% of the Brain*

It is important to understand the function of the brain. Learning and teaching are critical components of a child's brain development and psychological growth from a neuroscience perspective. There is a common misconception that people only use 10% of their brains, which is frequently reinforced by popular culture (Chew, 2018). According to this argument, the great majority of the human brain is inactive or underutilized. If we could only access a small portion of this brain's capacity, we could be able to develop superhuman skills or significantly enhance cognitive performance. However, there is no scientific basis for this idea in neuroscience.

Nearly every portion of the brain is active during the day, even when performing relatively routine tasks, according to research employing a variety of imaging techniques, including magnetic resonance imaging (MRI) scans. The activities of the brain are divided into many regions, each of which plays a role in the general functioning of the brain. The source of this myth is unknown, though it might have come from self-help experts pushing the idea of discovering one's own potential or from misreading's or misunderstandings of scientific data. The brain is an extraordinarily complex organ in actuality, and although much remains to be discovered about its internal workings, it is obvious that humans utilise far more of our brains than only 10% of them. The brain is a highly interconnected network with distinct parts that communicate and work together to support everything from intricate thoughts and behaviours to fundamental bodily functions. Each area of the brain has a specific role. Participants obtained different beliefs regarding their thoughts about the neuromyth that people using only 10% of their brain. There are seven research participants who were of the opinion that indeed most people only use 10% of their brain in their lifetime. This implies that most parts of the brain are not utilized in people's lifetime. One teacher reported that: *"I would agree. However, I think maybe not just 10 %, but I think we can use more of our brain. I think we can be quite lazy"* (Participant 10). Another teacher also supported that: *"I cannot 100 % say, but I do feel like we don't always use our brains to its full capacity. So, I will likely be inclined to believe it"* (Participant 17). Similarly, another teacher reiterates that: *"I strongly agree with the theories about this as they have evidence to back this up"* (Participant 20). In addition, some other teachers' findings from the transcribed interviews are:

> *"I agree that people only use 10% of their brain. Well, mathematically, when you look at what I can do maybe, or what a student can do mentally, it's way, way more. And even if you compare the work we used to do before technology took over, we used to do a lot of calculations in our brain, and now technology has taken over and we hardly do those. Talk about mental maths, talk about formulas, talk about... There's a lot that we kept and we did in our brain, which we no longer do, which tells you there is a lot that we can do"* (Participant 4).

> *"I do agree with it. I think it has been proven by multiple scientists over the few years that we only use a small part of our brain. I also think that not even every one of us are using our full capacity of the 10 %. So clearly, we*

are not even using the full capacity of the brain, and some people are not even using the 10 % that most people are using" (Participant 6).

"I agree, I think there's parts of the brain that we don't really exercise. For instance, creativity. Not everyone believes that they can be creative and that's a part of the brain that you can access and train. You can almost enhance it in a way, I think, through practice and teaching and learning. I see this every day. Not all the students are creative. But yeah, I think it just comes down to using different techniques to help them understand why they need to be doing the subject or the activity that they need to do. For instance, some students learn better kinaesthetically, so they'll get to stand up while we're busy learning, or I'll always try to include movements and images and different materials to enhance all the different kinds of learners" (Participant 11).

From the interview excerpts above, participants express agreement with the notion that people only use a fraction of their brain's potential. They suggest that advancements in technology may have led to a decrease in mental calculations and exercises, potentially resulting in underutilization of certain cognitive functions. They also mention the existence of unused or under-exercised parts of the brain, such as creativity, which can be enhanced through practice and learning.

Most participants, guided by scientific understanding and critical thinking, rejected the notion that people only use 10% of their brains. They emphasized the complexity of the brain and the need to dispel this popular but scientifically unsupported myth. One teacher reported that *"I disagree. I think it depend on individuals and how they are able to stimulate their brains to work better. They multi-task and be involved in different activities to challenge their brain"* (Participant 2). Another teacher also supported that: *"No, I do not agree with the statement that people only use 10% of their brain. The brain is a highly complex and interconnected organ, and nearly every part of it serves a specific purpose"* (Participant 7). Likewise, an additional educator affirms: *"I disagree as I know we use more than 10%"* (Participant 8). In addition, other participants reported the following:

"I do not agree that people only use 10% of their brain, the percentage of the brain in use at any given time varies from person to person. It also

depends on what a person is doing or thinking about. A lot of the brain is even active when a person is resting or sleeping" (Participant 1).

"I disagree. I think also it depends on every individual, because there's this test that you go for to see whether your brain needs added and stuff like that. And they're able to do this neurotransmitter things and connect things to your head. And they're able to tell you, you are only using 20 %, while another person can be using 30 %, while another child could be using 10 %. So, I think it varies from individual to individual, depending on background circumstances, diet, exercise, all that has an impact on thinking and learning" (Participant 5).

"No, I don't think that is true. I think if you are a healthy human being, you should be using 100 % of your brain. I don't think there's ever been real evidence. I think there was a very cool movie about it, and then most people are touched on. But no, I definitely do not think that is true because your body needs your whole brain. It doesn't just need it for thinking and learning. I mean, it uses it to walk and to talk and to breathe and to do everything. So I do not believe that you only use 10 %" (Participant 9).

"No, that's not something that I actually believe in. I believe that the brain is a muscle, and like with any other muscle, the more you practice or train, you can help it grow. For example, if a bodybuilder starts training, his muscles start to develop. And it's the same with the brain. The more use, the more active the brain is, the muscle grows" (Participant 15).

"I disagree, the idea that people only use 10% of their brains is a myth. The brain is a highly complex organ, and virtually every part of it serves a purpose. While it's true that we may not use every region of our brain simultaneously for every task, different areas are active during various activities and functions. Brain imaging studies have shown that much more than 10% of the brain is active at any given time. This myth likely stems from a misunderstanding of brain function and has been widely debunked by neuroscience" (Participant 19).

From the interview excerpts above, some participants, including those with a background in science or psychology, emphasize that the brain is a complex organ where different regions

have specific roles, and these regions work together for cognitive and physiological processes. Additionally, a few participants suggest that brain activity can vary by individual based on factors like diet, exercise, and background, but still reject the idea that only a small portion of the brain is used. Overall, the responses reflect a strong understanding of brain function and the importance of utilizing the entire brain

Theme 2: *Left brain vs Right brain*

There are different hemispheres of the brain that have different functions, and it may be believed that learning differences due to use of different hemispheres, and that people are either right-brained or left-brained (Dündar & Gündüz, 2016). While there was general acknowledgment of the different functions attributed to the left and right hemispheres, participants varied in their level of agreement, skepticism, or uncertainty regarding the concept of left-brain and right-brain dominance. Many participants emphasized the need to consider individual differences and the complexity of brain function. Participants had various views regarding the different hemispheres of the brain. One teacher reported that: *"I agree with that through study, but the evidence of it, I'm not really very strong on the evidence, but I agree with that"* (Participant 4). Majority of the participants agreed with this phenomenon. Here are some of their comments:

> *"I agree that there are different hemispheres of the brain, as far as I understand the left hemisphere controls a child's speech, comprehension, arithmetic, and writing. Whereas the right hemisphere controls creativity, spatial ability, artistic, and musical skills. I have a young man in my class, his writing is not up to standard and he really struggles with writing, but if I have to give him anything to do with drawing and about space, he is absolutely brilliant at that. At his age, he is just 7 years old, he knows more about space than I do I would say. I also have a young lady in my class who is not artistic at all and is not creative, she even complains when it comes to drawing, but when it comes to actually understanding, doing her school work and following instructions and writing she is able to do all that, but when it comes to fun activities it is not so fun for her"* (Participant 1).

> *"From research and what I've read, I would back it up because I don't know any better. I would agree because that's what I also read and heard about your left brain and your right brain and how learners or people function.*

That's where the teaching part come. You have to, firstly, as a teacher, be very observant and know the child. You will see the child that's more artistic, while the child that's more creative, that thing, and the child's needs" (Participant 5).

"I agree. It is correct to say that different hemispheres of the brain have different functions, but it is overly simplistic to attribute learning differences or individual characteristics solely to one hemisphere or to categorize people as "right-brained" or "left-brained." The brain's functioning is highly integrated and adaptable, and learning and cognitive abilities are influenced by a complex interplay of various brain regions and individual factors" (Participant 7).

"Yes. I don't know how I can disagree with that. It is scientifically proven that there are two hemispheres of the brain. I think that you can encourage the child that's really autistic. You can encourage their ability to organize and analyse as well because it does incorporate into something like maths because there's a lot of organization that comes with art and being creative as well. I think it does heighten that the greater success" (Participant 11).

"Yes, I agree with that. I have in my numerous years of teaching, which is actually 28 years, I have come across children and after doing my own personal research into the so-called neuromyths and things like that, because I'm looking for new ways to get that child's attention, we have discovered that if I bring in a piece of music or put in a picture, I find that that child learns better. I play music. I encourage a lot of role-plays in the classroom. And if I'm presenting something, I present it in two different ways, the right and the left brain. For example, the child is more artistically inclined, get them to draw what they are visualizing in their brain. For example, if I'm doing groups of, say, two times three, I have two groups of three things in it, get them to draw it so that they can understand the context" (Participant 15).

"I do agree that there is a difference between different brain, people who are stronger left brain and right brain, yes. I don't think I necessarily teach to pick that up, but it's also personality-wise, wise, and also you can see

learners that's, I'm not sure, right brain or left brain, but those learners who are very neat and tidy and organized, they are, I'm speaking out of correction now, for example, maybe right brain, where the other learners who are sporty and they don't really take pride in their work, they are left brain. I'm completely incorrect now, I'm sure of it. But I'm just saying that's the only way that I can see that learners are different in the way they think and do things" (Participant 17).

"I agree because the brain is highly interconnected, and both hemispheres work together for most cognitive functions. For example, creativity involves a network of brain regions, and it's not limited to just the right hemisphere. Language processing, often associated with the left hemisphere, also involves right hemisphere contributions. Individual differences in brain organization exist, but they're not as clear-cut as the left-brained or right-brained dichotomy suggests. People have unique combinations of strengths and weaknesses in various cognitive areas, and these differences are not solely determined by one hemisphere being dominant" (Participant 19).

"I completely agree because these are theories that I actually learned in psychology when I was in my study as well. It's something that I actually think they should be read on, but I was not very well-versed because I think I had shut down because the psychology was so typical in some of these theories, it's like they're so hard to find them. But this theory I do agree on. The left hemisphere and right hemisphere. I believe in that. We try it in that way as well and we do things in that way. We also accept in that way too. It's obviously... I think the easiest one is deciphering your preference depending of the right or left brain at doing things like... For instance, when I asked them to do a drill at hockey, I asked them to hold the hockey stick and I wanted them to show me which side they would hold it on. So then often you see a boy who's right-handed holding on to his left side. I'm like, why are you holding like that? What's your dominant arm? Which arm do you write with? And then I'll tell me, okay, show me the arm and then you see them raise that arm then I'm like, okay, so why would you choose to hold the stick in that way? And then sometimes they have no explanations" (Participant 20).

The findings above reflect a nuanced understanding of the left-brain/right-brain concept among participants, with varying degrees of agreement, skepticism, and recognition of the need for a more comprehensive view of brain function. The interpretation underscores the complexity of cognitive processes, and the challenges associated with oversimplified characterizations of individuals based on hemisphere dominance.

In addition, while majority of the participants agreed to the notion, a few of the participants' responses indicate a rejection of the oversimplified left brain/right brain dichotomy in favour of a more nuanced understanding of brain function and cognitive processes. One teacher reported that: *"I do not agree with this. The brain has different facets and different parts to it and I believe that it works all together. We do hear about the theories of the left-brain vs right brain but I do not believe in this"* (Participant 14). In addition, other teachers reported:

> *"I don't agree with that one, because again, you use your entire brain. That's why I don't agree with that idea. I also know that certain areas in the brain, for example, I know the language centre is mostly on the left side of your brain. But the right side of your brain still plays a role in interpreting the meaning of language. That's why I don't think left brain, right brain is a valid thing"* (Participant 3).

> *"I'm not sure on this one. When I was at school, we did learn about your different anatomy of the brain and how the different parts of the brain obviously impact your.... I don't know and I have no idea whether it influences your creative thinking, left brain, right brain, left brain, more logical. I don't know. I know about it. I understand it. I understand how the brain function due to biology, but I'm not sure whether it impacts your creativity and your logic and that thing. I really don't know"* (Participant 8).

> *"No, I disagree. Okay. Learning and cognitive functions are complex, that's what I believe in, and are involved with interplay of various brain regions rather than being confined to one hemisphere or another. I don't agree with that statement above. I think there's a lot to play when it comes to thinking and learning"* (Participant 13).

> *"I disagree with the notion that people are either right-brained or left-brained, and that different hemispheres of the brain have distinct functions. Scientific research has shown that while certain areas of the brain may be*

> *specialized for specific functions, the brain functions as an integrated whole. Both hemispheres work together and are involved in various cognitive processes. In my teaching, I focus on promoting holistic brain development by incorporating activities that engage different areas of the brain simultaneously. For example, I might use a combination of visual aids, auditory explanations, and kinaesthetic activities to provide a well-rounded learning experience"* (Participant 18).

On the bases of the findings above, while some participants emphasised the intricacy of learning and cognitive processes, others emphasised personal experiences or understanding of brain structure and function to support their viewpoints. Thus, most of the participants express agreement with the idea that different hemispheres of the brain have distinct functions. To bolster this belief, they point to observations made in classroom environments, own experiences, or academic research. These people frequently believe that an individual's preferences and strengths in cognitive activities are influenced by their left or right brain dominance. Conversely, other participants express skepticism or outright disagreement with the concept of left brain/right brain dominance. They argue that the brain operates as an integrated whole rather than being strictly divided into hemispheres for specific functions. These teachers emphasize the complexity of learning and cognitive processes and reject the oversimplified notion of left brain/right brain dichotomy. Some participants, offer nuanced perspectives, suggesting that individuals may use different parts of their brains depending on the situation rather than being strictly left or right-brained. Overall, the data highlights the complexity of understanding brain functioning and cognition, with participants presenting a range of beliefs and interpretations regarding the concept of left brain/right brain dominance.

Theme 3: *Visual, Auditory and Kinaesthetic (VAK) Learning styles*

The existence of VAK learning style which asserts that learning can be improved if children are classified and taught according to their preferred learning style, specifically as visual, auditory or kinaesthetic learners (Riener & Willingham, 2010). The finding reveals a range of opinions on the validity and practicality of the VAK learning styles theory. While some participants find value in tailoring instruction to individual preferences, others express skepticism and advocate for a more evidence-based, flexible, and inclusive approach to teaching and learning. The interpretation highlights the ongoing debate within the educational

community regarding the application of learning styles theories. The majority of participants expressed favour and agreement, with some participants advocating for its implementation in teaching practices and others calling for a more nuanced and evidence-based approach to address the diverse needs of learners. One of the teachers reported that: *"I strongly agree with the VAK learning style and also implement this in my teaching"* (Participant 6). Similarly, another teacher reiterates that: *"I do agree with this theory as students learn in different ways"* (Participant 12). Below are some of the other participants' responses:

> *"I agree in the existence of the VAK learning styles, because learners respond according to their preferred learning style. Some students are able to learn better when given pictures and shown videos whereas others work better listening to my voice. All students are different and they learn differently"* (Participant 1).
>
> *"I agree because when you look at some learners, when you give them a diagrammatic presentation, they quickly understand what you're talking about. Why at least some can read and interpret? Why at least some you can tell and they understand? But there are some that need you to sit down, give a pictorial or a diagrammatic presentation for them to understand"* (Participant 4).
>
> *"Yes I agree, I can just go to what I teach and how we are encouraged to teach at school is to use all different types of resources and different learning in the classroom. With the visual, we're trying to at times and introducing new topic, perhaps bring a video in, something that we've researched and gotten off Google and display it on our projectors onto the board. Then also, for instance, I had a game that I've used for my population geography that I'm teaching… I've created a few games for the children, which I think would bring in maybe the visual, bringing different visual aspects of it. Auditory, getting them to talk a little bit more, flip classrooms, get them to teach as well to try and bring in them, verbalizing the information…"* (Participant 8).
>
> *"Yeah, absolutely. I think it helps students respond to content. It allows them to differentiate between a lot of different content and activities. I think it's very important. For instance, if I'm teaching a class on art history, then I*

will have the notes and the pictures for the visual learners, and then I'll explain the topic for the auditory learners, and then have practical activities for the kinaesthetic learners. Get them to make mind maps or get them to actually act it out. A lot of the art history, we can actually act out little scenarios together as a group. I include a lot of dramatic arts as well in my learning" (Participant 11).

"I agree that all VAK used together is good. I don't think that I don't subscribe to that VAK learning style separately. I believe that a little bit of everything I believe that especially young children, they're open to different styles, and no child will only learn one way. I think it's a combination of all of it. And teaching styles, teaching methodology, a teacher incorporating visual, auditory, and the kinaesthetic waves, any child can benefit from a combination of all of them. I don't subscribe to the there's a learning style for each individual" (Participant 14).

"I agree the concept of VAK (Visual, Auditory, Kinaesthetic) learning styles has been a topic of discussion in education. While some educators and learners find value in tailoring teaching methods to individual preferences, there is limited scientific evidence to support the idea that matching instruction to a person's preferred learning style significantly improves learning outcomes. For example, every year when I teach new learners, I usually conduct a quiz on "How do you learn" "Why do you learn the way that you do", it helps to know the learners therefore specific teaching strategies can be amended for them" (Participant 19).

"I think that, yes, classification is true because I've seen it with the learners that I work with at my school. Some are very much visual learners. So when I have to demonstrate things, especially like when I coach them. When I have to show them certain things, some of them are more receptive when I show them than when I speak, and then some are more receptive when I speak. You can see that when I'm speaking, some of them, they're very distracted. That's not what they want to do or that's not how they want to see things. They are more receptive if I'm showing them things. And then that's way often some are also distracted" (Participant 20).

The findings presented above suggests a diversity of opinions regarding the validity and utility of the VAK (Visual, Auditory, Kinaesthetic) learning style theory. Some participants strongly support the theory, asserting that learners respond differently according to their preferred learning styles. They believe in tailoring teaching methods to accommodate these preferences, incorporating visual aids, auditory explanations, and kinesthetic activities to engage learners effectively. The findings reflect a complex landscape of perspectives on the VAK learning style theory, with some participants advocating for its implementation in teaching practices and others calling for a more nuanced and evidence-based approach to address the diverse needs of learners.

In addition, some teachers reported their disagreement with the VAK (Visual, Auditory, Kinaesthetic) learning style theory. They argued that the theory lacks strong empirical support and is considered oversimplified and potentially counterproductive. While acknowledging that individuals may have preferences for how they learn, they emphasized the importance of evidence-based practices in teaching that consider various factors such as content, context, and individual needs of learners. One of the teachers reported that: *"I disagree with the VAK method. I would recommend it maybe something like a more balanced and holistic approach to teaching that considers a range of instructional methods instead of using the VAK"* (Participant 13). In addition, other participants reported:

> *"I disagree, we can include different learning styles because the worlds have different challenges. Also, we can encourage the learners to think out of their comfort zone. The brain needs to learn flexibility. To cope with the outside world. The brain needs to be stimulated"* (Participant 2).

> *"I disagree. The VAK learning style theory lacks strong empirical support and is considered by many experts in the field of education to be an oversimplified and potentially counterproductive approach to teaching and learning. While it's important to acknowledge that individuals have preferences for how they learn, effective teaching should be based on evidence-based practices that consider a wide range of factors, including the content, context, and individual needs of learners"* (Participant 7).

> *"Well, so I have a different stance on this. I don't think that it is true for every single student. I think that it is true for different age groups. So, I think younger kids are more susceptible to visual aids, and they respond well to*

visual learning and learning with their whole bodies. And I think older kids or older learners or adults, who will respond better to auditory or things like that. But then I also do believe that it is a bit different when it comes to people that are neurologically a bit different. I have ADHD… I do feel like because we are neurologically a bit different and there are certain things that make more sense… So, I feel like it is true in a sense, but I feel like it's more true for people that are different and people of different age groups, but I don't think it can be applied to every single person" (Participant 9).

"I do not agree with the VAK learning style theory that states individuals have specific preferences for visual, auditory, or kinaesthetic learning styles. This theory suggests that tailoring instruction to a student's preferred learning style can enhance learning outcomes. However, scientific evidence does not support the validity of this theory. People have multiple intelligences and learn through a combination of senses and modalities. It is important to provide a variety of instructional strategies to engage all learners, rather than pigeonholing them into one specific learning style" (Participant 18).

From the interview excerpts presented above, it can be argued that there is widespread skepticism and disagreement among participants regarding the validity and effectiveness of the VAK (Visual, Auditory, Kinaesthetic) learning style theory. Thus, teachers expressed concerns about the lack of strong empirical evidence supporting the theory and highlight its oversimplified nature. They argued that effective teaching should be based on evidence-based practices that consider various factors such as content, context, and individual learner needs, rather than relying on a one-size-fits-all approach based on supposed learning style preferences.

The findings suggest a need for educators to critically evaluate educational theories and practices, ensuring they are evidence-based and adaptable to diverse learners. There's a call for a nuanced approach to teaching, one that recognizes the complexity of the brain, appreciates individual differences, and considers the practical implications of educational theories in the classroom. The interpretations highlight the ongoing discussions and considerations within the educational community, reflecting the complexity and dynamic nature of teaching and learning theories.

Theme 4: *Brain exercises as helpful*

Brain exercises can be classified as types of games that require multiple cognitive abilities, which challenges your brain and improves processing speed and memory (Papatzikis, 2017). Participants agreed that brain exercises have the potential to positively impact students by improving various cognitive skills. The reported benefits of brain exercises included enhanced concentration, memory, reading skills, and problem-solving abilities. There were also mentions of differentiation for learners with special needs and the importance of a holistic approach to cognitive development. However, some participants expressed skepticism or emphasized the need for further research in this area.

Participants reported a consensus on the potential benefits of brain exercises for learners. Many participants expressed agreement with the idea that brain exercises can improve concentration, memory, problem-solving skills, and overall cognitive function. They shared experiences of implementing brain exercises in their classrooms and observed positive outcomes such as increased focus and improved learning outcomes. Additionally, some participants emphasized the importance of incorporating brain exercises into educational practices to stimulate students' cognitive abilities and support their overall development. They highlighted activities such as puzzles, memory games, physical exercises, and problem-solving tasks as effective means of engaging students and promoting cognitive growth. However, there were also some nuanced perspectives among the participants. While most agreed on the benefits of brain exercises, a few expressed partial agreement or skepticism, noting that the effectiveness of such exercises may vary among individuals and that a balanced approach to learning, including other factors like a healthy lifestyle and well-rounded education, is also important for cognitive development. One of the teachers reported: *"I agree with brain exercises. Practice makes perfect. They can help to improve focus and memory. Learners need brain stimulation. I believe it will increase the blood flow and help to reduce risk of diseases at the later stage"* (Participant 2). Another teacher also supported that: *"I do think brain exercises can benefit learners. But I think if you focus on specific things, it will only improve that specific thing. Memory games will just help them to remember things. Reading will obviously improve their reading speed"* (Participant 3). Similarly, another teacher reiterates that: *"Yeah, I agree. I believe that brain exercises like using the puzzle or memory games can help improve students' problem-solving and logical thinking skills. I totally agree with that"* (Participant 13). A teacher also brought to light that: *"I completely agree with that statement. I've used it in my classroom and I can attest to it"* (Participant 15). In addition, other participants also indicated:

"I believe that brain exercises can benefit students, because brain exercises have a positive influence on concentration, memory and behaviour. In the morning in class before I start a lesson especially mathematics where they have to think I get them to dance or exercises, and I also follow someone on YouTube that specific brain exercises" (Participant 1).

"I agree very much. I see it even when I give learners what I call problem-solving, some very difficult problems at every level. You do that two, three, you see the learners starting to think differently and starting to be able to interpret and do very, very difficult problems" (Participant 4).

"I do agree with brain exercises and that it can be beneficial. I think doing those exercises keeps your brain fit and healthy. I think it will also stimulate your brain and will start to develop the other part of our brain that we don't use, and that will definitely increase our brain function as well. I've seen it in my classroom as well, if we go through a certain word or content a lot of times, the learners will start to memorize that, but they will only start to memorize something if they practice it. So, I definitely think doing brain exercises will stimulate the brain and improve the function" (Participant 6).

"I agree. Well, through head office we again receive different things with regards to that. So from my information from that I do believe that it does, it is of benefit. And also I've come from a married into a family of teachers. So we've had conversations surrounding that. I do think so. Also for my son, he's ADHD in attentive. I just find for him doing different types of activities does help him concentrate. And prior to exams, we encourage to use brain gym type activities to try and get the children to focus, breathe through it, calm down and focus energy. Yes, I do think it is of benefit and I have been using it. There is Melody, who is well known. We have been given information and tools from her from head office and also from just the management here, encouraged to use her methods" (Participant 8).

"Yes, definitely. I think it's very important for students to do brain exercises, especially just for their concentration. I work with a lot of different aged children, so from Grade 1 to grade seven. From Grade 1, when they're just learning to concentrate, I find that the memory games and brain teasers tend

to help them a lot in just simple day-to-day tasks. For instance, while we play puzzles with the little kids, we have to do co. I try and make them… The older students will actually try to create their own games. They create their own to do co challenges, and then they'll swap within the class. We've actually recently done a clay work where the children had to create a… What's that game? Like a little crossword, a little snakes and ladders game, but they actually made the little snakes and things out of clay and then they could play with them" (Participant 11).

"I think it can, yes. Even though I don't think I've had personal experience with it, but I do believe that yes, there's probably some truth behind it in classes or even at home, older people, things like that. I think there's definitely some truth to that, yes" (Participant 16).

"I agree. I'm guessing these brain exercises are often sometimes gaining questions or whatever it is, about the things like what did you do in your holidays? That's what I want to ask you. What did you do in your holiday? Who did you see? Then I have to do something like this. That's the thing that all these thoughts and bring them back and try to build, like you say, memories and stuff. I think brain exercises are cool. It's actually nice to see teachers do brain exercises. It's interesting" (Participant 20).

The overall interpretation of the data suggests a widespread belief among participants in the potential benefits of brain exercises for learners. Participants generally agree that engaging in brain exercises can improve cognitive skills such as concentration, memory, problem-solving, logical thinking, reading, writing, and motor coordination. Many teachers describe their personal experiences implementing brain exercises in the classroom and observing positive outcomes. They emphasize the importance of brain stimulation and believe that regular engagement with brain exercises can enhance overall brain function and academic performance. The data reflect a strong belief in the potential of brain exercises to benefit learners and contribute to cognitive development, although there is recognition that further research is needed to fully understand their effectiveness and optimal implementation strategies.

In addition, some teachers reported skepticism or lack of familiarity with the concept of brain exercises. Participants expressed doubts about the effectiveness of brain exercises, stating that

while brain breaks (short breaks involving physical activity) may be beneficial for energizing students, they don't believe that brain exercises, as typically implemented in classrooms, significantly improve cognitive abilities. They noted that consistent engagement with such exercises might have a more substantial impact, but in their experience, the occasional use of brain exercises in classrooms doesn't lead to significant academic improvement. Moreover, some teachers also expressed uncertainty about the efficacy of brain exercises, likening them to physical exercise in that they may not necessarily harm but may not significantly improve cognitive abilities either. They suggested that while brain exercises might have some benefits, they don't believe they would dramatically enhance memory, concentration, or academic skills. They reported:

> *"I don't think so. I have seen every fad and every brain exercise and brain jump and brain Zumba and all of those things. I don't think we've seen it enough. I think if a child gets exposed to that maybe 10 times a day, it would make a difference. But in the way we do it in the classroom, I don't think that works. I do, however, believe in brain breaks. That's something a bit different… I don't think brain exercises work in the way that we do it. Maybe if it got done every single day, every period, then I think maybe like memory games, definitely. I think in a way that maybe an OT does it, an occupational therapist. I know I used to go to OT for my ADHD and we used to play memory games. That used to help me a little bit, but it didn't really improve my memory… It works on your skills, but it's not going to make you clever. It's not going to make you academically gifted if you're no…"* (Participant 9).

> *"I'm not familiar with brain exercise. I don't think any exercise can be harmful. I'm not saying that it would necessarily improve their concentration or their memory. It could have some benefits, I suppose. I'm not the best exercise fanatic, but I know if I look at physical exercise, no harm if you're taking a walk or doing a few star jumps or anything. I don't think that exercise would necessarily prolong my life by years or whatever, but I don't think it would be harmful. In the same way, I don't necessarily think that brain exercises will be harmful or cause any damage, but I don't think they would necessarily improve memory or reading or writing or anything like that"* (Participant 14).

The data collected suggests a mixed perspective on the efficacy of brain exercises in improving cognitive abilities among participants. Some participants express skepticism about the effectiveness of brain exercises, questioning whether they significantly enhance memory, concentration, or academic skills. They highlight the need for consistent engagement with such exercises to potentially see meaningful benefits but remain doubtful about their overall impact. Others acknowledge that brain exercises might have some benefits but are cautious about overstating their effectiveness. They liken brain exercises to physical exercise, suggesting that while they may not necessarily harm, they may not dramatically improve cognitive abilities either.

Overall, the findings indicated a level of uncertainty and skepticism surrounding the concept of brain exercises among participants. While some recognize potential benefits, there is a consensus that further research and consistent engagement may be necessary to determine their true efficacy in improving cognitive function.

Theme 5: *Critical periods of development*

Critical periods of development suggest that there is a window of opportunity during which a person can acquire native competency in a new language (Nickerson, 2021). Typically, this crucial time frame begins at roughly age two and ends before puberty. The participants' responses reflect a balance between acknowledging the importance of critical developmental periods in early childhood and recognizing the brain's continuous capacity for change. The participants drew on personal experiences as parents and teachers, linking their observations to broader educational concepts. While there is general agreement, there's also a recognition that individual differences and the complexity of learning processes warrant a nuanced understanding. The importance of fostering positive learning environments and implementing effective teaching strategies to support neuroplasticity emerged as a key theme.

