



Master of Education by Coursework and Research (Full time)

The Prevalence of Neuromyths in Intermediate Phase Education in a South African
Context

Learner Name: Debora Leal

Learner number: 1687699

Supervisor: Dr. Cameron Martin

Ethics clearance no.: 2022ECE029M

Submitted on: 15 February 2023

**A research report submitted to the University of the Witwatersrand in partial
fulfilment of the requirements for the Master of Education Degree (MEd).**

Declaration

I declare that this project is my own work. It is being submitted for the Master of Education by Coursework and Research Degree at the University of the Witwatersrand, Johannesburg, South Africa.

It has not been submitted before for any degree or examination at any other university.

I have acknowledged all quotes and paraphrased ideas within my work as well as having provided a complete alphabetised reference list.

Signed: 

Date: 15 February 2023

Acknowledgements

I would firstly like to acknowledge and express my gratitude to my supervisor- Dr. Cameron Martin, who made this work come into fruition. His guidance, advice, continuous support and brilliant recommendations and words of encouragement which carried me through all the writing stages has made this research project a success. I am extremely grateful for your contribution. It was a great privilege and honour to work under your guidance.

I cannot express enough thanks to my loving, supportive and caring Mother- Jucelina Brandão, this is for you. Your inspiration and reassurance when times were difficult and imparting the value of a strong work ethic in me is appreciated. I am thankful for your prayers, unconditional love and sacrifices. It means everything to me. I will be eternally grateful for how you have prepared for my future by providing me with the best educational opportunities for me to reach this point.

Thank you to my entire family for their understanding and support when undertaking my research and writing my project. Your prayers for me were what kept me going this far.

And to my Dad- Gilberto Leal, as always this is dedicated to you. There is not a day that goes by when you are not in my heart and thoughts. You always said that your daughter would become an academic. I promised to make you proud and there are still a lot more prouder moments and achievements yet to come.

Abstract

Teachers still endorse numerous neuroscientific misconceptions and place their instructional practice on so-called neuromyths (Pasquinelli, 2012). This is problematic as it is perpetuating misconceptions in education which can disenable epistemological access in schools. As South African education is mandated to be more inclusive in its educational practices, perpetuating falsehoods in education becomes a problem. The distance between neuroscience and education is still too great and teachers are not aware of it (Grospietsch & Mayer, 2020). There is little research to the extent of the permeation of neuromyths and the how teachers are utilising neuromyths in the South African context. This study looks is to investigate how widely known is the concept of neuromyths within intermediate phase education, and to get a sense of how neuromyths are permeating pedagogical practices. This study incorporates a design that combines both qualitative and quantitative research methods known as an embedded mixed methods approach (Creswell & Plano Clark, 2011). A quantitative survey has been used to collect data on the number of teachers who implement neuromyth strategies as a classroom methodology and whether teachers have a prior understanding of neuromyths. A total of 57 teachers took part in the survey and purposeful sampling was employed in this research due to its specific focus on intermediate phase teachers. Qualitative methods by means of semi- structured interviews have been conducted to provide more depth on why teachers utilise these neuromyths, to cast light on how teachers incorporate neuromyths into their teaching practice and to find out about their thoughts on the value neuromyths adds to their practices when confronted with the point that neuromyths are not academically supported. Braun and Clarke's (2006) thematic analysis is then utilised to analyse the qualitative data to identify, analyse, select codes, construct themes and report repeated patterns. An embedded design is also used to facilitate the merging of qualitative and quantitative data. This is done by taking responses from the interviews and identifying themes and patterns. The survey responses are examined in the context of the interview themes, to find relationships and corroborating evidence. Emotional Intelligence and VAK/VARK learning styles which were the most prominent myths as indicated on the survey. The findings indicate that even when presented with contradictory information on neuromyths, teachers were highly resistant to letting the

concepts go. EI has made teachers more cognisant and conscientious about managing emotions of themselves and the learners as well as using their discretion in certain situations. Learning styles has been an effective teaching strategy for variation to keep the learners captivated in the lesson and it has been an inclusive tool to support learners with different levels and abilities. So, while academically the concepts are neuromyths and inaccurate, the reality is that Teachers do value the concepts as they use it to improve their pedagogies.

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List of Abbreviations

CAPS -National Curriculum and Assessment Policy Statement

EI- Emotional Intelligence

EQ-Emotional quotient

IQ- Intelligence quotient

MI- Multiple Intelligences

OBE Curriculum- Outcomes Based Education Curriculum

SGB- School Governing Body

SQ- Spiritual quotient

THRASS-Teaching of Handwriting, Reading and Spelling Skills

VAK/VARK learning styles- Visual, auditory, kinesthetic & reading/writing learning styles

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Chapter One: Introduction and background to the study

1.1 Introduction

The Organisation for Economic Co-operation and Development (OECD) Brain and Learning project (2002) emphasised that many misconceptions about the brain exist among professionals in the field of education. Although these so-called “neuromyths” are loosely based on scientific facts, they do not hold up to academic scrutiny. Neuromyths are discussed in informal discussions and in popular articles in a simplistic way to help articulate points, and while this may not seem that harmful, it has been argued that they may have an adverse effect on education in more formal contexts when attempting to make a lesson inclusive (Grospietsch & Mayer, 2020). These common neuromyths include Emotional Intelligence, multiple intelligences, learning styles and differences in hemispheric dominance (left brain, right brain).

Chapter One will provide an introduction to the research report and provide brief background information on what neuromyths are and the reasons why it is still prevalent in the education system as well as the relationship it has with the implementation of epistemological access (Dekker, Lee, Howard-Jones & Jolles, 2012). It will also structure the specific problem and purpose of the research, provide the central questions that will guide this research project and include information on my motivations and intentions behind conducting this research.

1.2 Background to the Study

A neuromyth is “a misconception generated by a misunderstanding, a misreading, or a misquoting of facts scientifically established (by brain research) to make a case for use of brain research in education and other contexts” (OECD, 2002, p.10). “Neuro” or “neural” signifies the nervous system or the brain, and “myth” denotes a false belief. Inside educational neuroscience (neuroeducation, or mind, brain, education science), misunderstandings about the purpose of the brain and its role in learning and teaching practices are also referred as neuromyths (Grospietsch & Mayer, 2020).

Neuromyths are usually spread by miscommunication, misinterpretation of results from a scientific study, oversimplification of a study's results by popular media, pop psychology, substandard media coverage such as the reporting of irrelevant information, sensationalism, and exclusion of relevant information (Torrijos-Muelas, González-Víllora & Bodoque-Osma, 2021). Some neuromyths are also derived from scientific hypotheses that have been considered true for a long time but are then rejected by the scientific community when new evidence comes out (Grospietsch & Mayer, 2020).

With recent advances in neuroscience, with the growing attraction of brain and mind sciences, *neurophilia* which is the fascination with everything related to neuro, is thriving, and findings from brain research has become very popular in media (Torrijos-Muelas, et al., 2021). Furthermore, the media has a way of marketing information in a manner that grabs attention and makes money (Grospietsch & Mayer, 2020). For example, news articles try to simplify information from research papers, and in that process it will either leave important information or utilise diction to distort the context of the findings which can be intentional and unintentional (Torrijos-Muelas, et al., 2021). The reason why news articles are believable is because it tends to include some facts or widely accepted evidence that are not relevant to the point, thus making it seem like their content is credible information (Grospietsch & Mayer, 2020). For example, the sentence "specific mental processes take place in the brain" is a vague, correct statement that is open to interpretation (Pasquinelli, 2012). The problem is that people who do not have background can construe these statements in many ways, and with limited access to original published peer-reviewed literature or less understanding of the publication process and the topic itself, they can be more resistant to accepting information that contradict their biases and current opinions and beliefs (Pasquinelli, 2012).

Another reason why neuromyths continue is because they are generally believable. Various myths come from legitimate scientific discoveries that are later found to be inaccurate, meaning that at some point they were backed up by believable data (Torrijos-Muelas, et al., 2021). We also tend to believe these myths because they have a comforting effect on us (Pasquinelli, 2012). An example of this is the Mozart Effect (White, 2004). The Mozart Effect refers to a popular scientific theory that listening to Mozart's compositions and other classical music will increase intelligence in terms of

retaining, retrieving, and generating knowledge. If you do not have resources or access to quality educational materials for children but do have a music player and a classical music CD, it would be encouraging to read that listening to classical music may help develop or improve a child's intelligence although this is not true (White, 2004).

The left and right brain dominance theory is based on the idea that people are either left-brained or right-brained, meaning that one side of their brain is dominant. If you are mostly analytical and systematic in your thinking, the theory states that you are left-brained. If you are more creative or artistic, you are right brained. Therefore, it may be uplifting to read that if you have developed artistic skills, but were not great at mathematics, one of your brain's hemispheres is dominant over the other, which is a sensationalised assertion (White, 2004).

The human mind tends to favour confirmation bias. This is a type of cognitive bias that involves favouring information that confirms previously existing beliefs or biases. (Pasquinelli, 2012). This confirmation tends to comfort us in our own opinions and validate our opinions (White, 2004). If something is meaningful to you, it will hold your attention and make you contemplate information more. For example, if someone holds a belief that left-handed people are more creative than right-handed people, whenever this person encounters a person that is both left-handed and creative, they place greater importance on this evidence supporting their already existing belief. Our personal biases and believing what we want to believe, are what prevents us from critically evaluating new information and changing our opinions because it upholds an existing belief that reinforces previous attitudes (White 2004).

According to Dekker, Lee, Howard-Jones & Jolles (2012), these false beliefs spread through social media, news articles, movies, popular media, forums, brain games, the educational setting and so on spread these beliefs. Studies have shown that putting a cover image with a brain MRI scan, or including the words such as "*brain, brain-based, neuro-* ", in titles and educational products, increases the interest of consumers and strengthens their belief in the value of a false product (Torrijos-Muelas, et al., 2021). Various studies have also shown that neuromyths are widespread and persistent among the public, among teachers of all levels, trainees, and recent graduates to award winning teachers and individuals who have formal tertiary and graduate training

in neuroscience which is the reason why neuromyths persist worldwide (Grospietsch & Mayer, 2020).

If neuromyths permeate the education system, there are two schools of thought in terms of the consequences (Pasquinelli, 2012). Some researchers suggest that neuromyth beliefs leads to wasteful, less productive practices, and less effective teaching. For example, teachers may spend time and resources developing activities for learners that are based on false science and have no real benefits to learning, or schools may invest in commercial programs that have no scientific grounding (Torrijos-Muelas, et al., 2021). Others suggest that unless the teachers are teaching neuroscience courses, their belief in neuromyths does not make them worse teachers (Pasquinelli, 2012). Evidence suggests that exercise is not linked to reading outcomes, but teachers often use physical activity in primary school curriculums as a teaching practice. This will not help children read better, physical activity has profound effects on human wellbeing, including positive effects on child development to stimulate learning (Pasquinelli, 2012). This is one example why some authors argue that belief in neuromyths is irrelevant to whether teachers are good teachers in general (Grospietsch & Mayer, 2020). From a purely academic perspective, the perpetuation of neuromyths is incoherent, flawed, and can negatively impact teaching and learning. Since neuromyths still contain an element of truth which may have either been misinterpreted or become distorted over time (Pasquinelli, 2012), the permeation into educational practices can be easy and yet have very negative consequences.

There are gaps in research regarding the prevalence of neuromyths in South African education, specifically within the intermediate phase. While there have been studies conducted on neuromyths in education globally, the specific context of South African education in these grade levels is understudied. This study provides information on the common neuromyths that are prevalent in South African education, specifically in Johannesburg, in intermediate phase. There is a need for studies that examine the extent to which these neuromyths impact teaching practices. This research aims to investigate the relationship between belief in neuromyths and actual instructional practices in order gain insights into the implications for teaching and learning in schools based in Johannesburg. Furthermore, there is a shortage of research that explores the factors contributing to the persistence of neuromyths in South African

education. This research looks at how neuromyths are viewed within the educational community can shed light on the mechanisms that perpetuate their prevalence.

1.3 Problem Statement

Teachers and university instructors, the alleged experts on learning, still endorse numerous neuroscientific misconceptions and orient their instructional practice on so-called neuromyths (Pasquinelli, 2012). It has persisted because neuromyths are often rooted in scientific research, but are derived from distortions, oversimplifications, and overgeneralisations of research findings. This is problematic as it is perpetuating misconceptions and untruths in education which can disenable epistemological access in schools. As South African education is mandated to be more inclusive in its educational practices by eliminating exclusionary practices (White Paper 6), then perpetuating falsehoods in education becomes a real problem. White Paper 6 acknowledges that all children and youth can learn and that all children and youth need support by enabling education structures, systems and learning methodologies to meet the needs of all learners (Department of Education, 2001). The distance between neuroscience and education is still too great and people are not aware of it (Grospietsch & Mayer, 2020). The gap between neuroscience and education has enabled many misconceptions about scientific findings to occur (White, 2019). In addition, official communications, and instructions for teachers to incorporate common neuromyths is stated in the National Curriculum and Assessment Policy Statement (CAPS) document. The CAPS document encourages teachers to make use of visual and audio aids in the classroom to accommodate the various learning styles which has entrenched neuromyths even further which goes against the notion of an all-encompassing, inclusive education (Department of Basic Education, 2011).

It is difficult for people who lack neuroscientific expertise to recognise misconceptions about brain research in the popular media. Information provided by the popular media is usually over-simplified or over-interpreted, as it aims to reach many people which creates misconceptions (Waterhouse, 2011). The simplicity of these popular articles has led to the inconsistent assumption that complex neuroscience is easily applicable in the classroom. When people lack a general understanding of the brain and do not critically reflect on their readings which results in the beliefs of these falsehoods and

limits epistemological access (Grospietsch & Mayer, 2020). Thus, a lack of neuroscience literacy and reading popular media uncritically are factors that result in the number of misconceptions teachers have about the brain as well as the perpetuation of neuromyths (White, 2019).

There is little research to the extent of the permeation of neuromyths and the how teachers are utilising neuromyths in the South African context in the intermediate phase. Therefore, the objective of this study is to explore and to investigate how widely known is the concept of neuromyths within intermediate phase education, and to get a sense of how widely known/common neuromyths are permeating pedagogical practices. By being aware of common neuromyths, teachers can avoid incorporating ineffective strategies or approaches based on these misconceptions into their classrooms. Instead, they can align their teaching methods with evidence-based practices, ensuring that their instruction is grounded in scientifically supported principles. Keeping up to date with information of these neuromyths can inform teacher practices in the classroom in the form of understanding learners and the ability to design and execute lessons that are effective to implement inclusion successfully. This knowledge empowers teachers to make more informed decisions about instructional strategies, classroom environments, and student support, ultimately enhancing the quality of education provided to South African learners. In addition, it would enhance our understanding of the presence and impact of neuromyths in South African education, enabling teachers, policymakers, and researchers to develop targeted interventions and educational strategies to promote accurate understanding of the brain and effective teaching practices.

1.4 Purpose Statement

The problem this study looks to explore is how widely known the concept of neuromyths is within intermediate phase teachers in suburban public and private schools based in Johannesburg. It also aims to investigate how some of the more widely known neuromyths are permeating pedagogical practices in the intermediate phase. Furthermore, this research project seeks to explore what teachers make of neuromyths despite the scientific conception that it may be detrimental to inclusive education.

In order to do this, the study will provide an exposition of the various schools of thoughts of neuroscience literacy including common neuromyths such as Emotional Intelligence, multiple intelligences, VAK learning styles and left/right brain dominance. I will be using a survey to establish the extent to which intermediate phase teachers in Johannesburg are aware of the concepts of neuromyths. I will then conduct interviews with 5 intermediate phase teachers to gain insight into their current understanding of the most common neuromyths, how they apply them in their lessons, how neuromyths may affect their pedagogical decisions to make their lessons inclusive as well as what they make of neuromyths despite scientific research that contends that it can be detrimental to epistemological access. These interviews will only focus on the 2 commonly known neuromyths which are EI and VAK/VARK learning styles.

1.5 Research Questions

This study aims to examine the level of familiarity of neuromyths and the common neuromyths in suburban public and private schools in Johannesburg. It looks to explore how these common neuromyths are influencing teaching practices in intermediate phase. Additionally, it looks at understanding the perspectives of teachers on neuromyths, despite the academic concern that it may negatively impact inclusive education.

The following question is the main research question of the study. There are also 3 sub-questions that are used to guide the study towards answering the main research question.

Main question:

1. To what extent have Neuromyths permeated pedagogical practices of intermediate phase teachers in Johannesburg?

Sub questions:

- What percentage of teachers are aware of the concept of neuromyths in Johannesburg?

- In what ways are the 4 common neuromyths (Emotional Intelligence, Multiple Intelligences, VAK/VARK (Visual, auditory, kinaesthetic & reading & writing) learning styles and Left/ right brain dominance) permeating/influencing intermediate phase education pedagogical choices in Johannesburg?
- What are teachers' opinions and impressions of neuromyths despite the information derived from academic research?

1.6 Rationale

I became interested in the topic of neuromyths when I learnt about it in the Psychological Issues in Education Honours course. I did not have any prior knowledge about neuromyths and became very interested and fascinated about this topic. It made me think and reflect on how the vast majority of teachers, including myself accepted these myths uncritically.

This topic made me realise that despite concerns regarding the rapid propagation of neuromyths, not much is known about the prevalence of neuromyths among professionals in the field of education because the majority of teachers do not read these academic articles on neuroscience literacy. Therefore, it seems clear that a lack of effective communication exists between the fields of neuroscience and education. I believe that the purpose of my research project is to help advance knowledge to create an awareness of the misconceptions among teachers.

Next to examining the prevalence of neuromyths, I also became interested in identifying the factors that predict a high susceptibility to believing in myths as well as what teachers think about these myths, how do they value it despite the academic sources and the impact these myths have had on their teaching efficacy. I am interested in finding out why teachers, learners, teacher training programmes, textbooks and teacher training examiners endorse these myths. Schools and educational departments do not address and create an awareness of the widespread misconceptions on this topic. This shows that neuroscience literacy and research is needed to enable individuals to differentiate science from pseudoscience which is the

reason why I have decided to focus on this area of research. It is essential to understand why some individuals are more prone to accepting and propagating myths, especially in an academic setting. By investigating these aspects, I believe we can enhance our educational practices by developing evidence-based interventions and curriculum content that debunk myths effectively. This interest stems from a genuine desire to improve teaching efficiency, enhance student learning outcomes, and foster critical thinking skills in our classrooms.

The reason why I have chosen the intermediate phase is because I have specialised in this phase, and I am familiar with the curriculum requirements. I believe that the value of neuromyths can be seen at this stage from the age of 9-12 years of age as it is a growth point where learners establish who they are and what they like. This is a good phase to target as neuromyths are prevalent in this phase. Furthermore, it is the age in which they transition into adolescence and Emotional Intelligence is a topic among today's modern adolescents due to identity development, the path to self-discovery and identity awareness.

1.7 Conclusion

This chapter has put forward the reasons for the research and has framed exactly why research in the field of neuromyths and pseudoscience are required. It has provided general information on neuromyths as well as the reasons why these neuromyths are rampant and stubbornly persist in education which has perpetuated falsehoods that are often accepted uncritically and hinder epistemological access. The next chapter which is the literature review will provide an in-depth exposition on the literature of neuromyths including an overview of the theoretical and empirical state of research on neuromyths, a discussion on controversies, fundamental concepts, issues, and problems of neuromyths.

Chapter Two: Conceptual Framework and Review of Literature

2.1 Introduction

While Chapter One has outlined the research report, Chapter Two will explore the concept of neuromyths in more depth. Before that, it is important to discuss the theoretical frameworks that underpin neuromyths and that will guide the exploration of the concept in this study. It also includes a detailed exposition of the origins of neuromyths, how neuroscience became associated to education, the various schools of thought surrounding the 4 common neuromyths as well as how it has been incorporated into the educational context to enable and disable epistemological access.

2.2 Theoretical Framework

The frameworks of social cognitive theory, cognitive psychology, and sociocultural theory provide valuable lenses through which we can interpret the understandings, misunderstandings and misuse of neuromyths in the educational context. They provide a basis on which the findings from the research can be analysed which adds stronger validity and trustworthiness.

2.2.1 Social cognitive theory

Social cognitive theory, proposed by Albert Bandura, emphasises the significance of social interactions, observational learning, and self-regulation in shaping human behaviour (Schunk, 2012). Bandura's theory highlights the importance of observational learning where individuals acquire knowledge and behaviour by observing others. Through this process, individuals develop a sense of self-efficacy, influencing their motivation, behaviour and ability to learn and adapt in various social contexts (Schunk, 2012). By applying this perspective to the prevalence of neuromyths in South Africa, we can explore how individuals acquire and perpetuate these misconceptions through social interactions, including from teachers, peers, and media influences. We can also examine the role of self-regulation in addressing and correcting these misconceptions (Schunk, 2012).

2.2.2 Cognitive theory

Cognitive psychology focuses on mental processes such as perception, memory, and problem-solving. Within this framework, we can investigate how individuals process and interpret information related to neuromyths and why these misconceptions may seem intuitive or appealing (Piaget, 2000). It can further shed light on the cognitive biases or heuristics which refers to the tendency to use information that comes to mind quickly and easily when making decisions that contribute to the persistence of these misconceptions despite contradictory evidence from academia (Piaget, 2000).

2.2.3 Sociocultural theory

Sociocultural theory, developed by Lev Vygotsky, emphasizes the role of cultural and social factors in cognitive development (Scott & Palincsar, 2013). Applying this lens to the prevalence of neuromyths, we can explore how culture, societal beliefs, and educational practices shape individuals' understanding of the brain and learning. We can examine how broader socio-cultural influences, including the media, educational policies, and societal attitudes, contribute to the perpetuation of neuromyths (Scott & Palincsar, 2013).