The participants' reported capture a nuanced perspective on the interconnectedness of early childhood development, learning, and the brain's adaptability, highlighting the need for a holistic and individualized approach to education. Participants responded to this issue as follows:

> *"I totally agree that there are critical developmental periods in early childhood. if skills of development are not met by a certain time or a certain*

age, it becomes much more difficult to acquire new skills. Being a mum of a toddler and a teacher, I have noted that after 1 year or 1 and a half, he is just sponge and recently at the age of 2 and a half he is learning everything and there's things he says that I haven't said to him or taught him so I am not exactly sure where he is learning these things from but it is amazing as to how much he is learning and I believe that I do not think it's going to stop now, I believe that it is important that they learn more, the more that they learn at a younger age becomes easier. I believe when he starts school it will definitely become easier on him. And even with teaching in class as well, from where the grade 1s where and when they come into grade two, as a grade two teacher, I can see the progress on how much more independent they become and how much more they learn and this is why I agree" (Participant 1).

"I agree in critical periods of development, I believe in early childhood development. They say the brain is easier to store and remember at the younger age than when you are older. I believe simple thing like reading, writing, creativity must be taught at a younger age. Then as they grow (youth) we can focus on developing or adding more skills. Critical thinking and problem solving. Then add more s they grow to evaluate and analyse. I also agree that the brain has well developed capacity to change in response to environmental demands, maturity and emotions demand can also lead to brain development" (Participant 2).

"I agree. It's not really difficult to learn or absorb information, but to learn and absorb certain information. There are times when I teach a topic like area in composite shapes. Where you are saying you have to cut this shape before you find area. It's in the area, it's easy when the shape is a square, a rectangle or a triangle. But here is a shape which has got both a square and a rectangle. So, it's composite. So, for learners sometimes in grade seven at the beginning of the year, I remain within a number that still cannot see the need to cut or the way the method to cut. But give them some time, maybe three months. When I come back suddenly, they understand, which means there was a gap in development which has taken place now that they then mature" (Participant 4).

"I believe that the brain has a well-developed capacity to change in response to environmental demands, and this capacity exists throughout the lifespan. The concept reflects the brain's remarkable ability to adapt, learn, and reorganize itself throughout life. This capacity supports learning, recovery from injuries, and adaptation to changing environments and demands. It is a fundamental aspect of human cognition and underscores the importance of lifelong learning and cognitive growth." (Participant 7).

"I agree with the brain having capacity. I think our classrooms and how it's set up and how they feel when they're learning would have a big influence on them wanting to listen, them being engaged. I think that the classroom set up is, I do think, very important to making them want to learn to make it something that they want to do to make it exciting" (Participant 8).

"Yes, I think so. Especially with, let's say, the grade fours now, you can see learners who may be needed some therapy, that helps they find motor skills and their big motor skills and everything. So obviously if you there might be a problem with that, you'll send them in the early years, like grade R, grade I maybe also. But by the time when they get to grade four and they haven't been through that process, then it's really like you can see in their handwriting, for example. You struggle to see what they're writing. And at this stage then, with all the new subjects and everything they have to learn. It's difficult to go back to the basics to fix something like handwriting, for example" (Participant 10).

"I do believe that when students are younger, they are the are able to absorb more information. I think it's also another myth, but there's been so much backing with regards to experiences. I don't know about the actual theoretical background of backing with it. But I know I've heard a lot about children that are under seven years and under that can learn the most number of languages, quite a few languages at one go, whereas as you grow older, it's a lot more difficult to learn a lot more languages, for instance. I don't know how true, again, it is theoretically because I haven't gone out and actually researched about it. But from pure experience only, I've seen

that that's possible, that they can pick up a lot more when they're younger" (Participant 12).

"I agree with that. I find that children are more perceptive in the morning when they come to school as opposed to later on in the day. And if you look at it, take it a little wider, I feel that especially when teaching a language, that children are more perceptive to learning a language when they're younger as opposed to learning it when they are older. And I've seen it at school, we've had children in a French class from grade 1 to 3 that assimilated the language much quicker than students that were in grade 6 and 7" (Participant 15).

"I agree that there are critical developmental periods in early childhood when certain learning must occur. Research has shown that early experiences play a crucial role in shaping brain development and establishing foundational skills. During these sensitive periods, children are more receptive to acquiring certain skills and knowledge. In my teaching, I prioritize creating a supportive and stimulating learning environment for young children, where they have ample opportunities to engage in meaningful experiences that promote cognitive, social, emotional, and physical development. The brain has a well-developed capacity to change in response to environmental demands, and this capacity exists throughout the lifespan. This phenomenon is known as neuroplasticity. The brain is adaptable and can reorganize its neural networks in response to learning, experiences, and environmental changes. This ability allows individuals to acquire new skills, modify existing neural connections, and recover from brain injuries. The understanding of neuroplasticity highlights the importance of providing enriched learning environments and targeted interventions to promote optimal brain development and learning throughout life" (Participant 18).

"I completely agree because I've worked with foundation-based learners for the longest period of my work career, and then also period of my career, I've worked with foundation-based learners who are now pre-teen, actual teenagers, and they're at 12 and 13-year-old, Grade 6 and grade 7, and they

> *are much more set in certain ways. I wouldn't say all the ways because they haven't learned other things, but they are now more set in their way in certain behaviours. It's very hard for you to teach them, for them to understand that. It is critical that you get to establish what you need to establish in that foundation phase because that's the critical period of them learning. And then it becomes more... They absorb more in that phase. And then they use that and digest that. They become 10, 11, 12, and then up to 13 now, they're most, like I said, they're most"* (Participant 20).

The interview excerpts highlight a consensus among participants regarding the importance of critical developmental periods in early childhood for learning and brain development. Participants generally agree that young children have a heightened ability to absorb information and acquire skills during these critical periods, which can have long-lasting effects on their cognitive, social, emotional, and physical development. Furthermore, participants acknowledge the concept of neuroplasticity, emphasizing the brain's remarkable capacity to adapt and change in response to environmental demands throughout the lifespan. They recognize that while early childhood represents a particularly sensitive period for brain development, the brain remains adaptable and capable of learning and growth at any age. Overall, the data reflect a nuanced understanding of the interplay between critical developmental periods, brain plasticity, and learning outcomes, with participants recognizing the significance of early intervention and ongoing support for promoting healthy brain development and lifelong learning.

The interview excerpts reveal a strong consensus among participants regarding the importance of critical developmental periods in early childhood for learning and brain development. Participants highlight young children's heightened ability to absorb information, emphasizing that early experiences shape cognitive, social, emotional, and physical development. Additionally, they acknowledge neuroplasticity—the brain's ability to adapt and reorganize throughout life—underscoring the need for enriched learning environments and early interventions. While early childhood is seen as a crucial phase for foundational skill acquisition, participants recognize that learning remains possible at any age. The findings reflect a nuanced understanding of brain development, reinforcing the significance of responsive teaching practices and lifelong cognitive growth.

In addition, some teachers generally expressed disagreement with the idea that there are critical developmental periods in early childhood that significantly impact learning outcomes. They argue that learning is a lifelong process and that individuals can continue to acquire new skills and knowledge at any age. Some participants emphasize that while children may indeed absorb a lot of information during their formative years, learning is not limited to specific stages of development. They highlight the importance of ongoing learning and the continuous development of the brain's capacity to adapt and change throughout life. Participants suggest that factors such as teaching approach and learning environment play significant roles in facilitating learning, regardless of age. They reported:

> *"I disagree with that because I think everyone is able to learn every day. I think when they're young, obviously that's when they're in their developmental stages, they possibly are more influential. But I do think that you are able to learn, every day you learn something new. I'm a bit undecided on that one. I learned with having my own children as they go through there from baby as they grow, obviously they learn so much in such a short amount of time to be able to function and get to school at six years old. But I'm not sure. I think I might have to disagree. I think we learn throughout our lives and not only in the early phases"* (Participant 8).

> *"No, I think that it is easier for kids to learn because that is their only responsibility in life. I think I believe in learning forever. You can learn a new skill or learn new information until the day you die. If I believe in forever learning. The thing is with kids is I think why people think that kids of a certain age learn more is because they do actually take in a lot of information… So, I do think that they take in a lot more information and they learn a lot more. But I don't actually think that... Yeah, I don't think that your brain develops just when you are a child. I think it happens for the rest of your life"* (Participant 9).

> *"I partly agree that there are critical development periods in early childhood. They often referred these to as sensitive periods during which certain types of learning are especially receptive and optimal. In these periods, our cultures are characterized by heightened plasticity in the brain, making it easier for children to acquire specific skills or knowledge. But as*

a learner, I remember when we did this at college, they say people are lifelong learners. You learn every day. I don't believe there's a certain stage where you say you've stopped learning or acquiring more knowledge. You continue to learn as long as you are alive" (Participant 13).

"I do not believe this. I think the whole learning process in an ongoing dynamic experience and we learn throughout our lives. I do not believe that at a certain time everybody must be able to do this or they are not going to know how to do it in the future. I do believe that the brain has well developed capacity to change. It all depends on the teaching approach as well and to have control of the learning variables in the learning process" (Participant 14).

"I don't really know of any facts about this. I just do believe that if some fundamental building blocks are not set when learners are young, then they will struggle when they are older, or for example, in grade seven, I teach grade seven, and I always tell parents that if those building blocks that they build in foundation phase is not there, those basic, affluent vocabulary words, for example, they will still struggle because it's still lacking. We are just building on that, and it's not there now" (Participant 17).

The above interview excerpts suggests a nuanced understanding of brain development and learning capacity, with participants recognizing the complex interplay between biological factors, environmental influences, and individual experiences. While there are differing opinions on the existence of critical periods and the extent of brain adaptability, there is a consensus on the importance of fostering continuous learning opportunities and creating supportive environments for learners of all ages. The participants' reports reflect a balanced perspective that appreciates the significance of early childhood development while acknowledging the continuous adaptability of the brain. This nuanced understanding highlights the need for flexible and individualized educational approaches that consider both critical developmental periods and the lifelong learning journey.

Theme 6: *Listening to Mozart can make a baby smarter*

The neuromyth of listen to Mozart can make a baby smarter has become a craze in the twenty-first century. According to a theory known as the "Mozart effect," listening to Mozart music can momentarily raise test results on a certain IQ component (Swartz & Nilsson, 2005). The idea is popularized in science circles with claims that "listening to Mozart makes you smarter" or that early exposure to classical music promotes mental development in children. The participants generally displayed skepticism about the Mozart effect, emphasizing the need to consider individual differences in babies. Conversations, nursery rhymes, and diverse interactive experiences were favoured over passive exposure to music. Some participants questioned the validity of the Mozart theory, citing inconclusive research and the lack of a direct correlation between Mozart's music and enhanced intelligence. While there was limited support for the potential positive impact of music on mood and cognitive stimulation, participants tended to avoid attributing significant intelligence enhancement solely to listening to Mozart.

The responses suggest a cautious or skeptical stance regarding the popularized idea of the "Mozart effect." Participants leaned towards a belief in the multifaceted nature of intelligence, influenced by various factors, and highlighted the importance of interactive and engaging experiences in a baby's development. One of the teachers reported that: *"I do agree, and it's not so much about listening to Mozart, but I play a lot of music, instrumental music that help to help the brain wave, helps the beta wave"* (Participant 15).

The participant expresses agreement with the idea that certain types of music, particularly instrumental music, can positively impact brain activity. They mention playing such music to help stimulate brain waves, specifically mentioning beta waves. This suggests an acknowledgment of the potential cognitive benefits of music on brain function. Overall, the data indicates a belief in the therapeutic and cognitive-enhancing effects of music, aligning with existing research that suggests certain types of music can influence mood, focus, and cognitive performance. It reflects a proactive approach to utilizing music as a tool to enhance brain function and optimize learning environments.

Participants generally disagreed with the notion that listening to Mozart would make babies smarter. They expressed skepticism about the Mozart effect and emphasized the importance of various factors in child development, including genetics, environmental stimulation, social interaction, and early learning experiences. Some participants mentioned that while music, including Mozart's compositions, could have a positive impact on mood and cognitive

stimulation, it should not be considered a sole determinant of intelligence. Instead, they emphasized the need for a holistic approach to early childhood development that includes diverse experiences and interactions. Overall, the participants' responses suggest a nuanced understanding of the complexities involved in child development and intelligence enhancement. One of the teachers reported that: *"I don't agree with that one. The only reason I don't agree with it is because I have read about studies based on this before where it has been said it's not a real thing. It doesn't make someone smarter"* (Participant 3). Another teacher also supported that: *"I disagree. Not everyone has access to Mozart around the world and are we saying that those who do not have access are not going to be smart"* (Participant 14). In addition, other teachers reported the following:

> *"I disagree that listening to Mozart will make a baby smarter. I believe in having conversations with kids will definitely make them smarter. I did try the listening to Mozart but it did not work. And the kids although they do not listen to Mozart, I see their progress and how much they learn. I use nursery rhymes which have taught them a lot, and obviously listening and repetition and the understanding is good to see. If kids listen to Mozart there is nothing said there, whereas listening to nursery rhymes you are actually listening and relating to it"* (Participant 1).

> *"My personal thought about that, no, I don't agree with that. No, I don't think it will make a baby smarter. You do get deaf babies as well where they're not able to listen to music. And then also you get other babies or other children when they grow up where they are not even able to listen to music when they have to study or to concentrate, where they use other things to study and concentrate"* (Participant 6).

> *"No. I think you can try anything that you want to. But I feel like academically gifted kids are born academically gifted and they are developed and they are... I feel like you can have Moza playing while they are playing with the most wonderful educational toys. But if you are not genetically, I feel like it's a genetic thing. Okay, thank you. So, if it's not genetically there, you can play all the most that you want"* (Participant 9).

> *"No, not really. I believe that maybe it can have a positive impact on the mood of the child and maybe cognitive stimulation. But making the child*

smarter, I don't think it's valid. Because being smart, it varies with maybe sometimes the genetics that comes to play or environmental factors. I don't think that's quite true" (Participant 13).

"I don't think so. I think we are born with different characteristics and tendencies depending on who your parents are and what characteristics you took on. But I don't think it can make you smarter. I think learning makes you smarter. I don't think music, maybe it can make you more perceptive or more calm or concentrate better, but I don't think it can make you smarter" (Participant 16).

"I disagree. I don't think that using music or that type of music. I don't know. That feels shadow. So, you're going to use the genre and music to... It insinuates that that listening to that genre, that's how it's smarter just because Mozart himself was a creative and created constantly. That was Mozart, it does not mean that the child will be like Mozart" (Participant 20).

The overall interpretation of the data collected indicates a diverse range of perspectives on topics related to education, cognitive development, and child learning. Participants shared their beliefs, experiences, and observations regarding brain exercises, critical developmental periods, the capacity for learning throughout life, and the Mozart effect. Regarding brain exercises, participants generally agreed that they could benefit learners by improving concentration, memory, problem-solving skills, and overall cognitive function. However, there were also mentions of the need for a holistic approach to learning, including factors like a balanced diet, physical activity, sleep, and social engagement.

On the topic of critical developmental periods, most participants acknowledged the existence of sensitive periods during early childhood when certain types of learning are particularly receptive and optimal. However, some participants also emphasized the importance of lifelong learning and disagreed with the idea that there is a cutoff point for learning. Concerning the Mozart effect, participants expressed skepticism about the notion that listening to Mozart's music could make babies smarter. Many highlighted the multifaceted nature of intelligence and emphasized the role of various factors, including genetics, environment, and early stimulation, in cognitive development. The participants' responses suggest a nuanced understanding of the complexities involved in child development and intelligence enhancement.

The participants reported varying levels of uncertainty regarding the idea that listening to Mozart can make a baby smarter. Some expressed skepticism or outright disagreement with the concept, while others acknowledged their uncertainty and lack of definitive knowledge on the topic. Additionally, a few participants shared personal experiences related to playing classical music during pregnancy but remained unsure about its effect on intelligence. Overall, the responses indicate a lack of consensus among the participants regarding the purported "Mozart effect," with many expressing uncertainty about its validity. One of the teachers reported that: *"I am not sure"* (Participant 4). Another teacher also supported that: *"I do not know"* (Participant 10). Similarly, another teacher reiterates that: *"No, I think that might be a myth. I don't know"* (Participant 11). Another teacher brought to light that: *"I am not sure, but I am inclined to disagree"* (Participant 17). In addition, other teachers reported:

> *"I don't really know about this, but I know when I used to read about it and I was pregnant, somebody told me I need to play The Sounds of Dolphins. I used to play The Sounds of Dolphins. So, whether that worked on or not, time will tell"* (Participant 5).

> *"I'm not sure. I read about it when I was pregnant and I played the classical music, but also, I enjoy classical music. But I'm not sure whether it makes the baby smarter or not. I think I'd have to say I disagree. I don't think it does. No, I think maybe it's enjoyable for them to hear it, but I don't think it makes them smarter"* (Participant 8).

> *"I am not sure. I don't know about smarter. I do have a tendency of always playing music in my class. That's more like a feel good, change your mood into a positive mood space. Not so much that it makes you smart. I think the same would apply to babies, in my opinion. I just don't think that it's going to make them smarter. But I do think it would probably create a peaceful haven and a space for them"* (Participant 12).

> *"I am unsure, from research; the idea that listening to Mozart can make a baby smarter is often referred to as the "Mozart effect." The concept originated from a small study suggesting that listening to Mozart's music temporarily improved spatial-temporal reasoning skills. However, subsequent research has been inconclusive, and the effect is still debated among experts in the field. While exposure to music, including Mozart's*

> *compositions, can have positive effects on cognitive development and overall well-being, it is unlikely to significantly increase a baby's intelligence on its own"* (Participant 18).

The overall interpretation of this data suggests a widespread sense of uncertainty and skepticism among the participants regarding the notion that listening to Mozart or certain types of music can make a baby smarter. Many participants express uncertainty or lack of knowledge about the topic, while others lean towards disagreement or skepticism. Some participants mention personal experiences or anecdotes, such as playing specific types of music during pregnancy or in the classroom, but they stop short of affirming whether they believe it makes babies smarter. Participant 18 provides some insight into the origin of the "Mozart effect" concept and acknowledges that while exposure to music, including Mozart's compositions, can have positive effects on cognitive development and overall well-being, it is unlikely to significantly increase a baby's intelligence on its own. The findings suggest that participants are cautious about endorsing the idea that listening to Mozart or certain types of music can directly lead to increased intelligence in babies. There is a recognition of the complexity of cognitive development and a hesitation to attribute significant cognitive benefits solely to music exposure. The findings highlight a range of opinions, with skepticism toward the Mozart effect prevailing. Participants tended to emphasize the importance of tailored and interactive approaches in fostering a child's development, recognizing the intricate interplay of genetic and environmental factors in shaping intelligence.

Theme 7: *Belief in Multiple Intelligence*

The theory of multiple intelligences was put forth by Harvard University education professor and psychologist Howard Gardner. Gardner (1987) introduced this idea in 1983 as a method to dispute the traditional notion that intelligence is a single, unitary trait that can be assessed by an IQ test. Rather, Gardner contended that there are several facets to human intellect and that these can be divided into several kinds, or "intelligences." Gardner claims that each person has a distinct blend of these intelligences, and that people can be very good at some while lacking proficiency in others (Gardner, 1987). The neuromyth suggests that rather than characterizing intelligence as a single, all-encompassing skill, the theory of multiple intelligences suggests that human intelligence be divided into several intelligences. Majority of the participants were in strong agreement that students have multiple intelligences which is significant indication of

individual differences among them. For example, a teachers reported that: *"I agree. I think there are some learners that can be all around us. I think to an extent I do believe in it, but I don't think everyone has that ability"* (Participant 10). In a similar vein, another teacher reiterates: *"I agree. There are students who possess different types of intelligences"* (Participant 14). In addition, other participants belief of this notion are as follows:

> *"I agree in the multiple intelligence theory, it describes the different ways students learn and obtain information. Every child is different. I do have students are quicker learners and they understand quicker, whereas you have a few or a hand full of kids that you have to reteach or reexplain because sometimes the information is too much for them, whereas some kids are able to grasp the concepts pretty quickly"* (Participant 1).

> *"I agree with this. I'll tell you why. When you look at the way we study, when we are preparing for an exam, there are some people who study when the music is on. There are some people who study by converting their notes into music. And some of us who want to study when it's dead quiet in the house. And so that shows how different we are"* (Participant 4).

> *"I do believe in the multiple intelligence theory because you can sometimes actually see, in most cases, I see that in the classroom, a child that's excellent in sports, but you find that they're academics. They're not good at it. They're as much as they try, they just end up being just mediocre. They cannot go beyond that as much as the effort they put in. But come in the sports field, they're able to Excel. If you think of your teaching in class, you would think the child will be listening and grasping the concept, but they fail to do it. But yet if you get a PT instructor giving them instructions, they're able to grasp, listen, and apply it quickly. So, you can see that Charlie is more sports-orientated and good at sports, but not in the classroom"* (Participant 5).

> *"I agree with the description of Howard Gardner's multiple intelligence theory, which proposes that learners possess a small number of relatively independent intelligences, and educational approaches can be tailored to promote individual learners' intelligences. The theory proposes that learners possess a variety of intelligences, and educational approaches can*

be adapted to cater to these individual strengths and preferences" (Participant 7).

"I do believe in that, but not in a school environment. I'm sorry if I'm taking this too much to a school thing, but in my personal opinion as a teacher, I feel like a lot of these theories are a way that we make ourselves understand why a learner is not getting eye marks. This gives us a reason, because number one, it's not our fault. The child is just not a visual learner or the child is just not this or that. Number two, it can explain to the parents without offending them. I think we use these different things to... Because you know what? I feel you are either academically gifted or you are not academically gifted. And I feel like there are different kinds of SMARTs. I do think that is very true, but I don't think one is... I think there are different strengths and different weaknesses, but I don't think there's different kinds of SMARTs" (Participant 9).

"I agree. For instance, in the art classroom, I use, well, very bodily, aesthetic intelligence and visual and spatial because it's all based on the visuals, on the spatial awareness, getting children to move within their sphere, and getting children to work within those different intelligences and how they also work together" (Participant 11).

"I do agree with that. I've realized that some students, they are good at med, some in languages, some also they want to listen to music for them to perform well. The only challenge that I have maybe is the setup that we have in our classes is so difficult to implement that because some students are in between. As a teacher to actually identify and know how to use the different theories that were created is difficult for me, if I'm to say. Though I agree that they are those intelligence are they are valid and valuable" (Participant 13).

"Oh, yes, definitely. Without a doubt, I've seen this numerous times. We have two or three students that are not academically smart, so their school work is not always great in terms of maths or literacy, but then you get them on the sports field and they can remember a whole gameplay or the entire song of a rhyme or three or four choir songs when they can't even remember a

story or the comprehension of a story. There's definitely different type of smarts. You get your kids that are not strong sports-wise, but then you get them in class and then mathematically, they are extremely smart" (Participant 16).

"I agree. I think the multiple intelligence theory is the because a child can be very good at playing an instrument because they are kids in my high, they're with the instrument, but they may have to do other things. And you can see that there is that disconnect, like you say. So, they don't possess that characteristic within them, but then they have that ability to do something else like this as well. The thing is, sometimes you have to model things in a way where he may see him want to participate. There are some students who are good at sport and not math, So, you can also play games that require him to use that maths in sport, and then you can see that he becomes more involved" (Participant 20).

The overall interpretation of the data suggests that the participants generally agree with the multiple intelligence theory proposed by Howard Gardner. This theory suggests that individuals possess different types of intelligence, and educational approaches should be tailored to accommodate and promote these diverse intelligences. Participants provide various examples and observations from their experiences as educators, highlighting how students exhibit strengths and weaknesses across different domains. They discuss instances where students excel in certain areas such as sports, music, or mathematics, while struggling in others. This supports the notion that individuals have varying strengths and abilities that may not necessarily align with traditional academic measures. The teachers emphasize the importance of recognizing and nurturing these different intelligences to help students reach their full potential. They suggest that teachers should design teaching methods that cater to diverse learning styles and strengths, allowing students to thrive in areas where they excel while also addressing areas where they may need additional support. The findings indicate a strong belief among the participants in the validity of the multiple intelligence theory and its relevance to education. They emphasize the need for a personalized approach to teaching that acknowledges and accommodates the diverse abilities and intelligences of students.

In addition, some teachers reported differing perspectives on the concept of multiple intelligences and its applicability to education. They expressed skepticism about the benefits

of tailoring education to individual learners, suggesting that the world does not offer individuality and that exposure to different skills can stimulate learners to focus on other study fields. Thus, some teachers expressed disagreement with the concept of multiple intelligences, citing doubts about its empirical basis and suggesting that skills can be developed through practice rather than being predetermined. The teachers reported that:

> *"It can be tailored but will the individual learners benefit? No, the world out there does not offer individuality. Different skills will also help different brain hemisphere to work. This will stimulate the learners to focus on other study field"* (Participant 2).

> *"Because I know a bit about this study from Gartner, I'm going to say I disagree because what I know when he first proposed that he didn't have any prior research into the field. I don't think that is true. You can be good in those things if you practice it. But I don't think learners have a predetermined field that they will excel in"* (Participant 3).

The interpretation of the data collected suggests a divergence of views regarding the concept of multiple intelligences and its implications for education. The data reflect a range of opinions on the topic, highlighting the complexity and ongoing debate surrounding the theory of multiple intelligences and its implications for educational practices. The data suggests that educators recognize and appreciate diversity in learning styles but may grapple with how to effectively tailor education to individual learners. The practical application of the multiple intelligences theory in classrooms varies, and there is a need for further exploration of how these concepts can be integrated into teaching practices. The interpretation of the data highlights both support for and skepticism about Howard Gardner's multiple intelligences theory, with educators navigating the balance between acknowledging individual differences and addressing practical challenges in implementing tailored educational approaches.

Theme 8: *Emotional Intelligence*

The ability to recognize, utilize, comprehend, regulate, and handle emotions is the most common definition of emotional intelligence. Individuals possessing high emotional intelligence are able to identify and categorize emotions, distinguish between various feelings and assign suitable labels, as well as modify their emotions to suit changing circumstances

(Mayer & Salovey, 1993). Majority of the participants were in strong agreement with this phenomenon. It's important to note that while there was general agreement on the positive impact of emotional intelligence, some participants acknowledged that it might be a skill that develops over time and with life experiences. Additionally, there were considerations about individual differences in how learners respond to emotional situations, and the role that age and life experiences may play in the development of emotional intelligence. Thus, one of the teachers reported that: *"I would agree in the emotional intelligence theory, as they are more mature emotionally. Learners with high emotional intelligence are able to empathize, they are motivated and self-aware"* (Participant 1). In addition, here are how other participants responded regarding their belief:

> *"I mostly agree with emotional intelligence theory. I do have some learners who display signs of emotional intelligence, but they are not able to easily accept constructive criticism. When they do receive criticism, they tend to no longer manage their own emotions as well as before"* (Participant 3).
>
> *"Yes I believe that. I really believe that. You see, in a class, in a group, there are many things that disturb emotional positions or dispositions of people. And if you are a learner, you need to mature to such a level that no matter what happens, you still can continue to learn or to exercise your intelligence. Some will be crying, some will be because of whatever has happened, but an emotionally mature learner will continue to learn no matter what is taking place"* (Participant 4).
>
> *"I agree. The emotional intelligence theory is widely accepted and supported in psychology and the field of personal and professional development. It emphasizes the importance of recognizing and managing emotions, both in oneself and in others, as a key factor in personal and interpersonal success and well-being. While emotional intelligence can enhance a learner's ability to handle criticism positively, this does not mean they will always react perfectly or without any difficulty. Everyone, regardless of their emotional intelligence level, may initially experience discomfort or defensiveness when faced with criticism. However, individuals with high EQ are better equipped to recognize and manage these*

initial reactions and ultimately use criticism as a tool for self-improvement and personal growth" (Participant 7).

"Think at a certain point, yes, I do believe in emotional intelligence, but more in a way of how we relate to the world around us, to the people around us. I also think it's an age-appropriate skill that you learn. I don't think you are born with it. I think it's really a skill that you need to work on and a skill that you learn over time. Also, certain emotional skills are taught at certain times or learned at difficult at certain times. I don't think you are born knowing how to relate to the people around you. I think you need to learn how to have sympathy. You need to learn how to make the people around you feel good. It's not something that you are born with" (Participant 9).

"Yes, absolutely. I think it helps students take care of themselves as well as the other with their friends. It's very clear to see the children that are more emotionally intelligent than others. They can already tell what their needs are. They demonstrate respect for their friends and they want to help each other. For instance, in the art class, you'll always have that one little child who will finish first and she's done all her work and then she'll go around and help all the other learners or she'll ask, "can I tidy up the classroom?", You can definitely see it in children" (Participant 11).

"Yeah, I think maybe it's a skill that you can actually acquire if you are intentional about it. Something that you should actually work on so that you'll be able to manage your emotions or other emotions better if you know how to. from my experience, I've realized that if you try to understand where the child is coming from, maybe you also give examples of the situation that you went through as a child, is to explain to the child, the child who is suffering, that maybe they can handle it better in a certain way, depending on how you as a child maybe once face that same problem, then they can relate to you better than if you say, it's a no, it's unacceptable, you can't behave like that. If you try to reduce yourself to their level and understand and you give also your own examples of how it happened to you, maybe they'll understand it better. It will calm them down. But it's normal to feel that way" (Participant 13).

> *"I agree with the theory. Emotional intelligence does play a big factor in a child's journey at school. And I noticed that children who do not have the self-regulating technique do not cope well. I'm currently experiencing it with a little one who does not know how to self-regulate and she's got a very fixed mindset. She doesn't want to do something, she literally throws a tantrum, throws her books and refuses to move on"* (Participant 15).

> *"I agree, I do see it every day where I reprimand learners that I don't feel like has the emotional intelligence of other learners, and they don't know how to react. They don't know how to say sorry. They don't know how to even speak to an elder, if that is to appear, let's say that"* (Participant 17).

> *"I agree it can indeed help individuals, including students, handle criticism constructively by being aware of their emotions and responding in a more balanced and productive manner. However, the impact of EI can vary from person to person, and it's just one factor among many that can influence how individuals handle criticism"* (Participant 19).

The overall interpretation of the data collected suggests a general agreement among participants regarding the importance and validity of the emotional intelligence theory. Participants emphasized the significance of emotional intelligence in students' personal and academic development, highlighting its role in managing emotions, understanding others, and fostering positive relationships. Participants agreed that emotional intelligence helps students recognize, understand, and regulate their emotions effectively. They noted that students with high emotional intelligence are better equipped to handle various emotional challenges, such as receiving constructive criticism or dealing with personal issues like divorce or bullying. Many participants discussed the impact of emotional intelligence on students' interactions with others. They observed that emotionally intelligent students demonstrate empathy, respect, and consideration for their peers, which contributes to positive social dynamics and effective teamwork. Overall, the data reflect a consensus among participants on the value of emotional intelligence in education and its potential to foster students' emotional well-being, social competence, and overall success both inside and outside the classroom.

The data collected also expressed skepticism about the ability of young children to handle criticism effectively. They emphasized the importance of life experience and the manner in which criticism is delivered in shaping a child's ability to process and respond to feedback. The

participant highlighted concerns about the impact of negative environments, such as those involving anger and shouting at home, on a child's receptiveness to criticism and their capacity for self-improvement. Overall, Participant 8 suggested that the development of skills related to handling criticism may occur later in life rather than during childhood. They reported:

> *"It's a tough one. I think they're very young and I don't think they're able to do it yet. I think maybe something comes later on with life experience and also how criticism is delivered. I think if they're sitting at home and there's anger at home and their parents are shouting at them, I think that is not going to help them understand things better or look at themselves and say they need to improve. I don't know. I think that's something that comes later on. I don't think children are able to do that, no"* (Participant 8).

Participant's response reflects a belief that young children may not possess the emotional maturity or cognitive ability to effectively handle criticism. They suggest that the development of this skill may occur later in life, influenced by factors such as life experience and the manner in which criticism is delivered. Additionally, the participant highlights the potential negative impact of environments characterized by anger and shouting, indicating that such circumstances may hinder a child's ability to understand and respond constructively to criticism. Overall, the teachers' findings suggest a cautious approach to expecting young children to navigate criticism and emphasizes the importance of supportive and constructive feedback environments.

5.3.2: Findings on how fads and neuromyths incorporated in educational polices and teaching practices

The study also explored the view of teachers on fads and neuromyths being incorporated into the educational policies and teaching practices at their schools. The findings from the qualitative data were analysed thematically and the themes reported include Infusion of fads and neuromyths in the curriculum and lesson plans. The themes are discussed below:

Theme 1: *Infusion of fads and neuromyths in the curriculum*

The lessons and tests that a teacher will teach in an educational setting are compiled into a curriculum. Stated differently, it denotes the entirety of encounters that students will have while receiving instruction from a teacher in an academic environment. Each school has their own

unique curriculum that the adhere to. In this study, most participants reported a recognition of the importance of various educational theories and strategies related to learning styles, multiple intelligences, and 21st-century skills. One of the teachers reported that: *"These fads are in our school policy where we are different and come from diverse backgrounds, including how we view certain aspects in a diverse way which is in the curriculum"* (Participant 19). Participants share how these fads and neuromyths are incorporated/adopted in educational policies at their school;

> *"In a way or in some aspects of it, we really use and intensify a utilization of these theories in our curriculum. But sometimes because of time, we don't really get that chance. But I'll give you an example to say. I believe in giving my children maybe two very difficult or challenging problems a week for them to do. But sometimes I don't practice that because I don't have time. I'm chasing a curriculum, I'm running for the exams, I'm running for sports. So sometimes I don't. But I want to challenge them widely so that they can develop the thinking skills that I want to see. Sometimes I want them to see visual things, but I don't have maybe the time to do that"* (Participant 4).

> *"At our school we do have a wide range of subjects and they are all adapted to the curriculum, or all adapted to those theories. We also try to expose the learners to different sport, and we try to encourage them to participate in all the sport that we have here at school. We also have a lot of cultural activities where the learners can participate there as well. Then also our school, every beginning of the term, our school sends the teachers for some training where we need to attend these, I don't say talks, but something like a talk is about different of these theories, and then also trying to use different teaching styles and how to explain the content to the learners. We are also using a lot of technology in our class to help the learners, especially with those learners that will learn better through visual, images and stuff like that, or by listening and watching a video or something. We also have a lot of support classes for our learners. And then we have a school psychologist that comes to the school weekly to help the learners. And then also, my school has implemented the de bono hats as well, where the learners should use different thinking hats in different types of activities, and we have to incorporate the de bono hats with our activities as well"* (Participant 6).

"We're focused on getting the curriculum done. So, there was not a lot of time to be creative and do a lot of things and incorporate all this and actually grow the child to become a successful member of the community. They always focused on, I know one of my principals used to say they keep on weighing the pig, but they feed the pig. I get that sense in some of those schools that they want to, they incorporate or they teach us this at university. I've done a teacher course, they teach us about all these things, but to actually incorporate them successfully is a different story. But at the private schools that I've worked at, I can see that they do put effort into these things. Like last week. We had or this term, each subject has a week for outdoor activities, and then it's just a little bit out of the classroom set up. Then you can incorporate, especially like your aesthetic, your audio, and your visual learning styles, and you are doing more group work, and there's time to do other things that can grow their emotional intelligence. I think they do put effort into switching up the methods of teaching to incorporate those things" (Participant 10).

"At our school, we sometimes use the Gardner theory, but sometimes it varies from educator to educator. What I said, sometimes it's difficult to implement them solely in class. It's not something that we're supposed to do every now and then again, but you can choose to use them if you want or if you feel like there are other things that are more applicable to your class, then you can use those ones" (Participant 13).

"We are a very inclusive school where we try to include every child and cater the curriculum around their needs. Our school revolves around the thinking aspect of critical thinking and we use the thinking maps and Dobono hats. So firstly, the first step is that it's a lot of professional development around this, where we have a driving team that drives these different thinking strategies and thinking methods across the school. So we have workshops every week. We have a Top Up Tuesday and we have a Thinking Thursday. So that's where the first phase of the staff is involved and equipped with this, and basically, it's not presented by just one facilitator. We get staff members to work into a group. So they kind of do the research around a certain thing. For example, we were looking at the

visible thinking routine, Harvard visible thinking routine, and we looked at Zooming In as one of the thinking routines. So, a team got together, a team of two or three teachers that get together, they do the research and then they present. And then there's handouts that are given out and everybody is encouraged to start practicing this into their daily teaching habits. And from there, it filters down to your lesson planning and preparation, and how you integrate and incorporate that particular thinking strategy, or what mindset or thinking map into your lesson, and it's integrated across the learning area, across the different learning areas. And it's entirely left up to that particular subject teacher or grade teacher. For example, the Natural Science teacher, how she wants to take these thinking strategies and integrate them. For example, with the geography teacher, she is using atlas games to help children with location and things like that" (Participant 15).

"If you look at the CAP's document, it does not give you enough resources or time to be able to teach in a specific way and say, okay, but it's not working. Let me try a kinaesthetic way. It's also not working. Let me try something else. We are so pushed for time and pushed to get assessments done and work done and contact learn that learners sometimes end up having to learn by themselves without even having a teacher with them. So, it's difficult. I think it's something that we really should work on as teachers" (Participant 17).

"The school has a holistic offering. We have a curriculum that involves different aspects such as music, art, sport etc. Students are allowed to choose anything according to what they prefer and where their strengths lie. We cover all different aspects so that all children feel included. They're not forced into anything, they're not to explore anything, they're not confined to anything, and that allows for all that to manifest genuinely, that's how I feel. In the curriculum, teachers adapt the way they teach because they'll use the V, which is the visual. They'll use the A, the audio, and sometimes the K, which is body movement. They can be still so... They do it. They incorporate it. The curriculum is always going to be planned because it's writing on paper. Every curriculum is writing on paper. But then the teacher needs to incorporate the way of teaching because she also

> *needs to adapt the way she teaches to her learners so that she can, as I would say, create a holistic human being because that's what you're supposed to do in foundation phase"* (Participant 20).

From the results presented above, it is evident that, schools adopt various neuromyths in their own unique way. Some adopt the VAK learning styles throughout all their subjects to best suit the needs of their students, and other schools take into consideration the critical periods of development within their school policies. Participants generally recognize the importance of educational theories, including multiple intelligences, learning styles, and 21st-century skills. The acknowledgment of these theories suggests an awareness of the diverse needs and capabilities of students. Time constraints emerged as a major challenge for teachers. The pressure to cover the curriculum and prepare for exams limits the practical implementation of educational theories. Despite the desire to challenge students with varied activities, the reality of time constraints often hinders teachers from fully realizing these intentions. Participants noted that certain subjects or phases, such as the foundation phase, allow for more flexibility and alignment with educational theories. Subject-related differentiation was mentioned, indicating that the application of theories might vary across different disciplines. Ongoing teacher professional development is deemed crucial for successful implementation. Workshops, training sessions, and collaborative learning opportunities were identified as avenues for improving teachers' skills in incorporating educational theories. While there is a shared recognition of the importance of educational theories, the challenges of time constraints, resource limitations, and the need for ongoing professional development present practical obstacles to their full integration into the curriculum. Successful implementation appears to require a concerted effort involving teachers, school policies, and parental support.

Theme 2: *Infusion into the Lesson plans*

The teacher's road map for what the students should learn and how it will be accomplished in class is outlined in the lesson plan. After that, teachers can create learning exercises that are appropriate for the students and devise methods for getting feedback on their progress. Participants shared insights into their practices and attitudes regarding the incorporation of educational strategies, technology, and learning styles into their teaching. Participants reported a range of practices aimed at accommodating diverse learning styles, leveraging technology, and integrating thinking maps and strategies into their teaching. The adaptability of teachers to the needs of each student and the emphasis on critical thinking and problem-solving were

notable themes across participants. Participants share their experience of how neuromyths are incorporated into their lessons;

> *"If fads and neuromyths are in the curriculum I would adopt it and cooperate it because of the fact that some of it does work, however, not all the time. So, for example in our school now we incorporate technology into our lessons, we play games and do brain exercises. It may work for one but not the other. But I think incorporating it and trying we just never know where our luck lies"* (Participant 1).

> *"In some lesson planning, yes. So not specifically at my school, but I have seen, for example, the different learning styles, the visual learner, the audio learner, in a textbook from a school where I did a practical. It was in a grade eight life orientation textbook where they had an entire lesson based on this, where learners found out what is their learning style. I haven't come across anything about the 10 % in schools. I do remember learners, especially high school learners, labelling themselves left-brain or right-brained. They usually get either from social media or if mostly from a more arts perspective, an art teacher might label them right brained"* (Participant 3).

> *"I don't think they have a strong yes or no approach when it comes to that. I think you as a teacher, you have an idea of the group of kids that you get each year, and you almost incorporate your own ideas in accordance to the group that you receive. Because I think each year, especially the last two years, we had a variety of students that we received because of the whole COVID story, and they weren't emotionally developed, socially developed, as well as the year, the previous years. It was like a totally different group of students that we were receiving for the first time in grade four. I think as teachers, you just learn to adjust as you receive new students and they work differently. We do a lot of growth mindset and thinking skills and thinking maps and all of that that's incorporated as part of our policy at our school because we regard it as a thinking school. We almost encourage our students to think independently and critically and be able to find solutions and problems and not just be able to identify a problem, but also be able to*

find creative solutions to that problem, either with your peer or as a group or independently or either which way" (Participant 12).

From the data collected, lesson plans are altered to different teachers. A teacher will include what works best for them and their students in the lesson plans. This can include the brain exercises, and the different learning styles. Teachers' lesson plans can change should they find their teaching methods ineffective and will adhere accordingly to other methods to best inform their instruction to create an effective learning environment. The information gathered from the participants' answers illustrates a multifaceted teaching strategy that takes into account different learning styles, technology, and tactics to meet the demands of a wide range of students. Overall, the interpretations reflect a commitment to creating dynamic and inclusive learning environments. Teachers are exploring diverse strategies, technologies, and theories to enhance the educational experience for their students, emphasizing adaptability and a focus on critical thinking and problem-solving skills.

Theme 3: *Professional development*

In order to improve their instructional methods and student outcomes, educators continuously improve their teaching abilities, knowledge, and expertise. This process is known as teachers' professional development. It includes a broad range of experiences and activities intended to help educators improve professionally and adjust to the changing nature of education. Participant 7 provided a comprehensive overview of various school policies, emphasizing the impact of professional development, curriculum development influenced by potentially questionable trends, assessment practices, resource allocation, teacher evaluation, and parental expectations;

"Some of our schools' policies include; a) Professional Development: My school provides professional development opportunities for us as teachers such as workshops or training sessions that promote these ideas. b) Curriculum Development: Educational policies related to curriculum development may include elements influenced by fads or neuromyths. c) Assessment Practices: Assessments are designed or selected based on the belief that they align with a specific educational trend, even if the validity and reliability of these assessments are questionable. d) Resource Allocation: School allocates resources, such as technology and equipment.

e) Teacher Evaluation; Teacher evaluation based on their skill sets. f) Parental Expectations: The beliefs and expectations of parents can also play a role" (Participant 7).

Participant 7's response suggest a school environment that values professional development, structured curriculum development, resource allocation, and consideration of parental expectations. However, there are significant concerns about the influence of unscientific trends (neuromyths) on curriculum and assessment practices, and the potential impact of these trends on educational quality and effectiveness. There is also an implied need for more rigorous validation of professional development content, assessment tools, and evaluation criteria to ensure they are based on sound educational research and practice. This interpretation indicates that while the school is proactive in several areas, there is a critical need for ensuring that all policies and practices are grounded in reliable and valid educational research to maximize their positive impact on teaching and learning outcomes.

Theme 4: *Embedded in teaching and learning styles*

"Embedded in teaching and learning styles" describes how particular pedagogies, techniques, or ideologies are incorporated into the manner that instruction is delivered and how students are supposed to learn in a classroom setting. This idea highlights how some behaviours and attitudes are firmly ingrained in teaching methods on a daily basis and in students' entire educational experiences, rather than being sporadic or add-on activities. The participants provided insights into their school's approach to teaching and learning, emphasizing the use of varied methods to cater to different learning styles and ensure inclusive education. They asserted:

"To cater for individual learners. We must teach using different learning methods to cater for all the learners. Incorporate videos, creativity (drawing using mind maps). In some learning areas we can play music to cater for those learners who love music" (Participant 2).

"Our school wants us to teach with all of these different learning styles in mind, but they call it teaching styles. So, it's all part of inclusive learning. I don't know if you've heard that term before. Yes. So that just means you include your whole class in the learning process. So, you include the kids

that are visual learners and you include the kids that are kinaesthetic learners. You include the kids that are auditory learners. That's the way that they encourage us to teach. So, they don't really use any of the other Miro myths that budgets more the teaching and learning style. They will focus a lot on scaffolding by Warwickshire, but I feel like that's more a theory. That's more like a scaffolding value, and a level of support" (Participant 9).

From the data collected, both participants highlight a strong commitment to differentiated instruction and inclusivity. This suggests that their schools recognize the importance of accommodating diverse learning preferences and aim to engage all students in the learning process. The emphasis on using varied instructional methods reflects a broader educational trend towards personalized learning, where teaching is tailored to the needs of individual students to enhance their learning experiences and outcomes. The participants indicate a strong focus on inclusive teaching methods that accommodate a variety of learning preferences and are backed by methodologically solid techniques like scaffolding. Based on the statistics, it appears that the schools have made a commitment to individualized instruction and diversity, steering clear of educational myths and toward evidence-based practices. This dedication to meeting the unique requirements of each student through a variety of teaching strategies and encouraging environments is indicative of an innovative and student-centered approach to education.

5.3.3: Findings on teachers understanding of fads and neuromyths

The study explored teachers' understandings of fads and neuromyths and their knowledge of any fads and neuromyths that may have emerged in the twentieth century. From the thematic analysis of interview data, the themes which emerged related to teachers understanding of fads and neuromyths included the conceptualisation of fads and neuromyths and the common neurological misconceptions. These themes are discussed below:

Theme 1: *Fads and neuromyths* as *exaggerated claims and false beliefs*

The concept of fads and neuromyths is often defined as a misperception formed by a misunderstanding, misreading, or misquoting of facts scientifically proven by brain research in order to make a justification for the utilization of brain research in education and other domains (Hardiman, 2012). According to the participants, this phenomenon can be explained by the

various ways in which people acquire new knowledge. Most participants indicated that they were unaware of these misconceptions of the brain. While a few teachers had an understanding of fads and neuromyths, many teachers had to research this phenomenon do clarify this term. Participants stated:

> *"Well, I would say it is myths and false beliefs and this is where the misconceptions of brain activity come in, I would say. It is a Craze because we hear from some teachers teaching methods that work best but it also depends on the generation of kids and the age group that we teacher because it is all different and what may work for you may not work for me. But if we working with the same age group we would definitely try and see if it works"* (Participant 1).

> *"Different learners learn differently. Some learners can only use visual while others are audio. We are born with few brain cells and they develop as you grow. Some people have preferred style of learning. We can use only 10% of our brains. Certain food affects the brain, like sugar"* (Participant 2).

> *"What I understand from them is that you have your different learning styles where people believe they learn better by seeing things or they learn better by hearing it or by having a practical experience of something. And then the 10% of your brain, I understand, is people believe by studying more, you can unlock more potential in your brain and use your entire brain. The other being the Right brain. It is people believing if you are more left brained, your left-brain functions are more dominant, you're more of a logical person. Whereas if you're more right brained, then you are more artistic and you might not necessarily be as good at logical things like the left brain"* (Participant 3).

> *"It's way on different methods or ways how children learn best are suited according to their environment. If you look at 21st century teaching and learning, some children may learn through maybe things that are more graphic, colourful, and things like that. Some children may learn through audio, by listening. So, for me, that's my understanding. It's how the child*

interprets how they learn best. and of course, myth would be we don't really know if it works or not. It could be the mindset" (Participant 5).

"So, my understanding is that it's misconceptions of how the brain works. And during the course of the years, different types of scientists have done research on how the brain works, and they gave us that research that they did on the brain. So, for instance, you only use 10 % of your brain. So that's for me, a type of neuromyth that we only use a certain percentage of our brain. However, it's not completely... It's like a type of miscommunication or not miscommunication, a misconnection to how the brain works" (Participant 6).

"Educational fads in my opinion are ideas or practices related to education which include the rapid adoption of certain teaching methods, educational technologies, or classroom management techniques. Neuromyths are misconceptions or misinterpretations of neuroscience concepts as they relate to education" (Participant 7).

"So, I can just explain it by examples. The biggest ones when I was growing up and when I was in varsity was probably your left brain versus your right brain and the different learning styles. Those are definitely the biggest ones. While I was growing up. I feel like a neuromyth is like a way to that people take educational theories by, let's say, Piaget or Vygotsky, and they turn it into this rulebook of every student is going to learn this way. Every student is going to react to this way to yoga in class, for instance, that's also a new one that's circulating at the moment. I feel like the myths are just ways to... How can I say? For teachers to politely inform parents about their child's academic strengths and weaknesses" (Participant 9).

"I think fads something pretty much like a trend or something that's happening at the moment that everybody's going with that does not necessarily have any scientific basis. Neuromyths, then that would have to do with all of this around the brain, study of the brain and how it works, perhaps" (Participant 14).

"Well, from my reading and what I have researched, it's a misconception that a sudden educational change, like maybe growth mindset, helps a child

achieve more in the classroom. Actually, there's no scientific proof to prove that. That's what I understand by the misconception" (Participant 15).

"What I obviously understand is that a lot of people have companies or programs that they basically come and advertise at schools or as parents to help their child learn better. As parents, we would take anything for kids to learn better, understand better, even though we don't understand the study of it. There's a lot of techniques or games or things that kids need to follow for their brain to work better. That's what I understand from it" (Participant 16).

"Fads and neuromyths are often misconceptions or exaggerated claims about how the brain works and how learning can be optimized. Examples of such fads and neuromyths include the idea that we only use 10% of our brain, the belief in particular learning styles (e.g., visual, auditory, kinaesthetic), and the notion that digital technology is inherently harmful to learning. These ideas have gained popularity in some educational settings but lack empirical evidence to support their validity. It is essential for educators to stay informed about current research and rely on evidence-based approaches to teaching and learning" (Participant 18).

From the results presented above, the participants present a variety of perspectives on educational fads and neuromyths. They recognized educational fads as rapidly adopted teaching methods or trends in education, while neuromyths were seen as misconceptions or misinterpretations of neuroscience concepts related to learning and brain function. Participants emphasized the importance of critically evaluating teaching methods, staying informed about current research, and relying on evidence-based approaches to education. They also highlighted the need to consider individual differences in learning styles and to be cautious of exaggerated claims about brain function and learning. The participants' reports underscored the importance of informed decision-making in education and the avoidance of relying on unfounded beliefs or trends.

The overall interpretation of the data suggests a nuanced understanding of educational fads and neuromyths among the participants. They recognize the prevalence of misconceptions and exaggerated claims about brain function and learning in education. Participants emphasize the importance of critically evaluating teaching methods and staying informed about current

research to ensure evidence-based approaches to education. They highlight the need to consider individual differences in learning styles and caution against relying on unfounded beliefs or trends. Overall, the participants' responses indicate a commitment to informed decision-making and evidence-based practices in education, with a recognition of the complexities involved in understanding how the brain works and how learning can be optimized.

In addition, there are teachers who have little or no awareness of fads and neuromyths. While many people have a vague idea of what a neuromyth is, they are not assured of their comprehension. Participants reported their varying levels of familiarity and understanding with the term "neuromyths." Some were not familiar with the term and expressed uncertainty, while others provided explanations based on their interpretations or prior knowledge. Several participants described neuromyths as misconceptions or beliefs about how the brain works, often citing specific examples such as the notion of using only 10% of the brain or the left-right brain myth. Overall, their reports highlighted a range of perspectives on the concept of neuromyths, reflecting differences in awareness and interpretation among the participants. One of the teachers reported that: *"I do not know"* (Participant 4). Another teacher also supported that: *"I was unaware of this term and after much research I understand that it's myths regarding the brain and how using different aspects of your brain or different learning styles that can affect how you learn"* (Participant 17). Similarly, another teacher reiterates that: *"I am not entirely sure but it is something about being scientifically true"* (Participant 20). In addition, below are excerpts from the transcribed interviews:

> *"I really didn't know what it was, so I did have to go and look it up. Based on my research and what I've looked at. I've looked at that some of the neuromyths that I heard of is well, the understanding of actually the term, I think it would be that these ideas that have come out with art sufficient study. And I think the study has been dabbed maybe not to this degree that it needs to be. And then people jump on these and it's like this fad that now is used and believe that it's of benefit. So, the ones that I read up and caught my eye were the using 10 % of the brain, sugar causing less attentiveness, the left, right brain dominance, the different learning styles, and then also learning with music. Those are the ones that came up when I was reading. That's what I thought and explained or understood that"* (Participant 8).

"I am not entirely sure how to explain it but things that people believe. Let's say when you're studying how to retain information, you have to do this and this and this. I think its different things people believe on how to retain information" (Participant 10).

"I am not aware of these terms. I think many teachers are aware of neuromyths, but I don't think they know that they are neuromyths. We tend to think of it as behaviours or just things that relate to practices in the classroom." (Participant 11).

"I actually didn't know there was a term for it. Obviously, when you sent your information through about your study, then I went and googled it a little bit. It's all things I've heard of before, like the brain gym and the left brain, right brain myth and all of that, and even the most are the music, how it affects students or how it affects people, or I think babies, to be precise. But prior to that, I had known them as they were things that would probably enhance a child's ability to learn. I didn't know there was an actual term for them. Because obviously, when you sent the stuff through and I Googled, I realized that I obviously know this stuff, but not per se according to the name" (Participant 12).

"I think neuromyths is misconceptions about how the brain work, from what I had searched on the internet. For example, some beliefs that listening to classical music makes you smarter, or the functions of the left and right brain, something like that. I think these are pseudoscientific claims about the brain and how games can train them" (Participant 13).

"I was unsure and therefore had to research. From what I understand from research, Left hemisphere of the brain is analytical and logical, while the right hemisphere is creative and artistic. Hence with a broad demographic scale and diversity this fad becomes considered especially in group work the learners that are analytical are usually grouped with the artistic learners. They all bring their fair share to the table" (Participant 19).

The data reveals a significant need for increased awareness and education about neuromyths among teachers. While many educators might recognize the concepts underlying these myths, they are not always aware of their scientific invalidity or the term "neuromyths" itself. Proper

education and professional development can help bridge this gap, ensuring that teaching practices are grounded in accurate and reliable scientific knowledge. Many participants were initially unfamiliar with the term "neuromyths," requiring research to understand it better. Despite this initial unfamiliarity, participants recognized specific examples of neuromyths, such as the 10% brain usage myth, left-right brain dominance, and the belief that classical music enhances intelligence. This indicates that while the terminology was not widely known, the underlying misconceptions were prevalent. The findings underscore the need for improved education and professional development for teachers to ensure they are equipped with accurate scientific knowledge, enabling them to debunk these myths and adopt evidence-based teaching practices. Overall, the results show differences in the teachers' comprehension and knowledge of fads and neuromyths, suggesting possible areas for focused professional development or pedagogical interventions.

Theme 2: *Fads and neuromyths as common neurological misconceptions*

Teachers had a few notions of neuromyths that may have emerged or have become popular. Neurological misconceptions, often referred to as neuromyths, are misconceptions or misinterpretations about how the brain functions and how learning occurs. These misconceptions may arise from oversimplified or outdated understandings of neuroscience concepts and may influence beliefs and practices in education, psychology, and other fields. Neurological misconceptions can lead to ineffective teaching practices, misinformed educational policies, and misguided beliefs about brain function and learning. Therefore, it is essential to critically evaluate and debunk neuromyths to promote evidence-based approaches to education and learning. From the participants' responses, there is a diverse range of awareness and opinions regarding fads and neuromyths related to education and cognitive processes. Most participants reported various examples of neurological misconceptions or neuromyths that they were aware of or had encountered. These included beliefs such as the misconception that humans only use 10% of their brain's capacity, the idea of left brain vs. right brain dominance, different learning styles, and myths related to brain development and the effects of factors like technology and music on cognition, while other participants were unsure. One of the teachers reported that: *"So, the ones I think it's 20th century, but as far as I can remember, it's left brain thinking, right brain thinking, having different learning styles. Not sure that was 20th or 21st century"* (Participant 3). Similarly, another teacher reiterates that:

"Left-brain Vs Right brain where they said the right brain myth suggests that individuals who are more creative or artistic and emotional are primarily right-brained" (Participant 13). In addition, when participants were further asked if they had any knowledge of any fads or neuromyths that have emerged during the twentieth century, they averred:

> *"The ones I am aware of is the rapid advances in technology and the growth in online education and cyberbullying. In the classroom I use technology such as the interactive whiteboard and YouTube, we watch YouTube videos, the internet and PowerPoint presentations"* (Participant 1).

> *"There have been several major fads and neuromyths that emerged during the twentieth century related to various aspects of science, psychology, and culture. One being the concept of learning styles suggests that individuals have preferred ways of learning, the second being Brain training games and apps claimed to improve cognitive function and prevent cognitive decline and the last being Lobotomy was a surgical procedure used to treat mental illnesses and behavioural disorders"* (Participant 7).

> *"I find that we do hear some of them, and I think I'm not sure when, but having been part of my school now, we get a few of them put through from CCMD, from head office. I've seen a few things, but also, yeah, I think... I'm not sure we don't really have training on them or anything like that. Well, to a certain degree. Some things come up and they say certain learning styles are encouraged to be in discussion, which I will talk about when you ask that. But I do think we do have a little bit of information that comes to us. I do think we are exposed to it to a certain degree. Others, I think, is through media, social media or the media that we choose as teachers to read articles that we read and things like that"* (Participant 8).

> *"So, we know about the learning style. A child will some children will only learn visually if they see things. Some children can't learn that way, and some children will only learn through auditory styles that every child has his or her own learning style. And I believe there should be a combination of all of it, but I think that's one of it, the other one that says the brain stops developing at a certain time, and you got to make sure a child learns everything by a certain age, because then there's a cut-off point. I don't*

believe that there's a cut-off point in the way the brain develops another one. You're born intelligent or you're born silly, and your environment nurturing has nothing to do with anything" (Participant 14).

"At the top of my head, nothing that I've specifically seen that's new that I've noticed. The only thing that I specifically focus on, which I still believe, which is maybe not that new, is the fact that they need to exercise. So, exercise is good for any learning or any studying method is to always be active when studying as well. You can't stop being active when it's all of a sudden exam time" (Participant 16).

"From what I have researched, the Left Brain-Right Brain Myth. This neuromyth suggested that the left hemisphere of the brain is analytical and logical, while the right hemisphere is creative and artistic. The Mozart Effect this was the belief that listening to classical music, particularly Mozart, could temporarily increase a person's IQ and cognitive abilities. While music can have cognitive benefits, the idea that it could make you permanently smarter was overstated and not supported by robust scientific evidence. The concept of "learning styles," which suggests that individuals have unique learning preferences (e.g., visual, auditory, kinaesthetic), became popular in education. However, research has not consistently supported the idea that tailoring teaching to specific learning styles improves learning outcomes" (Participant 19).