With these 3 frameworks, researchers can be confident in their analysis and explanation of how neuromyths are understood and interpreted by the participants of the study. This will be further discussed in Chapter 3. This multifaceted approach allows us to explore the individual, social, cognitive, and cultural factors that influence the acquisition, perpetuation, and impact of these misconceptions (Allahyar & Nazari, 2012). It also lays the groundwork for developing interventions and educational approaches that address and correct these misconceptions, promoting a more accurate understanding of the brain and learning (Scott & Palincsar, 2013).

2.3 A history of neuromyths

The word “neuromyth” was first devised during the 1980s when the neurosurgeon Alan Crockard used it to describe a misleading concept about the brain function in medicine (Torrijos-Muelas, González-Víllora & Bodoque-Osma, 2021). The term was then utilised on the Organisation for Economic Co-operation and Development (OECD)

report based on understanding the brain (OECD, 2002). The OECD included information about the propagation of the neuromyths around critical periods which refers to a fixed and crucial time during the early development of an organism when it can learn things which are essential to survival from birth to the age of 3. These influences impact the development of processes such as hearing and vision, social bonding, and language learning. It also included information on left vs. right brain people, and the 10% of the use of our brain, as the most widely spread neuromyths (OECD, 2002). In this report, a neuromyth was described as “a misconception generated by a misunderstanding, a misreading, or a misquoting of facts scientifically established by brain research to make a case for the use of brain research in education and other contexts” (OECD, 2002, p.10).

In the early 90s a movement began in education called “brain-based learning” that tried to link neuroscience and education. While early attempts to bridge the fields sparked controversy, it can now be argued that neuroscience does have a role to play in education reform (Howard- Jones, 2010). Brain-based learning was started by teachers to make inferences from findings in neuroscience to classroom practice (Bruer, 1997). Bruer (1997) called this movement a “bridge too far” because the practitioners did not have scientific understanding. Scientists began joining the movement to inform professional development but did not have classroom teaching experience (Howard-Jones, 2010). This was managed with scepticism and competitiveness, as educational psychologists, cognitive psychologists, teachers, neurologists, and neuroscientists debated on who should advise teachers (Bruer, 1997). Debate and discussion continued as the movement gained popularity and started emerging between disciplines. Publications and presentations by scientists to teachers informed teachers in more depth, leading to more credibility, although neuromyths still persisted (Domínguez, 2018). Almost two decades after Bruer's (1997) “bridge too far”, a credible bridge is being made between neuroscience and education, including Master's and PhD programs being offered in Educational Neuroscience.

However, these programs are unbalanced in qualifications and training. School systems and universities are not recognising this new field of expertise and seeking input and, instead, get information from those unqualified in either neuroscience or

school education (Domínguez,2018). Neuroscientists lament that they know how to improve learning, but the field of education is not responding. The so called “Brain” presenters are hired for teachers’ workshops professional development with no experience or credentials in neuroscience which is why neuromyths are still being implemented preventing epistemological access (Howard- Jones, 2010).

Scientists believe they are the ones qualified to address teachers about translating the research while teachers believe that they can better make implications for the classroom. Educational psychologists believe they are more qualified. And so, the disagreement continues (Domínguez, 2018). We need perspectives from research and teaching practice to change education. To support this bridge, a specialist with knowledge on each side is needed, with both experience and credentials in neuroscience and education, as one alone is not enough (Howard-Jones, 2010). Scientists have two weaknesses. First, teachers contend that scientists have difficulty speaking to teachers, although some are outstanding speakers. There is a standard method of presenting scientific information at conferences and many use that presentation style with teachers, failing to understand the teachers’ perspectives and needs (Bruer, 1997). Secondly, they have not taught unmotivated or struggling learners – early grades, high school, or college developmental courses because they have not practiced in this field (Howard-Jones, 2010). On the other hand, teachers can obviously make invalid leaps from research to practice because they do not read the scientific literature, but are getting second and third hand information, they are learning from pop psychology books written for nonprofessional audiences or basic science articles they cannot understand without the broader information (Bruer, 1997). What we need is a hybrid of these specialties to bridge the gap that unites scientific knowledge and practical application in education (Howard-Jones, 2010).

I argue that having an understanding of basic neuroscience research on learning and the fundamental constituents of learning is as crucial as the study of child development or educational psychology or other aspects of teacher training. Just as doctors and psychologists attend professional development workshops to stay updated, teachers must be updated on what we are learning about the brain, emotions, motivation, and physiology from scientific research. The most pertinent neuromyths in schools include Emotional Intelligence, Multiple Intelligences, VAK/VARK (visual, auditory,

reading/writing and kinaesthetic) and left/right brain dominance. Keeping up to date with information of these neuromyths can inform teacher practices in the classroom in the form of understanding learners and the ability to design and execute lessons that are effective to implement inclusion successfully. What follows next is a detailed exploration of the 2 more common neuromyths (EI and VAK/VARK learning styles) in education in terms of what they are, how they came to be and the reason it is deemed as a neuromyth. There will also be a discussion on how these neuromyths integrate into education. An extensive description of EI and VAK/VARK have been provided as the interview solely focuses on these two neuromyths because by focusing on the 2 most commonly known and understood neuromyths by teachers. Multiple intelligences and left/right brain dominance have garnered less popularity at schools because there is limited scientific evidence to support their claims in comparison to Emotional Intelligence and VAK/VARK learning styles. It is more accurate to promote the development of diverse skills and abilities in learners rather than focusing neatly categorised and distinct types of intelligences promoted by Multiple Intelligences (Howard-Jones, 2010). The left/right brain dominant theory suggests that individuals have a dominant brain hemisphere that influences their learning styles. Scientific evidence has debunked this notion by highlighting that both hemispheres function in an interconnected manner (Howard-Jones, 2010). The next section is then followed by a brief description on multiple intelligences and left/right brain dominance, which is not as prevalent, but is still important in education.

2.4 Emotional Intelligence

2.4.1 Brief history of Emotional Intelligence: Salovey and Mayer building up to Goleman

The concept of Emotional Intelligence (EI) was introduced by Salovey and Mayer (1990), although related ideas such as “social intelligence” had been introduced earlier by Edward Thorndike (Salovey & Meyer, 1990). Emotional Intelligence was first discussed as Social Intelligence. Emotional Intelligence later became the all-encompassing term of Emotional & Social Intelligence (Dhani & Sharma, 2016).

Thorndike used the term Social Intelligence in 1920 in an article titled “Intelligence and its uses” in the Harper’s magazine (Salovey & Meyer, 1990). Thorndike, an educational psychology professor at Columbia University, defined it as “the ability to understand and manage men and women, boys and girls—to act wisely in human relations” (Dhani & Sharma, 2016, p190). In essence Thorndike defined social intelligence as the ability to perceive one’s own and others’ internal states, motives, and behaviours, and to act toward them appropriately based on particular information (Cherniss, 2000).

In 1983, Howard Gardner spoke about the theory of multiple intelligences in his book titled “Frames of Mind”. In the set of the seven intelligences, Gardner discussed two “personal intelligences” which has very similar features to Emotional and Social intelligence (Boyatzis & Sala, 2004). These two personal intelligences were Intrapersonal Intelligence which is the ability to access and make use of one’s own feelings; and Interpersonal Intelligence defined as the ability to notice and make distinctions about the moods, temperaments, motivations, and intentions of other people (Boyatzis & Sala, 2004).

The year 1990 became a significant year for ‘Emotional Intelligence’ when John Mayer, a professor at the University of New Hampshire, and Peter Salovey at Yale published their article “*Emotional Intelligence*” in the journal “*Imagination, Cognition, and Personality*” (Salovey & Mayer, 1990). It was first serious academic inquiry of the term as they focused attention on a group of abilities instead of traits. Salovey and Mayer (1990, p. 189) defined Emotional Intelligence as, “the ability to monitor one’s own and others’ feelings and emotions, to discriminate among them and to use this information to guide one’s thinking and actions”. Salovey and Mayer (1990) expanded their conceptualisation of Emotional Intelligence. This included the evaluation of emotions in the self, the judgement and identification of emotions in others through empathy; the regulation of emotions in oneself and in others; and the utilisation of emotions to engage in flexible planning, creative thinking, direction of attention, motivation, and self- regulation (Salovey & Meyer, 1990).

Dr. Daniel Goleman (1994) then popularised the concept of Emotional Intelligence. According to Goleman (1994), EI entails self-motivation and persistence; skill at

introspection; the delay of gratification; self-control of impulses, moods, and emotions; empathy; effective leadership and social skills. In this way, Emotional Intelligence serves as a key factor in addressing the prevalence of neuromyths in a South African context. By promoting evidence-based practices from academia, critical thinking and open dialogue, educators with high Emotional Intelligence contribute to a more accurate understanding of the brain and learning, ultimately benefiting learners in their education.

2.4.2 Goleman's key theory arguments and what these arguments meant to education and schools

Emotional Intelligence (EI) was popularised in 1994 by psychologist and behavioural science journalist Dr. Daniel Goleman in his book, *Emotional Intelligence* (Goleman, 1994). Goleman (1994) defined Emotional Intelligence as “a person's ability to perceive, assess, and manage the emotions of oneself, of others, and of groups” (Goleman, 1994. p. 9). According to Goleman (1994), Emotional Intelligence is the largest indicator of success in the workplace. In school settings teachers are usually told that they need to understand the concept because it can have a great impact on the manner they teach, the lessons they deliver, the relationships they develop with their learners and the results that learners ultimately achieve (Cherniss, 2000). The UK's White Paper, which are government-issued documents asserts that the government declared its aim of reinforcing the Emotional Intelligence of learners because it would significantly improve learners' behaviour and increase levels of achievement (Grospietsch & Mayer, 2020). Goleman (2011) stressed that teachers were receiving a false idea of a learner's general intelligence if they merely trusted intelligence quotient (IQ) tests, which merely tested a particular selection of intelligences including their mathematical, logical, and verbal reasoning skills. Goleman (2011) asserted that a high IQ did not establish later success in life. It is rather a person's ability to socialise, inspire others and be self-motivated. He highlights that schools that were aware of EI tended not only to produce happier, more rounded individuals, but also to attain better academic results (Goleman, 2011). Many successful Emotional Intelligence programmes have been ongoing resulting in many institutions implementing the Emotional Intelligence philosophy (Cherniss, 2000). This

includes teacher training organisations that specialise in training teachers to use Emotional Intelligence in the classroom, believe that these programmes not only help decreasing antisocial behaviour, but they can also help with improving results (Grospietsch & Mayer, 2020).

It is generally believed that highly emotionally intelligent teachers tend to motivate their learners better and understand their learners' behavioural and psychological wellbeing because they felt included. They can also be more sensitive towards their learners' disruptive behaviours, academic performance, and relationship management (Cherniss, 2000). A good and emotionally intelligent teacher will not only be self-aware but will also show empathy towards children, parents, peers, etc. Empathy shown by the teacher makes a positive and a lasting impact on a learner's mind (Grospietsch & Mayer, 2020).

Goleman (2011) asserts that learners with higher levels of Emotional Intelligence can keep a check on their emotions better and be empathetic to others around them. This can help them develop improved self-motivation and effective communication skills essential to helping learners become more confident learners. On the other hand, learners who lack Emotional Intelligence can become less connected to school, negatively affecting performance in the classroom (Goleman, 2011). An emotionally intelligent learner will have an increased level of self-awareness, making him or her take charge of their learning proactively (Cherniss, 2000). Emotional Intelligence helps learners better analyse situations. It not only helps learners interact with others better but also helps them tackle academic issues with greater confidence (Boyatzis, 2008). A learner who can manage their emotions well is a learner that will not allow stress to rule their academic life. Emotional Intelligence creates a strong barrier for learners which helps them better handle the factors that create stress in the minds of the learner (Grospietsch & Mayer, 2020). Having a strong emotional foundation can help learners deal with their problems successfully making them far more satisfied. It is what teaches learners to set attainable goals, make better decisions, and deal with their problems in a healthier fashion (Goleman, 2011).

If one has a low EQ (Emotional Quotient), you may find yourself get caught up with perfectionism which can result in stress, slow productivity resulting in procrastination and make you difficult to work with (Cherniss, 2000). People with high IQs (Intelligence

Quotient) often report having difficulties in their relationships as they find themselves feeling misunderstood, overlooked and may have a difficult time relating to others. Furthermore, they struggle with empathy, keeping a two-way conversation and maintaining a connection with others (Cherniss, 2000).

Emotional Intelligence plays a vital role in promoting inclusive education in any context, including South Africa. Inclusive education aims to ensure that all learners, regardless of their background or abilities, feel valued, respected, and supported in the learning environment (Cherniss, 2000). Emotional Intelligence refers to the ability to recognize, understand, and manage our own emotions, as well as the emotions of others (Goleman, 2011).

In a South African context, where diversity in terms of race, culture, language, and socio-economic backgrounds is prevalent, Emotional Intelligence becomes even more crucial. By developing Emotional Intelligence skills, educators can create a welcoming and inclusive classroom environment (Boyatzis, 2008). This includes being aware of their own biases and prejudices, fostering empathy and understanding among learners, and addressing any instances of discrimination or exclusion (Goleman, 2011).

Emotionally intelligent teachers strive to create a safe space where each learner feels seen, heard, and valued (Boyatzis, 2008). They promote open dialogue, encourage active listening, and incorporate diverse perspectives into the curriculum. By embracing the principles of Emotional Intelligence, educators can enhance the overall learning experience for all learners, facilitating a sense of belonging, respect, and equity (Cherniss, 2000).

2.4.3 Arguments against Emotional Intelligence

Despite the popularity and usefulness of EI, examination of the literature suggests there is no clear, consensual definition of EI, and the multifaceted features of the concept appears at times is overwhelming (Matthews, Zeidner, & Roberts, 2002). Intelligence has been defined in various ways within different fields and typically includes concepts such as logic, understanding, abstract thought, self-awareness,

ability to learn, problem solving, communication, and so on (Coffield, et al., 2004). Some psychologists recognise a general intelligence factor in Emotional Intelligence (Cherniss, 2000). While most IQ tests will measure certain cognitive functions including pattern recognition and natural language skills, Emotional Intelligence typically measures other cognitive processes, such as memory, rapid decision-making, and ability to retrieve general knowledge linked to general intelligence (Coffield, et al., 2004). Both these concepts relate closely with the idea of Emotional Intelligence, and some psychologists argue that Emotional Intelligence quotients are merely aspects of general intelligence (Grospietsch & Mayer, 2020). Defining intelligence is controversial and leads to some of the challenges with getting EQ recognised as a form of legitimate intelligence (Cherniss, 2000).

There are several other problems with this definition. The ability to monitor one's emotions does not require any special degree or type of intelligence. Monitoring one's emotions is a matter of where one chooses to focus one's attention, outwards at the external world or inward at the contents and processes of one's own consciousness (Matthews, et al., 2002). Focusing inwards involves introspection. Similarly, the ability to read the emotions of others is not necessarily an issue of intelligence. It could simply be a matter of paying attention to others and being aware of one's own emotions so that one can empathise with others (Salovey & Meyer, 1990).

Discriminating between emotions is a learned skill just as is detecting a given emotion. A highly intelligent person may be better able to make very subtle distinctions between similar emotions (e.g., jealousy and envy), but, for basic emotions (e.g., love, anger, fear, desire), which is just a matter of focusing inwards to develop one's introspective skill (Coffield, et al., 2004). The definition of EI indicates that it is a combination of assorted habits, skills, and choices rather than an issue of intelligence (Salovey & Meyer, 1990). It is arbitrary to attach the word intelligence to assorted habits or skills, as EI advocates do (Matthews, et al., 2002). The motive is egalitarianism: redefining what it means to be intelligent so that everyone will be equal in intelligence to everyone else which makes the agenda political. However, arbitrary redefinitions do not change reality. Some people are more intelligent, in their ability to grasp concepts, than others, but this ability is not necessarily reflected in every skill that people choose to develop (Grospietsch & Mayer, 2020). If one wants to group a set of related phenomena into a

single concept, there must be a conceptually identified, common element among them (Cherniss, 2000).

One of the principal views of emotional-intelligence proponents is that awareness leads to behavioural change (Goleman, 2011). If that were the case, people would not need years of therapy, hard work and discipline to change their behaviour. Simple awareness would enable all of us to get out of our self-destructive tendencies and avoid all the pitfalls that make us less happy and successful. But this is not reality (Grospietsch & Mayer, 2020). The human mind consists of layer upon layer of neural pathways that are formed and reinforced over decades. The brain consists of inner workings of our emotions and behaviours occur mostly in our subconscious (Coffield, et al., 2004). Self-awareness is a positive thing in life, but it cannot be mistaken for what lies on the surface for the feelings buried deep below. That is why the path to achieving meaningful behavioural change is a long, difficult, and often painful experience (Cherniss, 2000).

While there may be differing arguments on the concept of EI, its importance in South African schools cannot be overlooked. In a country like South Africa with a history of social divisions and inequality, nurturing Emotional Intelligence can help bridge gaps, foster empathy and create a culture of unity and social cohesion (Goleman, 2011). Furthermore, it allows learners to develop crucial skills for personal growth, social interactions and creating inclusive and compassionate communities. It can better prepare learners to navigate the complexities of life and contribute positively to society.

2.4.4 Issues/ Considerations with use of EI in education

Although EI is a vague umbrella term for a variety of different abilities and personality traits, sometimes these neuromyths contain an element of truth (Salovey & Meyer, 1990). EI is still beneficial in raising awareness of emotional issues and motivating teachers and managers to take emotional issues seriously. There is a common link made between having a good mental health which can result in a better academic performance (Cherniss, 2000). Furthermore, training workshops are fostering EI competencies, useful skills in programs which include conflict management, taking the

perspective of others, verbal communication skills and assertiveness training in the classroom and workplace (Matthews, et al., 2002). In any case, studies of EI may be productive even if the construct proves to be obscure, and these false beliefs may stimulate valuable research and a deeper understanding on a topic (Salovey & Meyer, 1990). However, the teaching that being able to manage your emotions is equitable or the same as intelligence is not true, and learners who believe this to be true may not dedicate enough time to working on their cognitive processes or neglect certain academic concepts as they do not see them as intelligence related (Cherniss, 2000).

An incorrect understanding or teaching of Emotional Intelligence can have detrimental effects on inclusive education and learning. It can hinder self-awareness, effective communication, empathy, conflict resolution and social-emotional learning which are essential elements of an inclusive and enriching educational experience (Goleman, 2011). To foster inclusivity, it is crucial for teachers to acquire a comprehensive understanding of Emotional Intelligence and integrate its principles into their teaching practices (Matthews, et al., 2002).

2.5 VAK (visual, audio, and kinaesthetic) Learning styles

2.5.1 What are learning styles- brief history and use in education

VAK is an acronym for Visual, Auditory and Kinaesthetic learning styles which are different approaches and methods for an individuals' learning based on their preferences (Willis, 2017). Neil Fleming introduced this concept in 1987 that was designed to help learners and others learn more about their individual learning preferences (Willis, 2017). VAK was later on modified to VARK learning styles by Fleming in 2006 but is still commonly known as VAK (Fleming, 2006). The "R" in the acronym refers to reading and writing. Based on Fleming (2006), visual mode learners tend to learn best by seeing graphic displays such as charts, diagrams, illustrations, handouts, and videos which are helpful learning tools for visual learners. Aural mode learners tend to attain information by discussion and listening. For reading and writing modes, these learners interpret printed information and prefer handouts, textbooks, and overheads as a learning resource. They enjoy making lists, reading definitions and take notes in a lesson to retain information. Kinaesthetic mode leans more

towards hands-on activities that involve directly manipulating objects, materials and doing something to learn (Fleming, 2006).

This has resulted in a common conception amongst teachers that people predominantly learn using one style – whether visual, auditory, or kinaesthetic. Though every learner often incorporates elements of the other two styles, they are likely to achieve maximum benefit of inclusion from learning by focusing on their primary style (Grospietsch & Mayer, 2020). Furthermore, “brain-friendly” learning is a new catchphrase in school and university instructional practice. Most presentations of learning styles argue that most people prefer to learn in one of several different ways, a person’s learning preference reflects their learning style, education should match learners’ different learning styles and learners learn better if their education matches their learning style (White, 2004). This idea has been repeatedly tested and there is currently no evidence to support it. Despite this, belief in the use of Learning Styles appears to be widespread amongst schoolteachers and persists in the research literature (Willis, 2017). While we tend to have preferences about how we learn, the evidence shows we learn equally well in all modalities (Lethaby & Harries, 2016).

In a South African context, the VAK model suggests that individuals have different learning preferences such as visual, auditory, and kinaesthetic which aligns with the diverse needs and backgrounds of students in South Africa (Willis, 2017). The country has a rich cultural and linguistic diversity, where students may have different language abilities, educational backgrounds, and learning experiences. Using a variety of instructional approaches, including visual aids, verbal explanations, and hands-on activities, can cater to these diverse learning needs and help create a more inclusive classroom environment (Willis, 2017). Additionally, the VAK model continues to be utilized due to its perceived simplicity and ease of implementation by educators. It provides a framework that allows teachers to plan and deliver lessons in different ways to accommodate various learning preferences (White, 2004).