The data collected from participants reflects a diverse awareness and understanding of neuromyths and educational fads. Participants identified various myths, such as the belief in using only 10% of the brain, different learning styles, and the left-brain versus right-brain myth, indicating their familiarity with common misconceptions. Some participants mentioned specific fads and myths from the 20th century, including subliminal messaging and phrenology, highlighting the historical context of these beliefs. Others discussed more contemporary examples, such as the growth mindset versus fixed mindset paradigm and the Mozart Effect. Additionally, participants described how these myths and fads influence educational practices, with some integrating concepts like the growth mindset into teaching methods.

In addition, while many participants were able to identify neuromyths, other participants either had no knowledge or were unsure. Participants reported varying levels of awareness regarding

neurological misconceptions or neuromyths. Some participants expressed uncertainty about specific myths or were unaware of any examples. Others mentioned beliefs commonly associated with neuromyths, such as the idea that humans only use 10% of their brain's capacity or the effectiveness of certain study techniques like studying in the morning or using specific learning styles. Additionally, some participants mentioned misconceptions related to dieting, studying habits, and the effects of technology on learning. One teacher reported that: *"I am not sure if is myth or not. Your brain can only work in the morning better than afternoon. We use only 10% of our brain"* (Participant 2). Another teacher also supported that: *"I do not know of any. I think that teachers need to be exposed to this"* (Participant 4). Similarly, another teacher reiterates that: *"I do not know of any"* (Participant 11). That was also endorsed by another teacher: *"I cannot recall any neuromyths, I do feel like it's something that we should all be more aware of"* (Participant 17). In addition, other teachers reported:

> *"I do not really know of any. A lot of kids think that they learn based with music or they have to have sound around them. Our perception as adults, we want quiet and more conducive learning environment. While children think they need to be in an environment where they're more comfortable with things that they can associate it with. Like my son, for example, he likes to have all the curtains drawn in his window. I'm totally opposite. I feel they should be ventilation. But he feels that's a more calm environment for him. And he also likes to have soft music"* (Participant 5).

> *"I don't know of any new ones. I only know a few that keeps on going on during the 20th century. Like I said, like the one that you only use, I said it's in part of your brain, but that has started already a few years ago. So now I don't know if any new one now. I think some teachers are not aware of that. I think if they all were aware of the different neuromyths, then they would adapt to their teaching methods and to help the learners as well"* (Participant 6).

> *"I'm not sure of any. I can just comment on things we were told when we were younger and things that I probably still tell my learners that have like little snacks or healthy snacks while you're learning or maybe have some chocolate because that helps you to retain the information better. Or, when you're studying colour code your things, then if you think of the colours and*

then you can remember the information or what's that other thing where you study? I think you study for 20 minutes and you take a 10-minute break or 15 minutes and then 10-minute break. Yeah, to keep you active and focused on what you're doing" (Participant 10).

"I'm not sure when they emerged. I just literally know of them, so I can't answer that precisely. I'm aware of the brain gym. I'm aware of the left brain, right brain theory with regards to logic and creativity and all of that. I think I'm aware of the one where... Obviously, I don't have all the background knowledge with regards to them, but the one where it speaks about visual learning, auditory learning, kinaesthetic learning, all of those kinds of things. I'm aware of a few of them, but obviously not in great detail" (Participant 12).

"I am not sure but if I had to guess I would say for example, that dieting will help you always lose weight. I do not think it is true as it involved discipline and not just a diet. Or cross-knighting There is a theory that I really do disagree with about Varsity students who think that cross-lighting is beneficial for exams or tests or whatever, one of those things like pressure situation, semester test, exam, anything. And I don't believe in that because I used to do it and a lot of people used to cross night. I have a study partner that used to cross night and I never used to. I had to study once and be comfortable with that and that's where I was. And then she would cross night and stress cross night, study and over study and go through the notes maybe five or six times a week. We basically out get more or less the same score as her. We both passed very well" (Participant 20).

The data indicates that many participants are either unaware or unsure about specific neuromyths, revealing a significant gap in knowledge among teachers regarding these misconceptions. Participants commonly expressed uncertainty, with some citing familiar myths like the 10% brain usage myth and the belief that music enhances learning, while others were unable to identify any neuromyths at all. Several participants acknowledged the importance of being informed about neuromyths, suggesting that increased awareness and education could lead to better teaching practices. Overall, the responses highlight the need for

professional development to address these gaps in understanding and to promote the use of scientifically supported educational strategies.

From the data collected, the overall interpretation of the findings suggests that there is a varied level of awareness among the participants regarding neurological misconceptions or neuromyths. While some participants demonstrated familiarity with specific myths, others expressed uncertainty or lacked awareness altogether. Common examples of neuromyths mentioned by participants include beliefs about brain usage, learning styles, and the effects of certain habits or technologies on cognitive function. The responses highlight the importance of educators being informed about neuroscience concepts and debunking misconceptions to ensure evidence-based teaching practices. Additionally, the findings underscore the need for ongoing professional development to enhance teachers' understanding of brain function and its implications for learning.

According to the data's interpretation, the educational landscape is dynamic, with some instructors adopting cutting-edge techniques and resources while others might still be swayed by antiquated or possibly false ideas. For teachers to be knowledgeable about evidence-based approaches and capable of critically assessing new trends and ideologies in education, they must continue their professional development.

5.3.4: Findings on sources from which teachers acquire these fads and neuromyths

The study investigated where did teachers obtain knowledge of these fads and neuromyths, from which sources did teachers acquire theses fads and neuromyths and on what grounds did they accept these fads and neuromyths to be true. From the thematic analysis of the interview data, the themes which emerged included; mastery experience, more knowledgeable, social learning, reinforcement through training, trial and error, and learning through social media. Participants shared their experience of how they obtained knowledge of theses fads and neuromyths in the following themes reported below:

Theme 1: ***Mastery Experience***

The term “teachers’ mastery experience” describes the first-hand, individual accomplishments, triumphs and proficiency that educators gain via their work as teachers (Bhati & Sethy, 2022). Teachers’ mastery experiences play a crucial role in the development of self-efficacy, or the

conviction that one can succeed circumstances or complete tasks. It is incredibly important for influencing their professional development, confidence, and effectiveness in the classroom. Participants discussed their mastery experiences. Most participants reported acquiring information about educational theories from obtaining their degrees, trends, and research through a combination of sources. One teacher reported that: *"I obtained knowledge through research; it was an old article which I do not remember from where exactly. And I have heard people talking about it so I would say word of mouth"* (Participant 1). Another teacher also supported that: *"So many studies, internet and books. Especially neuroscience"* (Participant 2). Similarly, another teacher reiterates that: *"I studied a postgrad certificate in education at the University of Pretoria. Then I've also done courses through ESASA, as well as all these training sessions that I spoke about at the school that I'm at"* (Participant 11). It was also endorsed by another teacher: *"General reading, articles, educational websites and groups"* (Participant 14). In a similar vein, another educator restates: *"Professional development workshops, Education websites and blogs, Textbooks and curriculum materials and Professional networks"* (Participant 7). In addition, other participants reported the following:

> *"I was doing my degree, and I also had psychology as a subject when I was at university, but more recently when I did my TEFL teaching course, you had to write tests every week and things like that. One of the modules I remember was the VAK learning styles. We did the left brain and the right brain, and we did emotional intelligence"* (Participant 10).

> *"Some of it was Google, some of it we've learned through professional, obviously the workshops and all of that, or through textbooks, all the educational materials, resources, or from other teachers, peers or cluster meetings, all those various engagements, basically"* (Participant 12).

> *"A lot of it is reading up articles that come through ISASA websites, talking to the teachers in the profession. A lot of it filters down from our executive body, my principal and vice principal coming down to it, and watching TED talks and things like that. That's how I've become aware of all of this"* (Participant 15).

> *"Our school Schools, we have a source, called Connect, which they actually send through your most recent studies and papers on these styles or on the newer studies that's being done, even links to workshops to learn new styles*

or just to recap on styles that we've already been doing. I think, my school, they're actually very on top of it to give teachers the opportunity to broaden their knowledge on things like that. Even for me, as a PE coach or as a PE teacher, I still get the link to do certain workshops. Even though I'm not specifically teaching in class, they still do allow and open it up to every teacher that would like to attend. I think for me, that is how we definitely grow in that and how they help and how I keep up to date, especially if they need me in a classroom. I would like to be that teacher or that coach that can actually help out in a classroom as well and not completely not know what's going on" (Participant 16).

"The main source I would say, well, when I was teaching online, we had peer-to-peer training as well, and there were different topics that you could choose from. So, these were some of the topics and how you can incorporate it in the classroom. And so, we did some training on that, and then the teacher course that I did. Social media and google" (Participant 10).

"We do a lot of staff development at our school. We are a thinking school. We promote the growth mindset and the Harvard thinking strategies. A lot of staff development, teachers' pay teachers, Edutopia and a few other sites which we subscribe to which we get these daily emails with information on teaching strategies" (Participant 14).

"Online courses, Training from head office at my school. So every once a term, we have a workshop that is about a specific area of learning in a language or in Afrikaans, per se. And through that, we learn and we ask questions about how other teachers do it. For example, learners struggle with vocabulary, they struggle with speaking Afrikaans. And I just started playing a game where I would say, I'm opening the fridge and I see, and then they must all, as a rhyme, throw a paper around the class and all add another item in the fridge that they can see. And they actually asked me just now, I had them the last lesson and they said "Ma'am, when can we play that game again?" And it's something silly, but it's something so rewarding to them. They really enjoy it. And they're actually learning the language. So

> *I'm not using resources. I'm just using other teachers' ideas or my own ideas or... Yeah, that's my resources"* (Participant 17).

> *"Teachers acquire information about educational fads and neuromyths from a variety of sources. These sources can include educational conferences, professional development workshops, books and articles on education, online resources, educational organizations and associations, and academic research literature. It is important for teachers to critically evaluate the credibility and validity of the sources they choose to inform their understanding and teaching practices"* (Participant 18).

From the findings presented above, it's evident that teachers rely on a diverse range of sources to stay informed about educational theories and practices. The combination of formal education, research, professional development opportunities, collaboration with peers, and the use of online resources reflects a holistic approach to continuous learning and improvement in teaching methodologies. The data reveals a comprehensive and diverse approach among participants in acquiring knowledge about educational theories, trends, and research. Teachers utilize a combination of formal education, research, professional development opportunities, collaboration with colleagues, online resources, and in-house training provided by their schools. With obtaining a professional qualification, teachers employ a multifaceted approach to knowledge acquisition, integrating formal education, research, professional development, collaboration, and online resources. This holistic strategy aligns with the dynamic nature of education, emphasizing adaptability and a commitment to ongoing improvement in teaching practices.

Theme 2: *More Knowledgeable Others*

"More knowledgeable others" refers to individuals who possess a higher level of knowledge or expertise in a particular domain compared to others (Mariage, et. al., 2000). This idea is frequently linked to social learning theory, namely the research of Russian psychologist Lev Vygotsky. Social interactions and cultural context have an impact on learning and cognitive development, according to Vygotsky's sociocultural theory. To acquire knowledge about educational myths and concepts, participants made use of a variety of resources, including formal education, independent study, professional development opportunities, peer interactions, and exposure to educational programs. A few participants also stressed the value

of searching out different viewpoints and doing critical evaluations. One teacher reported: *"The sources in which I acquired these would definitely more senior teachers. And as I mentioned earlier, the learning styles, what stands out for me there is a textbook"* (Participant 3). In addition, according to reports from other teachers:

> *"What I learned about some of these and learned that they were not true was my undergrad studies at UNISA because I did a lot of psychology modules. That's where I learned most of it. I do also look at some of it out of curiosity and try to do my own research, but most of the time, it's usually a YouTube video, or a few of them to try and see if everyone's saying the same thing. I know I've heard some of these myths from older teachers where they will say some learners are better at left-brain things like logical maths and languages, where others will be more creative, right-brained learners"* (Participant 3).

> *"I think through reading, research, attending workshops. I think the recent one was, because I see our school is going full force now, 21st century teaching and learning. And I attended the recent one was the workshop, I think, about two weeks ago, where he talks about the shift on how we teach and how children learn. A very interesting thing that came out is that often we feel like when we need to enter the class, the teacher needs to be in control and delivering the lesson. They say a lesson now is more valuable to the learner is where the teacher is only talking 5% and the rest of the noise and discussion is happening with the learners. So very different approach. So, it's like more them doing all the work and problem-solving and in control of the lesson, actually. And you just facilitating the learning and directing them in the right direction"* (Participant 5).

> *"My parents could not understand me as a child, so they enrolled me in every single brain zuka and learning centre and holiday program in the hopes that I would become very clever. I mostly learned about these through these programs where people are marketing these things as like the next big thing. I feel like they use it as like a diet pill company. If you just take the pill in the morning, it's going to make you lose 20 kilograms by this afternoon. Or if you just put the cream on your face, then you'll be 10 years*

younger. So, these places market these myths as a one stop program for every single child that's going to make every single child, no matter the struggles, no matter the problems that they're learning, problems that they have, this is going to make them extra clever, extra smart, they're going to get 90 %. So that's where I was exposed to it for the first time. And then during my studies, actually, a lot of my lecturers used to be I think, a bit biased. So they would say, Vygotsky believes in this and this and this. So that definitely explains left and right brain. They used to, which I feel like is the wrong thing because I do feel like one of these Gardiner, Piaget and Vygotsky like, all of these people have a point. But I feel like my lecturers, my teachers and the people giving these programs used to oversimplify the research findings and then make it into a one stop shop to make every single child academically gifted" (Participant 9).

From the findings presented above, it is evident that the participants have diverse sources for acquiring knowledge about educational myths and theories. The teachers indicated that they obtained knowledge from more knowledgeable others including formal education, self-directed research, attendance at workshops and professional development sessions, peer learning from more experienced teachers, exposure to educational programs and learning centers, and reliance on textbooks. Therefore, it can be argued that teachers draw on a combination of formal education, self-directed research, professional development opportunities, peer interactions, exposure to educational programs, and reliance on textbooks to inform their understanding of educational myths and theories. This multifaceted approach reflects a commitment to continuous learning and adapting teaching practices based on diverse sources of knowledge.

Theme 3: *Social Learning*

Social learning is the process by which people pick up new information, abilities, behaviours, attitudes, or values through seeing, chatting, and working together with others in a social setting (Bandura, 1977). Most participants reported acquiring knowledge about educational theories, teaching methodologies, and neuromyths through a combination of formal education, professional development workshops, peer networking, online platforms, and social media. One teacher reported that: *"I gained knowledge about through my early years of studying and through research out of curiosity"* (Participant 19). Another teacher also supported that: *"Peer*

to peer networking, workshops, online courses and social media. Harvard thinking routines" (Participant 11). Similarly, another teacher reiterates that: *"The online platforms. We have training twice a week, workshops"* (Participant 20). Reports from other participants indicated the following:

> *"While I was completing my studies, we focused a lot on those theories, especially in the foundation phase, because I did foundation phase. And we spoke a lot about those theories in class, and our professors also informed us of the different theories and said that you have to apply it when you are teaching. And then also, like I said, at my school, the first day of every term, we have these talks about it. So, there was like one or two times where a person came and we went through one of these theories as a whole group"* (Participant 6).

> *"My networking network is quite broad. I have a lot of people that do innovate things with physical education. I have a lot of friends that they could drive PE curriculums, those guys. So, we get together, we talk about stuff, we try to do different things. I thought it's just even with coaching, there's also opportunities and go and do courses too. So, it's not just... Like you said, as a professional, I also keep it professional too. So, I do accreditations, I do courses, I'm also willing to learn new different things. And in all these different things, I always get to keep an eye on them"* (Participant 20).

> *"The sources I acquired these neuromyths, I would say Workshops, articles from newspapers or magazines, social media as well. And maybe from each other, because if I find something I would talk to my friend or peer about it if they understand me"* (Participant 1).

> *"The training we get, obviously from CCMD, that's online. Then I've been part of a couple of conferences. It was the, and I'm trying to think of the name now, International Conference that took place recently, I think it was earlier this year. And then I've been on an online conference. So from information from there. And then yes, also social media, the sites that I follow. I think it's Edutopia. There are a couple of other magazines, educational magazines and online... I wouldn't say magazines, but online*

sources that I follow on social media and those that interest me, I would click on them. I've also obviously got them emailing and things, so I get my information from there. Then if I have something that I query, I then go and look. Generally, because I also lectured at a university for eight years, I also like to go into and look at published articles and journal articles" (Participant 8).

"The main sources I acquired these neuromyths were University, workshops, peer to peer networking, They are definitely still, like these people giving these brain sugar and whatever programs, there are these, you can call them glorified life coaches, that give these very nice speeches, probably like on Ted Talks and YouTube videos and Pinterest and Facebook and Instagram, where they make it look like if you implement this brain gym activity in your class, all of your learners will get a 90 % for their next test. So definitely online, definitely a lot on social media. I think that's pushed on social media a lot. If you're on the teacher side of things, it gets pushed into your brain a lot that you're just not doing enough. If you just do more brain breaks, if you just do yoga with your class, if you just teach your kids about mindfulness, if you just do yoga with your kids, then they will achieve this, this, and this. So, a lot of teaching theories or things come from online where, again, they oversimplify these theories and make it like a craze. It's like a... I had a word for it, like a magical cure for all of your problems" (Participant 9).

The findings highlight the diverse and multi-faceted ways in which educators stay informed about educational theories, teaching strategies, and neuromyths, combining formal education with ongoing professional development and collaborative learning experiences, from the social learning perspective. While formal education plays a crucial role, the participants also engage in self-directed learning, conducting research out of curiosity and seeking information beyond their formal academic experiences. Educators value discussions with colleagues, sharing experiences, and learning from one another. This collaborative approach fosters a sense of community and shared knowledge. The participants' reliance on online platforms and digital resources underscores the importance of digital literacy in contemporary professional development. Educators navigate online spaces effectively to access relevant information.

Theme 4: ***Reinforcement through training***

Training reinforcement involves giving strategic content as a follow-up, utilizing the spacing effect to aid in the brain's retrieval and long-term memory consolidation. Most participants reported that they obtained awareness and information about educational theories, learning styles, and related topics through a combination of sources, including: teacher training courses, research and studies, workshops and meetings, and personal experiences. One teacher reported that: *"I obtained awareness from studies and articles, as well as teacher training courses"* (Participant 4). Another teacher also supported that: *"Research and training. Honours programme. Education development courses"* (Participant 7). In addition, another teacher brought to light: *"I would say articles and workshops (teacher training)"* (Participant 4). Similarly, another teacher reiterates that: *"Workshops, team and subject meetings and online readings"* (Participant 15). It was endorsed by another teacher: *"At our school, we normally have workshops where we are taught by experts on how to use these theories and adapt them in our class situations"* (Participant 13). Participant 8 also reported:

> *"Largely through CCMD training. That has been part of it. When we have our training is once a term. Also, through research, talking about... As a family, talking about things. My mother, for instance, was taught for 40 odd years. She only has just retired, and she's gone through all different learning styles. Then having a child that was ADHD, trying to study different ways of how learners learn and how to make sure that at home we were facilitating him being interested in learning and making sure that he wanted to learn and encourage it and try and make it not a problem, but a fun thing to do. I think through all of that research, I've got my information"* (Participant 8).

The findings presented above suggests that participants acquire knowledge about educational theories, learning styles, and related concepts through diverse sources. Teacher training courses, workshops, and professional development sessions emerge as crucial channels for obtaining information. The structured nature of these sessions provides educators with the opportunity to delve into various theories and their applications in the classroom. In addition, Personal experiences, both as educators and individuals dealing with unique challenges, contribute to participants' knowledge. Insights gained from their own teaching practices, interactions with students, and experiences within their families shape their understanding of

learning theories. Participants employ a multifaceted approach to acquire knowledge, combining formal training, research, personal experiences, and collaborative learning to stay informed about educational theories and practices.

Theme 5: ***Learning through Trial and Error***

Trial and error is a problem-solving or learning method in which various approaches are attempted, and the outcomes are observed to determine which one is most effective or successful (Hull, 1930). It involves experimenting with different strategies or solutions until the one that works best is identified. Participants generally reported that their approach to addressing different learning styles and challenges in the classroom is based on a trial-and-error method. They rely on experimenting with various teaching strategies and adapting their methods based on the observed outcomes. Research is not a primary approach unless they encounter a significant challenge or feel the need to explore new methods when their existing strategies prove ineffective. The emphasis is on practical experience and adapting teaching techniques based on the unique needs and responses of their students. One participant reported:

> *"I think it's just by trial and error. I don't really research. If it's a major concern and I really see that all the strategies that I use doesn't work, then I adapt accordingly. it's not something that I would necessarily research about unless I feel like it's necessary and all my different teaching techniques and options, I feel like I don't have any options anymore and nothing that I've been using is working. But it hasn't happened before where I will necessarily need to research and go and find out. But how can I assist these learners that have different learning styles?"* (Participant 17).

Based on participant's' responses, it seems that the predominant approach to addressing different learning styles and challenges in the classroom is a pragmatic one, characterized by trial and error. Teachers reported relying on their own experience and experimentation with various teaching strategies rather than extensive research. They adapt their methods based on the observed outcomes and effectiveness in engaging students with diverse learning styles.

This approach suggests a practical and hands-on orientation, where teachers are willing to adjust their teaching techniques based on real-time feedback from students. It reflects a flexibility and openness to trying different methods until they find what works best for their

particular classroom context. While research is not the primary driver in their decision-making, participants may turn to it if they encounter significant challenges or feel the need to explore new approaches. Overall, the approach seems to be student-centric, focusing on meeting the needs of individual learners through practical experience and adaptability.

Theme 6: ***Learning through social media***

Participants reported that they acquire information about educational theories, especially related to neuroscience, through various sources. The primary sources mentioned include the internet, reading about neuroscience, social media platforms like TikTok and Instagram, and educational networks such as YouTube. These platforms provide access to articles, videos, and content shared by researchers, educators, and other professionals in the field. One teacher reported: *"I will say internet. Reading more about neuroscience"* (Participant 2). Similarly, another teacher reiterates that: *"Articles and sources from researchers on educational networks like YouTube"* (Participant 19). Participant 12 also shared:

> *"Social media, I do normally look at a lot of TikTok videos, and obviously not on somebody in particular. I think because those are the things I watch, they generally just comes up because of the algorithm or what have you. But I often just tap in here and there through Instagram or TikTok. But yeah, that's about it"* (Participant 12).

The findings presented indicate that teachers reported diverse sources from which they acquire information about educational theories, particularly those related to neuroscience. The predominant sources mentioned include the internet, social media platforms like TikTok and Instagram, and educational networks such as YouTube. This indicates a shift towards digital platforms and online content as significant channels for accessing information in the field of education. It's noteworthy that participants also mentioned traditional sources like workshops, teacher training courses, research articles, and discussions with colleagues or peers. This suggests a balanced approach to professional development, where educators combine both digital and traditional methods to stay informed about educational theories and practices. The participants' reliance on various sources underscores the importance of continuous learning and staying updated in the dynamic field of education. However, it reflects the major reliance on these various ways to gain knowledge of the phenomena which is implemented in their teaching process.

5.3.5: Findings on teachers' use of fads and neuromyths in their practice on the grounds they accept it to be true

The study also explored the teachers' use of fads and neuromyths in the practice. The findings obtained were analysed and the themes reported include various methods to cater to diverse learning styles, use of diverse thinking approaches, use of brain exercises, the VAK learning styles, adopting the multiple and emotional intelligence theory and the critical periods of development phenomenon. These themes are discussed below:

Theme 1: Validity

The degree to which a theory accurately describes and explains the phenomenon it aims to explain or forecast is referred to as its validity. When a theory successfully explains the underlying mechanisms and patterns in the phenomena it studies, it is considered to have high validity. The grounds on which teachers found these neuromyths to be true varied. Participants discussed justifications for believing these neuromyths to be true in the following subthemes:

Sub-Theme 1: Trial and Error

In the context of adopting a teaching approach, trial and error refers to the process of experimenting with different instructional methods, strategies, or techniques to identify what works most effectively for a particular group of students. Teachers engage in trial and error when they implement various approaches, observe the outcomes, and adjust their methods based on the feedback received from students' responses and learning outcomes. Participants in the responses provided various perspectives on their willingness to implement neuromyths in their teaching practices. One teacher reported that: *"On the grounds that it works for my students"* (Participant 4). In addition, other participants asserted the following:

> *"I would implement the neuromyths in my practice to see if it works. Because it is always good to try because you would never know. I cannot say that I would do research to find out if it is true. Every teacher has their own teaching methods, sometimes it is not the right method but it is good to try"* (Participant 1).

> *"I think it depends, right? There are certain things can be conducive because it all depends on your learning environment. I can say I want to do*

this and that, but if I don't have the resources and means, it's not possible, all right? So therefore, actually, because if I looked at the curriculum and the direction it's going, I actually recommended that the grade fives now start with devices as well… You may have this exciting lesson planned, but if you've got those little hiccups, it just hinders the progress. That would be, for me, the step in the direction. So having the resources, the right environment, and catering for the needs of our particular learner, our environment learners, where the background they come from, that's how we can progress and better our learning system" (Participant 5).

"For me, as a teacher, I would say something works. If it works and you apply it to your classroom and it works, then I will take it as true. But for me as a person, I think I'll only accept it as true as only different scientists over a couple of years did the research and then they came up to the conclusion and has been proven that it is the way that it is or the way that it is working, then I will accept it to be true" (Participant 6).

"With the scientific studies and then also linking it to what I'm experiencing. So, if I see what they've been said and I can link it to what I am experiencing in my classroom, I think that's when I think, okay, I think this might be credible because I have witnessed it, I have seen it for myself. Again, also making sure that it is something that has been researched or published. Because what may work for you and if you see the benefits, then you would keep using it, whereas what works for me may not work for you. It all just depends as well with trial and error" (Participant 8).

"I feel like every teacher deserves to be tested. But I feel like if it comes down to it, teaching is teaching, and it depends on the type of teacher that you are. If you are a teacher that believes in teaching to every single individual child, then I could see you using the different teacher, the different learning styles to teach. But I think when it comes down to it in the classroom, the most important thing is getting the information that you need to give the kids, getting it to them and getting it to them in a way that will actually make them learn something and that teaches them a skill. I think that if you do use some of these and it works, then I mean it works. It's not

like the kids are getting hurt by trying…. But I think at the end of the day, it just depends on the type of teacher that you are. If you are the type that believes that doing yoga, I think it's like a placebo effect. If you think that your class is going to get full marks for their spelling test if they do yoga beforehand. And it works then I mean, the placebo effect is in effect and it works. But I don't think that it's a one stop shop. I think that every child is different. Every child comes from a different background, comes out of a different house. They have different parenting styles. So no, I don't feel like I use them a lot in my class. I don't believe in them personally. But I do know teachers that believe in these learning styles and they are excellent teachers as well. So yes" (Participant 9).

"I think the proof is in the pudding. I think you can definitely see which teaching methods work for you as a teacher in your class. I think in the visual arts class, it's a bit different to a maths class where it's a bit more free and a bit more, I don't want to say relaxed because everybody lumps that with art, but there's not as much structure that's needed with a maths class. I definitely think that you can see, or I can see, which teaching methods work for me. For instance, like I said, the kinesthetic and visual learning really works in my class, but kinesthetic learning might not work in a maths class. Then obviously then you do get that clarification from the studies that have been that have proven" (Participant 11).

"it's trial and error. And some of them I know from studying, it's definitely there. I had psychology in university. Don't ask me now about what I learned, but I can remember that there are different learning styles. I have seen it. Me, myself use different learning styles, and I try and teach learners the same. The same with intellectual theory or intelligence theory, sorry, and intellectual. It's just something that you, with experience and with studying, I know that some of these are facts and some of them are just myths" (Participant 17).

The data provided insights into the perspectives of educators regarding the implementation of neuromyths in their teaching practices. The theme of trial and error was prevalent. Educators described teaching as an ongoing, adaptive process. If a method did not yield the desired

findings, they were open to adjusting their approach and trying alternative strategies. the participants showcased a pragmatic and flexible approach to teaching, where they were open to integrating new methods, even if associated with neuromyths, while keeping a keen eye on the practical implications and effectiveness in their specific teaching contexts.

Sub-theme 2: Evidence

The term "sufficient evidence" describes the availability of sufficient, reliable, and pertinent information or facts to validate the existence, validity, or correctness of a given concept (Bowen, 2009). It suggests that the information at hand is sufficient and compelling to allow one to reach logical conclusions or render well-informed decisions regarding the subject matter. Most participants expressed skepticism or reservations about accepting neuromyths as true. They questioned the validity of these myths, highlighting the lack of concrete evidence and the individualized nature of learning. Many participants emphasized the importance of relying on evidence-based research and personal experiences in the classroom to determine the effectiveness of teaching methods. They asserted:

> *"I don't think they are true. How does a child know which side of his or her brain works better or which method of learning is good for him/or? They are myths not true. Different situations or location can stimulate different parts of the brain to work and that will help with learning"* (Participant 2).

> *"I don't accept these to be true. The only time I've seen a learner understand better is if I'm trying to explain something, but either using slightly more pictures is learners with learning disabilities. They need to have it explained to them in a different way. From my experience, now I have a learner that I'm currently teaching. With her, I usually have to re-explain things. But I don't know if that is a neuromyth or not. I did take some of it to be true from textbooks, but now, after my own research, I don't take them to be true"* (Participant 3).

> *"I don't know whether I accept those myths as truth because obviously I have no proof with that. I don't know. I couldn't possibly answer that correctly for you. If there was a backing. Number one, if there was backing. But number two, if there was no backing and I myself experienced a change with my students and felt like it was creating a positive effect in my classroom, then I'd continue to use them"* (Participant 12).

> *"Well, we basically, we track the students' progress throughout the year, from what they know to what they do not know to what they should know at the end of the year. So, we have a very well-designed assessment and report process here at our school. That is how we track students through their results in the assessments, their results in the exams, our one-on-one with the child. This is what shows us that it can be effective and is working"* (Participant 15).

> *"Educators should approach educational theories and trends with a critical mindset and consider evidence-based research before accepting them as true. It is important to examine the research, expert opinions, and empirical evidence supporting these ideas to determine their validity and applicability to educational practices. Relying on established scientific research and evidence-based practices is generally considered the most reliable approach to ensuring effective teaching and learning outcomes"* (Participant 18).

Participants highlighted the importance of evidence-based practices and personal experiences in the classroom. Many mentioned that they would only consider a teaching approach or educational theory effective if they could see tangible positive results in their students' learning outcomes. Emphasizing that if there is crucial evidence then it is bound to be effective in the teaching process. It is important that participants advocate for a critical mindset when dealing with educational theories and trends to understand the need to critically evaluate research, expert opinions, and empirical evidence before accepting any educational concept as true or effective.

Theme 3: *Personal Experience*

In education, "personal experience" refers to a teacher's unique experiences, insights, and analyses gathered from their interactions with students, lesson design and execution, and classroom management (Bandura, 1977). It includes all of the useful information, perceptions, and lessons that educators have gained in the actual classroom setting, all of which support their professional development and have an impact on their methods of instruction. Most participants reported that their teaching approaches and beliefs are shaped by a combination of critical thinking, ongoing professional development, practical considerations, and personal experiences. One teacher reported: *"Claiming each learner is different and learns in their own*

way, hence the multiple intelligences come into consideration when trying to teach my learners and considering the VAK learning styles" (Participant 19). Similarly, another teacher reiterates that: *"I have been teaching for 10 years now. It works for me and what I implement shows how it works and I do not see any other way of doing things"* (Participant 20). In addition, other participants suggested:

> *"As a teacher, I am a critical thinker and dedicated professional who prioritize evidence-based practices and the well-being of my learners. To make informed decisions about teaching practices, I engage in ongoing professional development, seek out reliable sources of information, and critically evaluate new trends in education before implementing them in my classrooms"* (Participant 7).
>
> *"I think also how I perceive the information. So, if you read the information, if you read up on left brain and right brain students, I can put myself in those little boxes and tick off, Okay, I like to make lists and I like things to be orderly and things like that, so I'm most probably a left brain person. I think putting myself in those shoes, in those theories makes it true for me"* (Participant 10).
>
> *"I do believe as teachers we have got to be ongoing and learning continuously. With everything that is out there, there is always value in information which we will go through and see what works for you. We get so much thrown at us as teachers and where is the time to practice all of the things we learn. If we learn something new we will make a note of it and use it at some time, or you will look at it and say "oh, that is interesting, but that is not something I can incorporate in my subject or with my students". So it would be nice to know, but may not be something for me. Then also with experience, something may be a bit far fetched and this will not work in a practical setting. On paper it sounds great but it is not practical. So discusses will take place and I will hear what works for them and we will share ideas, but each teacher will have something different of what works and what does not work, and this is what they will stick to. We may try something new that we read about because it sounded fantastic and it may very well turn out to be that. But it may also not work out due to many factors*

such as the environment at the time, or the group of students and it can be revisited at a later stage. It comes down to your experience, your opinions and your reflection and what works for you" (Participant 14).

"Well, you would hope that these teaching approaches are well studied or proven, if you understand what I mean, but not just proven worldwide, proven in our social economic status. Thing that I've noticed specifically is a lot of the studies are done in America or in the States, or in Europe, and it's not always specifically to where we are. Even textbooks, some of the textbooks, I've struggled to get a proper PE textbook based in South Africa, so written in South Africa for South Africans. That already is, for me, it's important is the fact that these fads or these techniques are proven and studied in South Africa, not just internationally. But I mean, as teachers as well, we hear of these methods. We would want to try it and see if it is effective in our classroom. And so it something works for you, it works, and if it doesn't work for you, it doesn't. I think it's the same as being a mom, is everybody wants to give you advice. What works for my child didn't work for your child. It doesn't mean that that advice is wrong. It's just everybody's different. You need to trial and test that the more advice you get, the more options you have to try. I think that's a good example that we can use in teaching as well. Just because the method doesn't work in your class for that child doesn't mean it didn't work for another child. and especially with subjects, it could work in natural science, but then it won't work in math, for example" (Participant 16).

The participants highlighted that while they value continuous learning and exploring new ideas, they ultimately rely on what works for them and their students based on practical experiences and observations. The data suggests that teachers acquire information about educational theories, trends, and practices from various sources. These sources include formal education such as university courses and teacher training programs, professional development workshops, online courses, educational websites, articles, textbooks, social media, and peer networking. Teachers also mentioned learning from their own experiences in the classroom and staying informed through school-supported platforms, conferences, and collaborative networks. The participants varied in their approaches to acquiring knowledge, with some relying on formal education and others utilizing a combination of formal and informal sources.

Social media and online platforms emerged as significant channels for staying updated on educational theories and practices.

To conclude, from the data collected, participants shared that on the grounds that it works for their students proves that it is true. In addition, they added, evidence is in the articles and practice, if the learning outcomes are achieved, scientific research articles that link to what they are experiencing, trial and error; if it works it works and if it doesn't work it doesn't, and lastly, some participants did not believe it to be true but still implemented it because it worked.

Theme 4: *Different methods to cater to individual differences*

People speculate if we could reach a vast reservoir of potential if we could utilize our brains to their fullest potential because it's a common misconception that we only utilize 10% of the brain. Participants seem to adopt a holistic approach to teaching, integrating various methods to cater to diverse learning styles, promoting student engagement, and addressing individual needs. The emphasis on technology, active learning, individualized support, and mindfulness suggests a commitment to creating a positive and effective learning environment. Participants found that implementing strategies to assist the function of the brain will benefit the learning process of students. Participants shared:

> *"I also try to make use of different teaching methods. For example, I present the content for the learners on a PowerPoint presentation using a lot of pictures. And we also watch videos where they have to try and explain the concepts back to me. We also have presentation day in class where I give the learners an opportunity to come and present their work to the rest of the class. I also provide the learners with support classes and then especially of the learners that are struggling to concentrate in class, I've made a place for them there next to me where it's quiet. And then a lot of times I sit with them on a one-on-one basis to go through the work"* (Participant 6).

> *"I personally do a lot of yoga and meditation. In class, I get my learners to close their eyes and take a few deep breaths before we start of lessons to get their mind set correct. I encourage education game play within my lessons to stimulate their brain. I use the Minecraft education. I incorporate a lot of*

crossword activities for learners to understand concepts and keywords" (Participant 7).

"10% of the brain; I think by switching up the routine sometimes can help, especially if you're in a school where it's allowed and where the ATPs are there to guide you, but you're not as limited to that or to that specific time. There's enough time to do everything. Then I think switching up the routines so that learners can keep on their toe so that lessons don't become mundane. I also think you are like a flipped classroom situation where the learners actually lead the classroom and leads, like you say, on topic, but they lead where the questions go or where the topic go so that they can think a bit instead of you just giving them the information" (Participant 10).

From the data collected, participant try to implement activities that can help students access more parts of their brain. Participants believe that this teaching method can definitely aid the teaching and learning process. This can help students not only retain information but also explore other aspects of learning by exposing other parts of their brain. Based on the provided data, it appears that teachers are conscious of and engaged in implementing various teaching strategies to enhance the learning experience for their students by adapting the 10% of the brain neuromyth. Participants frequently mentioned the integration of technology into their teaching methods. This includes the use of interactive whiteboards, videos, educational games (e.g., Minecraft), and PowerPoint presentations. The goal is to leverage technology to make lessons more engaging and interactive. There is a focus on active learning strategies, such as presentation days and group activities. Encouraging students to present their work to the class promotes active participation, fosters communication skills, and allows for peer learning. Teachers are implementing individualized support measures, creating quiet spaces for students who struggle to concentrate, offering one-on-one sessions, and providing support classes. This reflects a commitment to differentiated instruction to meet the unique needs of each student. Some teachers are incorporating mindfulness practices, such as yoga, meditation, and deep breathing exercises. Teachers believed that these activities aim to create a positive and focused learning environment, fostering the well-being of both teachers and students. Participants highlighted the importance of varying teaching approaches. This includes switching up routines, adopting a flipped classroom model, and allowing students to take a more active role in directing discussions. These approaches aim to keep lessons dynamic and prevent monotony. Several participants mentioned ongoing professional development and training sessions. This

indicates a commitment to staying updated on educational theories and teaching methodologies. Teachers are attending workshops and training sessions to enhance their skills and knowledge.

In summary, the data suggests that these teachers are proactive in adopting a holistic approach to teaching by adapting this neuromyth. They are aware of the importance of technology, diverse learning styles, active participation, individualized support, mindfulness, and continuous professional development in creating effective and engaging learning environments.

Theme 5: *Use of diverse thinking approaches*

The "use of diverse thinking approaches" refers to employing a variety of cognitive strategies, perspectives, and methods to address problems, make decisions, or generate ideas (Syed, 2019). It involves leveraging different ways of thinking, such as analytical, creative, critical, intuitive, and systematic approaches, depending on the context and requirements of the task at hand. By embracing diverse thinking approaches, individuals or groups can enhance their problem-solving capabilities, foster innovation, and achieve more comprehensive and robust outcomes. This concept emphasizes the importance of recognizing and valuing various cognitive styles and perspectives to maximize effectiveness in problem-solving and decision-making processes.

According to the theory, people are either right- or left-brained, which indicates that one side of their brain predominates. According to the theory, if you think primarily analytically and methodically, you're left-brained. You're right-brained if you have a tendency to be more artistic or creative. The participants commonly reported a focus on encouraging diverse thinking approaches and addressing both left-brain and right-brain activities in their teaching methods. Participants emphasized the importance of allowing students to use various methods and ideas when solving problems. This inclusive approach aims to accommodate different learning styles and encourage creativity in problem-solving. The participants commonly reported an awareness of the need to cater to diverse thinking styles, utilizing visual aids in abstract subjects, and incorporating activities that engage both left and right brain functions. This holistic approach suggests an intention to foster a comprehensive and inclusive learning environment for their students. Participants shared their implementation of this teaching method;

> *"Whenever my children are solving problems, I want them to use any method or idea that they know. And my encouragement always is scribble*

something down that you can interpret and relate to the problem. And that helps even those that are pictorial to be able to come through the challenge using the pictures. In fact, maybe in the when we're talking algebra, where we are solving for the Ys and the Xs, you don't want them to go there immediate or they don't understand that. But when they draw or when you give them a picture, they understand what you're talking about" (Participant 4).

I also cater for the left-brain vs the right brain. I think for the left side, for the language and speech, we have a lot of class conversations in class where the learners can share their thoughts and they can come and present their work. And then also they also have to design a lot of posters and things like we are busy now designing posters on how to stop fires where they can use their rights side for that part of the activity" (Participant 6).

"Left and right brain concept: I allow learners to explore and use different skills when working which enhances both sides of their brain. I try to incorporate different types of activities in my lessons and class to stimulate both sides of the brain. Theory, speaking, discussion, analysing, understanding concepts and content is more left brained activities but actually engaging physically in a task, performing practical's, building projects and models, feeling and understanding allows the right side of the brain to work" (Participant 7).

From the data collected, participants used different strategies to cater for students who are left brained and right brained. To obtain the best outcome of the learning objects, students had activities that leaned towards their strengthens, taking into consideration which is the students dominant hemisphere. Participants reported integrating technology into their lessons through the use of interactive whiteboards, videos, games, and PowerPoint presentations. While acknowledging that not all methods work for every student, there is a willingness to experiment with different technological approaches to enhance learning. Participants acknowledged the need for flexibility in teaching styles, considering the uniqueness of each group of students. They reported adapting their methods based on the characteristics and needs of the learners, demonstrating a responsive and student-centered approach. The participants acknowledged the left-brain vs. right-brain concept and reported efforts to stimulate both sides of the brain

through diverse activities. This includes a balance between theoretical, analytical tasks (left-brain) and practical, creative activities (right-brain). the data suggests a commitment to creating dynamic and inclusive learning environments that leverage technology, accommodate diverse learning styles, foster critical thinking, and promote holistic development. The participants appear dedicated to adapting their teaching methods to meet the evolving needs of their students.

Theme 6: *Creating inclusive and dynamic learning environments*

Most participants demonstrated a commitment to creating inclusive and dynamic learning environments by incorporating a range of teaching methods that address diverse learning preferences. The emphasis on VAK learning styles, multimodal approaches, and subject-specific strategies reflects a student-centered and adaptive approach to teaching. Additionally, efforts to consider individual student needs, involve students in decision-making, and foster creativity contribute to a holistic and engaging educational experience. One teacher reported: *"Learning Styles: I use different learning styles such as visual and audio. Practical work helps learners understand concepts"* (Participant 7). Other participants shared their practice below:

> *"By using interactive whiteboards, watching videos, playing games and using PowerPoints in our lessons is the only ones I know of. Using English as an example, teaching nouns, I normally put on a video with a song for the kids and when they listen to the music they are attracted more and they are watching a video they understand better. Even if we play games as well it is something more interactive and fun and interesting and it is to their ability, that's what they enjoy. It can go back to the VAK learning styles of how some students enjoy the creative and fun lessons and others prefer kinaesthetic learning styles"* (Participant 1).

> *"I'll go with the different learning styles because I did try and use that in the past, where if I'm making a worksheet, I will try and use pictures in it too, that is relevant to what is being said on the paper. I'll go over what's on the worksheet with the learners so that they can hear me saying it. And if time allowed, I would also let some learners write answers on the board so that they are more involved in the process. VAK learning styles, I saw listening. We did a listening comprehension last week, and some of the*

learners did ask me, how can they improve this? I told them they went on YouTube and found some listening exercises. Through that, they actually managed to get 100 %" (Participant 3).

"VAK learning styles. So, body movement, I would use the thinking maps, okay? So, it's not one stationary boot, and you get them to work in teams, and they add... You give them a topic, so the group would start with the topic, and then they would rotate. So, you actually time them. You've got two minutes. So put on your points, and then you move to the next group, and the next is like a round-robin thing. And you keep adding, all right? Because now it's not stationary. So, you're constantly moving. At the same time, you're exercising your brain, you're forced to think. And everybody has to take a turn to contribute towards maybe a poster. Sound would actually come through listening. Maybe you play a club where they are forced to listen, but at the same time, they guide in the listening what they need to listen to, so you have structured questions prior to the lesson. The children are listening and they have to listen now such that they're able to direct the answers to the question that's on the page. The visual would be you showing them a video clip" (Participant 5).

"VAK learning styles; For our school, we are encouraged to use these different learning styles to explain things to the learners because they feel like then every child gets a fair... How can I say? A fair chance at learning the information. I teach Grade 1. So, for me, I feel like visual aids, a lot of visual aids help the kids to learn. Also auditory, so reading them a story and having them listen to it is also effective. But just telling them information doesn't really work. I like to combine auditory with visual. So, while telling them a story, I'll put up storyboards so that they can visualize it in a way. So, I feel like that's a small way that I include it in my classroom. But that's just because I work with a smaller age group. I think if I were teaching older learners, then I obviously would not be using these methods. But that is how we are encouraged to teach at our school" (Participant 9).

"VAK learning styles; For visual, I love PowerPoints, pretty PowerPoints or slides and summaries that are colourful and things like that. So, I use that

a lot. But then also I think with a new language, it's nice to act out. Let's say you learn vocabulary. If you learn actions or phrases, maybe then you can act it out. We do a lot of listening. Listening to music, listening to or watching videos, listening to recordings and things like that in the language. I think there's quite a mixture, but like I said, it's important not to prefer or benefit or emphasize your own learning style, but I think I do that a bit" (Participant 10).

"Depending on which class we're talking about. For instance, in the art class, I do put it into my lesson plan as well as teach with it on a daily basis. The inquiry-based learning and how it comes into play in the classroom, group learning, like I said, kinesthetic and visual, near-up. We definitely incorporate into the classroom" (Participant 11).

"In a lesson, for example, with a math lesson, I would start off with a little brain break before I start, just to get everything flowing. And then I would use concrete or manipulative in the class, concrete resources or manipulative. For example, if I'm teaching fractions, I would bring in apples or oranges or even in some cases, pizza. So, from the concept to the procedure and then to the abstract" (Participant 15).

"For me personally, when I was teaching theory subjects and not just outside because I'm mainly a PA coach. But in class itself, I've seen songs like Making Up. Even with my toddler, she's three, but having a song to learn, like either facts or things like that, is she remembers it more. Maybe she can't recite it to me if I ask her a question, but she knows the facts. When you connect the facts with the songs, then that's definitely a good recollection of it" (Participant 16).

"In my teaching, I aim to implement a multimodal approach that incorporates visual aids, auditory explanations, and hands-on activities to cater to different learning preferences. I understand that students have diverse learning styles, and I foster an inclusive classroom environment that allows for different ways of learning and expressing knowledge. However, I do not categorize students solely based on VAK learning styles, as it is not supported by research" (Participant 18).

> *"VAK; For example, every year when I teach new learners, I usually conduct a quiz on "How do you learn" "Why do you learn the way that you do", it helps to know the learners therefore specific teaching strategies can be amended for them"* (Participant 19).

> *"So, when I have to demonstrate things, especially like when I coach them. When I have to show them certain things, some of them are more receptive when I show them than when I speak, and then some are more receptive when I speak. You can see that when I'm speaking, some of them, they're very distracted. That's not what they want to do or that's not how they want to see things. They are more receptive if I'm showing them things. And then that's way often some are also distracted"* (Participant 20).

From the data collected, participants suggest that the VAK learning makes the lessons more enjoyable for the students and best cater for their interests and strengths. Participants create opportunities for students to learn according to their preferred learning styles. Participants propose that learning can be improved if children are classified and taught according to their preferred learning style, specifically as visual, auditory or kinesthetic learners.

Many participants emphasized the integration of technology into their teaching methods, including interactive whiteboards, PowerPoint presentations, and educational games. This suggests a recognition of the role technology plays in engaging students and enhancing the learning experience. Teachers are mindful of the diversity of learning styles among their students. They reported using different methods to cater to visual, auditory, and kinesthetic learners. This includes incorporating visuals, playing music, and providing various learning activities to address individual preferences. This awareness is reflected in their efforts to use various methods, such as visual aids, storytelling, and hands-on activities, to cater to diverse preferences among students. The participants showcased a commitment to multimodal teaching approaches. They described using a combination of visual, auditory, and kinesthetic elements to create a more comprehensive and inclusive learning environment. This aligns with the idea of recognizing and accommodating various ways in which students absorb information. Creativity was highlighted through activities like designing posters, sensory writing exercises, and outdoor lessons. This indicates a focus on engaging students through diverse and imaginative methods, fostering a more enjoyable and memorable learning experience. Several participants mentioned involving students in decision-making processes and allowing them to

contribute to the learning environment. This student-centric approach reflects a belief in empowering students and acknowledging their preferences and needs. Some participants integrated mindfulness practices, such as deep breathing, yoga, and outdoor activities, into their teaching routines. This suggests a consideration for students' well-being and a recognition of the importance of creating a positive and focused learning atmosphere. Participants discussed tailoring their methods based on the subject matter. For example, using specific approaches for language teaching, incorporating games for math lessons, and utilizing sensory experiences for language arts. This subject-specific adaptation reflects a nuanced understanding of pedagogy. The data indicates that some participants assess students' learning styles at the beginning of the academic year. This proactive approach allows teachers to better understand their students and tailor their teaching strategies accordingly, promoting a more personalized learning experience. One participant mentioned being cautious about neuromyths, demonstrating a critical awareness of educational theories and practices. This approach reflects a commitment to evidence-based teaching rather than relying on potentially misleading or unsupported ideas.

In summary, the data suggests a pedagogical approach that is both student-centered and diverse in its methods. Teachers are incorporating technology, recognizing and accommodating different learning styles, fostering creativity, promoting student involvement, and considering well-being. The emphasis on evidence-based practices and a cautious approach to educational trends indicates a thoughtful and reflective attitude toward teaching methodologies.

Theme 7: *Use of Brain Exercises*

Every action we take requires the use of one or more of our cognitive abilities, and a functioning brain is better equipped to carry out these fundamental functions. Brain exercises are said to benefit learners by improving concentration, memory, reading, writing, organizing, listening and motor co-ordination. The participants commonly reported incorporating a combination of physical activities, memory games, creative approaches, technology, and mindfulness techniques to engage students' brains and enhance their learning experiences. These practices reflect a holistic approach to education, acknowledging the importance of both physical and mental aspects of student engagement. One teacher reported: *"Brain exercises: Stimulation of the mind and brain is vital to get the mindset of learners correct"* (Participant 7). Another teacher also supported that: *"I use brain exercises. I think the brain exercises and things like that makes them a little bit more receptive. I personally do think there's definitely some examples of benefits in that, yes"* (Participant 16). Similarly, another teacher reiterates that:

"In my teaching, I incorporate brain exercises through various strategies such as puzzles, problem-solving activities, memory games, and mindfulness exercises. These activities help students strengthen their cognitive skills and improve their focus and attention span" (Participant 18). Other participants also share their beliefs of this below:

> *"Brain exercises, we do our mind skills... every Friday or so or in the mornings when we start, we ask them a little bit of brain teasers questions, especially in natural science, we'll ask them a few brain teaser questions to get them to think a little bit more… We also do rhymes. So, I will make rimes for my kids so that they can learn the rimes. We also take certain words and we create a short story for them. Or sometimes my kids will make a joke about a certain word, and that is a way for them how they will remember some of the content or some of the words"* (Participant 6).

> *"Brain exercises; So it can be repetition. So maybe if you put up a word on the board. It's just short exercises like lesson started. Before you start your lesson, you just want to get them engaged. So you may put up a picture or a word and then each one of them will try to repeat it so that they will remember it. That could be an example of improving their memory. Another one could be a writing brain exercise. You put up pictures and then you give them a few seconds to look at it, and then they need to write down which pictures they remember for an example. While I was teaching online, we used that a lot. We would play online games where you have to match certain blocks to each other. You would flip a block, those memory games, and match pictures to words and things like that. Now back at school, I think I use brain exercises unconsciously. When we do new words, it is up on the board, there's posters around us. We repeat them, we look at them"* (Participant 10).

> *"I think each teacher has their own little thing that they do sometimes when the kids get a little bit antsy. I think to bring them back almost to their learning space or what have you, I normally allow them to scan up and use the two… I don't know if you ever heard of it. It's like the two-finger, one-finger swap out. I don't know how to explain it without showing you. My camera is not working. You almost swap two fingers over two fingers, and*

you place two fingers over two fingers, and then you swap hands around, and it goes one finger over one finger. It's almost like a concentrate. You almost have to concentrate each time because you go two fingers, one finger, two fingers, one finger, one finger. As you said, it's like a myth, but you would hope it would bring them back into some learning space where they are able to concentrate a little better to just let out some of the energy that they have going and just by focusing on something in particular" (Participant 12).

"When starting a lesson, usually we do memory games with my learners where I screen, I put something on my projector, I ask them to remember. It can be colours, or blocks that are built, so they should be able to remember the colours that were said. I think it jumps to their memory before we start a science lesson" (Participant 13).

"Brain exercises; I don't know if you know the little brain break where it's the lava. So, I would use that first to get everybody excited and energized. And then I would take them on a high and bring them back to a note where I want everybody calm and ready for the lesson. So, at my school we use, I don't know if you're familiar with the study tech of Alva and Hubbard? …so when I first started here at my school 20 years ago, our founder, … introduced me to the study tech by Alva and Hubbard, it is used by few schools in the US and UK where you would have something called a locational and you would point to things in the classroom... And with the study take-off hours on Harvard, there are three main facets that we focus on. One is the lack of math. The second one is the skipped gradient or the misstep. And the last one is the misunderstood word where we use dictionaries to clear words that children do not know to help them get a better understanding" (Participant 15).

"Brain exercises; because some of the drills I'll show them once and then I'll say, I won't show you again, and that's it. Then that's it. Then that to do that to get the moment where it is. Thirty minutes. I only show them in a course of maybe 30 minutes. Then I'm like, well, I'm only for one minute,

you guys have to do this thing for 30 minutes. If you fail, ask your friend, struggle, do whatever you think is right" (Participant 20).

From the data collected, participants adopt various brain exercises into the practice. They have unique exercises for different circumstances. Participated suggested that these brain exercise that they use best aids students learning by improving concentration, memory, reading, writing, organizing, listening and motor co-ordination as well as their overall learning experience. The findings indicate that educators are employing a diverse range of strategies and techniques to create engaging and effective learning environments for their students. Brain exercises and activities aimed at stimulating cognitive skills were prevalent. These included memory games, brain teasers, and physical exercises designed to wake up students' brains and enhance their focus and memory. Educators recognized the importance of cognitive engagement in the learning process. Participants demonstrated awareness of neuromyths and acknowledged that not all fads or neuromyths are universally effective. This critical awareness suggests a commitment to evidence-based teaching practices and a discerning approach to incorporating new methods. Educators showed a reflective attitude toward their teaching practices, often evaluating the effectiveness of different methods and adjusting their approaches based on the feedback and responses of students. This continuous reflection indicates a commitment to improving instructional strategies. The findings suggest that educators are actively engaged in creating dynamic and inclusive classrooms. They recognize the importance of adapting to diverse learning styles such as brain exercises, employing evidence-based practices, and fostering holistic development to meet the needs of their students effectively.

Theme 8: *Use of active, and student-centered learning*

The "use of active, and student-centered learning" refers to instructional approaches that actively engage students in the learning process and prioritize their active participation, inquiry, and collaboration. In this approach, students take an active role in constructing their own knowledge, rather than passively receiving information from the teacher. Student-centered learning emphasizes student agency, autonomy, and responsibility for their learning outcomes. Critical periods of development refer to specific time frames during which an individual is especially sensitive to environmental stimuli and experiences, and the absence or presence of certain stimuli can have a profound and lasting impact on the organism's development. These critical periods are often associated with the development of specific skills or abilities. The brain develops during critical times for its pattern of connectivity to function. The primary

auditory cortex's response specificity and structural development are influenced by the early auditory environment. Participants generally reported a focus on active, student-centered learning through hands-on projects, strategies like the flipped classroom, cultivating a growth mindset, and tailoring activities to support critical development in various domains. These approaches aim to create engaging and effective learning experiences for students. One teacher reported: *"Critical development; For example, I incorporate age-appropriate activities that encourage early language development, social interactions, and fine and gross motor skills"* (Participant 18). Participant 7 shared some activities to assist with the critical periods of development;

> *"Project and practical's: A focus on hands-on, project-based learning and the use of tools and technologies in educational settings to foster creativity and problem-solving skills. Flipped Classroom: This helps me get my learners to be able to learn concepts and develop skills to teach it to their peers.*
>
> *Growth Mindset: Vitally important in my classes as it promotes and encourages learners to embrace challenges and learn from failures"* (Participant 7).

From the data collected, participants incorporated activities to help bridge gaps for students who experience difficulties. According to the participants, a child's brain develops optimally when they receive the right care, attention, and stimulation during this crucial stage. Fast and strong connections are formed. Better learning, emotional control, and the development of relationships are paved over by this. Thus, the implementation of these activities. The participants highlighted the importance of practical, hands-on learning experiences. This approach, along with project-based learning, aims to connect theoretical knowledge with real-world applications. The findings suggest a student-centered and adaptive approach to teaching, with a focus on leveraging technology, accommodating diverse learning styles, promoting critical thinking, and incorporating practical and real-world elements into lessons. The participants demonstrate a commitment to creating engaging and effective learning environments for their students. Both participants stress the importance of active and engaging learning experiences. Participant 7 emphasizes project-based learning, the flipped classroom model, and the promotion of a growth mindset to nurture problem-solving skills and a positive attitude towards challenges. On the other hand, Participant 18 highlights age-appropriate

activities for early language development and the improvement of motor skills, recognizing the significance of foundational development during the critical early stages of education.

Theme 9: *Use of holistic and varied approach to teaching*

The "use of holistic and varied approach to teaching" refers to an instructional strategy that considers the diverse needs, backgrounds, and learning styles of students while incorporating a range of methods, techniques, and resources to support their learning (Lindner & Schwab, 2020). This approach recognizes that students have different strengths, interests, and ways of processing information, and seeks to create a supportive learning environment that addresses these individual differences. Intelligences refer to the theory introduced by psychologist Howard Gardner, suggesting that intelligence is not a single, fixed entity, but rather a set of distinct abilities or intelligences. According to Gardner, individuals possess different types of intelligences, and these can include linguistic, logical-mathematical, spatial, musical, bodily-kinesthetic, interpersonal, intrapersonal, naturalistic, and, in some discussions, existential intelligences. Each person may excel in different areas, and the theory broadens the traditional view of intelligence beyond academic or cognitive abilities.

According to the multiple intelligences notion, which was put forth by psychologist Howard Gardner in 1983, intelligence is actually a collection of distinct talents that people possess to varying degrees rather than a single, unchanging feature. Gardner first classified humans into seven categories of intelligence, each of which represented a unique method of information processing and learning. It has been observed that when Howard Gardner's multiple intelligences theory is applied in the classroom, students are inspired to think critically and creatively, gain a deeper understanding, and acquire abilities that will benefit them both inside and outside of the classroom, Most participants reported a holistic and varied approach to teaching, acknowledging the diversity of student strengths, learning styles, and intelligences in their classrooms. They incorporated a mix of strategies to create inclusive and engaging learning environments. One teacher reported: *"Multiple intelligence; some students who may love doing the artistic activities in your class, but then when it comes to reading comprehension, they really struggle with that"* (Participant 10). Similarly, another teacher reiterates that: *"Multiple intelligence; For example, I provide hands-on activities, group discussions, artistic projects, and opportunities for self-reflection to support students with different strengths and learning preferences"* (Participant 18). In addition, participants present how they use the multiple intelligence theory in their practice:

"Accept different learners as individual and try to incorporate different method of teaching in my practice. Practical task, demonstrate, videos and reading. Even going outside and learn about nature can help to stimulate the brain. Drawing - creativity and project, Learners make their 3D models. Writing key words and they copy." (Participant 2).