2.5.2 Arguments against learning styles

There is no evidence that designing lessons that appeal to different learning styles accelerates learner learning or will improve learning (Grospietsch & Mayer, 2020). Like many misconceptions about learning and the brain, the belief in learning styles stems from an incorrect interpretation of valid research findings and scientifically established facts (Geake, 2008). Yet teacher candidates are consistently directed to keep these pseudoscientific style categories in mind. The idea of “learning styles” is persistent and popular in the field because majority of teachers do not know the science that disproves it (White, 2004).

It is important to ensure that teachers are prepared with accurate insights into learning, instead of perpetuating myths that can potentially inhibit inclusion (Geake, 2008). The problem is when teachers do encounter sound science, those messages are blurred by the importance assigned to learning styles in coursework and licensure exams. Furthermore, when teachers study educational psychology, those textbooks, unlike general education materials approach the myths with scepticism, pointing out the lack of evidence and cautioning against the use of unsupported instructional practices (Grospietsch & Mayer, 2020). Textbooks also align their content with standard licensure exams, leading to incongruent mentions of learning styles. Nearly all those materials advocate for modifying instruction to accommodate learning styles for inclusive lessons (Pasquinelli, 2012). Licensure tests ask aspiring teachers to describe some activities that might help learners with varying learning styles best learn key concepts and to give a specific example from your personal classroom experience of the effects of differences in learning styles on how people understand and express what they know (Geake, 2008).

Despite this evidence, a large proportion of people including the general public, teachers and even those with a background in neuroscience still believe in the myth (Geake, 2008). A review published in *Frontiers in Education*, finds no signs of that changing (van Dijk & Lane, 2020). The team looked at articles that focused on belief in learning styles published between 2009 and April 2020. Articles with participant groups that were not made up of teachers or trainee teachers were excluded from analysis (van Dijk & Lane, 2020). Data from over 15,000 teachers were included in the analysis. Overall, 89.1% of participants believed that people learn better when

instruction is matched to their learning styles. A total of 95.4% of trainee teachers believed in learning styles, slightly higher than the 87.8% of qualified teachers who showed similar beliefs. And despite more widespread debunking of the myth, both in academic publishing and the mainstream media, there was no significant decrease in belief in studies conducted more recently (van Dijk & Lane, 2020).

The popularity of the learning styles mythology may stem in part from the appeal of finding out what “type of person” you are, along with the desire to be treated as an individual within the education system (Bellert & Graham, 2013). There are many other factors that affect a person’s ability to learn, such as their background, interests, and motivation to learn. Both the content (subject matter) and the context (how the subject matter needs to be applied) directly affect the design and delivery of learning, and not a person’s learning style because not all learning happens in the same way, not even in one individual (Grospietsch & Mayer, 2020). It is crucial to decide which techniques are best for which learning outcomes and not to customise learning provision based on learning style as empirical research shows that there is no correlation between learning styles and successful learning (Coffield, 2004).

Despite the criticism, many educators in South Africa still utilise the concept to cater to diverse learning needs and engage students in the learning process. One major impact of the VAK/VARK learning styles in South African education is the recognition of different learning modalities and the promotion of inclusive and student-centred pedagogy. By acknowledging that students have varied learning preferences, educators can design instructional strategies and activities that cater to these preferences. This approach aims to enhance students' understanding and retention of the subject matter by presenting information in ways that align with their preferred learning style. Moreover, the VAK model has influenced instructional practices and teaching methods in South African classrooms. Teachers often incorporate visual aids, such as charts, diagrams, and videos, to support visual learners. They may also utilise auditory strategies such as lectures, discussions, and audio recordings to engage auditory learners. For kinesthetic learners, hands-on activities, experiments, and movement-based tasks are frequently employed. The integration of these diverse teaching methods helps create a dynamic and engaging learning environment that accommodates various learning styles.

While VAK learning styles may still be used extensively in the South African education context, it is important for educators to critically evaluate its validity and supplement it with evidence-based practices. By employing a range of instructional strategies, teachers can better accommodate the diverse learning needs of students in South Africa, ultimately promoting a more inclusive and effective learning environment.

2.5.3 Issues/ Considerations with the use of Learning styles in education

The persistence of learning styles stems from the fact that people have different abilities, talents, goals, life experiences and motivations, including better working memory or persistence, which plays a crucial role in inclusive education (Bozarth, 2018). The idea that people differ in their abilities is almost certainly right, however it does get confused with learning styles. Paying attention to these differences comes from a place of caring for the learners and teachers may misinterpret how to help learners with different abilities flourish by differentiating instruction for inclusion (Bellert & Graham, 2013).

Advocates who understand learning styles insist that learning styles represent preferences (Bozarth, 2018). It is not a black-and-white thing, that you are either this or you are that. This often happens by dividing learners into groups (e.g., the kinaesthetic learners) and then providing information only in that modality. Strictly adhering to learning styles may be counterproductive to learners learning. This not only leads learners to depend on that modality for learning but denies them of the opportunity to learn in other modalities (Bellert & Graham, 2013). A good instructor will not heavily overload on one side or the other of any of these dimensions. The idea is balance (Coffield, 2004). What good teachers understand is that the different senses each have their own strengths and weaknesses. We are all visual learners as our vision is the best system to take in data. Likewise, we are all auditory learners- when the material calls for it (Geake, 2008). For example, consider the advantages of hearing a story via audiobook, sequential information is ideal for this “style” of learning. An “auditory learner who wants to get better at soccer will still lace up their cleats, run onto the field and practice their moves and not just listen to podcasts all day. Therefore, we take in information utilising our different senses (Geake, 2008).

It seems harmless enough, but when teachers work to accommodate learning styles, which have no empirical support, they divert attention and effort away from instructional strategies that are supported by a substantial body of research (Geake, 2008). In addition to the misallocation of teachers' time and effort, there are other potentially detrimental effects of learning-styles based instruction. Learners may act on their label. If a learner believes s/he has a particular dominant learning style, the learner may avoid effective learning strategies or even entire subjects they believe are a better fit for a learning style they do not think suits them (Bozarth, 2018). Learners who are taught they have a dominant learning style may attempt to process information in their preferred style, even when the method does not fit the task. Teachers who attempt to accommodate multiple learning styles in a lesson, rather than focusing on the most effective methods to present the specific material, can negatively influence learner learning by causing cognitive overload and stagnant mindset (Grospietsch & Mayer, 2020). A recent review of the scientific literature on learning styles found scant evidence to clearly support the idea that outcomes are best when instructional techniques align with individuals' learning styles (Bozarth, 2018).

Akkoyunlu & Yilmaz Soylu (2008) assert that there appears to be a divide between the perspectives of researchers. Researchers who advocate for learning styles point out that anecdotal evidence exists that support their view that learners have a preference for taking in information and that it is based on the learners themselves. The researchers who oppose the notion of learning styles do so because there is no empirical evidence that learners improve their learning based on learning styles (Akkoyunlu & Yilmaz Soylu, 2008). As a result, researchers feel like they have to take sides. When one takes sides that means they have to discredit others who do not agree with them (Gappi, 2013). There is also known evidence that supports the idea that learners do learn better when they are more comfortable with how the information is presented to them (Gokalp, 2013). Teachers should be concerned with improving how their learners learn and if conversing with them about how they like to take in information helps with their ability to better understand themselves, there should not be any harm in that. Therefore, there is no absolute answer to this debate (Akkoyunlu & Yilmaz Soylu, 2008).

2.6 Multiple Intelligences

2.6.1 What are multiple intelligences and its use in education

The following neuromyths including Multiple Intelligences and Left/Right brain dominance are not as popular, but still continue to be relevant neuromyths in education. The theory of Multiple Intelligences was presented in 1983 by Howard Gardiner, a psychologist, when he published his book titled *Frames of Mind*. Gardiner asserted that learning occurred through types of intelligences and people had various levels of each (Gardiner, 1978). He came to the realisation that intelligence cannot be limited to one group, but rather can be classified into eight separate areas of intelligence. Every human possessed all eight intelligences in various amounts, and everyone is made up of a unique combination of all the intelligences. Learners can experience great success if learning tasks are related to their developed intelligences. These intelligences can be developed, weakened, ignored or strengthened with practice (Gardiner, 1978).

The first form of intelligence includes the bodily- kinaesthetic intelligence which entails the ability to manipulate due to a strong mind-body union which is demonstrated in the form of physical skills. This includes dancers, athletes, or precision and steady movements in a craft. Existential intelligence refers to the ability to be able to have deep discussion about the meaning of life and human existence. People with this intelligence rationally address difficult questions. Intrapersonal intelligence is based on the ability to communicate effectively with others and is not limited to verbal interaction. People with this intelligence can read the moods of others, they can access the sentiments and motivations of others, they are able to communicate nonverbally and understand differences in perspectives. These people make good teachers, actors and social workers (Gardiner, 1978). Individuals with intrapersonal intelligence are highly aware of their feelings and can show an appreciation for themselves and other humans. They are self- motivated and use their understanding to direct the course of their own lives. This includes philosophers, psychologists, religious leaders, etc. Verbal- linguistic intelligence is the ability to express oneself using words and language to apply meaning to words and complex phrases such as journalists, poets and public speakers. Logical-mathematical intelligence is based on the ability to

calculate mathematical equations, demonstrate abstract thought and reasoning, and infer based on patterns (Gardiner, 1978). This includes scientists, mathematicians, and detectives. Musical intelligence is demonstrated by individuals who can distinguish between specific tones, rhythms and is a sensitive listener and can reflect or produce music accurately such as musicians, conductors, and composers. An individual who possesses a naturalist intelligence has a sensitivity to features in the natural world and can distinguish between living and non-living things. This includes chefs, farmers, botanists, etc. Spatial intelligence refers to people who can manipulate images, has graphic skills and spatial reasoning. They can be daydreamers, draw in their free time and show interest in puzzles and mazes. This includes artistic vocations such as architects, sculptors, painters, or careers that requires one to visualise like sailors or pilots (Gardiner, 1978).

2.6.2 Analysing Multiple Intelligences: A Critical Perspective

The theory of multiple intelligences has been criticised by mainstream psychology for its lack of empirical evidence and its dependence on subjective judgement (Waterhouse, 2006). The major criticism of the theory is that Gardiner's selection and application of criteria for his 'intelligences' is subjective and that a different researcher would likely have come up with different criteria. Gardiner has not provided a test of his multiple intelligences and originally defined it as the ability to solve problems that have value in a particular culture or a learner's point of interest (Waterhouse, 2006). Gardiner also added a disclaimer that he had no fixed definition of multiple intelligences and that it would be impossible to guarantee a definitive list of intelligences. Furthermore, it cages all the heterogeneous forms of human intelligence into a few categories which makes the theory weak (White, 2019). White (2004) asserts that Gardiner's multiple intelligence theory was funded by the van Leer Foundation. Sponsored studies tend to be biased in favour of the sponsor's agenda. Funding sources can influence the design, conduct, publication of research and the way in which research questions are chosen and framed. Bias in research agenda can produce results that support the funder's point of view which restricts the validity of a study and credibility of the evidence (White, 2004).

2.7 Right brain and left-brain dominance theory

2.7.1 A brief history and use in education

The brain is divided into two halves, or hemispheres. Within each half, particular regions control certain functions. The theory is that people are either left-brained or right-brained, meaning that one side of their brain is dominant (White, 2019). People who are mostly analytical and methodical in their thinking are said to be left-brained. The left brain is more verbal, analytical, and orderly than the right brain. It is better at things such as reading, writing, and computations (Ofiaz, 2011). The left brain is also connected to logic, sequencing, linear thinking, mathematics, facts and thinking in words. If an individual tends to be more creative or artistic, you are thought to be right-brained. The right brain is more visual and intuitive. It has a more creative and less organised way of thinking which is linked to imagination, holistic thinking, intuition, the arts, rhythm, nonverbal cues, feelings and daydreaming (Encyclopaedia Britannica, n.d). Teachers commonly believe that it is not only important for learners to understand what learning styles work best for them according to their brain dominance, but also for teachers to understand their own neurological strengths and weaknesses so they too can successfully reach every learner by using different teaching techniques better suited to their abilities and interests as in inclusive approach in the classroom (White, 2019).

In the 1800s, neurologists investigated the notion that each hemisphere of the brain functioned rather independently of the other. Discoveries by scientists such as Pierre Paul Broca strengthened this myth (Chiron, Jambaque, Nabbout, Lounes, Syrota & Dulac, 1997). Broca found that patients with a specific type of language function all shared damage in the left frontal hemisphere and not the right. This was empirical evidence to prove that the brain has specialised regions for processing and producing information (Knecht, Dräger, Deppe, Bobe, Lohmann, Flöel, & Henningsen, 2000). The problem was that the scientific finding was overgeneralised. Although the brains do have asymmetries when processing sensory data, there is no scientific evidence to prove that specific categories of thinking reside in specific hemispheres (Chiron, et al., 1997). This theory came again into light in the 1960s by the research of the psychobiologist and Nobel Prize winner Roger W. Sperry who noticed differences in

the brain when he studied people whose left and right brains had been surgically disconnected (Knecht, et al., 2000). While it is true that specific hemispheres of the brain are responsible for generating specific functions like speech, creativity and so on, it takes both hemispheres of the brain to process all of these functions and work together in every cognitive task (Encyclopaedia Britannica, n.d).

2.8 Impact of neuromyths in South African education

The link between the South African CAPS curriculum and neuromyths lies in the potential influence that these neuromyths can have on educational practices and pedagogical approaches. Instructions for teachers to incorporate common neuromyths is implied in the CAPS document (Department of Basic Education, 2011). The CAPS curriculum aims to provide a framework for quality education, guiding teachers in their teaching practices. However, there is a risk that neuromyths may infiltrate the education system and influence the way teachers approach instruction and assessment. Regarding specific neuromyths, it is important to note that the CAPS curriculum does not explicitly endorse or mention VAK learning styles, right-left brain dominance, Emotional Intelligence, or multiple intelligences as valid frameworks for teaching and learning. The CAPS (2011) document encourages teachers to make use of visual, audio and/ or audiovisual aids such as charts, posters, and images in the classroom to accommodate the various learning styles.

On the positive side, incorporating visual aids, images and other multimodal strategies can cater to the diverse learning needs of the students. Inclusive education aims to create an environment where all learners can thrive and achieve their full potential. By recognising and utilising various learning styles, teachers can engage students in different ways, making learning accessible and inclusive. It is important to note that VAK/VARK learning styles within the CAPS curriculum has limitations and potential negative consequences. It perpetuates the myth that students have fixed learning preferences that dictate instructional strategies. Furthermore, it overlooks individual strengths and preferences. To ensure genuine inclusivity, it is crucial for teachers to adopt a more holistic and evidence-based approach that goes beyond relying on learning preferences.

It is evident in the South African context that teachers are endorsing in neuromyth practices because they are not aware of the academic perspective of neuromyths as well as the perpetuation of these neuromythological falsehoods which can be implied in curriculum documents and teacher training courses and workshops. These concepts have received critique and controversy within the field of education and neuroscience due to the lack of empirical evidence supporting their effectiveness (White, 2004). It is crucial for educators and policymakers to critically evaluate and separate neuromyths from evidence-based educational practices to ensure that the CAPS curriculum promotes effective teaching and learning strategies that are supported by research and best practices in education.

While it is known that neuromyths have permeated education, there is little research to the extent of the permeation and the how teachers are utilising neuromyths in the South African context. Thus, to restate, the purpose of this study is to investigate the prevalence of neuromyths within the intermediate phase of education in order to bring to light the extent by which neuromyths may be impacting teaching and learning.

2.9 Conclusion

This chapter has provided a comprehensive explanation on the origins of neuromyths, the issues and debates surrounding the common neuromyths in education as well as the impact these neuromyths have in education in terms of making education all-encompassing and impeding inclusive education. These arguments provided show the need to find out about the prevalence and understanding of neuromyths amongst teachers in a broader space in the intermediate phase. Furthermore, there is a necessity to investigate how the use of these neuromyths are permeating the educational system and the extent of value it holds in teachers' pedagogical choices.

The next chapter will explore how the research will attempt to collect data by means of mixed methods to expand on our understanding on the perverseness of neuromyths and the influence it has on pedagogical efficacy.

Chapter Three: Methodology and Research Design

3.1 Introduction

The purpose of this study is to investigate the prevalence of neuromyths in the intermediate phase in the South African context, specifically in suburban public and private schools based in Johannesburg, as well as the ways in which the common neuromyths are permeating in intermediate education pedagogy. This chapter begins by discussing the research paradigms that serve as the foundation of this investigation. It delves into the theoretical frameworks that guide and shed light on the philosophies that shapes the researcher's analytical approach. It will also include detailed insights into the research design which encompasses the methodology and structure of the study. It extensively discusses the data collection process, including techniques employed and the instruments utilised to gather information. To ensure the reliability and validity of the findings, it addresses the important topic of trustworthiness of both qualitative and quantitative data. Lastly, it incorporates information on the ethical standards by outlining the steps taken to comply with ethical principles throughout the research.

3.2 Research Paradigm

This research project is aligned to the critical theory approach in inclusive education which falls under the social model. According to Petriwskyj (2014), critical theory is a philosophy that involves being critical of the prevailing view of society. In most cases, that means looking closer at beliefs and questioning how our educational system can best offer education to all people (Petriwskyj, 2014). In this case, the interviews provided teachers with an opportunity to reflect on the efficacy of their current teaching practices which assisted in understanding how their learners learn and think deeply about the best ways to teach learners for inclusivity. It supported teachers to identify any barriers to learning that their learners may have to make education inclusive. This research project offers opportunities and understanding of the different perspectives of neuromyths as well as the significance/ value it may hold in the educational system.

3.3 Theoretical Framework

In the context of this research on the prevalence of neuromyths in a South African context, several frameworks can provide a theoretical lens to understand this phenomenon. This theoretical framework was also mentioned in Chapter 2.

Albert Bandura's social cognitive theory emphasises the reciprocal relationship between behaviour, personal factors, and environmental influences. This framework highlights how individuals acquire knowledge, beliefs, and behaviours through social interactions and observational learning (Schunk, 2012). When it comes to neuromyths, social cognitive theory suggests that people's beliefs regarding brain function are shaped by their social environment, including educators, colleagues, media, and cultural norms. The prevalence of neuromyths in a South African context may be influenced by the social and cultural factors specific to that context. Teachers' beliefs about neuromyths are shaped by their observations of other teachers, discussions with colleagues, professional development opportunities and popular media (White, 2004). As they encounter and internalise this information, teachers may develop misconceptions or incomplete understandings. Social cognitive theory helps explain how teachers develop different understandings of neuromyths and how those understandings influence their pedagogical decisions and behaviours. By providing accurate information and fostering an environment of professional learning, we can support teachers in making informed decisions that positively impacts learning (Schunk, 2012).

Cognitive psychology focuses on understanding mental processes such as perception, attention, memory, and problem-solving. Within this framework, the prevalence of neuromyths can be attributed to cognitive biases, misinformation, and the human tendency to seek simplistic explanations for complex phenomena (Piaget, 2000). For example, individuals may be drawn to neuromyths because they provide seemingly logical explanations for learning and memory processes. Additionally, cognitive psychology examines how prior knowledge and misconceptions can impact the acceptance and perpetuation of neuromyths (White, 2004).

Lev Vygotsky's sociocultural theory emphasizes the role of social and cultural factors in the development of individuals (Allahyar & Nazari, 2012). This framework posits that learning is a socially mediated process, influenced by cultural norms, language, and social interactions. In the context of neuromyths, sociocultural theory suggests that beliefs and misconceptions surrounding brain function may stem from collective cultural beliefs, educational practices, and societal expectations. Understanding the prevalence of neuromyths in a South African context requires considering the cultural, historical, and social influences that shape people's beliefs about the brain (Allahyar & Nazari, 2012).

3.4 Philosophical Assumptions of Paradigms

In analysing the prevalence of neuromyths in Intermediate Phase in a South African context, we can explore the philosophical paradigms in terms of axiology, epistemology, ontology, interpretivism and subjectivism.

3.4.1 Axiology

Axiology refers to the study of values and ethics. In the context of studying neuromyths, axiology assesses the ethical implications of promoting misinformation and misconceptions about the brain and learning. It highlights the importance of valuing accurate scientific knowledge and evidence-based practices in education (Biesta, 2015). From an axiological standpoint, it is crucial to prioritize the ethical responsibility of educators to provide accurate and reliable information to students, parents, and the wider community (Kiryakova, Olkhovaya, Melekesov & Presnov, 2015).

3.4.2 Epistemology

Epistemology deals with the nature of knowledge and how it is acquired. As applied to the prevalence of neuromyths, epistemology focuses on the process of knowledge acquisition and dissemination in education. It emphasizes the need for educators to rely on valid, reliable, and scientifically grounded research to shape their understanding of how the brain works and apply it to teaching and learning

(Edelheim, 2014). Epistemologically, it is important to foster a culture of critical thinking and scientific inquiry to challenge and dispel neuromyths that may hinder effective educational practices (Biesta, 2015)

3.4.3 Ontology

Ontology refers to the nature of reality and existence. In the context of studying neuromyths, ontology explores the validity and existence of these misconceptions in educational settings (Biesta, 2015). Ontologically, the prevalence of neuromyths indicates the existence of misconceptions about the brain and learning that need to be addressed. It emphasizes the need for educators, researchers, and policymakers to engage in dialogue, ongoing research, and professional development to challenge and correct these misconceptions, promoting a more accurate understanding of how the brain functions and its implications for education (Kiryakova, et.al, 2015).

3.4.4 Interpretivism

Interpretivism emphasizes the understanding and interpretation of individuals' experiences and perspectives (Pham, 2018). In this context, interpretivism would examine how individuals in South Africa interpret and understand neuromyths, as well as the cultural and societal factors that contribute to their prevalence. This paradigm would explore the subjective meanings assigned to neuromyths and how they are influenced by cultural, historical, and social contexts (Pham, 2018).