"So also when I'm doing my planning, like I said, I try to implement the Bono hats as well with my planning and with our activities. And then a lot of the learners, especially now it's a great force here, we have a few learners that are one year younger. So they are not well developed emotionally. So I try to give them extra support. I've placed them now into groups. So we're in the groups, at least there are one or two learners who are well developed emotionally. And also at each group, there is a member in the group who is good at something. So let's say the one friend is better in maths. So whenever we have to count something or do something, at least each group member can learn then from that friend or that friend can assist the other group members. So I try to do that now with them. And then like I said, I also make use of a lot of visual pictures and videos to help the learners to understand the concept and the topic more" (Participant 6).

"With regards to multiple intelligence, I try to develop different and promote learners' intelligences by using different teaching methods. I sometimes take my lessons outside so learners can work in nature outside a classroom environment which has helped them focus better. Projects and practical's in my lessons help learners work hands on that helps them understand the concepts and makes it fun. Group based activities; role play activities" (Participant 7).

"I think, well, I definitely encourage them to work together. Bringing in the flip classroom, trying to do group work, problem-based learning or project-based learning, PBLs to go through those even independent learning where they're going and doing projects by themselves. Obviously with me facilitating, walking around, asking questions that require them to think critically, trying to change the learning so that, again, it's not me just telling them the information, expecting them to absorb it. Definitely, my learning

style would definitely be to try and encourage them to seek the information for themselves, to not just rely on me for it, to go and be inquisitive, to inquire about things that they have, the questions that they have, to go and enable them, say, okay, where do you think we can go and find this information? And then guide them a little bit more on that. Yes, I do try and follow what management has said and what head office gives us to do. And then obviously as I teach, I definitely try and encourage them to think critically and to find information out for themselves and also try and be as open as possible for them to come and question things and have different ideas. Often our lessons go off the topic. But I do think that's important because it's also answering the questions that they have and that they feel are important, which I do think is also important for us to consider when we're teaching" (Participant 8).

"I've had quite a few of my students that are very academically inclined but have never participated in any of the sporting activities. They literally will not take part in a single sporting activity. I think cultural activities is almost a no-go as well. They're not always very vocal. I'm not talking about all of them. I'm speaking about one specific group of students that I would have taught across my teaching career. They obviously are not sporting inclined, but they also find it very difficult to fit into a socially academic space where they have to voice themselves" (Participant 12).

"I'm a science teacher. I know there are certain maybe theory or let's say content that involves calculations and some that involves a little bit of reading. I know some certain learners in my class, they'll be doing well when it's reading and they'll also struggle when it's calculations. I've realized that it's because maybe of their different intelligences that they have, so I try to cater for this in different activities" (Participant 13).

From the data collected, participants suggest that by encouraging multiple intelligences, we build an inclusive classroom that celebrates individual differences in ability and fosters the overall development of every student. They employ various activities by adapting assignments, curricula, and classroom arrangements for these multiple intelligences to effectively improve students' academic performance, foster their desire to learn, improve their comprehension of

what they read, and even improve their capacity for peer-to-peer cooperative learning. Many participants acknowledged the concept of multiple intelligences among students. They reported efforts to recognize and promote different types of intelligences through activities such as hands-on projects, group discussions, artistic projects, and opportunities for self-reflection. This approach aligns with the idea that students have unique cognitive strengths. Visual aids, pictures, and videos were frequently used to enhance the learning experience. These methods cater to visual and auditory learners, providing a more comprehensive understanding of the content. The data indicates that most participants adopt a student-centered and inclusive approach to teaching. They recognize and celebrate the diversity of students' learning preferences, strengths, and intelligences, and they implement various strategies to create engaging and supportive learning environments. The emphasis on hands-on experiences, collaboration, and critical thinking aligns with contemporary educational principles that aim to nurture well-rounded and adaptable learners.

Theme 10: *Fostering positive psychology*

Fostering positive psychology refers to the intentional promotion of psychological well-being, resilience, and flourishing in individuals, groups, and communities (Terjesen, et. al., 2004). It involves creating environments and implementing practices that support individuals in leading fulfilling, meaningful lives and realizing their full potential for well-being and happiness. Emotional intelligence is ability to identify, comprehend, regulate, and make good use of one's own emotions as well as those of others is referred to as emotional intelligence. It includes recognizing emotional cues, feeling other people's emotions, controlling one's own emotions, and utilizing emotional intelligence to inform decisions and actions in a range of social and personal contexts. Research indicates that emotional intelligence and conscientious attitude are almost as important as cognitive intelligence when it comes to academic performance. This is because students who possess emotional intelligence are more capable of handling uncomfortable feelings that could interfere with their ability to learn. Most participants emphasized the importance of acknowledging and addressing emotional intelligence in the educational setting. They discussed various aspects of emotional intelligence, such as promoting self-awareness, understanding and managing emotions, and fostering positive communication. Participants shared examples and experiences related to students' emotional well-being, the impact of teacher communication on emotions, and challenges faced by students with varying emotional responses. The consensus was on the significance of incorporating strategies to enhance emotional intelligence, create a supportive learning

environment, and help students navigate emotional challenges effectively. One teacher reported: *"So first of all, I try to encourage my learners a lot to speak about their emotions and then also to be mindful about the way that they speak, especially when they're speaking to others"* (Participant 6). In addition, other participants share their experience of emotional intelligence in their practice:

> *"Emotional intelligence, some examples are* a *learner in class lost their parent during COVID-19 and she excelled academically, however with the loss of her parent caused emotional stress but having the ability to be headstrong with a positive and open mind set, she was able to continue excelling academically whilst dealing with emotional stress. Another example is in class, learners are all different and sometimes what we say as teachers impacts learners in different ways. I had an experience where I reprimanded a class for their bad behaviour which was only directed at a few learners but the other learners who were behaved, took it to heart which affected them emotionally. I realised that even though a learner may be well behaved, does not mean that there are strong minded to handle anything that could be sensitive"* (Participant 7).

> *"Emotional intelligence; With my kids, I'm a Grade 1 teacher, so we take on the kiddies from age seven or six, and then they turn seven. But this year I was blessed with three five year olds in my class. So that means they are a year younger than my usual age group. I can tell you that there is a very big difference in the way that they relate to the world around them. Firstly, silly things like sense of humour. The kids around them can be laughing. And instead of thinking, oh, okay, someone made a joke, they instantly think, Oh, someone is laughing at me. They also don't really understand. They don't really get that you need to give other people space. Not just physical space, but emotional space, if that makes sense. They are very all up in your business all the time. They want to know everything. They struggle to get along with the kids around them because they are not the centre of attention all the time in a friendship. I can see that that's a big thing that develops when they are between those ages. It's just that they develop the skill to learn. There's a whole world around me and I'm not the centre of everything. So that's the biggest thing, I think. Also emotionally intelligent, just knowing*

I'm not getting all of the attention now, but if I give it a second or I wait my turn, I will get the attention that I deserve" (Participant 9).

"I think there's only a handful of learners who is actually who is emotional or highly emotional intelligence. I think maybe in this day and age, it might become a problem because the majority of the learners, if you correct them or you give them some criticism, it's always they put it on themselves, and it's like you're attacking them, or they feel like you're attacking them, and they cannot separate themselves from a situation and say, Okay, but this is not on me. This is just to help me improve my work, for example. there are obviously a few learners, but I think the majority, what I've seen recently, even I've taught grade 10 and 11 and 12 a little bit this year, and you cannot say anything because then you attacking them as a person and not see it as I want you to improve, for example, your work, or you can do this so that this can improve" (Participant 10).

"I had a little boy last year in grade four… very emotional. He couldn't take criticism or change in any way. We were preparing for the montage… had practiced a whole routine… About three weeks before, we had to change a few things… He could not handle it. He burst out, started crying… 'But I've practiced this. I spent so much time… I can't do it.' He shut down while the other kids adjusted. Eventually, he did it, but struggled… In the end, he enjoyed himself so much I got emotional watching him. He wasn't a cultural kid… socially awkward… relearning the steps felt impossible" (Participant 12).

"Emotional intelligence; In a teaching environment, educators can incorporate emotional intelligence by promoting self-awareness, empathy, and effective communication among students. This can be done through various activities, such as group discussions, role-playing, and providing opportunities for students to reflect on their emotions and develop strategies to manage them. Students with high emotional intelligence tend to have better interpersonal relationships, they can regulate their emotions effectively, and they are often more open to constructive criticism and willing to make the necessary changes" (Participant 18).

From the data collected, participants beliefs in emotional intelligence impacted their teaching practice and how they approach or deal with situations. Participants experience of emotional intelligence suggested that for students, emotional intelligence has many advantages. It may affect how a student acts toward their elders, peers, and even themselves. Emotional intelligence was recognized as a crucial aspect of teaching. Educators shared experiences related to students' emotional responses, the impact of teacher communication, and the importance of creating a supportive environment. Strategies such as encouraging open discussions about emotions and mindfulness exercises were mentioned. Overall, this suggests a holistic and adaptable approach to teaching, considering the cognitive, emotional, and diverse learning needs of students. Educators are actively engaged in finding innovative ways to create inclusive and effective learning environments by taking into consideration the emotional intelligences of the students.

5.3.6: Findings on the effectiveness of using fads and neuromyths in the learning process

The study finally examined the effectiveness of using fads and neuromyths in the learning process. From the data analysed thematically, the themes reported include increased academic outcome, improved positive psychology among students, and finally, enhances meditation during lessons.

Theme 1: *Increased Academic outcome*

Participants suggested that the implementation of fads and neuromyths were effective because it led to increased academic outcome among students. The participants' overall view suggests a nuanced understanding of effectiveness in teaching. While academic findings are a significant factor, there's a recognition of the multifaceted nature of learning, encompassing emotional, social, and personal dimensions. The responses also highlight the need for evidence-based practices and a commitment to ongoing learning and adaptability in the field of education. One teacher reported that: *"The effectiveness is evident in their results"* (Participant 4). Another teacher also supported that: *"If I accept that it is true and I see a positive outcome in students and their results, I would say that is effective"* (Participant 6). Similarly, other participants reports the following:

> *"I found some learners understand better. Even if I'm just reading the textbook to them, then suddenly they understand better instead of reading it*

themselves. Where others I might have to rephrase what I'm saying, use simpler words. But that might be due to the gap left by COVID for some learners" (Participant 3).

"Based on what I witnessed and how the children respond to it and whether it is of benefit perceived in terms of the results, how it helps them learn, how engaged they are in the conversation, and how they respond to that learning style, whether it works for them" (Participant 8).

"I think it can be very successful into bringing every single learner into your classroom, but like anything in life, you need to put in a lot of effort into your planning to make sure that all of these little boxes are ticked and that your activities reflect on that. If you want to see that improvement and want it to be successful" (Participant 10).

"If there's some actual experience where it shows growth from the beginning of the year until the end. I don't want to specifically… They've become so iffy about the whole mark thing where we don't rate a child with their mark anymore. But yeah, if it shows improvement and progress in any way, then definitely there's grounds to adopt it in my classroom on a permanent basis because anything that works is what you want to keep" (Participant 12).

"I think at the end of the day, the students learning and the students having a good learning experience, and you achieving your outcomes and objectives is key to what you are doing in class. it is a happy, successful outcome, objectives achieved, kids' content, and kids learning, then is it safe to say it is a successful methodology, it works in theory, and it works in practice, so let's go for it" (Participant 14).

"It is important to note that adopting fads and neuromyths in practice does not necessarily mean they are effective in the learning process. Claims of effectiveness may be based on anecdotal evidence, misinterpretation of research studies, or misguided beliefs. However, without solid empirical evidence supporting their effectiveness, it would be unjustifiable to claim that fads and neuromyths are effective in the learning process and this is evident in the academic results" (Participant 18).

> *"As teachers we need to be open to being lifelong learners and I find these fads and neuromyths effective in the learning process especially the fact that we are either left or right brain dominated. With these processes in mind teaching resources and strategies can best balance these two brain dimensions for effective learning and teaching"* (Participant 19).

From the data collected, participants suggested that there were evidence in the effectiveness of implementing these neuromyths approaches in their teaching as their learning outcomes were achieved, they saw a change of behaviour in students as they were more enthusiastic to learn, understood information better, effective and better results, growth from the beginning of the year to the end of the year, in students maturity, independence and responsibility, as well as their overall academic performance in addition to personal growth. The data summary underscores the complexity of evaluating teaching effectiveness, encompassing various dimensions beyond traditional academic metrics. The insights highlight the importance of adapting teaching methods to individual student needs, fostering practical application, and considering the holistic development of learners. The cautious approach towards educational trends suggests a commitment to evidence-based practices, reflecting a thoughtful and nuanced perspective among educators.

Theme 2: *Improved positive psychology among students*

Participants suggested that the use of fads and neuromyths was effective because it was visible not only in their teaching but also in how students received information. The participants exhibit a balanced and pragmatic approach to teaching, recognizing the diversity of students and the need for flexibility in methodology. The focus is on effectiveness, practicality, and a commitment to continuous improvement through ongoing professional development and adaptation of teaching strategies through trial and error. Most participants reported a willingness to experiment with different teaching methods and strategies to determine their effectiveness in the classroom. They emphasized the importance of adapting and evolving their approach based on the outcomes observed with their students. Participants expressed a focus on student growth and development, not only academically but also in terms of personal skills such as emotional intelligence, maturity, independence, and interpersonal relationships. Additionally, participants highlighted the significance of ongoing professional development, critical evaluation of educational trends, and seeking reliable sources of information to inform their teaching practices. Overall, most participants emphasized a student-centered approach,

prioritizing the impact on student learning and well-being when assessing the effectiveness of teaching methods. One teacher brought to light: *"I engage in ongoing professional development, seek out reliable sources of information, and critically evaluate new trends in education before implementing them in my classrooms, and if it works, it works"* (Participant 7). Another teacher supported that: *"The most effective way to teach are using these methods and there is no other way to teach. They learn the techniques in sport for example, and practice makes perfect"* (Participant 20). Similarity, other participants shared their experience below:

> *"To be honest, I will say it depend on the child. I don't have the ground to say they are working or not but I believe every child is individual and we can balance the brain by including different ways to learn"* (Participant 2).

> *"So, for me, it's more if I look at the different methods and the new stuff that's coming out and through research, it's all a matter of trial and error. You got to try it and see if it's working. If it's not working, then you chop and change. You can always adapt. It depends. If you start and use a system like I've started now, it's fairly new. I don't ever give notes anymore. I've just started letting them to use the thinking maps because if you look at essays, it's a lot of notes. I feel with me showing them, using it constantly in the classroom, they will learn how to use this thinking maps to make their own study notes. Because often they think making study notes is taking my textbook or taking my notes and rewriting it, and that's not what it's about. And I said to them, "put these, summarize and put these in bullet points so that if I throw any question at you, you can apply your knowledge because you know the facts already. I can give you any scenario and you can use the information""* (Participant 5).

> *"Well, from seeing how the students retain the knowledge and how well they do in their assessments and their learning every day and how they grow to learn and their overall performance. Not only academic performance but personal growth and as a whole person, their emotional intelligence, their physical ability. I think it affects a lot of the student"* (Participant 11).

> *"We see it in their maturity, their independence, their responsibility skills and their interpersonal relationships, not only with their teachers but with their peers. We see how they work in groups when we do project-based*

learning and enquiry-based learning. We have Junior Engineers for Africa (JEFA), which is a stream initiative, and they come to our school and they host these workshops with the children and a lot of it is group based and very often, children that are so used to working independently are now given the opportunity to work into groups and teams to develop and extend their knowledge" (Participant 15).

"For me, if I knew it worked or didn't work for me, it's that the majority of my classes were positively affected by it, even though every child is different and it might work for the one and not the other. It's for me to see whether it works or not. It is just to see that the majority was affected or not. For example, in PE, if the one class drastically caught a ball better or focused a lot longer for me to explain the technique for the day, I think then I would say yes, it works" (Participant 16).

The participants demonstrate a balanced and pragmatic approach to teaching, blending theoretical concepts with practical applications. The focus on individualization, adaptability, continuous improvement, and a results-oriented mindset collectively contributes to a thoughtful and effective teaching philosophy among the participants using a trial-and-error method. From the data collected, participants asserted that the effectiveness of implementing neuromyths were evident in trying new things coming out and through research, if it works, it works, and the most effective way to teach are using these methods and there is no other way to teach. The data suggests a multifaceted approach to teaching and learning, with an emphasis on adaptability, experimentation, and student-centeredness. Participants expressed a willingness to try new methods and strategies in the classroom, recognizing that what works for one student may not work for another. They highlighted the importance of ongoing professional development and critical evaluation of educational trends to inform their teaching practices.

Furthermore, participants emphasized the significance of considering students' individual needs, including their emotional intelligence, maturity, and interpersonal skills, in addition to academic performance. They indicated a focus on student growth and development, both academically and personally, as a measure of the effectiveness of their teaching methods. Overall, the interpretation of the data suggests a commitment to student-centered teaching,

continuous improvement, and a holistic approach to education that prioritizes the well-being and success of each student.

Theme 3: *Enhances meditation during lessons*

Enhancing meditation during lessons refers to incorporating mindfulness and meditation practices into the learning environment to promote focus, attention, and emotional regulation among students (Russo, 2019). This approach involves guiding students through mindfulness exercises, breathing techniques, or short meditation sessions during class time. Participants expressed a strong interest in learning more about the structures of the brain and the role of cognition in learning. They believe that gaining this knowledge would enhance their ability to assist different learners effectively and adapt their teaching methods to ensure optimal learning outcomes. Participants emphasized the importance of understanding how neuroscience influences teaching practices, stating that teachers need this knowledge to avoid falling prey to neuromyths and to implement evidence-based strategies in the classroom. They reported:

> *"I would definitely like to learn more about the structures of the brain. it will enhance my ability to assist different learners and obviously teach in different ways or methods to ensure effective teaching and that the kids are getting the best out of me.*
>
> *It is so important for teachers to have knowledge about how neuroscience might influence and explain their work. Teachers need to acquire this knowledge to enhance their teaching methods so that they can do their best when teaching students. If we are not aware, our teaching methods may be flawed"* (Participant 1).
>
> *"I would like to learn more about the structures of the brain and the role of cognitive in learning. I believe it can help the learners to think and apply their knowledge and solve problems. To know as a teacher on how to encourage and motivate learners to work. Stimulate their brains to work at its full potential.*
>
> *It is important to know to help the learners to think and understand the concepts better. Teaching will be interactive and less stressful with remedial cases. It will make it easier for them to learn new skills with confidence and*

apply them. Learners enjoy learning with deeper understanding." (Participant 2).

"I definitely would like to learn more about that because I think as teachers, the better understanding we have of the brain, the better we'll be able to teach. We might not need to know every single detail about the brain, but we should know the basics of learning, how learning happens in the brain. Would you also agree to saying that it's so important to know that learning is a complex process? It's not just a straightforward teaching method that you can convey context to students. It's quite a complex process that you will need to do research. You would need to adapt your learning accordingly to make sure that it is an effective teaching method.

I definitely do think it is important to know how it works, even if it's just to realize about these neuromyths and to know that they're not true and how to avoid things like that. I think if you're more aware of cognitive neuroscience, then it'll also help you to adjust your teaching better, because then you're consciously thinking about the learners and how they take in information" (Participant 3).

"As a professional teacher I would definitely want to learn more about the brain and cognition in learning. Because I think it would be an added benefit to see how children learn best. If you look at cognitive thinking, learning the brain, all linked to how children learn. And I think as a teacher, if I have this information, it's half my battle won. So, when I prepare my teaching, I know this is how I need to structure my lesson because this is how children learn best. I always believe more knowledge about anything you can make more informed decisions about how you teach" (Participant 5).

"I would definitely want to know more. I think that learning is a lifetime process, and I think it will definitely benefit me as a person and also as a teacher. I think I might understand some concepts more, and then we'll be able to help the learners understand certain concepts more as well. I think most teachers believe in science and things that has been proven before. So, I think if we all have the correct knowledge about cognitive skills and neuroscience, and we can start to implement some things in our classroom

that will definitely influence our teaching practice. I think that teachers should be aware of it as I think it might enhance both learning and teaching. And we might even get solutions to current problems that we are facing right now in let's say ADHD or something like that where we can help the learners more" (Participant 6).

"From the point of view, being able to understand exactly what it is that works for the children to make sure that I'm helping them in the best way possible to grow their brains so that when they leave school, they have all everything that they need, the information that we've helped them obtain to make sure that that is of benefit to them once they've left school. I think then we would understand what does and does not work and understand that the neuromyths are not actually helping that. To prove and show why that wouldn't work, I do think it would be of benefit. We definitely need to gain more knowledge about cognitive neuroscience and how this influences our teaching. Obviously, the detail of it, we're not scientists, we're not doctors. But I do think to have a certain amount of information would be of benefit, I think, so that we understand exactly why we're doing what we're doing" (Participant 8).

"I would love to know more about the brain… to understand why kids struggle—whether it's auditory issues, ADHD, autism… to get to the root cause. Teachers would benefit from this knowledge, but many use neuromyths as excuses, saying a child isn't academically gifted. They rely on quotes like, 'You can't judge a fish by its ability to climb a tree,' instead of asking why a child is more creative, escapes into drawing, or struggles with work. Maybe it's not just a 'left-brain' thing—maybe it's a real learning disability. Teachers shouldn't shy away from deeper evaluation." (Participant 9).

"As a professional teacher and also still learning, I would like to know more. I think it's just because it's always interesting to see how different people retain information, handle situations, and it just makes you more understanding of those in your classroom or those around you. Some teachers may not be aware of neuromyths. We teach them more about the

brain and how it works. That they will not implement these false new myths in their teaching. I think it's important. Like I said, teaching is our job, so if you want to become the best at your job, you take all the information you can and try and apply it to see what works best. I think if you know about cognitive neuroscience, then I think that you would take that information that you know to be true and try and implement that into your classroom instead of just going on what other people say is works" (Participant 10).

"I do want to learn more about neuromyths and the brain function. As I said, when you mentioned it the first time, that was the first time I've heard of it, so I definitely like to learn more about it. I think the more teachers know, the more they shy away from everything, the neuromyths. It is important for teachers to know how it can influence their teaching, because especially if we are using all these different strategies to help different students, I think if we know where it comes from, it'll be a lot easier to get to know and help and know what we're teaching from" (Participant 11).

"I don't mind learning about the function of the brain and neuromyths because I would know how to apply them more effectively in my class. Yes, I would love that. It is very important that we know about it. Some of our teaching practices or methods, they are more of traditional ways. We don't really know about the science maybe behind the brain and all that. If we are to give that knowledge, acquire that knowledge, it will help us to be effective in class" (Participant 13).

"Learning about the brain function and the role of cognitive in learning world be fascinating. There is this whole talk recently in school about neuroplasticity, and we did see a picture of how neurons work and the connections and I think it will be fascinating to learn how the brain works. If teachers were aware of these neuromyths, it will bring an end to all of these myths. I suppose it is the lack of knowledge and not knowing better, we have these growing numbers of myths that a lot of people swear by, whereas if we did have the real information and the real data, this will definitely be better for everybody involved. I think it would be interesting and beneficial. For teachers yes, but it is also important for curriculum

developers and the people who sit above and decide how and what the children should be learning" (Participant 14).

"To gain for information, definitely because we always speak about metacognition and it's a word that is branded around very often in our school, so it would be interesting to know more about it and what does it actually entail. If teachers knew more, the more information that is out there and the more research there is to back this up, teachers will experiment, because that is what it is. Teachers will experiment and try to find something that works for the. Each teacher is an individual, and he or she is going to try something that works best for them in their particular dynamic group for that year" (Participant 15).

"We don't have enough training regarding this topic. We only learn, okay, you must teach this principle…but they don't really teach us different learning styles, different learning techniques different in your subject specific. I think a language can be very boring. It's just read and answer… And due to the fact that we are so squashed with time and pressured with time, we can't really think outside the box and make cue cards and flashcards and sticky ball games like we would do in primary school or kindergarten. So, I would really like to know how we can as teachers, incorporate, let's say, for example, the V AK in one lesson with one specific topic to make sure that all learners with all different learning styles are accommodated. As a teacher, we have a specific learning style, some teachers might think that this is the only learning style and this is the only teaching style and this is the only way that I can teach the subject. There is no other way. And I feel like if teachers are more educated and more trained and have more knowledge, then they can say, but we are all different and we are all learning on different grounds and in different styles and that we must be adaptable to a situation or to a specific learner" (Participant 17).

"As a professional teacher, learning more about the structures of the brain and cognition in learning would be beneficial… Understanding the brain's structures and functions provides insights into how learning occurs and how to optimize strategies… helps design effective learning experiences aligned

with the brain's natural processes. Knowledge of cognitive neuroscience enhances teachers' ability to identify and address cognitive difficulties… enables tailored teaching approaches. It could help teachers shy away from neuromyths… Increased awareness allows them to critically evaluate information, distinguishing evidence-based knowledge from myths. Understanding how the brain learns enables more effective teaching, informed interventions, and better support for students." (Participant 18).

"I personally, I would not really be open to learn more about this. The brain is very complicated. However, I think it is very important that teachers become more aware of the cognitive neuroscience, the way we teach and the way we learn through our brain being receptive in different aspects. For example, the VAK learning style, if we are able to understand and learn our students better. It is vital in terms of implementing the appropriate interventions. Through this, it will allow teachers to shy away from making assumptions or creating these neuromyths about learning, and actually have valid scientific ways to inform us about the pattern of learning. Teachers gaining this knowledge will assist them in terms of knowing that there are different ways of teaching and doing things" (Participant 20).

From the data collected, majority of participants do in fact want to learn more about the role of cognitive in learning and how this can influence their teaching. Teachers are aware that learning is complex. Learning is a difficult process. It is unique to each student and is the process of comprehending and applying new information and experiences. Students do this when they make connections between their previous experiences and knowledge and new information they encounter. Participants want to improve in their practice and grow professionally to best support the students that they teach.

Many participants highlighted the significance of knowing how learning occurs in the brain to tailor instruction to individual learner needs, stimulate students' cognitive abilities, and create inclusive learning environments. They expressed a desire to integrate cognitive neuroscience findings into their teaching practices to improve student engagement, motivation, and learning outcomes. Additionally, participants recognized the importance of identifying and addressing cognitive difficulties or learning disorders that students may face, advocating for more informed and data-driven approaches to teaching. Participants stressed the importance of

ongoing professional development in cognitive neuroscience for educators to stay abreast of the latest research findings and apply them effectively in their teaching. They believe that acquiring this knowledge can empower teachers to make informed decisions, differentiate instruction, and create optimal learning experiences for all students.

5.4 Conclusion of the Chapter

This chapter focused on the findings of the study. The chapter concludes that although many teachers were able to provide a definition for the concept of fads and neuromyths, their beliefs on the phenomena showed that although they may have understood the term, they still believed in some of the neuromyths. The next chapter elaborates on the summary of findings, discussion, conclusion, and recommendations for this study.

CHAPTER SIX

6.0: SUMMARY OF FINDINGS, DISCUSSION, CONCLUSION AND RECOMMENDATIONS

6.1: Introduction

In this final chapter, the summary of research findings, conclusions and discussions are presented. In addition, the suggested areas for further study and recommendations, are discussed. This research study examined the complexity of learning and opposing the uncritical adoption of pop psychological fads and neuromyths in education among teachers in private schools in Midrand, South Africa.

6.2: Summary of Findings

6.2.1: Teachers understanding of fads and neuromyths

The study explored teachers' understanding of fads and neuromyths. The study findings reported that teachers had a varied understanding of educational fads and neuromyths. While some teachers demonstrated a clear grasp of these concepts, identifying examples such as the left brain-right brain myth, learning styles, and the belief in only using 10% of the brain in one's lifetime, others showed lack of awareness and limited knowledge of the concepts. The findings reported that the teachers understanding of fads and neuromyths included misconceptions about brain function, learning styles, and the influence of technology on education. Thus, the findings underscores the importance of teachers staying informed about current research and employing evidence-based approaches to teaching and learning to avoid perpetuating neuromyths and ineffective practices.

6.2.2: Teachers' beliefs of the major fads and neuromyths

The study also explored teachers' beliefs of the major fads and neuromyths. The findings indicated that teachers' beliefs regarding major fads and neuromyths varied widely. While some teachers agreed with concepts like that people only use 10% of their brain or the left-brain vs. right-brain theory, others strongly disagreed, citing scientific evidence to debunk these myths. Similarly, teachers' opinions on the VAK learning style theory were divided, with some believing in its effectiveness in catering to individual learning preferences, while other teachers' viewed it as oversimplified and lacking empirical support. Overall, the findings

indicated that teachers' beliefs reflect a combination of personal experiences, educational backgrounds, and exposure to scientific evidence, highlighting the complexity of understanding and addressing different learning styles and neuromyths in education.

The teachers expressed a range of beliefs regarding brain exercises, with some strongly endorsing their benefits for concentration, memory, and overall cognitive function. They highlighted the importance of engaging learners in activities that stimulate their brains and promote critical thinking. However, there were also varying opinions, with some teachers expressing scepticism about the effectiveness of brain exercises in improving intelligence or academic performance. Overall, while many teachers acknowledged the potential benefits of brain exercises, there was also recognition of the need for a balanced approach to learning that includes factors such as a healthy lifestyle, adequate sleep, and consistent teaching methods.