3.4.5 Subjectivism

Subjectivism, on the other hand, focuses on the subjective experiences and beliefs of individuals. In relation to the prevalence of neuromyths in South Africa, subjectivism would study the individual perceptions and beliefs about the brain and learning, regardless of their scientific accuracy (Bunge, 2013). This paradigm would inquire into how individuals in South Africa develop and maintain their beliefs around neuromyths, and how these beliefs influence their educational practices and decision-making (Bunge, 2013).

The philosophical paradigms of axiology, epistemology, and ontology invite us to consider the ethical implications, knowledge acquisition processes, and existence of neuromyths in analysing their prevalence in the South African context (Biesta, 2015). By engaging with these paradigms, we can foster a more informed and evidence-based approach to education, ensuring the promotion of accurate information and effective teaching practices (Edelheim, 2014). By considering interpretivism and subjectivism, we can explore not only the prevalence of neuromyths in a South African context, but also the diverse perspectives, beliefs, and influences that contribute to their existence. Understanding these paradigms allows for a more comprehensive examination of the issue, taking into account cultural, social and individual factors (Biesta, 2015).

3.5 Research Design

This section includes the crucial features of this research with regards to the methodology and paradigm to investigate, collect and examine the requisite data.

3.5.1 Mixed methods research design

According to Braun & Clarke (2006), mixed methods research is an approach to inquiry that combines or associates both qualitative and quantitative forms. It involves collecting and analysing quantitative and qualitative data. Mixed methods design provides researchers, across research disciplines, with a rigorous approach to answering research questions and a holistic analysis of complex systems (Braun & Clarke, 2006).

The use of mixed methods enables researchers to answer research questions with sufficient depth and breadth and helps generalise findings and implications of the researched issues to the whole population (Devers & Frankel, 2000). For example, the quantitative approach helps a researcher to collect the data from many participants; thus, increasing the possibility to generalise the findings to a wider population. The

qualitative approach, on the other hand, provides a deeper understanding of the issue being investigated, honouring the voices of its participants. In other words, whereas quantitative data bring breadth to the study and qualitative data provides depth to it. Moreover, quantitative results can be embedded with qualitative findings and vice versa (Braun & Clarke, 2006). Another driving motive for combining the two methods is the belief that both kinds of research have values and that in some respects they are complementary, and therefore, there would be an added value in combining them. Researchers use both data sets to answer the same research question which can produce greater certainty and wider implication in the conclusion (Devers & Frankel, 2000).

Quantitative methods have been used to collect data on the number of teachers who implement neuromyth strategies as a classroom methodology and whether teachers have a prior understanding of neuromyths. Qualitative methods by means of semi-structured interviews have been conducted to provide more depth on why teachers utilise these neuromyths, to cast light on how teachers incorporate neuromyths into their teaching practice, to find out about their thoughts on the value neuromyths adds to their practices, and what their response is when confronted with the point that neuromyths are not academically supported and can impede epistemological access. Mixing these two methods have helped produce a more holistic, complete picture and provide an opportunity for a greater assortment of divergent or complementary views on neuromyths which are valuable as they not only lead to extra reflection and enrich our understanding of a phenomenon, but also open new avenues of inquiries (Braun & Clarke, 2006).

3.5.2 Embedded Design

Embedded Design is a mixed methods design in which one data set provides a supportive, secondary role based on the other data collected. The idea of this design is that a single data set is not enough because different questions need to be answered and each type of question needs different kinds of data (Braun & Clarke, 2006). This design is used when there is a need to include qualitative and quantitative data to answer a research question within a largely quantitative or qualitative study. This

design is useful when a researcher needs to embed or show the correlation of a qualitative component within a quantitative component (Braun & Clarke, 2006).

In this study, the survey and semi-structured interviews have run in conjunction, but separately. The qualitative semi-structured interview formed the primary data collection method with the quantitative survey used to support the data collected from the interviews. The 5 interview participants also participated in the survey.

3.5.3 Research Site

This research includes 40 different schools, specifically the intermediate phase situated in Johannesburg and falls into the suburban public and private schools' categories. The survey was conducted digitally through 40 different schools in the Johannesburg suburbs. The schools were both private and public in order to have a broad scope and diverse demographics. In order to obtain a comprehensive understanding of how neuromyths are utilised in classrooms, this research includes 5 teachers from both private and public schools as participants of the interview. This approach allowed to gather information from a diverse range of educational settings and student demographics.

3.5.4 Purposeful Sampling

Purposeful sampling was utilised in this research as it had a specific focus on intermediate phase teachers from suburban public and private schools based in Johannesburg. The surveys used to collect quantitative data were conducted online as the link was provided through the school and staff emails. In order to collect the qualitative data, 5 different intermediate phase teachers participated in the semi-structured interviews. The schools were previously given a letter which outlined the purpose of the research, the specific information being collected and how the data will be used for the survey and interview. The 5 teachers who took part in the interview were provided with an informational letter, which they subsequently acknowledged by signing it. Each teacher who participated in the interview was from a different school to ensure that there was a variation in responses as well as avoiding homogeneity and a shared culture. The teachers who were involved in the survey received the

necessary information through the information letter which was provided to the principal. By participating in the survey, they effectively provided their consent as the letter stated that participation was voluntary. A total of 54 teachers from over 40 schools participated in the online survey.

3.6 Data Collection Process

To conduct the interviews and surveys, ethical clearance from the Gauteng Department of Education to interview the teachers was required. I then had a meeting with the school principals of the 40 schools to ask permission to conduct the survey and interviews with the teachers. I then addressed the relevant teachers to ask for their participation after providing a detailed clarification of the purpose of the study as well as the ethical precautions. In addition, I typed out a letter outlining the intentions of this study in detail. Once all the permissions were approved with the notified consent, I conducted the survey by means of utilising online software and conducted the interviews with the teachers.

3.7 Data Collection Instruments

To expand the scope of knowledge about neuromyths, it is important to highlight that the survey specifically enquires about four commonly encountered neuromyths: Emotional Intelligence, Multiple Intelligences, VAK/VARK learning styles and Left/Right brain dominance. This deliberate selection allows for a more comprehensive understanding of the prevalence and impact of these neuromyths. The interview focuses only on the 2 most prominent neuromyths, namely EI and VAK/VARK to get deeper insight from the participants. By focusing on the 2 most commonly known and understood neuromyths, it guarantees that teachers will have greater insight and be more confident in answering the questions.

3.7.1 Structured survey

The survey entailed a structured question design. The survey is a quantitative research method where the interviewer planned a set of prepared closed-ended

questions in the form of an interview schedule, in which he/she reads out exactly as worded (Minnaar & Heystek, 2013). The interviewer does not deviate from the interview schedule except to clarify the meaning of the question or probe beyond the answers received (Devers & Frankel, 2000).

The aim of the survey with structured questions was to sum the number of teachers who implement neuromythological practices in their teaching pedagogies, it is also to get information on the number of teachers who were aware of the concept of the common neuromyths and get a numeral figure of the specific neuromyths teachers implement in their teaching.

The pros of using a structured survey in this context include standardisation. Standardisation ensures consistency in the data collection process, as all participants receive the same set of questions. This makes it easier to compare responses and analyse the data (Minnaar & Heystek, 2013). Surveys are a time-efficient method of data collection, as they can be distributed to many participants simultaneously. The cons of using a structured survey in this case include limitations to predetermined questions. Since the questions are pre-defined, participants may not have the opportunity to elaborate or share additional insights beyond the given options (Devers & Frankel, 2000). There may also be a potential for response bias which means that participants might interpret the questions differently or provide socially desirable responses which can introduce bias into the results (Minnaar & Heystek, 2013).

For the online survey questions, refer to Appendix A.

3.7.2 Semi- structured interview

In this type of interview, the interviewer prepared a list of questions but did not necessarily ask them all, or touch on them in any particular order. Instead, the interviewer used these questions to guide the conversation. The interviewer asked only a few predetermined questions while the rest of the questions were not planned in advance. A semi-structured interview allowed for follow up questions to answers that are not anticipated to find deeper perspectives (Devers & Frankel, 2000).

The quantitative data gets the numbers to prove the broad general numbers of the prevalence of neuromyths in schools. Qualitative data derived from the semi-structured interview did bring in the details and the depth of how teachers incorporate neuromyths into their teaching and how it is permeating in pedagogical practices as well as to gain an understanding of the implications of these myths have in teachers' teaching methodologies and what they make of neuromyths which hinder epistemological access from an academic perspective.

In the context of this research on the prevalence of neuromyths in South African schools, conducting a semi-structured interview can be a valuable because it allows for open-ended questions and follow-up queries, enabling one to delve deeply into the topic (Devers & Frankel, 2000). This will help understand how teachers incorporate neuromyths into their teaching and gain insights into their perspectives and beliefs. Furthermore, one can capture rich and detailed accounts of teachers' unique experiences and insights of neuromyths. This can provide a nuanced understanding of the implications these myths have on teaching practices and student learning as well as shed light on why these myths persist, despite the evidence against them.

Interviews tend to have limited generalisability. Semi-structured interviews typically involve a small sample size, making it challenging to generalise findings to the entire population of South African teachers (Devers & Frankel, 2000). The insights gained may only represent the perspectives of those interviewed. It may result in biased responses. Participants may provide socially desirable answers or alter their responses to align with what they perceive as the "correct" or expected answer. This could potentially impact the accuracy and reliability of the data collected.

Appendix B contains the questions from the semi-structured interview.

3.7.3 Audio recording

The audio recording of the interview improved the quality and transparency of the information provided. With note taking, there was often an increased risk of the interviewer being more subjective or misinterpreting the information provided to him or her by the interviewee. An audio record provided an unbiased and true recitation of the interview, which gave greater context and a holistic picture of the situation. Rather

than simply relying on notes taken, the interviewer had the ability to review and replay the interview at a later date and potentially identify key information that may have been missed during the interview.

3.7.4 Thematic analysis

Thematic analysis is a method for analysing qualitative data that entails searching across a data set to identify, analyse, and report repeated patterns. It is a method used for describing data and it also involves interpretation in the processes of selecting codes and constructing themes (Braun and Clarke 2006). In other words, thematic analysis is about analysing the themes within your data to identify meaning. This process is driven by research questions; therefore, it is not necessary to identify every possible theme in the data, but rather to focus on the key aspects that relate to the research questions. The principles of thematic analysis include how to code data, how to search for and refine themes, as well as to report findings are applicable to several other qualitative methods such as grounded theory (the collection and analysis of data) and discourse analysis (Braun & Clarke, 2006).

In this case the thematic analysis has been used to familiarise myself with the qualitative, quantitative, the audio recording and various sources of conceptual data. It allocated initial codes to the data in order to describe the content. This did assist with search for common patterns or themes in my codes across the different interviews and conceptual research sources. It helped in collating codes with supportive data and sort the codes into potential themes. Themes in qualitative research are a way to see trends and patterns in my data. It aided in seeing how various codes can be combined and see if there are themes that can be made into sub-themes. Grouping codes into themes served as a way of summarising sections of my data in a useful way that helped me answer the research question and achieve the research aims and objectives. Once I had fully thought-out the themes, it gave me a chance to communicate to readers about the validity of the analysis. It assisted in a coherent story about my data and went beyond describing the data and included my own interpretive analysis and made an argument for the claims presented.

The thematic analysis process employed in my research following Braun and Clarke's approach involved the following steps:

Step 1: Familiarization with data

This entailed reading and re-reading the interview transcripts and the quantitative survey data to immerse oneself in the data by taking notes and jotting down initial ideas or patterns that stand out to the researcher (Braun & Clarke, 2006).

Step 2: Generating initial codes

The researcher codes the qualitative interview data by identifying meaningful units or segments related to the research question (Braun & Clarke, 2006). These include the participants' beliefs or misconceptions about neuromyths.

Step 3: Searching for themes

Once the initial codes to specific portions of the qualitative data are generated, the coded segments are used to identify broader patterns or themes are examined across the data (Braun & Clarke, 2006). The researcher looked for similarities, differences, or recurring ideas related to neuromyths in the South African context.

Step 4: Reviewing and defining themes

The quantitative survey data is examined and the researcher searches for any patterns and themes that align and connect with the qualitative codes identified earlier. The identified themes are reviewed, and a thorough analysis of each theme is conducted (Braun & Clarke, 2006). This is done by defining and naming them in a way that accurately represents the content and meaning within the data. Each theme should capture important aspects of the prevalence of neuromyths.

Step 5: Refining themes

This entails the evaluation of the identified themes and codes by considering how they relate to both the qualitative and quantitative data. The researcher ensures that the themes accurately capture the essence of the data and provides meaningful insights

which relate to the main research questions (Braun & Clarke, 2006).

Step 6: Creating a thematic map

A visual representation of the themes was designed to illustrate the relationships between the themes (Braun & Clarke, 2006). This helped in visualising how different themes interconnect and contribute to the overall understanding of neuromyths in the South African context.

Step 7: Writing up the analysis

This entails writing a comprehensive report that presents key findings from the integration of the qualitative interview data and quantitative survey data. It also describes and explains each theme in detail (Braun & Clarke, 2006). This was done by incorporating relevant quotes or examples from the interviews to support the researcher's analysis of each theme.

By following Braun and Clarke's (2006) step-by-step thematic analysis, one is able to effectively combine qualitative and qualitative data from semi-structured interviews in order to gain holistic insights into the prevalence of neuromyths in a South African context.

3.8 Issues of Trustworthiness for quantitative data

3.8.1 Transferability (Applicability)

The transferability of quantitative data refers to its applicability to other settings or contexts. To enhance transferability, it is crucial to describe the research setting, population, and sampling methods used in this study. This helps readers understand the extent to which the findings may be applicable to other similar contexts (Farrelly, 2013). In this case, the research data specifically comes from suburban and private schools located in Johannesburg.

3.8.2 Credibility (Truth Value)

Credibility in quantitative data relates to its truthfulness and accuracy. To ensure credibility in this research, appropriate data collection methods, such as validated surveys and documentation of the data collection procedures are being used (Loh, 2013). This helps demonstrate the reliability and validity of the findings. In this case, this research data included a diverse and representative sample of participants from both public and private schools in Johannesburg. There was a clear definition of research objectives that were directly aligned with survey questions to maintain focus and relevance (Farrelly, 2013). Both participants and the school had a clear understanding of the research purpose for informed consent. Moreover, their personal data was handled confidentially to safeguard their privacy (Loh, 2013).

3.8.3 Dependability (Consistency)

Dependability in quantitative data refers to the consistency of the findings over time. To establish dependability, it is important to employ rigorous data analysis techniques and clearly document all steps of the data analysis process in the thematic analysis (Loh, 2013). Chapter 4 shows a comprehensive step-by step process used to code the research data using Braun and Clarke's thematic analysis approach.

3.8.4 Confirmability (Neutrality)

In quantitative research, conformability can be achieved by ensuring the anonymity and confidentiality of participants and maintaining a transparent data analysis process (Loh, 2013). In this research, the online survey ensured the anonymity of all participants by not disclosing their names.

3.9 Issues of Trustworthiness for qualitative data

3.9.1 Transferability (Applicability)

While qualitative data may not aim for generalisability, transferability can be achieved by providing a detailed description of the research context, participants, and data

collection methods (Farrelly, 2013). This allows readers to assess the applicability of the findings to other similar educational settings (Loh, 2013). In this study, a specific sample of teachers who teach intermediate phase from both suburban public and private schools in Johannesburg was utilised. As a result, the findings and information gathered are primarily applicable within that particular context.

3.9.2 Credibility (Truth Value)

Credibility in qualitative data is concerned with the trustworthiness and authenticity of the findings. To establish credibility, one should follow rigorous qualitative research practices, such as utilising an embedded design in thematic analysis in this case (Farrelly, 2013). This was done by comparing findings from the interview and using different coders to analyse the data.

3.9.3 Dependability (Consistency)

Dependability in qualitative data focuses on the consistency and stability of one's findings. To ensure dependability, it is important to maintain a clear audit trail by documenting the research process, including data collection, analysis, and interpretation (Loh, 2013). Braun and Clarke's thematic analysis was employed during the research process to establish a transparent audit trail, ensuring a clear record of how themes and codes were identified and derived from the data.

3.9.4 Confirmability (Neutrality)

In this case, confirmability is based on the neutrality and objectivity of the research process. In qualitative research, confirmability can be enhanced through reflexivity, by reflecting on personal biases and perspectives of the research (Farrelly, 2013). This point is mentioned in 3.6.1. It explains how thematic analysis may be subjective. Furthermore, this research does not exclusively concentrate on the negative consequences of neuromyths, which may result in ineffective teaching practices. It also considers the positive aspects by exploring its potential usefulness.

3.10 Compliance with Ethical Standards

In terms of ethical consideration, informed consent was obtained through the following process. Before the research took place, I obtained an ethical clearance from Wits University. I also applied to the Department of Education for permission to conduct my study in the selected schools. Prior to conducting the study, I spoke to the various principals of the schools to brief them on information about the study's purposes and then got permission to proceed. This was done through a face-to-face meeting and the use of a letter of information and request. I provided a letter of the purpose of this research to the SGB (School Governing Body). I also informed the potential participant teachers of the intended survey and interview about the purpose of the study and then asked for her/his informed consent.

In addition to this, each teacher did have the choice to volunteer to take part in the study. The teachers being interviewed had the option to consent whether they agreed or disagreed to the audio recording of the interview. Teachers had the chance to agree if direct quotations from the interview could be used by the researcher in the research report. Confidentiality was achieved by making sure that teacher participation in the survey was handled with the utmost discretion and their identities remained anonymous in the dissemination of the research findings. The teachers had the choice to agree or disagree that other researchers may use the information I provided in my interview, however name and any personal information of the participant would not be used or passed on. The recording was also be stored in a hard drive which only I would be able to access, and it would be deleted 2 years after the final report.

3.10.1 Research Bias

Thematic analysis can often be quite subjective and relies on the researcher's judgement, so I reflected carefully on my own choices and interpretations. This entailed paying close attention to the data to ensure that I was not picking up on things that are not there or obscuring information.

From an academic perspective, neuromyths are typically viewed as a negative approach to education which is widespread and prevailing the education system and hinders epistemological access. This academic stance has influenced my personal

bias in which I have viewed neuromyths as detrimental to education and it has also made me think about teachers adopting ineffective teaching practices which may have a negative impact on learner learning. At the same time from a practical perspective, neuromyths do have an element of truth and neuromyths are not completely irrelevant to teacher effectiveness when looking at the two sides of the coin (Pasquinelli, 2012). It is not possible to completely eliminate biases in data analysis. However, when devising this research project, it was crucial for me to code multiple perspectives of neuromyths and review findings with my supervisor. This prevented the biased notion that the purpose of research project is to help advance knowledge to fight against the misconceptions among teachers and into the education itself. The purpose was rather to provide scientific information about neuromyths for teachers to keep up to date with information of neuromyths which can inform their practices in the classroom to design and execute lessons that are effective to implement inclusion successfully.

3.11 Conclusion

In conclusion, this chapter provides insights into various aspects of the research process related to the prevalence of neuromyths. It begins by discussing different research paradigms and the philosophical assumptions that guide the analysis in this particular context. The chapter then delves into the research design, exploring the chosen methodologies, data collection processes and instruments used for data collection. Additionally, it highlights the importance of ensuring trustworthiness for both quantitative and qualitative data, addressing the potential issues and strategies employed. Lastly, the chapter emphasises the significance of compliance with ethical standards throughout the research process.

Chapter 4: Findings

4.1 Introduction

Chapter 4 will provide information linked to the findings of the survey and the semi-structured interview. Each section of the survey and interview has an outline of background information on the participants of the research. The first part pertaining to the survey includes pie charts that provide numerical data on the teachers' responses of the survey. It also includes a table that contains information on how the meanings of a neuromyth provided by the teachers were grouped according to the teachers' individual connotations of the term. The last section of this chapter comprises of a detailed summary of the responses given by the participants in the semi-structured interview. It merely presents the information given by each educator and does not include any discussion or analysis of the findings.

4.2 Background data of survey participants

The purpose of the survey was to primarily gather quantitative data on the prevalence of the awareness of neuromyths with Intermediate Phase teachers based in Johannesburg. The survey questions are based on whether teachers knew what a neuromyth is, as well as teachers' knowledge and awareness of the common neuromyths which include Emotional Intelligence, Multiple Intelligences, VAK (Visual, auditory, and kinaesthetic) learning styles, and Left/Right brain dominance. Furthermore, it aimed to investigate teachers' conceptions of the definition of a neuromyth as well as the pervasion and permeation of these common neuromyths in teachers' pedagogical practices. The survey is the qualitative data aspect to the survey. It will help in answering the main research questions on the degree of how neuromyths have influenced teachers' pedagogical practices, the percentage of teachers who are aware of these neuromyths and assist in providing numerical data on the ways that the common neuromyths (Emotional Intelligence, Multiple Intelligences, VAK- visual, auditory & kinaesthetic Learning Styles, left/ right brain dominance) are permeating/influencing intermediate phase teachers pedagogical choices.