The teachers' beliefs on major fads and neuromyths vary widely. Some agree with the concept of critical periods of development, emphasizing the importance of early childhood education and the brain's capacity to change in response to environmental demands. Others emphasized the lifelong nature of learning, rejecting the idea of age cutoffs for acquiring new skills. Regarding the Mozart effect, opinions were divided, with some acknowledging the potential benefits of music exposure for cognitive development, while others dismiss it as a myth. Overall, there's recognition of the complexity of learning and development, with an emphasis on the need for diverse experiences and a supportive learning environment throughout life.

The teachers’ views reflect a diverse range of beliefs regarding educational theories, including multiple intelligences and emotional intelligence. Many teachers agreed with the concept of multiple intelligences, acknowledging that students have varying strengths and weaknesses across different domains, such as academic subjects, sports, and arts. Similarly, teachers generally support the idea of emotional intelligence, recognizing its importance in helping students manage their emotions, understand others, and navigate social interactions. However, there are also dissenting voices, with some teachers expressing skepticism about the applicability or validity of these theories, particularly in the context of classroom practice. Overall, the findings suggest a nuanced understanding among teachers regarding educational theories, with varying degrees of acceptance and skepticism influenced by personal experiences and observations in the classroom.

6.2.3: Fads and neuromyths incorporated in educational polices and teaching practices

The study also explored the Fads and neuromyths incorporated in educational polices and teaching practices. The study findings reported a variety of approaches to incorporating educational theories, fads, and neuromyths into curriculum and teaching practices. The findings indicated that teachers discussed efforts to challenge students, adapt teaching methods to different learning styles, and integrate technology and diverse activities into the classroom. Some teachers expressed challenges in fully implementing these practices due to time constraints and curriculum demands, while others emphasized the importance of professional development and ongoing training to support teachers in effectively applying these approaches. Additionally, there is recognition of the need for critical evaluation of educational trends and alignment with evidence-based practices to ensure positive learning outcomes for students. Overall, the findings underscore a dynamic landscape where teachers navigate the integration of educational theories and practices to meet the diverse needs of students while balancing curriculum requirements and resource limitations.

The findings indicated that teachers' acknowledged the incorporation of certain theories and methodologies influenced by popular trends into their curriculum and teaching styles, others highlight challenges in fully implementing them due to time constraints and the pressure to cover the curriculum. The findings further confirm that professional development opportunities, curriculum development, assessment practices, resource allocation, teacher evaluation, and parental expectations all play a role in shaping how fads and neuromyths are integrated into educational policies and teaching practices. Despite efforts to cater to diverse learning styles and promote critical thinking, there's a recognition that the adoption of these approaches varies across schools and educational systems, with some cautioning against uncritical acceptance of practices lacking evidence-based support. Overall, while there's an awareness of the need to adapt teaching methods to cater to individual learners, there's also a call for greater emphasis on evidence-based practices to ensure effective learning outcomes.

6.2.4: Sources from which teachers acquire the fads and neuromyths to be true

The study further explored sources which teachers acquire the fads and neuromyths to be true. The findings of the study suggested that teachers acquire knowledge about educational theories, trends, and research from a wide range of sources. These sources include formal education such as university courses and postgraduate studies, professional development workshops, online platforms, educational websites and blogs, peer-reviewed journals, conferences, social media, and networking with colleagues. Additionally, some teachers mentioned learning from

textbooks, articles, TED Talks, and even family experiences. The findings also highlight the importance of critical evaluation of sources to ensure credibility and validity in informing teaching practices. Overall, the diverse sources reflect a commitment to ongoing learning and professional growth among educators, contributing to effective teaching strategies and student engagement.

The study findings also reflect a diverse range of perspectives among educators regarding the implementation and acceptance of neuromyths in teaching practices. While some teachers expressed openness to trying neuromyths in their classrooms, citing anecdotal evidence or personal experiences as justification, others emphasize the importance of evidence-based research and critical evaluation before adopting such practices. There is a recognition of the uniqueness of each learner and the need for adaptable teaching methods, including catering to different learning styles and engaging both sides of the brain. Teachers also highlighted the importance of ongoing professional development, reflective practice, and considering contextual factors in educational settings. Overall, the findings underscore the complexity of navigating educational theories and trends, with a call for a balanced approach that prioritizes evidence-based practices and individual student needs.

The findings showcased a wide range of strategies and approaches employed by educators to cater to diverse learning styles, multiple intelligences, and emotional intelligence in their classrooms. Additionally, teachers recognized the value of brain exercises, critical thinking activities, and emotional literacy in enhancing students' cognitive skills, problem-solving abilities, and social-emotional development. Overall, the findings underscore the multifaceted nature of teaching and the importance of adopting flexible and student-centered approaches to promote holistic learning and growth.

The findings suggests that teachers acquire various fads and neuromyths from a multitude of sources, including professional development workshops, educational literature, school policies, and institutional guidelines. These sources often promote popular teaching trends and theories without sufficient empirical evidence or critical evaluation. Additionally, anecdotal experiences, peer influence, and pressure from educational authorities may contribute to the adoption of these practices. While some teachers expressed skepticism and critical thinking regarding these trends, others embraced them uncritically due to a desire to improve student outcomes or conform to perceived expectations within the educational community.

6.2.5: Findings on the effectiveness of using fads and neuromyths in the learning process

Finally, the study explored the effectiveness of using fads and neuromyths in the learning process. The findings indicated that teachers reported positive outcomes, such as improved understanding, better results, and enhanced learning experiences, others highlighted the importance of empirical evidence and critical evaluation. Therefore, anecdotal evidence, personal observations, and perceived benefits contribute to some teachers' belief in the effectiveness of certain practices. However, there's a consensus among several teachers regarding the necessity to engage in ongoing professional development, acquire reliable knowledge about cognitive neuroscience, and critically evaluate new trends before implementing them in classrooms. In addition, most teachers emphasized the need for evidence-based practices and express concerns about the potential negative impact of false beliefs or ineffective methods on student learning. Overall, while some teachers acknowledged perceived benefits, there's a strong emphasis on the importance of informed decision-making and the avoidance of neuromyths in educational practice to ensure the best outcomes for students.

6.3: Discussion of findings

6.3.1: Teachers understanding of fads and neuromyths

The study explored teachers understanding of fads and neuromyths. The findings revealed that teachers' understanding of educational fads and neuromyths varied, with some grasping concepts like the left brain-right myth and learning styles, while others lack awareness. In agreement, Hughes, et. al., (2020) reported that more than half of teacher participants argued that neuromyths were implemented into the curriculum, an indication that these misconceptions are widespread among educators. The findings align with Vygotsky's (1978) social constructivism and Hein’s (1991) constructivist learning theoretical assertion that learning is a social process where individuals construct knowledge through interactions within cultural contexts. This perspective encourages educators to see learning as dynamic and contextually embedded. However, this focus can sometimes lead teachers to adopt neuromyths—misconceptions about brain function and learning—believing they provide personalized strategies for student engagement. While this framework encourages interactive

and adaptive teaching methods, it can also make neuromyths, such as learning styles or brain-based teaching methods, appear credible as they seem to cater to individual differences. Thus, the implication of this finding is that, it is crucial for educators to critically reflect, stay informed about current cognitive science research, and ground their practices in evidence-based principles that genuinely enhance teaching and learning. Moreover, the implication of this finding is that there is need for the Department of Education to train teachers on fads to correct these misconceptions since individuals are less likely to question beliefs they hold with high certainty.

The study finding also indicated a significant gap between current scientific understanding of neuroscience and what is believed and practiced in educational settings. In addition, the findings indicated that the teachers' misconceptions are not just superficial misunderstandings but are deeply ingrained beliefs. The finding agreed with Hughes, et. al., (2020) which reported that neuromyths are being implemented into the curriculum indicates that these misconceptions are not just passive beliefs but are actively influencing teaching practices and educational content. The findings also agree with Hein's (1991) constructivist theoretical perspective which argued on the principle is that people learn to learn as they learn: learning consists both of constructing meaning and constructing systems of meaning. This indicates that teachers conceptualize the beliefs on the bases of how they understand them in the school contexts where they are based. Similarly, Hardiman's (2012) study, indicated that many teachers have a limited understanding of neuromyths, frequently believing in misconceptions such as the idea that students only use a small percentage of their brains or that specific learning styles significantly enhance learning outcomes. Similarly, Van Dijk and Lane's (2020) study found that many teachers continue to believe in neuromyths, such as the erroneous concepts that individuals only use 10% of their brains or that tailoring instruction to specific learning styles significantly enhances learning. These persistent misconceptions are attributed to a lack of comprehensive neuroscience education in teacher training programs and the widespread dissemination of inaccurate information. The implication of this finding is that there is need for continuous teacher training to address misconceptions on fads and neuromyths. This is because since teaching practices are influenced by teachers' beliefs and knowledge, the presence of neuromyths in the curriculum can impact student learning outcomes.

Despite recognizing these myths, teachers noted their impact on educational practices, sometimes integrating them into teaching methods without robust empirical support. There was consensus on the necessity for improved teacher training to distinguish between evidence-

based strategies and unsupported trends. Overall, the findings underscored the importance of critical evaluation and informed decision-making in shaping effective pedagogical approaches amidst evolving educational theories and practices. Therefore, the implication of this finding is that, there is a need for ongoing education that focuses on debunking neuromyths and promoting accurate, evidence-based understanding of neuroscience in education.

6.3.2: Teachers' beliefs of the major fads and neuromyths

The study also investigated teachers' beliefs of the major fads and neuromyths. The findings revealed that teachers' beliefs on major fads and neuromyths, such as the left-brain vs. right-brain theory and the VAK learning style theory, were diverse. Thus, teachers believed in brain exercises for concentration, memory, and cognitive function, but also acknowledge the need for a balanced approach. Moreover, teachers also support the concept of critical periods of development and the Mozart effect, emphasizing the lifelong nature of learning. They also support the idea of multiple intelligences and emotional intelligence, suggesting that tailoring educational approaches to individual strengths can enhance learning. However, some teachers expressed skepticism about the applicability of these theories in classroom practice. Overall, teachers' beliefs reflect a nuanced understanding of educational theories, influenced by personal experiences and observations in the classroom.

The findings align with Feuerstein's (1990) Mediated Learning Experience (MLE) theory, which emphasized on the role of teachers as mediators in cognitive development. However, teachers' beliefs in neuromyths can influence this mediation process. Conversely, the findings are contrary to MLE theory assertation by emphasizing structured interactions over fixed cognitive traits. It posits that cognitive abilities can be developed through mediated interactions, challenging the notion that learning is predetermined by genetics or fixed traits. In agreement, Dündar and Gündüz (2016), argued that the propensity for educators to accept this media information may also be a sign that they don't understand it well enough or that they are unable to critically evaluate their own understanding of neuroscience. In addition, the findings indicated that teachers tend to adopt the visual, auditory and kinesthetic learning styles which they believed has an impact on learning through hemisphere dominance to cater for right-brained and left-brained individuals (Dündar & Gündüz, 2016). The findings also agreed with Riener and Willingham (2010) study which reported on regarding teachers' belief in the myth of learning styles. The implication of this finding is that teachers should adopt reflective

teaching styles do address the misconceptions on fads and neuromyths that they encounter in classrooms.

The findings also indicate that despite substantial evidence debunking the effectiveness of learning styles, this myth continues to hold strong influence in educational settings. The persistence of the learning styles myth suggests that educational myths are particularly resistant to change. This could be due to various factors, including the intuitive appeal of learning styles, the prevalence of this concept in teacher training programs, and the reinforcement of this belief through educational materials and professional development courses. In agreement, Kakoma (2019) highlighted the widespread belief in neuromyths among teachers, such as misconceptions about the use of brain capacity and learning styles. In addition, Lithander's (2022) study, suggested that a significant number of teachers continue to hold beliefs in neuromyths, such as misconceptions about brain usage and learning styles. Similarly, Schreiber's (2024) revealed that many teachers still subscribe to neuromyths, such as the notion that people use only 10% of their brains or the belief in distinct learning styles. The implication of this finding is that teacher education programs should incorporate rigorous training on how to critically evaluate educational theories and practices, ensuring that future teachers can distinguish between scientifically supported methods and popular but unsupported myths.

6.3.3: Fads and neuromyths incorporated in educational polices and teaching practices

The study aimed to investigate fads and neuromyths incorporated in educational polices and teaching practices. The findings revealed a complex relationship between educational theories, fads, and neuromyths, highlighting the need for adapting teaching methods to diverse learning styles and integrating technology. The study emphasized the importance of professional development, ongoing training, and alignment with evidence-based practices to ensure positive learning outcomes. The adoption of these approaches varies across schools and educational systems, and there is a call for greater emphasis on evidence-based practices to ensure effective learning outcomes. The findings support Hein's (1991) Constructivist learning theoretical argument that learners construct knowledge through their experiences and interactions. theory's

emphasis on individualized learning has increased the focus on tailoring instruction to perceived individual needs, like learning styles, despite the lack of scientific support for such concepts. The findings also align with Vygotsky's (1978) social constructivism theoretical assertion, emphasizing social interaction and cultural context in cognitive development, which has influenced educational practices to sometimes incorporate neuromyths. This underscores the need for educational policies and teacher training to be grounded in evidence-based neuroscience to align with social constructivist principles.

However, the findings are contrary to Feuerstein's (1990) Mediated Learning Experience (MLE) theoretical assertation which emphasizes dynamic, interactive cognitive development through intentional, structured interactions, contrasting with the oversimplified ideas of neuromyths. Similarly, the findings also disagree with Hein's (1991) theoretical argument that since constructivism emphasizes active, learner-centered engagement in constructing knowledge, which contrasts with neuromyths' oversimplified misconceptions. Thus, it can be argued that neuromyths lack empirical support and can lead to ineffective strategies, while constructivism promotes research-based practices that foster genuine understanding and critical thinking.

The findings indicated that teachers acknowledged the incorporation of certain theories and methodologies influenced by popular trends into their curriculum and teaching styles, others highlight challenges in fully implementing them due to time constraints and the pressure to cover the curriculum. The findings agree with Hughes, et. al (2020), which argued that the knowledge teachers obtained about the brain was high, however, teachers who believed in neuromyths also implemented the myths into their practice. Similarly, Geake (2008) indicated that neuromyths are not only believed by individual teachers but are also embedded in educational policies and practices at a broader level. This widespread influence suggests that misconceptions about neuroscience have permeated the education system deeply and are shaping how education is delivered. The findings agree with Hughes, et. al., (2021) and Torrijos-Muelas et al., (2021) which both revealed that educational policies and teaching practices are frequently shaped by fads and neuromyths, such as the pervasive belief in distinct learning styles and the myth that people use only a fraction of their brains. Moreover, Grospietsch and Mayer's (2020) study concurred that the prevalence of fads and neuromyths in educational policies and teaching practices, indicating that these misconceptions often shape decision-making despite lacking empirical support. In addition, Grospietsch and Lins (2021) argued that common neuromyths such as the belief in learning styles and the misconception

that individuals use only a small percentage of their brains. Finally, the findings agree with Bissessar and Youssef's (2021) study which identified common neuromyths such as the belief in learning styles and the idea that individuals use only a small percentage of their brains. The implication of this finding is that there is need for the Department of Education to train teachers on understanding the different fads and neuromyths that they encounter in classrooms.

6.3.4: Sources which teachers acquire these fads and neuromyths to be true

The study aimed to investigate the sources which teachers acquire these fads and neuromyths to be true. The findings revealed that educators acquired knowledge about educational theories, trends, and research from various sources, including formal education, professional development workshops, online platforms, and peer-reviewed journals. They also learn from textbooks, articles, TED Talks, and family experiences. The findings also highlighted the importance of critical evaluation of sources to ensure credibility and validity in teaching practices. The findings align with Feuerstein's (1990) Mediated Learning Experience (MLE) theoretical argument which highlight the importance of the mediator's role in cognitive development, and showing how teachers' sources of information can propagate neuromyths. Similarly, Vygotsky's (1978) social constructivism theoretical assertion emphasizes social interaction and cultural context in learning. However, from the findings, teachers, seeking innovative instructional strategies within the Zone of Proximal Development (ZPD), often turn to professional development, literature, and peer discussions, where they may encounter and adopt neuromyths. Therefore, while Vygotsky's (1978) theory promotes engaging with diverse perspectives, it also stresses the importance of critical evaluation and evidence-based practice to ensure instructional methods support cognitive development effectively. Conversely, the findings disagree with Vygotsky's (1978) theory which emphasized learning as a social process occurring through interactions with knowledgeable others within cultural contexts, contrasting with the individualistic and oversimplified views of neuromyths. Moreover, Vygotsky (1978) argues that effective teaching should focus on scaffolding students' learning through meaningful activities that promote higher-order thinking and collaboration, rejecting the simplistic notions of fixed learning styles or specific brain-based activities. Thus, Vygotsky's theory critiques neuromyths and advocates for socially constructed knowledge within educational settings. The implication of this finding is that there is need to expand the

Vygotsky's (1978) theory to incorporate psychological aspects in which neuromyths are embedded.

The findings also indicated that educators have diverse perspectives on the implementation of neuromyths in teaching practices, with some open to neuromyths, while others emphasize the need for evidence-based research and critical evaluation. They also emphasized the importance of adaptable teaching methods, considering contextual factors, and incorporating various modalities to engage students effectively. The findings agreed with Bellert and Graham (2013) study which suggested that teacher education programs sometimes include outdated or incorrect information about brain-based learning, which can propagate neuromyths among pre-service teachers. In agreement, Grospietsch and Mayer's (2019) and Kim and Sankey's (2018) studies which both identified professional development workshops, educational conferences, teacher training programs, educational literature, and online resources as primary sources where teachers often encounter and adopt these beliefs. Moreover, Redifer and Jackola's (2022) study reiterate on the significant impact of these sources in shaping teachers' pedagogical practices and beliefs, highlighting the need for critical evaluation of the scientific validity behind educational strategies. The implication of this finding is that there is need for teacher development is the urgent need for professional development workshops, teacher training programs, and educational resources that emphasise critical evaluation skills, especially when it comes to differentiating between information that is scientifically validated and information that is neuromythic. Moreover, teacher development initiatives should prioritise incorporating the most recent neuroscience research into curricula and fostering an evidence-based mindset.

6.3.5: Findings on the effectiveness of using fads and neuromyths in the learning process

The study aimed to investigate the effectiveness of using fads and neuromyths in the learning process. The findings indicated that some teachers believed that they improved understanding, while others had contrary beliefs emphasizing the need for empirical evidence and critical evaluation. The findings support Feuerstein's (1990) Mediated Learning Experience (MLE) theoretical argument which emphasizes the mediator's active role in cognitive development, which can inadvertently validate neuromyth-based strategies when teachers observe positive student outcomes. The findings also align with Hein’s (1991) Constructivist learning theoretical assertation, which emphasizes the active role of learners in constructing knowledge

through experience and interaction. This approach has shaped teaching practices to sometimes validate neuromyths, such as learning styles, as educators seek to personalize instruction.

Conversely, the findings disagree with Feuerstein's (1990) MLE theoretical argument, which emphasized structured interactions and intentional mediation, opposing the simplistic and unfounded categorizations promoted by neuromyths. Thus, the MLE advocated for evidence-based practices that enhance cognitive functions through purposeful interactions, addressing individual learning needs and fostering higher-order cognitive skills. In addition, the findings also disagree with Hein's constructivist theory, which emphasizes evidence-based, learner-centered approaches, and also advocates for meaningful activities that promote critical thinking and problem-solving, critiquing the simplistic and misleading ideas of neuromyths. The results highlight the vital need for evidence-based strategies in education and support and build upon constructivist theory by Hein and Feuerstein's Mediated Learning Experience (MLE) hypothesis. The argument against neuromyths supports constructivism and MLE's demand for flexible, learner-centred methods even more. It suggests that to maintain the sophisticated and reflective processes that these frameworks aim to foster in both instructors and students, it is imperative that these theories be actively shielded against the spread of neuromyths. This also emphasises a larger duty on the part of teacher education programs to guarantee that constructivist and MLE methods are based on the most recent neuroscience research, favouring deliberate mediation and critical thinking above the mindless dissemination of knowledge. The findings emphasise the significance of matching pedagogical methods with educational initiatives that have scientific backing, so contributing to the expansion of these theories.

The findings also indicated that anecdotal evidence, personal observations, and perceived benefits contribute to some teachers' belief in the effectiveness of certain practices. In agreement, Van Dijk and Lane (2020) argued that implementing neuromyths—misconceptions about brain function and learning—can be detrimental to educational practices. Similarly, Howard-Jones's (2019) study emphasized that while neuromyths such as the idea of distinct learning styles or the belief in brain-based educational strategies may seem intuitively appealing, they often lack scientific validity and can lead to ineffective teaching practices. In addition, Lawrence et al.'s (2020) study found that popular educational trends and neuromyths, such as the belief in learning styles or brain-based teaching strategies, often lack empirical evidence to support their efficacy. Finally, Lithander et al. (2021) underscored the importance of educators critically evaluating the scientific validity of educational practices before implementation, advocating for evidence-based approaches grounded in rigorous research.

Overall, these perspectives underscore a collective interest in integrating neuroscientific knowledge into educational practices to enhance learning outcomes and address individual learning differences more comprehensively. The implication of this finding is that there is need to give continuous professional development for teachers on understanding common neuromyths in classrooms.

6.4: Conclusion

The study concludes that there is a wide range of beliefs and misconceptions within educational practices. Many teachers showed awareness of prevalent neuromyths such as the left brain-right brain myth and the effectiveness of learning styles, though a significant number still held these beliefs. Thus, a substantial portion of educators incorporate neuromyths into their teaching, suggesting these misconceptions influence educational content and methodologies. These entrenched beliefs pose challenges, as confident adherence to neuromyths can hinder efforts to correct them, potentially leading to ineffective teaching practices rooted in misinformation rather than scientific evidence. The study underscores the necessity for robust neuroscience education in teacher training programs to foster a more accurate understanding of brain function and learning processes. By addressing these gaps, educators can better implement evidence-based strategies, ultimately enhancing educational outcomes for students.

The study concludes that there is a diverse spectrum of perspectives among educators. While most participants demonstrated a scientific approach by rejecting the neuromyth that people only use 10% of their brains, beliefs on other topics varied widely. Views on left brain/right brain dominance were split between those supporting distinct hemispheric functions and those advocating for a holistic understanding of brain integration. Most teachers agreed on the benefits of brain exercises for enhancing cognitive function, while recognizing the need for a balanced approach in education. Additionally, there was consensus on the importance of emotional intelligence in fostering supportive learning environments. These findings underscored educators' nuanced perspectives on educational theories, influenced by both empirical evidence and practical experience in the classroom. The study highlighted the ongoing need for rigorous professional development to ensure that teachers are equipped with accurate neuroscience knowledge and can effectively apply evidence-based practices to enhance student learning outcomes.

The study also concludes that there is a complex landscape where educational theories intersect with prevalent misconceptions. While educators acknowledged the appeal and potential of

adapting teaching methods to accommodate diverse learning styles and integrating technology, they also faced challenges such as time constraints and curriculum demands. The findings underscored the critical role of professional development and ongoing training in aligning teaching practices with evidence-based approaches to enhance educational outcomes. However, the study highlighted significant disparities in the adoption of evidence-based strategies across schools and educational systems, indicating a need for greater consistency and rigor in educational policy. The persistence of neuromyths, as discussed by various studies, emphasized the importance of educators critically evaluating and integrating accurate neuroscience knowledge into teaching practices to ensure effective learning environments and support student success.

The study also concludes that there exists a multifaceted process influenced by diverse educational avenues. Educators gather knowledge from formal education, professional development workshops, online platforms, and peer-reviewed journals, alongside textbooks, articles, TED Talks, and personal experiences. These sources contribute to a varied understanding of educational theories and trends, including both evidence-based practices and pervasive neuromyths. The findings underscore the critical need for teachers to critically evaluate the credibility and validity of information they encounter, particularly in shaping their teaching practices. This study contributes by advocating for evidence-based practices in education, promoting a shift towards integrating accurate, research-based neuroscience knowledge into teacher training and professional development. The findings highlight a consensus among educators on the necessity to critically evaluate educational strategies to enhance teaching and learning outcomes effectively.

The study further concludes that many teachers hold beliefs in fads and neuromyths about learning and brain function, despite evidence suggesting otherwise. The study revealed that these neuromyths and fads often find their way into educational policies and teaching practices. This incorporation may stem from a desire to innovate or improve teaching effectiveness but can inadvertently lead to the adoption of ineffective strategies that do not align with empirical evidence. It was found that teachers acquire these fads and neuromyths from various sources, including professional development seminars, popular media, and informal discussions within the educational community. This suggests that efforts to combat misinformation should target these sources to promote evidence-based practices. The effectiveness of using fads and neuromyths in the learning process was evaluated and found to be lacking. The study further indicated that strategies based on these misconceptions often do not improve learning outcomes

compared to scientifically validated methods. This reinforces the importance of promoting critical thinking and evidence-based decision-making among educators.

6.5: Contributions of the PhD study to existing Literature

From the study findings, it is evident that, this PhD provides three key contributions to existing literature, existing theories and development of a framework that could be adopted to assist teachers address issues related to fads and neuromyths in classrooms. The PhD contributions are discussed as follows:

Literature Contributions

- This PhD study has contributed to addition of literature on identification of prevalence of Neuromyths and Fads in classrooms because previous literature indicated scanty information on the same. The study provides empirical evidence on the widespread belief in neuromyths and educational fads among teachers. Similarly, the study presents the sources through which teachers acquire these misconceptions, such as initial teacher education programs, professional development workshops, and peer influence. In addition to the literature contributions already outlined, this PhD study addresses several other significant gaps. This PhD study provides findings which fills research gaps on the effectiveness of teacher education and ongoing professional development in disseminating accurate neuroscientific knowledge. Furthermore, the study contributes to the dialogue on how the persistence of these misconceptions impacts teaching practices and student learning outcomes. By examining teacher perspectives, the research provides insights into the limitations of current educational interventions and identifies areas for improvement in integrating neuroscientific research into pedagogical methods. These aspects expand the literature on bridging the gap between neuroscience and practical education. The findings also contribute to literature since the teacher perspectives underscore a collective interest in integrating neuroscientific knowledge into educational practices to enhance learning outcomes and address individual learning differences more comprehensively.
- **Theoretical Contributions**

This PhD study has contributed to the proposed extension of two theories that were adopted to guide the research. Thus, several psychological aspects could be incorporated into Feuerstein's Mediated Learning Experience Theory and the Constructivist Learning Theory as discussed below.

- This PhD study findings proposed an extension of the Vygotsky's Social Constructivism theory (1978) to create a more comprehensive understanding of how neuromyths and fads persist in educational contexts. This is because this theory lacks key concepts on cognitive psychology which affects teachers understanding of fads and neuromyths. One key psychological aspect to consider is cognitive biases, such as confirmation bias, where individuals tend to favour information that supports their pre-existing beliefs. This could explain why teachers continue to believe in neuromyths despite contradictory evidence. Another important aspect is belief perseverance, where individuals maintain their beliefs even after the original basis for those beliefs has been discredited. This phenomenon is evident in teachers' adherence to educational fads and neuromyths. Metacognition, or teachers' awareness and regulation of their own learning processes, also plays a role, as it influences how they reflect on and revise their teaching practices based on misconceptions they may hold. Finally, emotional investment in particular teaching practices or educational theories may cause resistance to change, as teachers may feel a personal connection to certain methods or ideas that they have used over time. These psychological elements contribute to the internalization of neuromyths, suggesting the need to integrate these cognitive and emotional factors into Vygotsky's framework to better address the interplay between social influences and individual psychological processing.
- This PhD study findings also proposed the extension of the Feuerstein's (1990) MLE theory, which emphasizes the role of the teacher in actively shaping a learner's cognitive development by interpreting, selecting, and transforming stimuli to enhance the learning process. The findings from the PhD study offer opportunities to extend this theory by highlighting how the presence of neuromyths and educational fads can distort the mediation process. Teachers, as mediators, often internalize misconceptions that can affect the way they present and interpret learning experiences for students, which in turn affects cognitive development.

  One way to extend MLE is by emphasizing the need for critical mediation, where teachers not only provide mediation but also critically evaluate the scientific validity of the concepts they use. This addition would encourage teachers to challenge their own misconceptions (such as neuromyths), ensuring that mediation is based on evidence-based practices. Additionally, the findings suggest the inclusion of reflective mediation, which involves fostering teachers' metacognitive awareness of their own beliefs and

practices. This aligns with Feuerstein's focus on intentionality and reciprocity but could be enhanced by ensuring that teachers are actively reflecting on the sources of their knowledge, critically analysing whether their methods are rooted in science or unfounded myths. Furthermore, the study points to the importance of emotional and psychological mediation in MLE. Therefore, incorporating emotional regulation and psychological reflection into the MLE framework would help address these affective dimensions, ensuring that mediation is not just cognitive but also emotionally aware and scientifically grounded.

- **Proposed framework for teachers to address issues related to fads and neuromyths**

On the bases of the study findings, a proposed framework for teachers to help address issues related to fads and neuromyths is presented. The focus should be on integrating these elements into the core aspects of teacher education, professional development, and ongoing support. The figure 1 below is an explanation of the proposed framework for teachers to address issues related to fads and neuromyths.