4.3 Results of the survey

Question 1

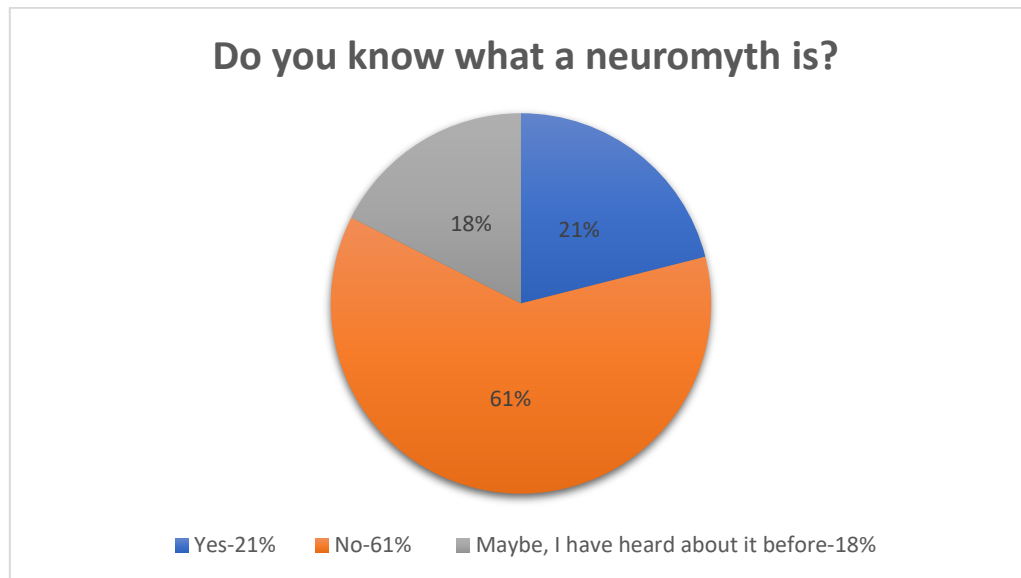


Figure 1 - Do you know what a neuromyth is?

The pie chart illustrates the awareness levels among participants regarding neuromyths, with 18% indicating prior knowledge, 21% are familiar with the concept and the majority of 61% admitting no prior understanding.

Question 2

The table below shows a numerical representation of teachers' definitions of a neuromyth that were grouped into different meanings. The meanings were grouped according to teachers who reproduced the same definition from the internet, the educators who got an accurate definition, teachers who got close to the meaning, teachers who had an estimated and vague conception of the term, teachers who gave a very scant definition of the word as well as teachers who did not know the meaning of the term.

The paragraph below the table includes examples of the definitions that the participants provided in their responses.

Table 1 - A table showing numerical data on the grouped definitions of a neuromyth.

Participants who copied the definition from the internet.	3
Participants who got the correct definition.	2
Participants who got close to the correct definition.	6
Participants who had a rough idea of the definition.	18
Participants who provided scant definitions.	20
Participants who did not know the meaning of the term.	8

3 participants of the survey copied a very similar definition from the internet. These definitions included *"A misconception regarding research due to the misunderstanding or misquoting of the actual facts"* and a *"Misconception generated by the misunderstanding or misreading of facts scientifically established by the brain."*

2 participants provided a correct definition of a neuromyth. They outlined a neuromyth as *"Misunderstandings of facts that come from brain science"* and *"A commonly held, but false belief that is often presented as a fact which may be based on something scientific."*

6 participants were close to the correct definition. It was described as *"A myth that is accepted as true based on incorrect knowledge or teachings"* and *"A myth about ways of learning or brain function."*

18 teachers had a rough idea of a neuromyth. A participant reported that it is *“Ideas that we have such as learning styles and we can be more right brained which is artistic and left brained which is more academic.”* Another educator defined a neuromyth as *“A misconception that if a learner is taught in a particular way, it will improve their understanding of content in education”* and *“Perhaps a false belief of something that is generally implanted in most people’s mind.”*

Twenty teachers gave a very scant definition of the term. They stated that a neuromyth had *“To do with the brain”* and was *“Something that has to do with the works of the brain”*. It was also interpreted as *“Myths about how to learn or study”*.

8 participants did not know the meaning of the term and included statements such as *“I’m not 100% sure about this topic”* and *“I don’t know.”*

Question 3

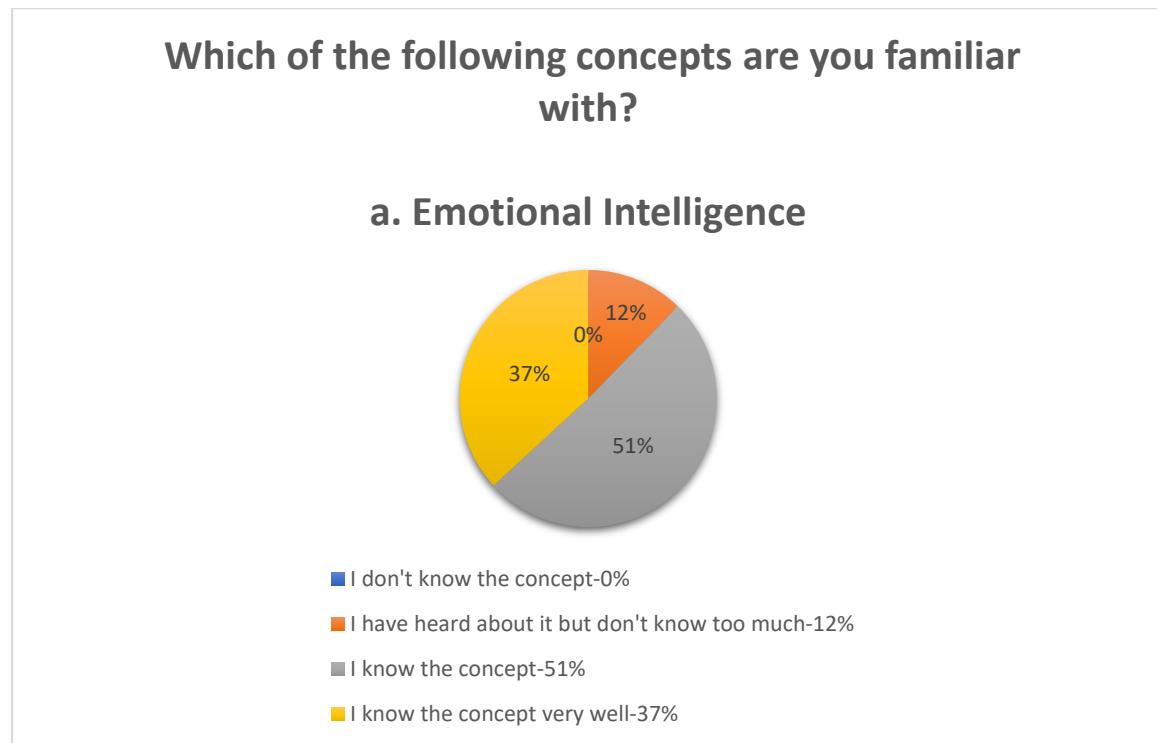


Figure 2 - Which of the following concepts are you familiar with? (Emotional Intelligence)

This pie chart represents the familiarity of participants with the concept of Emotional Intelligence. Notably, 0% indicated unfamiliarity, 12% recognised the term but lacked in-depth knowledge, a majority of 51% claimed familiarity, while 37% exhibited a strong understanding of Emotional Intelligence.

Question 4

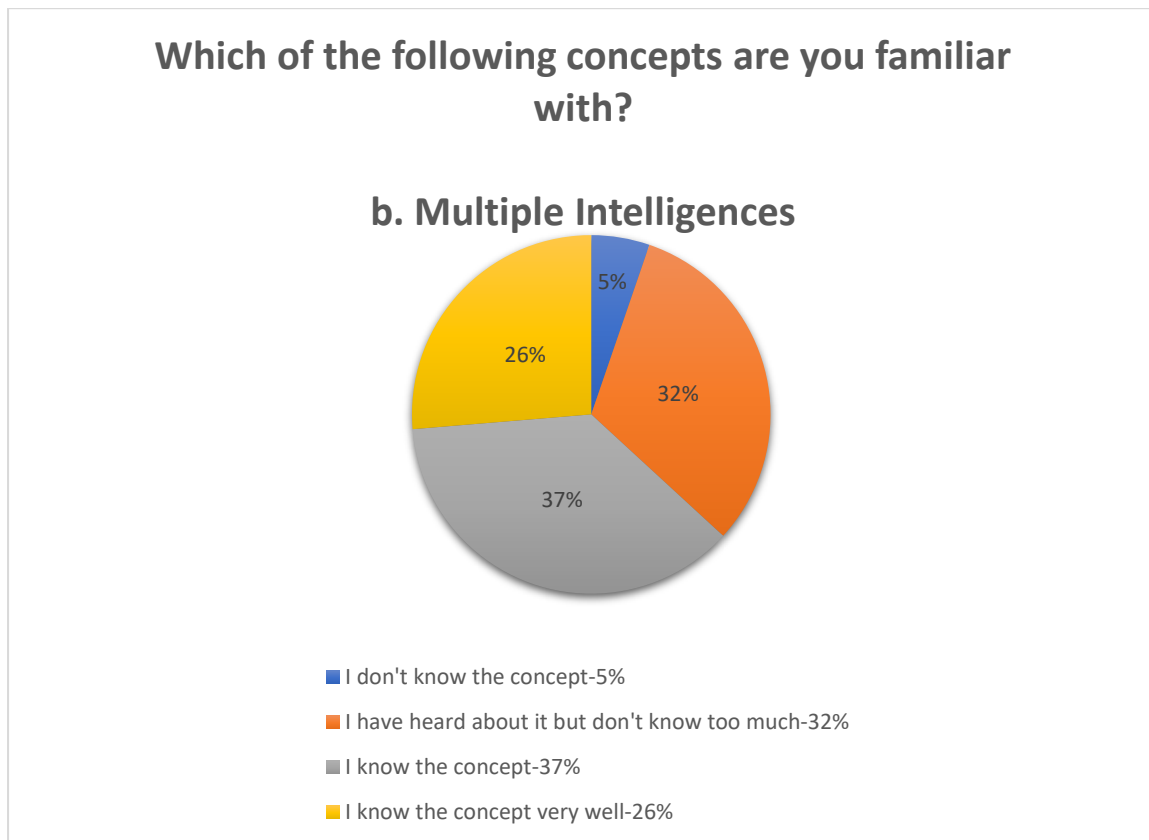


Figure 3 - Which of the following concepts are you familiar with? (Multiple Intelligences)

Notably, a small percentage of 5% admitted to being unaware of the concept. In contrast, 32% recognised the term but possessed limited knowledge. 37% exhibited a solid understanding of Multiple Intelligences and 26% of participants indicated a high level of knowledge and awareness.

Question 5

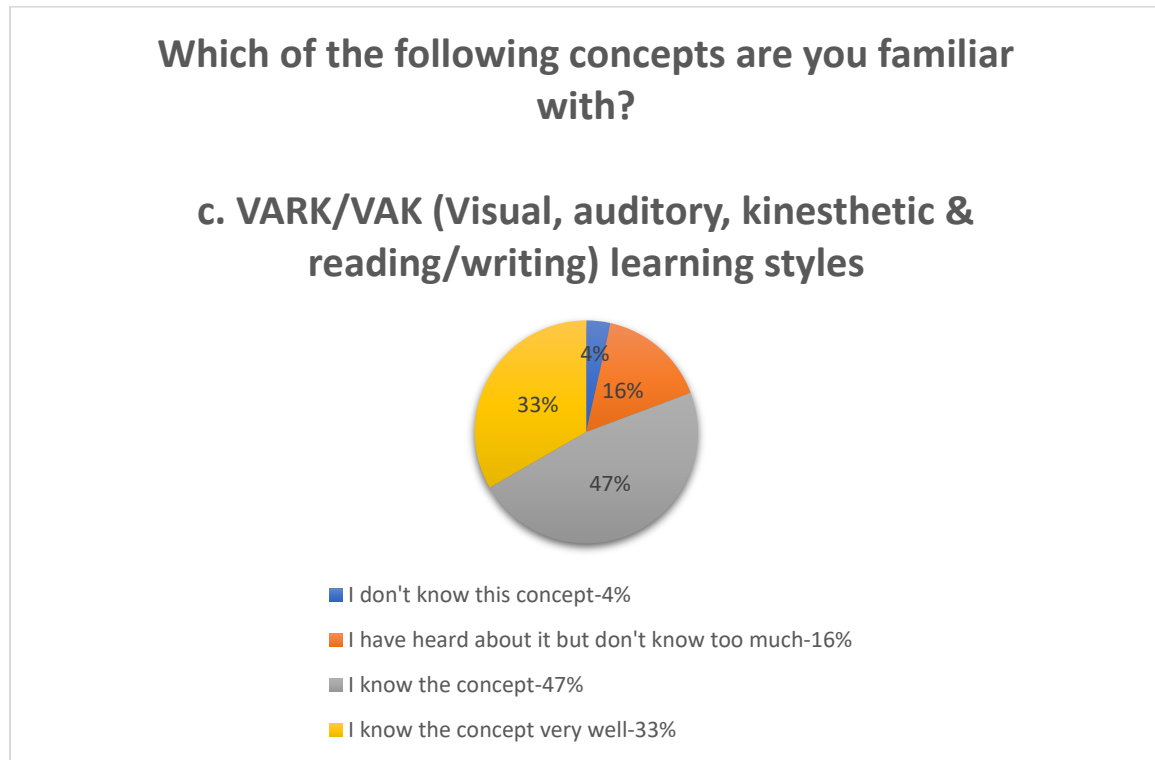


Figure 4 - Which of the following concepts are you familiar with? (VAK/VARK learning styles)

This graph showcases the participants' awareness levels regarding VAK/VARK learning styles. While a small portion of 4% admitted to being unaware of the concept, a significant number of 16% stated that they have heard of it but have limited knowledge. A majority of 47% indicated that they have a good understanding of VAK/VARK learning styles. Notably, 33% of the respondents indicated an in-depth knowledge of the concept.

Question 6

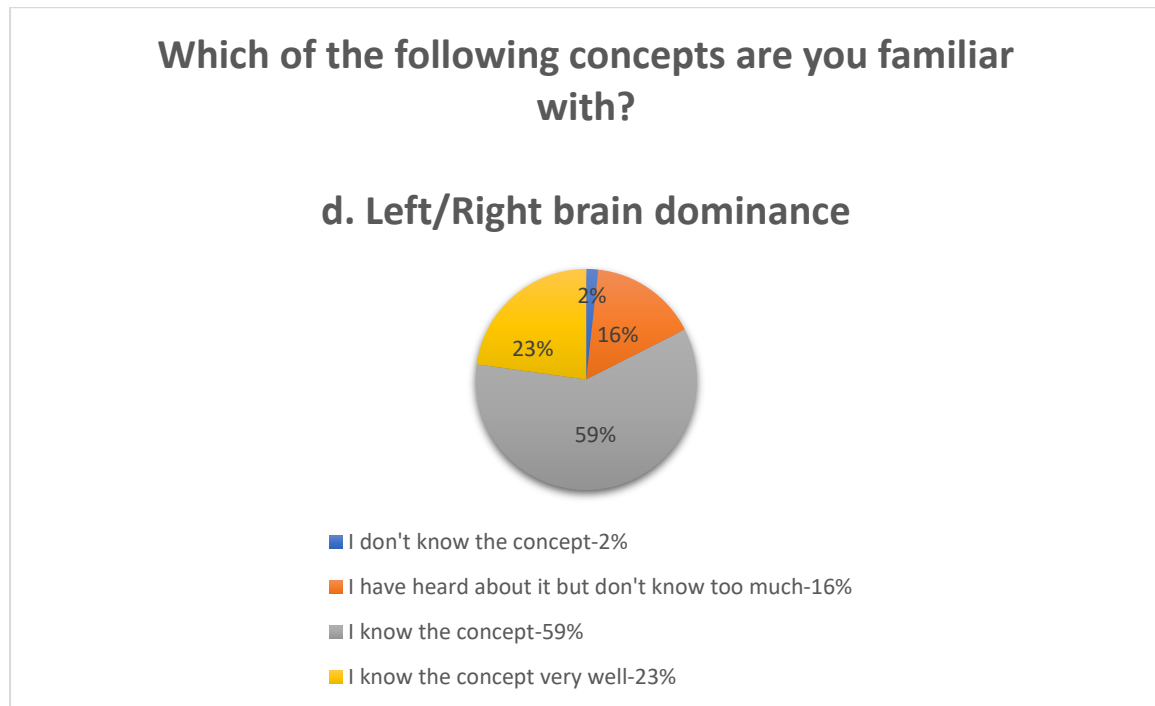


Figure 5 - Which of the following concepts are you familiar with? (Left/Right brain dominance)

This pie chart illustrates the participants familiarity with the concept of Left/Right brain dominance. A small percentage of 2% indicated that they are unfamiliar with the concept. Additionally, 16% reported hearing about it but lacking in-depth knowledge. The 59% of participants expressed a good understanding of the concept. Notably, 23% of the respondents showcased a high level of familiarity, suggesting a strong grasp of the concept.

Question 7

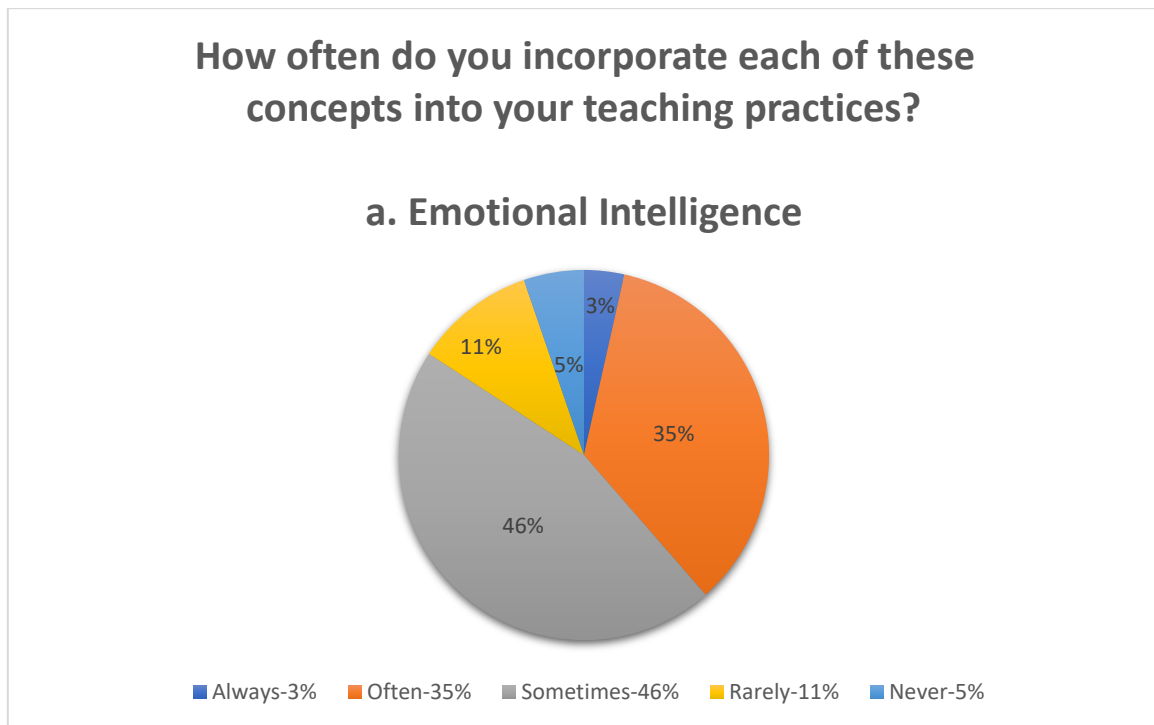


Figure 6 - How often do you incorporate each of these concepts into your teaching practices? (Emotional Intelligence)

This pie chart represents the frequency with which teachers incorporate Emotional Intelligence into their teaching practices. According to the data, 3% reported always including Emotional Intelligence, 35% often incorporate it, 46% do so sometimes, 11% said rarely and 5% never include Emotional Intelligence in their lessons.

Question 8

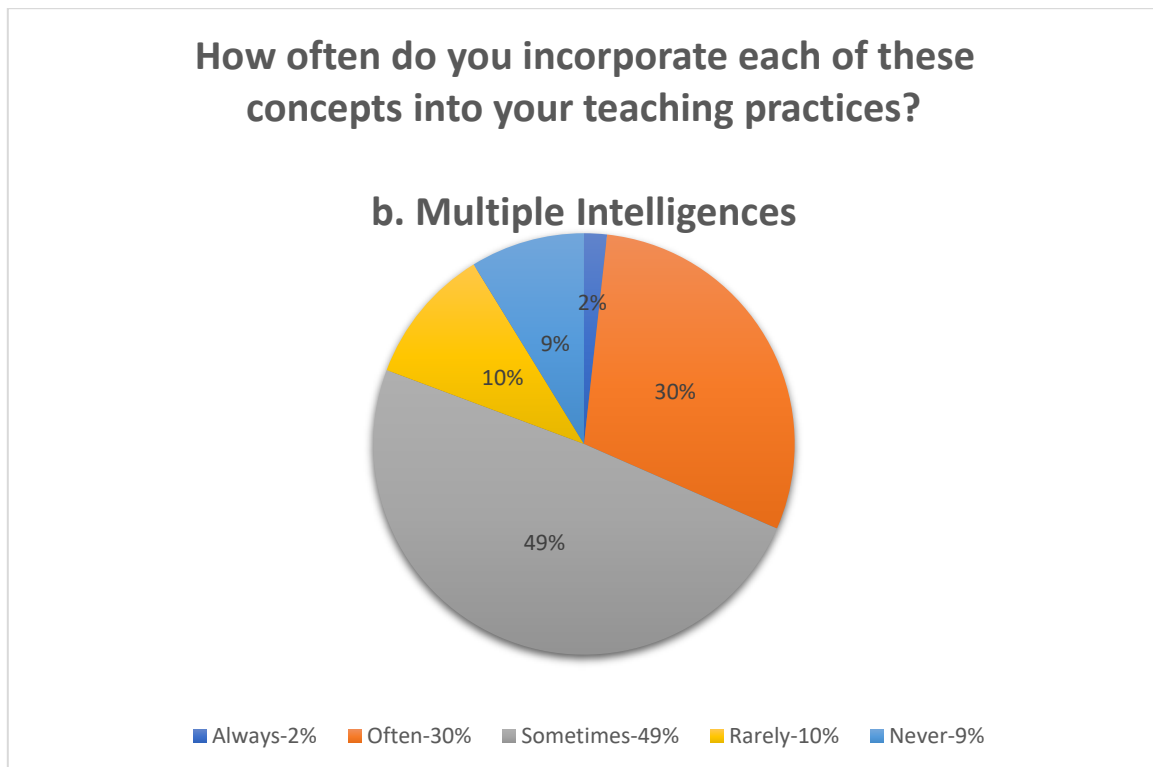


Figure 7 - How often do you incorporate each of these concepts into your teaching practices? (Multiple Intelligences)

Based on the percentages depicted in the pie chart, it is evident that teachers vary in their inclusion of multiple intelligences in their teaching practices. Only 2% of teachers claimed to always integrate multiple intelligences, while 30% reported doing so often. A significant portion, 49%, mentioned incorporating multiple intelligences sometimes. On the other hand, 10% of teachers stated that they rarely include multiple intelligences in their lessons, and 9% admitted to never doing so.