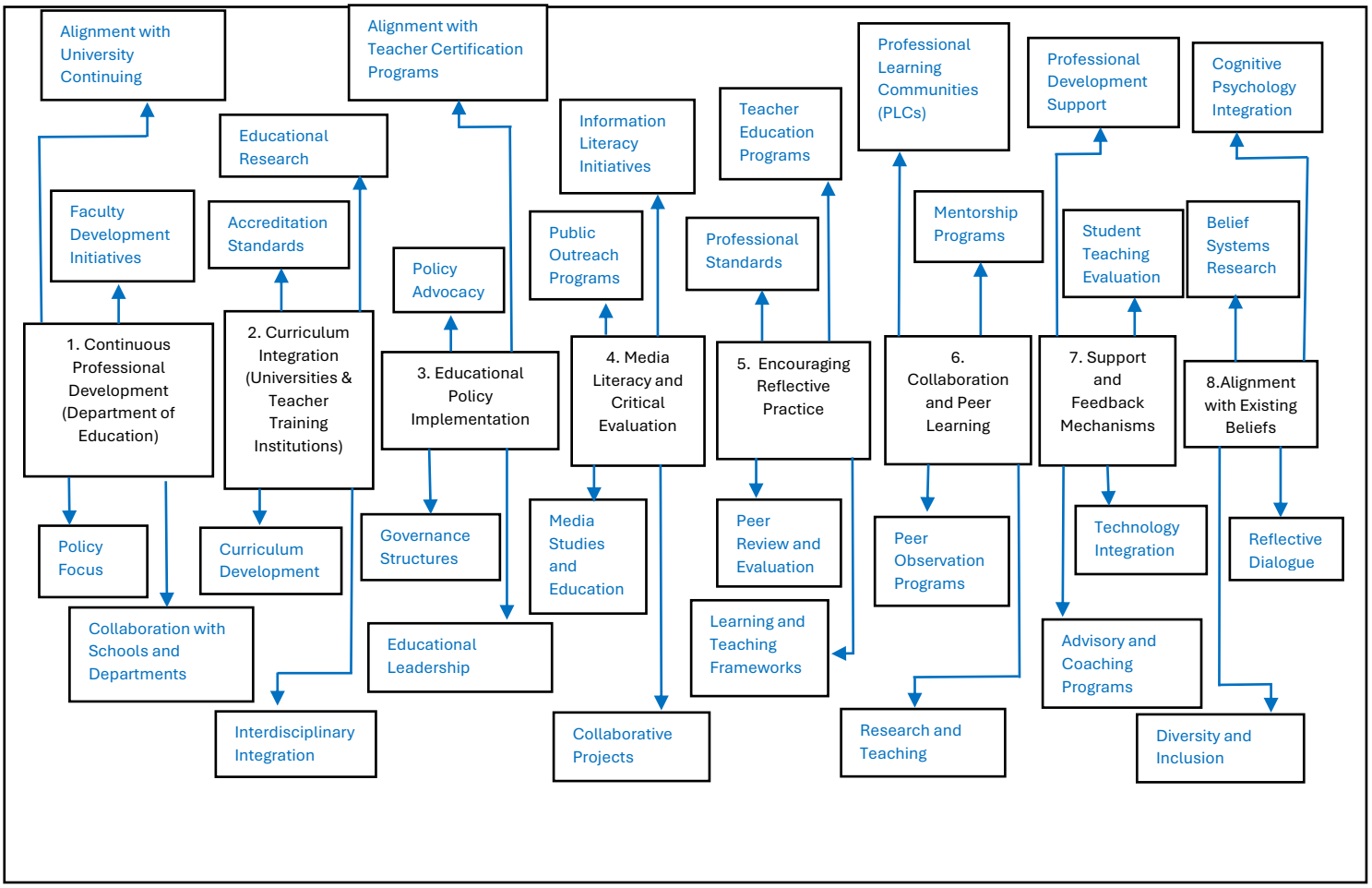


Figure 1: *Framework to help teachers construct knowledge of fads and neuromyths* (Source-Research data-2024)

The proposed framework aims to help teachers construct a deep understanding of educational fads and neuromyths through a comprehensive approach involving continuous professional development, curriculum integration, educational policy implementation, media literacy, reflective practice, collaboration, support mechanisms, and alignment with existing beliefs. This multi-faceted strategy is designed to ensure that teachers not only recognize and avoid unscientific practices but also actively integrate evidence-based methods into their teaching. In this regard, the framework aims to help teachers construct a deep understanding of educational fads and neuromyths through a comprehensive approach involving continuous professional development, curriculum integration, educational policy implementation, media literacy, reflective practice, collaboration, support mechanisms, and alignment with existing beliefs. The tenet of the framework is discussed below:

1. Continuous Professional Development for teachers **(Department of Education)**

The framework emphasizes the need for universities to incorporate professional development (PD) programs focused on debunking neuromyths and educational fads into their continuing education efforts. Faculty members would also participate in these programs, ensuring they stay current with the latest research. Collaboration with local schools would allow practical, on-site PD, making these sessions more relevant and immediately applicable. This multi-faceted strategy is designed to ensure that teachers not only recognize and avoid unscientific practices but also actively integrate evidence-based methods into their teaching. Through workshops, online modules, and resource hubs, teachers would gain critical insights into the validity of various educational trends. This structured approach to PD helps teachers build a foundation of knowledge that differentiates scientifically supported practices from fads, leading to more informed instructional decisions.

2. Curriculum Integration of fads and neuromyths content **(Universities & Teacher Training Institutions)**

The framework proposes a revision of university curricula to include mandatory modules on neuromyths, cognitive psychology, and critical evaluation of educational practices. Interdisciplinary courses will bring together insights from psychology, neuroscience, and

education, providing a holistic understanding of learning processes. Assignments focused on critiquing popular educational theories will further develop students' critical thinking skills. By embedding the content of fads and neuromyths into the core curriculum, future teachers would be better equipped to identify and reject educational fads early in their careers. The integrated approach fosters a scientifically grounded understanding of how learning occurs, which is crucial for effective teaching. The curriculum integration of fads and neuromyths content would be ascertained by accreditation standards, educational research, curriculum development and interdisciplinary integration.

3. Educational Policy revision on training teachers on neuromyths

Universities would play a role in advocating for policy changes that require teacher certification programs to include mandatory training on neuromyths and evidence-based practices. Thus, new curriculum standards and accountability measures would be developed to ensure consistent application of these practices across schools. Policy changes would institutionalize the rejection of unscientific methods, creating an educational environment where evidence-based practices are the norm. This consistency across the education system may reinforce teachers' understanding and application of scientifically supported methods. From the framework diagram, it appears that Policy Advocacy and Governance Structures would play critical roles in ascertaining the institutionalization of policies against neuromyths in teacher training and practice. Educational Research and Professional Standards would likely support and validate the development of evidence-based practices in teaching. Policy Advocacy would drive the policy changes needed, while Governance Structures would ensure that these policies are enforced across institutions. Additionally, Teacher Certification Programs aligned with these policies would standardize training on neuromyths and scientifically supported practices, ensuring new educators enter the system with a solid foundation in evidence-based methods. Accreditation Standards would further ensure consistency and accountability, making it mandatory for institutions to integrate these policies and practices effectively.

4. Media Literacy and Peer Critical Evaluation

The framework emphasizes the importance of media literacy in helping teachers critically evaluate the vast amount of educational content available online. Workshops, guidelines, and collaborations with media experts would provide educators with the tools needed to assess the credibility of information sources. Improved media literacy would help teachers discern credible educational information from unsupported fads, preventing the adoption of ineffective

practices based on misinformation. This skill is crucial in the digital age, where misinformation can easily spread. From the framework diagram, Public Outreach Programs and Information Literacy Initiatives would play key roles in ascertaining the development and implementation of media literacy and critical evaluation skills for teachers. Public Outreach Programs would likely involve collaborations with media experts to provide workshops and guidelines, while Information Literacy Initiatives would focus on building teachers' skills to critically assess the credibility of educational content. These components together would ensure that teachers are equipped to navigate and evaluate online information effectively, helping to prevent the spread of neuromyths and unsupported educational practices.

5. Encouraging Reflective Practice among teachers

Reflective practice would be embedded into teacher education programs, encouraging educators to regularly assess and analyse the effectiveness of their teaching methods. Tools such as reflective journals, guided reflection sessions, and training in critical questioning will support this ongoing process. Reflective practice encourages continuous personal and professional growth, allowing teachers to construct and refine their knowledge based on their experiences. This habit of self-assessment leads to a deeper understanding of what truly works in education. In the framework diagram, Peer Review and Evaluation and Professional Standards would be responsible for ascertaining and supporting the integration of reflective practice into teacher education programs. Peer Review and Evaluation would facilitate regular assessment and feedback among teachers, promoting reflective practice through collaborative review. Professional Standards would ensure that reflective practices are a required component of teacher training and professional development, establishing guidelines and expectations for continuous self-assessment and growth. Together, these components would foster a culture of reflective practice that enhances teachers' effectiveness and professional development.

6. Collaboration and Peer Learning among teachers

The framework supports the formation of Professional Learning Communities (PLCs) and mentorship programs within teacher education. These collaborative environments would allow teachers to share experiences, insights, and strategies, promoting collective learning and the spread of best practices. Collaboration fosters a culture of shared learning, where teachers can learn from each other's successes and challenges. This peer learning enhances the construction of knowledge about effective educational practices, moving beyond isolated learning to a community-driven approach. According to the framework diagram, Professional Learning

Communities (PLCs) and Mentorship Programs would be responsible for ascertaining and supporting collaboration and peer learning among teachers. PLCs provide structured environments for teachers to engage in collective learning and exchange best practices, while Mentorship Programs facilitate one-on-one guidance and knowledge-sharing between experienced educators and newer teachers. Together, these components create a supportive network that fosters shared learning and continuous professional growth, enhancing teachers' ability to implement effective, evidence-based educational practices.

7. Continuous Support and Feedback Mechanisms for teachers

Ongoing support and feedback would be integral to the framework, with coaching sessions, follow-up workshops, and access to experts providing continuous assistance to teachers. This ensures that educators receive the guidance they need to successfully implement new practices. Continuous support helps teachers refine their knowledge and practice over time, deepening their understanding of what works in education. Sustained feedback loops reinforce the application of evidence-based practices, reducing reliance on fads. In the framework diagram, Advisory and Coaching Programs and Student and Teacher Evaluation components would be responsible for ascertaining continuous support and feedback mechanisms for teachers. Advisory and Coaching Programs provide ongoing guidance and tailored support, while Student and Teacher Evaluation offers feedback on teaching effectiveness, helping educators to refine their practices. Together, these components create sustained feedback loops and support systems, enabling teachers to deepen their understanding and application of evidence-based practices, reducing reliance on unverified methods.

8. Alignment of new knowledge with Existing Beliefs

The framework also recognizes the importance of addressing teachers' existing beliefs about education. Training would focus on cognitive consistency and reflective practice to help educators align their beliefs with evidence-based practices. Tailored professional development programs would address specific beliefs and concerns, making it easier for teachers to adopt new methods. By aligning new knowledge with existing beliefs, teachers are more likely to internalize and adopt evidence-based practices. This alignment reduces resistance to change and supports the successful implementation of scientifically supported methods. According to the framework diagram, Belief Systems Research and Reflective Dialogue are the components responsible for ascertaining the alignment of new knowledge with teachers' existing beliefs. Belief Systems Research helps identify and understand the underlying beliefs teachers hold

about education, while Reflective Dialogue provides structured opportunities for teachers to examine and reconcile these beliefs with new evidence-based practices. Together, these components facilitate cognitive consistency and reduce resistance to change, supporting the successful adoption and internalization of scientifically supported methods.

This integrated framework provides a comprehensive approach to help teachers construct a deep understanding of educational fads and neuromyths, equipping them to critically assess and adopt only those practices that are scientifically supported. Through continuous professional development, curriculum integration, policy advocacy, media literacy, reflective practice, collaboration, and support mechanisms, teachers will be better prepared to provide high-quality education that is grounded in evidence, ultimately leading to improved learning outcomes for students.

Conclusion

By aligning these recommendations with university policies, frameworks, initiatives, and practices, universities can play a crucial role in helping teachers construct knowledge that is grounded in scientific evidence. This alignment not only equips teachers with the tools to critically evaluate and discard fads and neuromyths but also fosters a culture of continuous learning, reflection, and collaboration. As a result, the teaching workforce will be better prepared to implement effective, research-backed practices that truly enhance student learning outcomes.

6.5: Recommendations For Practice

From the study findings and conclusions, the following specific recommendations are suggested for practice and policy:

- **Department of Education to consider continuous teacher Professional Development on understanding neuromyths and fads**

This study recommends that the Department of Education should consider continuous teacher professional development. These programs should focus on debunking common neuromyths and providing educators with accurate, evidence-based information about how the brain learns. This is because the study findings indicated that many teachers acknowledge the integration of various popular theories and methodologies into their teaching practices yet face challenges due to time constraints and curriculum pressures. Therefore, providing targeted training would equip teachers with the skills to critically evaluate and implement evidence-based practices,

ensuring more effective and tailored educational experiences for learners. This approach would further help bridge the gap between theoretical knowledge and practical application, fostering a more informed and adaptable teaching workforce.

- **Universities and teacher training institutions should infuse neuromyths and fads into the curriculum**

The study also recommends that Universities and teacher training institutions should infuse neuromyths and fads into the curriculum. This would entail incorporating comprehensive modules on neuromyths and educational fads into their curricula for teacher training. This is important because insufficient training in neuroscience within teacher education programs leaves teachers vulnerable to adopting neuromyths that are presented as credible educational strategies. Thus, the professional development sessions often focus on popular but scientifically unsupported educational trends, reinforcing neuromyths. This is because the study findings indicate that while many teachers are introduced to various educational theories during their training, they often struggle to differentiate between evidence-based practices and popular but unsupported methods. By integrating these topics into teacher preparation programs, future teachers would be better equipped to critically assess and apply educational strategies. This would ensure they are prepared to implement effective, research-backed practices in their classrooms, ultimately enhancing student learning outcomes and promoting a more scientifically grounded approach to education.

- **Educational Policy Implications**

The study recommends that the Department of Education should consider policy interventions at the institutional level. Educational policymakers might need to revise curriculum standards and teacher certification requirements to include training on neuroscience and cognitive psychology, ensuring that educators are well-informed about how students learn best. Educational policy should mandate the integration of evidence-based practices while systematically addressing the prevalence of neuromyths and fads in teaching. This is because the study findings revealed that while some schools strive to implement diverse instructional strategies, the adoption of unverified methods often hampers effective teaching. Thus, the policymakers should ensure that curricula, professional development, and assessment practices are grounded in robust educational research. This would help educators focus on methodologies that truly enhance learning outcomes, fostering a more scientifically sound and effective educational environment. The

study recommends that the South Africa National Policy on Teacher Education and Development (NPFTED) could be revised. This could be done by revising Initial Teacher Education (ITE) programs to include neuroscience and cognitive psychology, and by mandating ongoing training through the Continuing Professional Teacher Development (CPTD) framework to ensure teachers stay updated. Additionally, the Curriculum and Assessment Policy Statement (CAPS) should emphasize evidence-based teaching methods, avoiding discredited practices like learning styles. These changes would improve teacher knowledge and foster more effective, research-based education across the country.

- **The Department of Education should promote critical evaluation of educational trends in media to prevent the spread and adoption of neuromyths and fads.**

  The study recommends that the Department of Education should actively promote critical evaluation of educational trends in media to prevent the spread and adoption of neuromyths and fads in schools. By providing teachers with the tools and skills to assess the validity of information sourced from media, social platforms, and popular science, educators can better differentiate between credible research and misleading trends. This would lead to more informed decision-making and reduce the influence of unverified practices in classrooms, ensuring that teaching methods are rooted in sound scientific evidence. This is because the study findings highlight that many teachers adopt popular but unsupported methods—such as the belief in learning styles or the "10% brain use" myth—due to influences from social media, peer networks, or parental expectations. By encouraging critical media literacy, the Department can help educators avoid these misconceptions, focusing instead on implementing proven, evidence-based approaches that enhance learning outcomes.

  This is because the findings revealed that many educators adopt unverified methods, such as neuromyths and fads, influenced by external sources like social media, popular science books, and parental pressures. By fostering a culture where educators are trained to assess the validity of educational trends and seek out reputable, evidence-based sources, schools can make more informed decisions. This ensures that only scientifically backed teaching practices are implemented, ultimately improving student learning outcomes.

- **Teachers should continuously engage in Critical Reflection practices to address misconceptions of concepts**

The study recommends that teachers should continuously engage in Critical Reflection practices to address misconceptions of concepts. Thus, engaging in continuous critical reflection practices would empower teachers to actively challenge and address their misconceptions, particularly regarding neuromyths and educational fads. This reflective practice would encourage educators to regularly examine their beliefs and teaching strategies, fostering a deeper understanding of the scientific basis of learning processes. By critically analyzing their methods, teachers can shift away from unverified practices and instead adopt evidence-based approaches that enhance student learning outcomes. This is because the study findings showed that many teachers unknowingly perpetuate myths like the "10% brain use" and "learning styles," often internalized through media or peer influence. Encouraging critical reflection would help teachers become more aware of these misconceptions, allowing them to correct their approaches and improve their instructional effectiveness. This shift would lead to more informed, research-aligned teaching that directly benefits students' learning experiences.

- **The Department of Education should champion for establishment of professional learning communities for teachers**

  The study recommends that the Department of Education should champion for establishment of professional learning communities for teachers. This would provide teachers with a collaborative platform to share knowledge, reflect on teaching practices, and engage in continuous professional growth. These communities would encourage teachers to collectively address and debunk neuromyths, promote evidence-based strategies, and support one another in implementing best practices. The collaborative environment of PLCs fosters peer learning, critical discussion, and a shared commitment to improving instructional methods, ultimately leading to more informed and effective teaching. This is because the study findings highlighted that many teachers hold onto misconceptions such as the "left brain vs. right brain" theory or rely on learning styles, often due to a lack of professional support or guidance. By creating PLCs, teachers can engage in structured discussions to critically evaluate such myths, ensuring that their teaching practices are aligned with current research. This would enhance teaching quality by reducing reliance on unverified methods and increasing the use of scientifically supported strategies, benefiting both educators and their students.

- **School principals should develop peer mentorship programs for teachers in schools**

  The study recommends that school principals should develop peer mentorship programs for teachers in schools. Developing peer mentorship programs in schools, where teachers who are skeptical of neuromyths are paired with those who are more knowledgeable have successfully adopted evidence-based practices, would create an environment of peer-to-peer learning and mutual support. This initiative would help skeptical teachers gain practical insights and confidence in transitioning to scientifically validated methods, while mentors can share strategies and experiences that have proven effective in their classrooms. Such programs could help foster a culture of collaboration and continuous professional development, leading to improved teaching practices.

  This is because the study findings revealed that many teachers unknowingly adhere to debunked concepts such as "learning styles" or the "Mozart effect" due to limited exposure to alternative, research-based approaches. Thus, the peer mentorship program would not only support individual teacher growth but also ensure that the entire school moves towards more effective, scientifically supported teaching practices, ultimately benefiting student learning outcomes.

6.6: Limitations of the study

One of the limitations of this study is that the findings obtained from the schools I have chosen may not be generalised to all schools in Midrand, South Africa. This study intends to provide new information presented to help individuals, namely teachers, to acknowledge the various fads and neuromyths so that it will not be implemented in their teaching practice. However, the aims of the study were still achieved by unpacking teachers understanding of fads and neuromyths in classrooms.

6.7: Suggestions for future research

On the bases of the study findings, conclusions, and limitations of the study, the following suggestions are proposed for future research:

- Investigating how neuromyths and fads manifest across different educational settings, including varying grade levels, subject areas, and cultural contexts.

- Conducting longitudinal studies to track changes in teachers' beliefs and practices over time.
- Assess the effectiveness of interventions in changing teachers' beliefs and improving teaching quality and student learning outcomes.
- Examine how misconceptions influence instructional strategies, classroom environments, and student engagement and achievement.
- Explore effective strategies for integrating neuroscience-informed knowledge into teacher training programs.

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Appendices

Appendix A: Information Letter



PARTICIPANT INFORMATION SHEET

Title of Study: Constructing Knowledge is More Complex: Opposing the Uncritical Adoption of Pop Psychological Fads and Neuromyths in Education.

Institution: University of Witwatersrand, School of Education.

Dear Participant

My name is Lizanne Leslie Jacob, PhD student from the University of Witwatersrand Education campus. I am conducting a study which focuses on Constructing Knowledge is More Complex: Opposing the Uncritical Adoption of Pop Psychological Fads and Neuromyths in Education. The study aims to focus on teachers' awareness of the various fads and neuromyths, what influences their belief of fads and neuromyths, and their contributions to the application of the fads and neuromyths in the classroom, and the credibility of their source of knowledge.

I would like to invite you to participate in this study. Your participation involves participating in an interview (1 hour). With your permission, this interview will be recorded in order to ensure accuracy. Interviews will be scheduled at a date, time and venue convenient to you. Your participation in this study is entirely voluntary and your identity will be kept anonymous. Before agreeing to participate, it is important that you read and understand the explanation of the purpose of the study and the study procedures. This information sheet will help you decide if you would like to participate in this study. Should you have any questions, do not hesitate to contact me. If you agree to participate in this study in the form of an interview, you may refuse to answer any questions you would prefer not to, and you are still able to withdraw from the study at any stage and this will not be held against you. If you do decide to participate in this study, you will need to sign this document to confirm that you understand the study and agree

to participate. You will be given a copy of this document to keep. Your participation in this study would be greatly appreciated.

Purpose of the study

The research is required in order to educate teachers who unwittingly employ incorrect teaching methods because they think that implementing neuromyths will improve their methods of instructing and learning. Teachers need to be made aware that the sources from which they derive these beliefs must include substantial evidence, not merely incorrect information from the media. In specific terms, the aims are to:

- To draw awareness amongst teachers regarding the concept of pop psychological fads and neuromyths.
- Sensitise the education community about fads and neuromyths so that these fads and neuromyths are not passed on from one generation to another.
- Curb malpractices so that these fads and neuromyths are not practiced as there is no scientific research to support the concept as it may not result in a desired outcome/result in teaching and learning.
- To avoid the widespread use of pop psychological fads and neuromyths that are not credible in scholarly works as, learning is much more complex, teachers need to understand that imparting knowledge on learners is more difficult than just adopting fads and neuromyths to solve learning difficulties.

Risks and Benefits

There are no risks involved in participating in this study and you the participant and the school will be kept anonymous. The benefit of the study is that we intend to help improve the teaching system as well as promote inclusive education in the classroom. There is no assurance you will benefit from this study. However, your participation may contribute to the literature around this phenomenon.

Confidentiality

All information obtained during the course of the study, including the interviews, will be strictly confidential and kept anonymous. There will be no names mentioned in the study.

Participants will be given access to the interview reports. Your records, to the extent of the applicable laws and regulations, will not be made publicly available. Only the researcher and the supervisors will have access to the confidential information being collected. All of your responses will be kept confidential, and no information that could identify you will be included in the research report. Any information obtained during the course of this study will be stored and analysed only for the purposes of this study for a period not exceeding two years if the research report is published and five years if no publications emanate.

If you have any concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0) 11 717 1408, email hrecnon-medical@wits.ac.za

Yours sincerely,

Lizanne Leslie Jacob.

Researcher:

Lizanne Leslie Jacob

Lizannejacob11@gmail.com

+447553075244

Supervisors:

Dr Peter Aloka, Peter.aloka@wits.ac.za, 01171773065

Appendix B: Informed Consent to participate



Informed Consent

Constructing Knowledge is More Complex: Opposing the Uncritical Adoption of Pop Psychological Fads and Neuromyths in Education.

Lizanne Leslie Jacob.

I, ……., agree to participate in this research project. The research has been explained to me and I understand what my participation will involve. I agree to the following:

(Please circle the relevant options below).

I agree that my participation will remain anonymous	YES	NO
I agree that the researcher may use anonymous quotes in his / her research report	YES	NO
I agree that the interview may be audio recorded	YES	NO
I agree that the information I provide may be used anonymously after this project has ended, for academic purposes by other researchers, subject to their own ethics clearance being obtained.	YES	NO

I hereby confirm that I have been informed by the researcher Lizanne Leslie Jacob about the nature, conduct, risks and benefits of the study. I have received, read and understood the participation information sheet involving the study. I am aware that I may at any stage be able

to withdraw my consent and participation from the study. I have had the opportunity to ask questions and (of my free will) declare myself prepared to participate in the study.

…… (signature)
…… (name of participant)
…… (date)

…… (signature)
…… (name of person seeking consent)
…… (date)

Contact details

Cell number: _____

E-mail address: _____

Biographical Questions

Age: _____

Gender: _____

Job Title: _____

Department: _____

Years in present position: _____

Number of years' experience in teaching: _____

Elaborate on teaching experience: _____

_____

Qualifications obtained: _____

Appendix C: Informed Consent to be interviewed

Consent Form for being Interviewed

I _____ consent to being interviewed by Lizanne Leslie Jacob for her study on Constructing Knowledge is More Complex: Opposing the Uncritical Adoption of Pop Psychological Fads and Neuromyths in Education; in Selected Private Schools in Midrand, South Africa. I understand that;

 Participation in this interview is voluntary.

 That I may refuse to answer any questions I would prefer not to.

 I may withdraw from the study at any time.

 No information that may identify me will be included in the research report, and my responses will remain confidential.

 The recordings and transcripts will not be seen or heard by any person in this organisation at any time, and will only be processed by the researcher.

 All recordings will be destroyed after the research is complete.

 No identifying information will be used in the transcripts or the research report.

_____ _____

Signature Date

I, Lizanne Leslie Jacob, herewith confirm that the above participant has been fully informed about the nature and conduct of the above study.

Study researcher

Lizanne Leslie Jacob _____ _____

Printed name Signature

Appendix D: Interview Questions



Interview Questions

1. Do you know of any major fads and neuromyths that have emerged during the twentieth century? Explain your response?
2. Do you agree or believe that people only use 10% of the brain? Explain your answer.
3. Do you disagree/ agree or believe in the existence of VAK learning style which asserts that learning can be improved if children are classified and taught according to their preferred learning style, specifically as visual, auditory or kinaesthetic learners? Explain your answer.
4. Do you disagree/ agree or believe that brain exercises can benefit learners by improving concentration, memory, reading, writing, organizing, listening and motor co-ordination? Explain your answer.
5. Do you disagree/ agree or believe that multiple intelligence theory, proposed by Gardner, and developed into a pervasive educational approach proposes that learners possess a small number of relatively independent intelligences, and educational approaches can be tailored to promote individual learners' intelligences? Explain your answer.
6. Do you disagree/ agree or believe that there are different hemispheres of the brain have different functions, that learning differences due to use of different hemispheres, and that people are either right-brained or left-brained? For example; creative thinking happens in the right hemisphere of the brain. Explain your answer.

7. Do you disagree/ agree or believe that there are critical developmental periods in early childhood when certain learning must occur? Explain your answer.
8. Do you disagree/ agree or believe that listening to Mozart will make a baby smarter? Explain your answer.
9. How are these fads and neuromyths incorporated/adopted in educational policies at your school?
10. What is your understanding of these major fads and neuromyths?
11. How do you as a teacher use these fads and neuromyths in your practice?
12. What are some of the neuromyths that you implement in your teaching?
13. How did you obtain knowledge or learn about these neuromyths?
14. Form which sources do you as a teacher acquire these fads and neuromyths?
15. On what grounds do you as a teacher accept these fads and neuromyths are true? Explain your answer.
16. If you adopt these fads and neuromyths in your practice, on what grounds do you claim these fads and neuromyths are effective in the learning process?
17. Would you as a professional teacher like to learn more about the structures of the brain and the role of cognitive in learning? Explain your answer (why).
18. Do you think it is important for teachers to know about how cognitive neuroscience might influence and explain their work? Explain your answer (why).
19. Do you believe that the brain has well developed capacity to change in response to environmental demands and this capacity exists throughout the life-span? Explain your answer (why).

APPENDIX E: CERTIFICATE OF EDITING

Dr VERON AKINYI OGADA (PhD Linguistics, KIU)
Veron consultants,
Bondo-Kisumu Road,
Tel. +254-057-2501812
Email: veragada@gmail.com

2nd January 2025

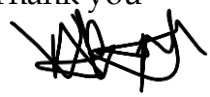
To

Dear Madam,

REF: CERTIFICATE OF EDITING- LIZANNE LESLIE JACOB

This document certifies that the PhD thesis titled "***Constructing Knowledge is More Complex: Opposing the Uncritical Adoption of Pop Psychological Fads and Neuromyths in Education among teachers in private schools in Midrand, South Africa***" was proofread and edited by Dr Veron Akinyi Ogada. The editor endeavored to ensure that the authors' intended meaning was not altered during the review. All amendments were tracked with the Microsoft Word 'Track Changes' feature. Therefore, the author has the option to reject or accept each change individually.

Thank you



Dr VERON AKINYI OGADA (PhD Linguistics, KIU)

Appendix F: Ethical Clearance

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Research Office

HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)
R14/49 Jacob

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER: H23/06/12**
PROJECT TITLE	Constructing Knowledge is More Complex: Opposing the Uncritical Adoption of Pop Psychological Fads and Neuromyths in Education among teachers in private schools in Midrand, South Africa
INVESTIGATOR(S)	Mrs L Jacob
SCHOOL/DEPARTMENT	Wits School of Education/
DATE CONSIDERED	23 June 2023
DECISION OF THE COMMITTEE	Approved Risk Level: Minimal
EXPIRY DATE	24 July 2026

DATE 25 July 2023 **CHAIRPERSON** _____
(Professor J Watermeyer)

cc: Supervisor : Prof P Aloka

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **A SIGNED COPY** returned to the Secretary electronically. Unreported changes to the application may invalidate the clearance given by the HREC (Non-Medical)

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure be contemplated from the research procedure as approved I/we undertake to submit an amendment of the protocol to the Committee. **I/we agree to completion of a regular progress report. For Minimal and Low Risk studies, this is due annually on 31 December. For Medium and High Risk studies, this is due twice annually on 30 June and 31 December.**

L Jacob
Signature

26 / 07 / 2023
Date

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

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