Question 9

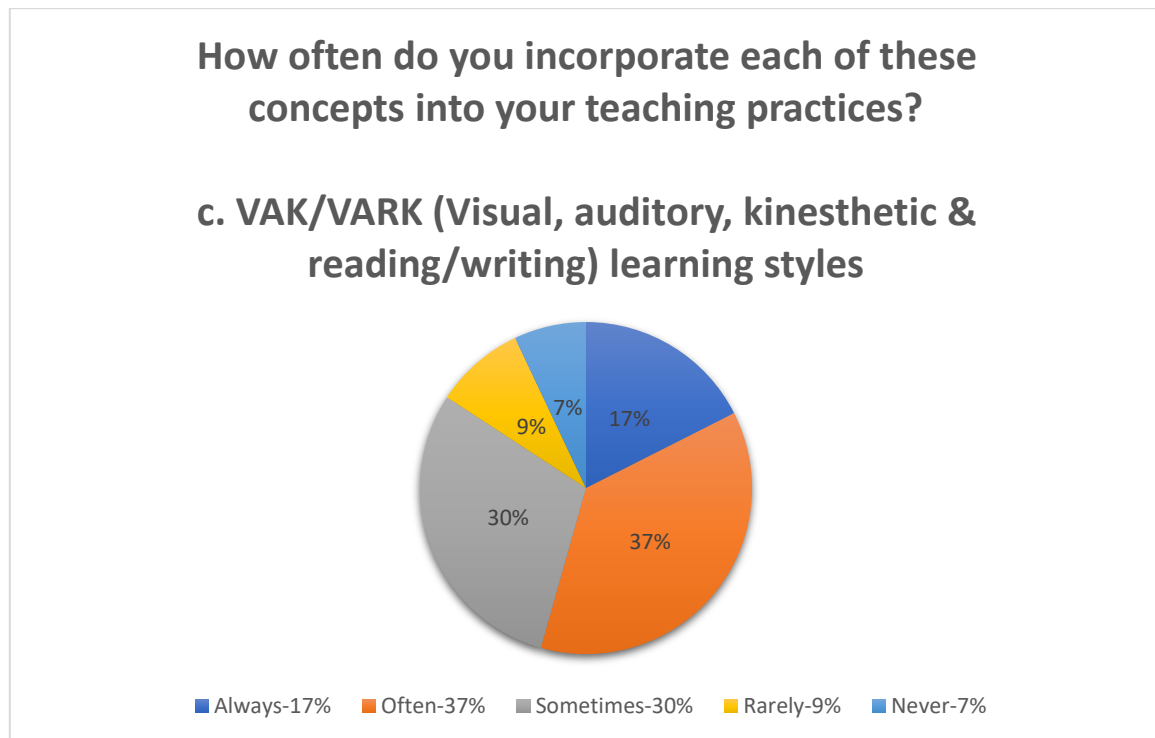


Figure 8 - How often do you incorporate each of these concepts into your teaching practices? (VAK/VARK learning styles)

This pie chart showcases the varying practices among teachers when it comes to utilising VAK/VARK learning styles in the classroom. It reveals that 17% of teachers consistently incorporate VAK/VARK learning styles into their lessons, with an additional 37% doing so often. Approximately 30% of teachers reported using these learning styles sometimes. A smaller portion of teachers (9%) stated that they rarely implement VAK/VARK learning styles, while 7% confirmed that they never include these learning styles in their lessons.

Question 10

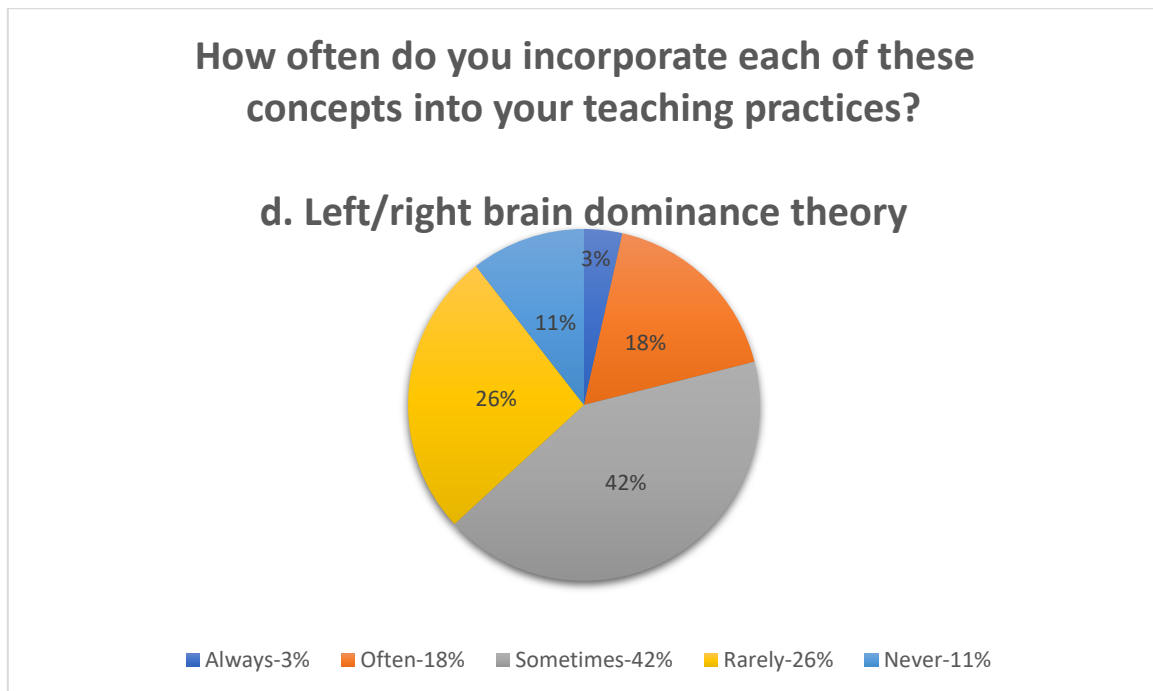


Figure 9 - How often do you incorporate each of these concepts into your teaching practices? (Left/right brain dominance theory)

This graph shows the diverse approaches employed by teachers when considering the incorporation of left/right brain dominance in their teaching methodologies. According to the data, 3% of teachers consistently incorporate left/right brain dominance into their lessons, while 18% do so often. 42% of teachers reported implementing this neuromyth sometimes. On the other hand, 26% of teachers stated that they rarely include left/right brain dominance in their teaching practices, with 11% confirming that they never integrate these techniques in their lessons.

4.4 Background data of interviewees

Five intermediate phase teachers from 5 different suburban private and public schools based in Johannesburg participated in this semi-structured interview. Each interview was conducted in the school setting of the respective teachers. The purpose of the interview was to get breadth and depth on the teachers' knowledge of the concept of a neuromyth. It was to also get information on how teachers incorporate neuromyths into their pedagogies and how it is permeating in their teaching practices. It helps to gain an understanding of the implications that these myths have in teachers' teaching methodologies and what teachers think of neuromyths despite the academic information of these neuromyths. This was done by conducting a semi-structured interview based on Emotional Intelligence and VAK/VARK learning styles in which the teachers were asked about what they knew about these neuromyths, whether it was valid to utilise these myths, their thoughts about these concepts and how it is used in their teaching practises. After answering these questions, the participants were presented with the arguments that identify EI and VAK/VARK as a neuromyth. The teachers were then required to provide their own opinion on how they felt and what they make of these myths despite the academic contestations. The information from these interviews in conjunction with the survey would assist in answering the main research question on the extent of how neuromyths have permeated pedagogical practices in intermediate phase education as well as the sub questions on the percentage of teachers that are aware of neuromyths, the ways in which the common neuromyths are permeating and influencing teachers' pedagogical choices and finally the teachers' impressions of these myths in spite of the contested data of these myths.

4.5 Semi- structured interview findings

The table below includes professional background information of each teacher. It is then followed by a detailed summary that presents the information given by each educator.

Table 2 - A table providing the professional background information of the interviewees.

Questions:	<u>Teacher A</u>	<u>Teacher B</u>	<u>Teacher C</u>	<u>Teacher D</u>	<u>Teacher E</u>
How long have you been teaching?	19 years	35 years	7 years	42 years	30 years
What are your qualifications?	BEd, BEd Honours	BA, DipEd, BEd Honours	Bed	DipEd	BEd, BEd Honours
How long have you been teaching at this school?	3 weeks	8 years	3 years	16 years	28 years
Which subjects do you teach?	Mathematics, Life Orientation	English, Mathematics, Natural Science, Life Orientation	Afrikaans, Robotics	Afrikaans	English, Social Science
Type of school: private or public	Private	Public	Private	Public	Public

Teacher A

Participant A had an idea of the meaning of Emotional Intelligence (EI) but struggled to articulate the exact meaning of it. The educator defined Emotional Intelligence (EI) as the following: *“So that would be EQ. Or maybe, uh yeah, I do know trying to explain it to you, it’s emotionally coping. It’s not about how intelligent I am”* (Interview transcript, Participant A, Line 12). The interviewee felt that the curriculum does not accommodate the concept sufficiently. It is covered in Life Orientation, but teachers do not do enough to groom their learners and listen to them to see what is going on. The participant asserted that it is imperative to incorporate EI in Intermediate Phase teaching in order to attack particular problems such as behaviour issues and discipline. The teacher added that EI assists teachers to explain why learners are behaving in a particular

manner or are not completing their homework as well as to investigate what is happening in their household such as the issue of divorce.

The teacher was familiar with the concept of VAK learning styles but did not know what the R acronym stood for in VARK. The participant agreed that it was valid to use these styles and linked this concept to brain dominance by stating that not every child is right brained or left brained. *“Not every child is right brained or left brained. So, depending on the brain dominance of your child, you have to incorporate colour, you have to incorporate sound because every child has a learning strength at one of them”* (Interview transcript, Participant A, Lines 22-24). The teacher mentioned that one must incorporate colour and sound in learning and studying and discover the child’s strengths depending on the brain dominance of the child. The educator tries to move away from chalk and talk in the lessons to accommodate the various learning modes by playing videos to get the learners to listen to a different voice and uses pictures and other visual aids to make the content more real. *“I have to move away from chalk and talk because then I’m not incorporating the different styles. I try to play videos just to get a child to hear a different voice because they get tired of my voice. So that helps the auditory learner. And then visual aids, real life objects. They may see a certain picture or example in a textbook, but I bring in something a bit more real that they can relate to”* (Interview transcript, Participant A, Lines 24-27). The teacher said that the CAPS curriculum has also been designed in a particular way to accommodate learning styles by means of groupwork, hands on projects as opposed to the previous OBE (Outcomes Based Education) curriculum which was mostly based on writing. The participant also stated that as a teacher, one cannot control how dominant a particular learning style is for each learner in different activities. It is dependent on the setting and mood to shift between the modes when teaching and studying.

The teacher still feels that these neuromyths are valuable in today’s context. When looking at the curriculum changes that have occurred overtime, teachers and learners have lost the value and essence of what must be done at a deeper level. The learners are robotically doing exercises, activities, projects, and tasks which has made learning lose its meaning and value it may have in a child’s life. The teacher said that she is equally guilty of this as she is constantly pushing to complete the curriculum which has ultimately turned learners into robots. Teachers need to take a moment to think about how they can bring the emotional side when planning a lesson. *“We’ve lost the value*

and the essence of what we need to do. So, I think if we can get kids to do was a bit more of the feeling side, it must have meaning to them, not make them these robots. They're just robotically doing, doing exercise, activity, project, task. We lost the meaning. And I think the curriculum has done that to a large extent. That when, I mean, I'm equally guilty (Interview transcript, Participant A, Lines 64-68).

Teacher B

Teacher B asserts that EI is linked to the ability to think on your feet and a person's response is determined by the situation or event. At a particular moment, the teacher will not dig up and think about what they learnt at college but rather react at that point of time dictated by emotions which is spontaneous. The educator agreed that EI is a valid concept by saying, *"Absolutely. Absolutely. Uh, reason being that you respond according to the situation and what your emotions are dictating at that point in time"* (Interview transcript, Participant B, Line 18). This makes teachers to be present in the moment and react accordingly to make certain decisions to help and benefit a child. The teacher added that the child is the core and EI makes teachers think about ways to make learners respond to the lesson more effectively and interesting by bringing life into the classroom, situation, and event for the learner to identify with the content and make it a lifelong lesson and ultimately a lifelong skill. *"So, I would like want to make teaching reality and not just a concept being taught. I want to bring life into the classroom. Right. Life into the event, into the situation. Make it real so the child can identify with it. And also, it makes remembering longer. You know, the child's not going to learn it for now and forget it. It's going to become a lifelong lesson"* (Interview transcript, Participant B, Line 16).

The educator was fully aware of the concept of VAK/VARK learning styles. The teacher stated that the auditory learning style is effective in developing a child's listening skills and kinaesthetic learning is effective especially for learners on the lower spectrum of autism which has not been fully diagnosed. An example provided by the educator of incorporating the learning styles for an autistic child would include utilising videos to get them to listen to instructions and visualise what is being modelled. Concrete objects and taking the learners on excursions makes the content real and

relevant. The kinaesthetic mode can be useful for a learner who cannot think at an advanced level that needs concrete objects such as drawing pictures or holding counters. In a classroom of learners who have diverse abilities and different levels, mixed media and the four learning modes are effective.

According to Teacher B, learning styles is not always necessary if a classroom has low maintenance learners which refers to learners that require little support, they grasp concepts quickly and are coping. A teacher will be guided by the type of learners they teach and classroom situation. For example, if the auditory mode is not working, i.e., children are not listening, the teacher would then use a visual or kinaesthetic aid because their listening skills are not developed. The teacher agreed that learning styles are a positive element to education as it exposes learners to technology which is the direction that is becoming the focus in the 4th industrial revolution as well as thinking and listening skills which enhances their learning. With the various abilities in the classroom, learning styles provide a lot more exposure and makes learning interesting and exciting as opposed to the traditional approach of the teacher standing in front. The teacher also added that learners of today have low attention spans and can spend longer periods of time watching TV and being on their phones, or iPads. And if a child can learn something from watching these devices, they can also learn from watching a video and seeing variety in learning.

“No, it's not bad. Uh, I think it's a good thing because it exposes kids to technology. For one, they're going to listen, lots of listening, lots of visual activity happening. And that enhances their learning styles. Not all kids want to learn by writing and reading in a book. Kids have different learning styles. So, I think that is with the new in the direction were going with technology becoming the focus. I think that is, for me, that's brilliant. It's, it's a lot more exposure. Kids learn a lot. Kids enjoy that, and they start to grasp faster as opposed to a teacher standing in front and saying a whole lot of stuff. But if they can learn from an iPad, if they can learn from a video, why not? And if it makes learning easier, by all means. And I think that makes great sense to have those kind of teaching styles or learning styles in the classroom to complement your normal classroom. It, it'll play a big, big part in complimenting the teacher in the classroom. For me, I think that will make teaching exciting, fun, interesting, you know, and the kids of today need that because they have such low attention

spans. They can't concentrate for long, but they can watch TV for long. They can watch, sit and watch their phones for a longer period of time. They can sit and watch their iPads for a longer period of time, as opposed to listening to a teacher. So, if teaching can happen using those styles, and if it is effective, why not" (Interview transcript, Participant B, Lines 31-32).

The teacher stated that prior to the knowledge of the contestation of EI and VAK learning styles, these neuromyths have proven to work and have been beneficial in the participant's years of teaching. Furthermore, it has confirmed to be advantageous for different learners at different points in time. Therefore, the teacher will continue the use these neuromyths unless it can be proven to be of no absolute value with an alternative to EI and learning styles. But for now, she would stick to what she knows.

Teacher C

According to Teacher C, Emotional Intelligence was defined as *"how you handle situations emotionally"* and is linked to whether *"you can read people's emotions"* (Interview transcript, Teacher C, Line 10). The teacher also stated that there are different types of intelligence such as EQ (emotional quotient), IQ (intelligence quotient) and SQ (social and spiritual quotient). The teacher concurred that EI is valid in intermediate phase teaching by providing an example that a child may not be emotionally ready to cope with changing from one subject to the next in a rapid pace and handle the given work. If a child is easily frustrated because they have not learnt how to deal with frustration, they will grapple with the workload. Teacher C added that EI is a crucial aspect in learning which focuses on the child holistically, which allows teachers to focus on the social, emotional, and educational attributes of the child. The teacher incorporates EI in her classroom by letting the learners know that the door is always open for them to come and talk to the teacher about any academic or friend problem or a home problem. For example, a few weeks ago one of the learners she teaches had lost their parent. Before the child came back to school, the teacher sat down with the learners and explained the situation to ensure that the learners show love, care and support to their classmate and help the child catch up. This was a situation that brought emotions back into the classroom.

The teacher knew about VAK/VARK learning styles but was not aware of the R in the acronym. The teacher agreed that learning styles are useful in teaching. She explained that she is a predominantly visual learner and the manner in which one learns remains the same throughout their lifetime. For example, when someone speaks about a subject that the participant has no prior knowledge of, the only way she may learn is if there is a visual entity to fully understand the concept. It is crucial to integrate these styles in the classroom to reach out to every single child. The educator does this by including YouTube videos in the classroom, she creates songs to explain parts of speech, ensures that there are flashcards and makes the learners write down definitions so that every learning mode is put into one whole lesson.

I then explained the academic contestations of these neuromyths and Teacher C said that she still values the use of these neuromyths. *"I think that's a very important aspect of teaching because you need to focus on the child holistically. Which means you need to focus on their social things, the emotional part of them as well as the educational part of them"* (Interview transcript, Teacher C, Line 14). She also that her sister has a degree in BA psychology and works as a councillor. They both grew up in the same household, yet they handle their emotions differently. The teacher did agree that the notion that EI is more of a skill rather than intelligence may be true, but she still genuinely believes that it is an intelligence. When looking in retrospect, she is able to handle situations in a certain way because of the skills she has taken and learnt which are the same as the skills her sister has learnt growing up together. Her sister also does not necessarily apply what she was taught in her psychology degree in her life. Psychologists go to other psychologists when they need help. There is also an influence of nature versus nurture that comes into play. For example, her sister will break down easily whereas she tends to handle emotional situations with a bit more hardness.

"I mean, my sister and I grew up in the exact same household. Yet we handle our emotions or the way we handle things completely differently, you know? So, I think, like you said, it's not an intelligence, it's more of a skill or something. So yes. Okay, maybe that is true. Um, but I think it's an intelligence still in that, like there's retrospect. I can look at it and say I'm able to handle it this way because these are the skills I've taken and learned and taken to into myself. Compared to my sister, who would have been given those exact same skills,

however, chose not to use them because that it brings into that like, you know, that nurture nature kind of question. And we both have completely different ways of handling things. She'll break down easily, whereas I'm more emotionally strong" (Interview transcript, Teacher C, Line 31).

The participant agreed that learning styles should be used unanimously and make it into one whole thing in the classroom. However, when a concept is too abstract, an individual may learn best by focusing on their dominant learning style to understand a concept better rather than having all the learning styles in one go which is related to the academic argument that having all learning styles in one lesson may cause cognitive overload instead of focusing on the most effective method to teach (White, 2004).

Teacher D

Teacher D did struggle to express the meaning of Emotional Intelligence but said that it related to how emotions affect people which is different in children and adults. Adults tend be emotionally stronger than children due to difference in maturity. According to the teacher, the use of EI in intermediate phase is context dependent. An educator should not do too many things at the same time with the child as it can confuse the child and make them nervous. The content should also be presented at an appropriate level depending on the child's age. The teacher mentioned that EI is not a valid concept and that she thinks that it may be a myth rather than intelligence was not able to provide a reason for this. EI happens unconsciously between the teacher and learner, but the participant could not remember an example in which this was applied.

When it came to learning styles, the teacher said that she preferred visual learning and felt that it was a valid concept because people are different, have various strengths and weaknesses and grasp concepts differently. Learning styles gives teachers a chance to give make provision for all learners in the class. The teacher does this by including technology in her lessons, different visual aids, the use of colour which learners like and repetition as well as individual remedial learning.

After explaining the academic contestations, the teacher still felt that learning styles should still be implemented as people learn in different ways depending on their abilities, interests and what the learning material calls for. It was agreed that EI is still a myth but can be effective because when children are not emotionally stable, they cannot learn. It is valid in everyday life but is context dependent. The teacher mentions this point by saying, *“It is still valid because you have to use it in your everyday life but not everything, but some are still valid I think it depends on the situation”* (Interview transcript, Teacher D, Line 96-97) and *“when children are emotionally not stable they don’t actually learn”* (Interview transcript, Teacher E, Line 94).

Teacher E

According to Teacher E, Emotional Intelligence is something along the lines of how one’s feelings relate to what you are doing out in the world. The teacher was not so sure if EI is a valid notion to use in intermediate phase teaching. The reasons included that fact that when you ask children for the reason of their misbehaviour, they do not know and cannot explain how they feel. The teacher said that EI would be more of focusing on a psychological thing. For example, the parent of one of the learners that she teaches passed on this year and the child would sleep in the class. In scenarios like this, teachers have to be cognisant that those situations can affect the child’s work. The teacher also said that she would not make it an official policy to constantly find out how a child is feeling otherwise the class would turn into a large counselling session. EI is incorporated into this teacher’s teaching by explaining concepts in a way that the children will find fun because if they do not like the lesson, they will not pay attention. The teacher also tries not to scream and shout too much and if a child is upset, she will stop and ask what is wrong. But on the other hand, sometimes children do not want the teacher to stop the lesson and put the spotlight on them. As a teacher you have to carry on with the lesson because you do not want to force a child into revealing something they are not comfortable with.

The teacher was aware of learning styles and stated that the school made the teachers do a workshop at the school. They were told to not only utilise one learning mode as there are children with various abilities and strengths. During the pandemic, it was mandatory for the teachers to put up Power Points with voice overs so that the learners

not only read it but can also play the sound for the auditory learners to hear it. The teacher finds the idea of using learning styles to cater for all quite dubious because from her own reading of educational papers, authors say that it does not make a difference to how a child learns. In reference to this point, the teacher said, *“I was quite dubious because from my own reading, just you know, not I haven't read anything specific, just my random readings of educational papers and things. They said that it doesn't really make a difference to how the child learns”* (Interview transcript, Teacher E, Line 14). The educator mentioned that it was interesting to observe that a child may say that they prefer visual or auditory, and yet when you test them, that is not how they ended up learning. However, learning styles should be used because children enjoy variation with a bit of visual, auditory, and reading. This is incorporated into the educator's teaching practices by playing a video, or the teacher records her own voice when the class reads a prescribed reader, and the teacher plays the full stop game where each learner reads a sentence for reading and viewing as stated in CAPS. The teacher does not do this to strictly adhere to learning styles, but rather for variation which is never a bad thing.

The teacher stated that these neuromythological notions usually become a fad in education. She mentioned an example of ‘which became a trend a few years ago. THRASS is a teaching method for teaching learners of any age about the foundation of reading and spelling which include the 44 phonemes (speech sounds) of spoken English and the graphemes (spelling choices) of written English. At her school, the teachers had to go for training to implement this method. After a few years later, researchers discovered that it does not work for second language learners. The educator said that this tends to happen every single time a new discovery or trend comes into education. The teacher also said that as much as teachers in the classroom want to challenge these fads, the school principal ignores and would rather listen to the so called “educational experts” and theorists.

Despite these debates, the teacher said that learning styles can be beneficial as a teacher cannot merely come into a classroom and stick a Power Point with the expectation that the learners will work. Learners need to get an all-round experience with a bit of everything when they learn. The teacher affirmed that when it comes to Emotional Intelligence, she was not too sure how to go about it because when it comes to managing emotions and recognising it, children do not always know what they are

feeling and may act out in strange way. A teacher may also know that something is going on with a child and know that something is there, but they may not give theoretical background for what they know.

4.6 Conclusion

This chapter has presented the findings of the survey and the semi-structured interview. The quantitative data from the survey has been presented in the form of a pie chart and it also contains a table which groups the participants' definitions of a neuromyth according to different meanings. It has included professional background information of each teacher who participated in the interview and has outlined the crucial points of the interview by providing a detailed summary of the participants' responses to the questions. From these findings, all teachers seemed to incorporate elements of EI and were in favour of VAK/VARK learning styles. The next chapter will provide a detailed discussion and analysis of these findings in relation to the research questions of the study by using Bruan & Clarke's (2006) thematic analysis.

Chapter 5: Discussion of Findings

5.1 Introduction

This chapter discusses the findings set out in chapter 4 in more detail. The first section of this chapter includes an examination of the survey results which provides quantitative data on the awareness and prevalence of neuromyths in the classroom and draws information from the literature review. The next section utilises Braun and Clarke's (2006) thematic analysis and shows a step-by-step process of coding and identifying common themes from the interview. It also incorporates a discussion of each theme and simultaneously shows the link it has to the main research questions. The chapter will then be rounded off by including information on the value and implications these neuromyths have despite the debates.

Five teachers working at a school based in Johannesburg were interviewed in this research and 57 teachers participated in the survey. This research project applies an embedded mixed methodology design in which the interviews (qualitative data) is the primary focus with the survey (quantitative data) is secondary and supportive in nature. The quantitative data from the survey was used to find out if teachers knew the common neuromyths as well as the permeation levels of these myths. The quantitative data from the interview provides data to get deeper insight on how teachers are using the common neuromyths and how it is influencing their pedagogies and decision making. The survey asks for four of the most common neuromyths (EI, MI, VAK/VARK and left/right brain dominance) to increase the scope on knowledge about neuromyths. The interview then focusses on the 2 most prominent neuromyths, namely EI and VARK to get deeper insight from the participants. This was gathered from the findings of the survey as every participant had heard about EI and VARK and learning styles are strongly implied and supported by the CAPS documents. By focusing on EI and learning styles, it guarantees that the teachers will have more information about it and will be confident to answer the questions at a deeper level to get greater insight on how neuromyths affect them.

5.2 Discussion of the survey findings

A total of 57 teachers participated in the online survey. From the survey responses it is evident that the majority of the teachers surveyed do not know what a neuromyth is. In question 1, 18% of the participants said that they may have heard of the concept of a neuromyth before, 21% responded that they knew what a neuromyth is and the rest of the 61% of participants did not know the meaning of a neuromyth.

Question 2 of chapter 4 includes a table in which the participants' definitions of a neuromyth were grouped according to their meanings. Only 2 out of the 57 (3%) participants provided a precise definition of the term and 6 out of 57 (10%) definitions were close to the accurate meaning of the term. This statistic supports the notion that teachers are unaware or at the very least unsure of the concept of a neuromyth. Moreover, these findings align with Bruer's (1997) assertion that there is a lack of neuroscience learning in the teaching environment.

The findings from this survey show that VAK/VARK learning styles was the most prevalent neuromyth used in the classroom. This is most likely due to CAPS promoting the use of visual aids, groupwork and hands-on projects (Department of Basic Education, 2011). Although learning styles is contested in academia, CAPS plays a role in fostering the learning styles discourse. Furthermore, most teacher-preparation programs require learner teachers to incorporate learning styles into lesson-planning assignments, and many of the textbooks recommend taking learners' learning styles into account. Teachers share a common consensus that individuals learn better when they receive information in their preferred learning style and agree that children have learning styles that are dominated by their senses (Furey, 2020). Textbooks also align their content with standard licensure exams, which includes a section on learning styles. For example, teacher certification tests may ask one to design a lesson that would accommodate learners' various learning styles. Therefore, it should come as no surprise that most teachers think learning styles are crucial (Furey, 2020).

The majority of participants were well acquainted with the concept of Emotional Intelligence. According to the survey, 0% of the participants indicated that they did not know about the concept. Only 14% of the teachers confirmed that they had heard about the concept before but did not have an in depth understanding of the concept.

Despite understanding the concept, only 38% of the teachers showed that they incorporated this into the pedagogical practices and 19% did not use it.

The least predominant neuromyth was Multiple Intelligences (MI). As indicated, 63% of the teachers were familiar with this conception. In addition, the least utilised concept in the classroom was the left/right brain dominance theory as 21% of teachers reported to use it in their teaching. There is usually a correlation made between MI and brain hemisphere dominance. According to Knecht (2000), teachers tend to make a link between a learner's particular intelligence and make an assumption related to an individual's brain dominance as it is commonly believed that developing multiple intelligence of the learners with regards to brain hemisphericity will help the learners excel in their academic pursuits. Depending on the child's brain dominance, the teacher must accommodate particular intelligences for an inclusive lesson. It is also thought that brain hemispheres activate the various concepts of multiple intelligences (Knecht, 2000).

The data from the survey indicates that in general teachers are aware of the four individual examples of neuromyths, but do not realise that they are deemed to be neuromyths. Moreover, the term neuromyth itself is a mystery to the vast majority of teachers. This emphasises the divide between neuroscience and educational practice proposed by Howard-Jones (2010). This point is backed up by the literature which states that in order to support the bridge between neuroscience and education, a specialist with knowledge on each side is needed, with both experience and credentials in neuroscience and education (Howard- Jones, 2010). Educational psychologists and neuroscientists are familiar with the jargon of the term "neuromyth" because of their speciality, whereas most teachers are familiar with the jargon of individual concepts that make up a neuromyth because it is emphasised in textbooks, lesson planning, teacher training courses and workshops as well the curriculum (Domínguez, 2018). As a result, there is limited knowledge of brain science and a lack of academic instruction on neuroscience in teachers' curricula. In addition, there is a distance between brain sciences and proven teaching methods ready for the classroom (Howard- Jones, 2010).

5.3 Thematic analysis of the interview

Thematic analysis is the process of identifying patterns or themes within qualitative data. Braun & Clarke's (2006) thematic analysis follows a 6-step framework which has been utilised in this research project. The goal of a thematic analysis is to identify themes which are the patterns in the collected data that are important or interesting and use these themes to address the research (Braun & Clarke, 2006). This was done by conducting semi-structured interviews to gain deeper insight. The interviews assisted in finding deeper and more insightful knowledge on teachers' views, opinions, knowledge, experiences, and value of the common neuromyths. The use of thematic analysis helped to identify common trends as well as to analyse and gather data related to the purpose of the research. This includes information on how teachers are using common neuromyths, how it is permeating in their pedagogies and decision making when planning a lesson as well as acquiring an understanding of the implications of these myths in teachers' teaching methodologies and what they make of neuromyths in spite of the debates from the literature. The participants of this interview were all intermediate phase teachers from different schools based in Johannesburg. The interviews solely focus on EI and VAK/VARK learning styles which are the most prevalent and familiar examples of neuromyths amongst teachers.

5.3.1 Thematic Analysis steps

This first step in any qualitative analysis entails reading and re-reading of the interview transcripts which have been attached to become familiar with the data. This is done by becoming familiar with the entire body of data. At this stage, it is useful for one to make notes and jot down initial impressions (Braun & Clarke, 2006). I read through the transcripts and took brief initial notes on the thought-provoking and the common points that I identified in the transcription.

In the second phase, the researcher organises the data of the interview in a meaningful and systematic way to generate initial codes. This process entails coding which reduces the big amount of data into small chunks of meaning. The researcher codes data that is relevant and captures something interesting pertaining the research question (Braun & Clarke, 2006). This was done by reading the transcript in more

detail taking phrases and sentences that were interesting and share similar ideas, and arguments. The third step involves searching for themes. A theme is a pattern that captures something significant or interesting about the data and/or research question and is characterised by its significance (Braun & Clarke, 2006). In this step, the researcher examined the codes of the interview and some of them fitted together into a theme. From the coding tables for the individual teachers, the table below shows the combined codes from the three educator interviews which have been compared. The colours are used to highlight similar themes.

Table 3 - Initial codes from all Participants coloured to indicate similar themes.

Teacher A	Teacher B	Teacher C	Teacher D	Teacher E
EI is about being able to cope emotionally.	It is about being present in the moment and thinking on your feet to react accordingly.	EI is about how you handle situations emotionally and whether one can recognise the emotions of others.	It is about how emotions affect you and how we all experience different emotions in different situations.	EI would mean something along the lines of how your feelings relate to what you're doing out in the world.
EI explains why the child is behaving in that way and assists with getting to the source of the problem.	EI ensures that one is present in the moment and reacts accordingly to make sure that it benefits the situation at hand.	If a child cannot emotionally cope with changing from one subject to the next in a rapid pace, they may struggle to handle the work given and get easily frustrated.	Although EI is a myth, it assists with breaking down the work into manageable parts to avoid confusion and anxiety in the child.	Children generally cannot explain how they feel but the teacher must be cognisant of how they feel to understand them better.
VAK/VARK is an important concept that has proven to work.	VAK/VARK learning styles is not always necessary and is dependent on the level of	It is good to have teaching styles that incorporate different learning modes so that you reach	VAK/VARK assists with making provision for all learners.	It does not make a difference on how a child learns but it is necessary for variation.

	the learners in the class, however it is not a bad thing to incorporate into your teaching practice.	every single child in your classroom.		
The term neuromyth sounded familiar but the teacher could not define it.	Teachers do a thinking exercise but still have a scant idea of what it is.	Teachers have an inadequate knowledge of neuromyths and deduce the meaning from the word itself.	It was defined as a myth of the brain.	It is ideas about how the brain works that are perpetuated, even though there is no evidence to back it up.
Despite the contestations of neuromyths, the teacher still values neuromyths highly.	Neuromyths have proven to be effective throughout and the teacher will stick to these myths unless an alternative is provided.	Teachers should still integrate these neuromyths in the classroom.	Neuromyths can still add value to teaching.	Although neuromyths are fads, they are still valuable to a degree.

Each row in Table 5 represents a similar idea and the different colours in each row emphasise a slightly different perspective on the concept. The themes will be explained in the Discussion of Themes in 5.4.

The fourth step entails reviewing, modifying, and developing preliminary themes that were identified in Step 3. The researcher then thinks about whether the themes work in the context of the entire data set (Braun & Clarke, 2006). In this case, the themes identified in Table 5 were analysed and reviewed in relation to the research questions of this report which were used to provide information on the ways EI and VAK/VARK learning styles are permeating and influencing pedagogical choices as well as information on teachers' opinions and impressions of neuromyths despite the information derived from scientific research. This last stage entails the final refinement of the themes, and the aim is to identify the essence of what each theme is about such as what is the theme saying and showing how do the themes interact and relate to

each other (Braun & Clarke, 2006). This process has been done in the table below by grouping the initial codes, then providing an explanation of the patterns and themes in each group with codes and lastly, identifying a theme name from each group.

Table 4 - The reviewing, defining and naming process.

Initial Codes	Group Definition	Theme name
EI is about being able to cope emotionally. It is about being present in the moment and thinking on your feet. How you handle situations emotionally and whether one can recognise the emotions of others. It is about how emotions affect you and how we all experience different emotions. It is about how your feelings relate to what you're doing out in the world.	This group provides information on how the teachers have their personal and individual definitions of Emotional Intelligence.	The varying definitions of Emotional Intelligence
It explains why the child is behaving in a particular way and gets to the source of the problem. EI ensures that one is present in the moment and reacts accordingly. If a child cannot emotionally cope with changing from one subject to the next in a rapid pace, they may struggle to handle the work given and get easily frustrated. Although EI is a myth, it assists with breaking down the work into manageable parts. Children generally cannot explain how they feel but the teacher must be cognisant of their emotions.	This group gives insight into the pedagogical experiences that the teachers have had by incorporating the concept of EI. The 2 last points provide a contrasting opinion of EI from the other assertions.	The value of EI in the classroom
An important concept which has proven to work. It is not always necessary and is dependent on the level of the learners. It is good to have teaching styles that incorporate different learning modes. Make provision for all learners. It has not proven to work but is necessary for variation.	This group is based on how effective VAK/VARK learning styles has proven to be effective along the teaching years of the participants. The last point does contrast slightly with the previous points.	The value of VAK/VARK learning styles in the classroom
It sounded familiar but the teacher could not define it. Teachers do a thinking exercise but still have a scant idea of what it is. Teachers have an inadequate knowledge of neuromyths and deduce the meaning from the word itself. A myth about the brain. Ideas about how the brain works that are perpetuated, even though there is no evidence to back up.	This section shows how the teachers defined a neuromyth which supports the idea about the gap between neuroscience and education.	The vague interpretations of a neuromyth

The teacher still values neuromyths highly.	This group gives information on how teachers view the significance and usefulness of neuromyths despite the contestations.	Neuromyths are still valued despite the academic contestations
Neuromyths have proven to work over the many years of teaching.		
Teachers should still integrate it into their teaching.		
Neuromyths can still add value to teaching.		
Although it is a fad, it is still valuable to a degree.		

5.4 Discussion of Themes

The purpose of this report is to provide in depth information on the ways EI and VAK/VARK learning styles are permeating and influencing pedagogical choices as well as data on teachers' opinions and impressions of neuromyths despite the information derived from scientific research. The following themes have been identified in this research:

1. The varying definitions of Emotional Intelligence (EI)
2. The value of EI in the classroom
3. The value of VAK/VARK learning styles in the classroom
4. The vague interpretations of a neuromyth
5. Neuromyths are still valued despite the academic contestations

5.4.1 Theme 1: The varying definitions of Emotional Intelligence (EI)

Salovey and Mayer (1990, p. 189) defined Emotional Intelligence as, "the ability to monitor one's own and others' feelings and emotions, to discriminate among them and to use this information to guide one's thinking and actions." Salovey and Mayer (1990) then expanded their notion of Emotional Intelligence. This included the evaluation of emotions in the self, the judgement and identification of emotions in others through empathy; the regulation of emotions in oneself and in others; and the utilisation of emotions to engage in flexible planning, creative thinking, direction of attention, motivation, and self-regulation (Salovey & Meyer, 1990).

Goleman (1994) defined Emotional Intelligence as "a person's ability to perceive, assess, and manage the emotions of oneself, of others, and of groups" (Goleman,

1994. p. 9). In brief, Goleman's (1994) book titled *Emotional Intelligence- Why It Can Matter More Than IQ*, explains that EI also entails characteristics including self-motivation and persistence; skill at introspection; the delay of gratification; self-control of impulses, moods, and emotions; self-regulation; empathy; effective leadership and social skills.

In spite of the definitions of EI provided by Salovey and Meyer as well as Goleman, the literature states that there is no clear-cut, distinct, consensual conceptualisation of EI, and the multi-layered characteristics of the concept that is viewed as overwhelming which is a reason why Emotional Intelligence is perceived to be a myth (Matthews, Zeidner, & Roberts, 2002).

During the interviews, the participants demonstrated that while the concept of EI was familiar, they struggled to clearly define it. Teacher A did struggle to articulate the meaning of EI in the beginning but then said that it was linked to EQ and being able to cope emotionally. She stated that EI *"would be EQ. Or maybe, I do know trying to explain it to you, it's emotionally coping. It's not about how intelligent I am. It's not about answering accurately. It's more about trying to get the right words. Yeah, I think I do know. I'm just not explaining it because you can elaborate if I've got"* (Interview transcript, Teacher A, Line 12). Therefore, EI is not necessarily an intelligence as stated by Goleman (1994) as well as Salovey and Meyer (1990), but rather a coping mechanism when emotions overwhelm an individual and when one has difficulty in managing emotions. EI is not entirely based on emotionally coping but is part of IE.

Similarly, to Teacher A, Teacher D also did struggle to express the meaning of EI at first. The educator then stated that *"Emotional Intelligence is what you know. And our emotions affect you. We all have different emotions, and we all experience different emotions in different situations"* (Interview transcript, Teacher D, Line 10). Teacher D also suggested that adults had a higher EI than children by affirming that *"It's different in children because it depends on what situation they are. Because adults are stronger. Like children will just cry"* (Interview transcript, Teacher D, Line 15). The teacher's conceptualisation of EI aligns to Salovey and Meyer's (1990) view of observing one's ideas and emotions and Goleman's (1994) definition of an individual's capability to recognise and observe of oneself. The definition the teacher provided is still vague and scant which shows that the teacher is not acquainted with the topic.

Furthermore, the teacher did grapple to convey personal ideas and thoughts in words throughout the interview. Later, the teacher affirmed that EI occurs unconsciously which indicates that the teacher has not put much thought into the concept which may be the reason why the teacher may have struggled to demonstrate her personal thoughts.

According to Teacher B, EI is related to being able to be present in the moment, to think on your feet and react accordingly when making judgements and decisions in certain situations. The participant explained that EI was *“basically thinking on your feet. Your response will be dictated, will, um, be determined by the situation or the event. You know, uh, sometimes you can have all the, the, um, theoretical knowledge, but Emotional Intelligence will dictate, like if you are a mother, how you respond to a situation. If you are a teacher, how you react to a kid in a situation. You're not going to try and dig up and think, what did I learn at college? What am I supposed to do? You react based on your emotion”* (Interview transcript, Teacher B, Line 14). This definition is specifically linked to Salovey and Meyer's idea of the ability to classify and distinguish emotions to guide an individual to react accordingly to a situation. It is also related to Goleman's self-regulation and self-control of emotions to make prudent decisions at a particular moment.

Teacher C's definition was based on the notion that *“Emotional Intelligence has to do with how you handle situations emotionally. Can you read people's emotions, things like that”* (Interview transcript, Teacher C, Line 10). Teacher C also added that an adult can be intellectually smart and still handle emotions at the level of a 10-year-old. This is linked to the idea that people with high IQs and low EQs are high achievers who accomplish a lot but have difficulty in managing emotions and often feel overwhelmed as stated in the literature review (Goleman, 1994). Goleman (1994) further states that if an individual has a low EQ, you may find yourself getting caught up with perfectionism which can result in stress, slow productivity resulting in procrastination and make you difficult to work with. People with high IQs often report having difficulties in their relationships as they find themselves feeling misunderstood, overlooked and may have a difficult time relating to others (Goleman, 1994). Teacher C gave another example that a child may not be emotionally ready to cope with changing from one subject to the next in a rapid pace and handle with the given work. If a child is easily frustrated because they have not learnt how to deal with frustration, they will grapple

with the workload. According to Goleman (1994) an emotionally intelligent learner will have an increased level of self-awareness, making him or her take charge of their learning proactively tackle academic issues with greater confidence. A learner who can manage their emotions well is a learner that will not allow stress to rule their academic life (Goleman, 1994). Salovey and Meyer (1990) affirm that EI assists with the regulation of emotions and flexibility in planning which ultimately leads to a learner being able to retain information and produce better results.

Teacher E provided a short and concise definition of EI. She stated that *“I would think that that it would mean something along the lines of how your feelings relate to what you're doing out in the world”* (Interview transcript, Teacher E, Line 8). This description supports Salovey & Meyer's (1990) idea of the regulation of emotions in oneself and in others. Goleman's (1994) description is similar in which he says that EI is utilised to manage the emotions of an individual and others.

All the teachers who participated in this interview had different meanings of EI that were based on their personal views and experiences of what it entails in the classroom. The teachers take bits and pieces of the Goleman, Salovey and Meyer definitions and recontextualise it for their own purposes. Teachers viewed EI as a mechanism of managing emotions which is the aspect that was taken from the original conceptualisation. These various descriptions of EI in this interview can be backed up by the statement in the literature review which states that the definition of EI takes a broad view and is not entirely clear and subjective which has become a laundry list that is too over-inclusive which has resulted in little consensus of how EI should be conceptualised or defined (Matthews, Zeidner, & Roberts, 2002). The teachers generally spoke about EI in a positive light which provides background for the next theme.

5.4.2 Theme 2: The reasons why teachers think that EI is necessary in their pedagogies

The teachers shared a similar view that EI was a necessary tool to be empathetic towards the learners to better understand their learners' behavioural and psychological wellbeing and be sensitive towards their behaviours. Teacher A argued that EI is

important in the classroom and felt that the curriculum does not accommodate it enough. It is taught in Life Skills but is not sufficient to groom the children, to listen to them, to hear them and see what is going on. The educator said that she had to include EI in the classroom because as a teacher *“you don’t want to attack the child, shout at them when they out of line”* (Interview transcript, Teacher A, Line 20). She also stated that if one does a little bit of research to find out what led to the child behaving in a particular way or why the homework was not done, there has always been a very valid reason coming from the child’s household. This could include issues such as parents fighting or divorce. Therefore, EI provides an explanation and conscientizes teachers about the source or root cause of a problem before judging a child unfairly.

This idea of emotionally supporting students to improve learning is echoed in approaches such as a trauma-informed approach (Opiola, Alston, Copeland-Kamp, 2020). It emphasises the understanding and addressing the underlying trauma or adverse experiences that may influence a child’s behaviour. By taking time to gather the background story behind a learner’s behaviour, teachers can better support and respond to their needs, fostering an empathetic and conducive learning environment (Opiola, Alston, Copeland-Kamp, 2020).

Teacher C agreed that EI was a very important concept that focuses on a child holistically in terms of their emotional, social and educational wellbeing. Goleman (2011) recognises that a child’s emotional, social and educational competencies play an important role in their overall educational success. By embracing a holistic approach, teachers can better understand the interconnectedness between EI and various aspects of a child’s development including their academic performance, relationships with peers and overall well-being (Goleman, 2011).

Teacher C said that she incorporates EI to the classroom by making sure that *“my kids know we are a family and that my door is always open for them to come and talk to me about any problem, be it an academic problem, a friend problem or a home problem”* (Interview transcript, Teacher C, Line 16). Another example was cited of a child who had lost a parent due to cancer. The teacher had a talk with her class to explain the situation. Teacher C said:

“Please make sure to, you know, when he comes back, don’t ask him what happened, but make sure he knows that you’re there to support him and love

him and care for him. If he's missed out on work, help him to catch up all of those kind of things, and we discussed it, um, and how it would affect them. A lot of my kids were some were crying afterwards, and some were very hurt or sad because, you know, it's losing a parent, and it makes them think of their own parents. So, we had a whole day of, you know, discussing emotions and everything like that. So, we try to always bring emotions back into the classroom in that way" (Interview transcript, Teacher C, Line 16).

In contrast to Teachers A and C, Teacher D and E were slightly critical about the use of it when answering to the question about the validity of EI in the classroom. Teacher D said that she believed that EI was a myth but struggled to articulate the reason for this. Teacher E shared a similar perception of EI being a fad and was not entirely sure about whether it should be used. Teacher E explained that when one asks a child for the reason of their misbehaviour, they do not know and cannot explain how they feel. Furthermore, when the teacher notices that a child is upset, she will stop the lesson and ask what is wrong. Sometimes children do not want the teacher to stop the lesson and put the spotlight on them. As a teacher you must carry on with the lesson because you do not want to force a child to reveal something they are not comfortable with. The educator said that she would not use EI as an official policy because you do not want to change the class into a large counselling session.

It is true that children may face challenges in articulating their emotions and explaining their behaviours accurately. In contrast to this argument, Goleman (2011) states that EI can go beyond asking a child to articulate their feelings. It involves developing skills such as managing emotions, self-regulation, empathising with others and decision making. By teachers helping learners to cultivate EI, teachers can help children navigate challenges, make positive choices and thrive academically and socially (Goleman, 2011).

Teacher E and D then provided similar opinions on how EI may be a tool for empathy in the classroom like Teachers A and C. Teacher E gave an account of a situation of a child's parent passing on and the role EI plays in these circumstances. The child was sleeping in the class and EI makes teachers cognizant that these situations can affect the child's work. Therefore, EI does play a role in the midst of grieving which resulted in a higher empathetic understanding towards the learner at that time.

Teacher D affirmed that it is crucial to be aware of situations such as the passing of a parent because children are not able to learn when they are emotionally unstable.

Another common notion amongst the teachers was that EI can be utilised as a pedagogical mechanism to engage the learners in learning by making the lessons interesting to build a positive relationship with the learners. Teacher B stated that EI also makes her think about ways to make learners respond to the lesson effectively and make the lesson captivating by bringing life into the classroom for the learner to identify with the content and make it a lifelong skill. *“And if Emotional Intelligence helps them respond adequately and effectively and makes teaching more interesting, I would definitely use it all the time. Because then they will be able to identify with the situation, with the event, with what's happening around them, with the concept of being taught and bring it and bring it, make it alive in the classroom”* (Interview transcript, Teacher B, Line 20). Goleman (2011) does highlight the connection between a positive teacher-learner relationships and students' academic achievement. When learners feel connected to their teachers and perceive them as supportive and caring, learners are more likely to feel safe in taking academic risks, seek help when needed and perform better academically.

Although Teacher D argued that EI is a myth, she affirmed that EI occurred unconsciously in the classroom which assists teachers to present the content in an appropriate manner to the learners in order to not feel anxious and overwhelmed with the given work.

Teacher E explained that EI is still necessary in creating lessons that the children will enjoy and captivate them.

“I try to explain things in a way that they will find fun because I think if they don't like something, they're not going to really pay much attention to it. So, I tried to, um, to keep things quite upbeat. And, um not to scream and shout too much” (Interview transcript, Teacher E, Line 12).

Teacher B gave a different account from the other teachers in which EI has assisted her in being able to be present in the moment to think on your feet and react accordingly by making the learner the core when making certain judgements. This statement agrees with Goleman's (2011) assertion that being emotionally intelligent enables a person to understand the impact that emotions can have on decision

making, one can be objective and react in a sound and rational manner when making a choice.

The following information has shown how teachers have incorporated EI into their pedagogical practices. It is evident that this concept is permeating teachers' pedagogical practices to a large extent. Although, two teachers (Teacher D and Teacher E) affirmed that it is not a valid concept, it has still been utilised in the classroom and contains an element of truth. There is a divergence from what EI actually means in practical terms in which teachers have taken positive aspects of the term and have used their own interpretation to add value to their teaching practices. EI has been an instrument emotion for the teachers to show care for their learners and to create an emotional climate in the classroom that develops the learner learning environment and helps teachers to become more effective to ensure academic achievement. Furthermore, it has assisted teachers to develop awareness, empathy, understanding and ways to manage and understand children's emotions. The teachers have also utilized EI to reengage learners in the lesson and captivate them to learn. While EI is not being applied in its original and hole form, it forms a lightning rod for teachers to improve emotional awareness and management in their pedagogical practices.

5.4.3 Theme 3: The reasons why teachers believe that VAK/VARK is required in their teaching practises

VAK/VARK learning styles is a concept that provides a simple way to explain and understand an individual's own learning style and the learning styles of others. It also assists teachers to design learning methods and experiences that match their learner's preferences (Willis, 2017). Teachers A, C and D share a common agreement that learners have their personal learning inclinations and learning styles should always be used as an inclusive means.

Teacher A believes that learning styles is an important aspect that should be incorporated into lessons as everyone learns differently. Teacher A justified this point by saying *"I think I never understood it very well until I became a teacher. And you see how everyone learns differently. Um, also being a parent, I've seen how both my*

children learn completely differently. When I was furthering my studies, I needed colour and notes all over my room and it worked for me. I couldn't just sit down and study. So, I think it's important and it works" (Interview transcript, Teacher A, Line 26). Teacher A reported that she incorporates this concept by moving away from chalk and talk in the lessons to accommodate various learning modes by playing videos to get the learners to listen to a different voice and uses pictures and other visual aids to make the content more real and accommodate the strengths of the learners.

Teacher C shared a similar belief by affirming that learning styles is of value to be able to reach out to every learner in the classroom. She also added that everyone has a dominant or preferred mode of learning by stating that *"the way you learn doesn't change throughout in your lifetime. I'm, for example, I'm still a very visual person. Someone else might be more of a listening person. So, and that stays with you from, you know, foundation phase all the way up"* (Interview transcript, Teacher C, Line 20). Teacher C also reported that she incorporates learning styles by finding *"YouTube videos, for example, um describing parts of speech and I'll create songs as well to describe the different parts of speech. I will also have a video. Um, also make sure I have flash cards, and I also make sure that I have some space for the kids to write down every single definition that we've done so that I incorporate every one of those aspects into one whole lesson"* (Interview transcript, Teacher C, Line 22).

Teacher D's perspective also relates to the previous viewpoints in which she stated that these learning modes were needed to make provision for all learners. Teacher D agreed to this idea by stating that *"It is valid I would say because you use different techniques and different styles"* (Interview transcript, Teacher D, Line 25). *"I use a lot of technology, visual aids for the children to hear and see...they like colourful things"* (Interview transcript, Teacher D, Line 27).

While the VAK/VARK learning style theory itself may be controversial, many teachers recognise the importance of catering for diverse needs and preferences in the classroom (Furey, 2020). Incorporating various instructional strategies such as visual aids, auditory cues and hands-on activities can enhance student engagement, improve learning outcomes to foster a more accessible and equitable learning environment (Geake, 2008). For example, Teacher A stated that *"I try to play videos just to get a child to hear a different voice because they get tired of my voice. So that*

helps the auditory learner. And then visual aids, real life objects. They may see a certain picture or example in a textbook, but I bring in something a bit more real that they can relate to (Interview transcript, Teacher A, Line 28). Teacher B reported that, *“children are not listening, maybe I need to use a visual aid, or maybe I need to use a kinaesthetic aid because the kids, their listening skills are not developed”* (Interview transcript, Teacher B, Line 12) and *“If I’m going to teach a child with autism, I could use a video, uh, to explain the concept and also use concrete objects. And that brings in the kinaesthetic part of the, uh, lesson”* (Interview transcript, Teacher B, Line 26). Teacher E reported that *“any variation will make the child feel a lot better. So, I try to always have a video, some type of sound. Sometimes when we are reading our because, you know, we have to read a reader, um, during the year. So, I sometimes record my voice, and then I play it to the Children. Sometimes I make them read. Sometimes I play the full stop game where they each read one. You know, actually, vary it and for all things, sometimes I’ll show them a video on a concept. Sometimes I’ll make them watch a video as a visual, like reading and viewing for reading and viewing, for example”* (Interview transcript, Teacher E, Line 18).

In contrast to the previous argument, teacher B states that it is not necessary to use learning styles all the time. An educator would be guided by the type of learners and their needs in the classroom. She provided an example by stating *“if you got a class that’s mixed with remedial learners and so forth, it’s a must. But if you got a class that are low maintenance kids way the kids are coping, they’re doing well, they do not need all the levels, then you don’t need to. But where you see you need to in classes that are mixed, like you’ve got different levels of learners, some cope very well, some average, some struggling, then you would incorporate all three”* (Interview transcript, Teacher B, Line 28). While it is true that some students may benefit more from specific learning styles based on preferences and strengths, the concept of tailoring instruction to different learning styles applies to students across the academic spectrum (Boyatzis, 2008). In addition, the teacher mentioned that the auditory learning style is effective in developing a child’s listening skills and kinaesthetic learning is effective especially for learners on the lower spectrum of autism by using concrete objects.

Teacher E has another opposing argument in which she stated that learning styles is not necessary like Teacher B states, but for a different reason. According to Teacher E, learning styles does not make a difference to an individual’s learning. Literature

does challenge the effectiveness of learning styles and critics argue that it oversimplifies the complex nature of human learning (Boyatzis, 2007). The teacher had previously read articles on Facebook about the science that disproves learning styles. She *stated “I was quite dubious, actually, because from my own reading, just you know, not I haven't read anything specific, just my random readings of educational papers and things. They said that it doesn't really make a difference to how the child learns”* (Interview transcript, Teacher E, Line 14). From her personal experiences she said that *“one thing I found very interesting was that a child might say they prefer visual, or they prefer auditory. And yet when you test them, that's not how they ended up learning. So, I honestly don't think that it really makes a difference”* (Interview transcript, Teacher E, Line 16). Teacher E then explained that learning styles should still be utilised as a child may get bored, therefore they need different learning modes by saying: *“You know, just for variation. Not because I want to strictly adhere to the learning styles just for variation. Because I think variation is never a bad thing”* (Interview transcript, Teacher E, Line 18). *“So, I do try to incorporate a bit of visual, a bit of auditory, a bit of reading in in all the lessons, as much as possible”* (Interview transcript, Teacher E, Line 12). According to Teacher E, these learning styles give learners an all-rounded learning experience which is necessary.

Teacher B shares a similar view as Teacher E by affirming that learning styles is a learning instrument that gives learners exposure, including exposure to technology for learners to have an all-encompassing experience. Not all children want to learn by reading and writing in a book as they learn differently. Teacher B proves this point by saying *“I think that is, for me, that's brilliant. It's, it's a lot more exposure. Kids learn a lot. Kids enjoy that, and they start to grasp faster as opposed to a teacher standing in front and saying a whole lot of stuff. But if they can learn from an iPad, if they can learn from a video, why not?”* (Interview transcript, Teacher B, Line 28). By providing learners with exposure to technology and learning activities by utilising different learning modes, it makes learning exciting and interesting as children of today have low attention spans. Children can watch TV and sit in front of their phones instead of listening to a teacher. If teaching can occur by using these various modes and is effective, then learning styles can add value to the classroom. Research shows that learners have a combination of preferences rather than a single dominant style (Domigomez, 2018). Well-designed instruction that focuses on metacognition and

differentiated approaches allows teachers to consider a variety of instructional strategies and methods which allows for a differentiated approach rather than relying solely on VAK/VARK learning style theory (Geake, 2008).

From these responses, there is a general consensus that VAK/VARK learning styles can be a useful inclusive tool and be of value in an everyday context based on the teachers' anecdotal evidence which has resulted in the permeation of this concept to a large extent. The teachers state that it is a positive thing to implement this concept into a lesson even when confronted with the science. Teachers tend to hand pick the best parts of learning styles to do what they believe entails better teaching. This is done by teachers equating learning styles with varying exposure to different learning activities to be more inclusive and to try and engage learners in the education process. This concept is different to the point that learners can only learn in a particular style as stated by Grospietsch & Mayer (2020) in the literature review.

5.4.4 Theme 4: The vague interpretations of a neuromyth

Bruer (1997) explains that it is necessary to bridge the gap between neuroscience and what happens in the classroom. A hybrid of these specialties is needed to bridge the gap between scientific knowledge and practical application in education. As a result of this gap, teachers are not acquainted with the conception of a neuromyth (Bruer, 1997). Bruer's (1997) claim is evident from the teachers' definitions of a neuromyth. Teacher A stated: *"I can't place it. Not at all"* (Interview transcript, Teacher A, Line 32). Teacher B and C did a thinking exercise in which they defined the term *"neuro"* and *"myth"* and deduced that it was related to a myth of the brain. However, their definitions were still scant with missing information. According to Teacher B *"Neuro is related to the brain and a myth is something that isn't true. So, it is a myth about the brain"* (Interview transcript, Teacher B, Line 34). Teacher C defined the term as *"neuro has to do with mind or thinking, and a myth would be, um, thoughts about how we do things or how things are done or perceived. So, a neuro myth would be something based on how we perceive or how we think of things to do with thought, processes, and learning"* (Interview transcript, Teacher C, Line 24). Teacher D was not able to provide a definition of the term.

Only one teacher (Teacher E) could provide an accurate meaning of the term. Teacher E stated: *“I read about it is that it's ideas about how the brain works that are perpetuated, even though there's not really evidence to back it up”* (Interview transcript, Teacher E, Line 20). The fact that only one participant could provide a definition proves that there is a gap between neuroscience and education.

This information is aligned to the survey response that only 3% of the teachers gave a clear-cut definition of the word. Ten percent of the participants' definitions were close to the exact meaning of the term. Teachers are very much unaware and uncertain of neuromyths which supports the findings in the survey. This figure corresponds to Bruer's (1997) argument that researchers in education and neuroscience have worked apart in silos which has resulted in a distance between education and neuroscience that is too far to bridge. As a consequence, there is limited knowledge of brain science and a lack of academic instruction on neuroscience in teachers' curricula which subsequently has resulted in the permeation of these myths in the classroom and the widespread unfamiliarity of the concept (Cherniss, 2000).

5.4.5 Theme 5: Neuromyths are still valued despite the academic contestations

After the participants were presented with the academic contestations, I posed the question of whether they still valued EI and VAK/VARK learning styles despite the debates. Each of the teachers revealed a common argument that neuromyths are still effective and constructive in their pedagogical practices. Teacher A affirmed that she still holds these myths in high regard. She mentioned how learners have turned into robots who have lost the meaning of learning and robotically do activities and move straight into another task and project due to the excess of work stipulated in the curriculum. It is necessary to revive the emotional aspect of teaching when planning a lesson for learners to see the meaning and value in what they learn. Teacher A explained this point by saying, *“When last did I even stop to ask the child, you know, what value does this have to you in your life? How is this going to help you? Just bring a little bit of them into this. I haven't done that because I am pushing for curriculum and just listening to you now, just getting a child to engage a little bit around the topic, you know, uh, can help”* (Interview transcript, Teacher A, Line 61). Incorporating EI

into education can help strike a balance between the demands in the curriculum and emotional well-being of the learners (Howard-Jones, 2010). Learners are not just passive recipients of knowledge but individuals with emotional needs. It creates a more holistic educational experience that acknowledges the importance of feelings and cultivates a supporting, engaging and enriching learning environment (Knecht, et.al, 2000).

Teacher B reported that these neuromyths have proven to be beneficial in her teaching and years of training as well as interaction with the learners at different points in time. Furthermore, she stated that, *“I would continue to use it unless scientists can prove it has no value at all, then and provide me with alternative, then I would maybe consider it”* (Interview transcript, Teacher B, Line 56).

Teacher C agreed with the academic argument that EI is a skill, habit, and choice rather than a form of intelligence by providing the following example: *“I think it's an intelligence still in that, like there's retrospect. I can look at it and say I'm able to handle it this way because these are the skills I've taken and learned and taken to into myself. Compared to my sister, who would have been given those exact same skills, however, chose not to use them because that it brings into that like, you know, that nurture nature kind of question”* (Interview transcript, Teacher C, Line 32). Teacher C still held the belief that people learn best in their preferred learning mode by providing a personal example of being a visual learner by saying *“if someone is talking about a subject that is difficult to me and I don't have something in front of me that I can see, I won't know what you're talking about”* (Interview transcript, Teacher C, Line 32). While academic literature may question the effectiveness of learning styles, it is important to acknowledge that individuals have preferences and ways of processing information (Geake, 2008). The teacher also agreed with the debate that VAK/VARK can create cognitive overload in a lesson and should be utilised unanimously rather than having it all in one go.

According to Teacher D, learning styles is still a valid concept to implement differentiation. The teacher agreed to this point as *“we are all different. We all learned through different methods. Some is weak, some is strong, some is very weak”* (Interview transcript, Teacher D, Line 62). In an everyday context, learning styles can still be valuable as one of many strategies to support diverse learners. Recognising

and catering to different modalities can enhance engagement and benefit learners with different strengths and challenges (Geake, 2008). In terms of EI, she spoke about the correlation between a stable mental health and good grades. *“You have to incorporate emotions and things within your learning environment and when children are emotionally not stable, they don't actually learn”* (Interview transcript, Teacher D, Line 64).

Teacher E stated that VAK/VARK learning styles is still valuable to a degree. A teacher cannot come into the class with a PowerPoint and expect the learners to work. A child must get an all-rounded experience of a lesson with visuals, sound, and movement. Teacher E said that *“I like to have a bit of everything because, as I said, you want the child to have a bit a bit of everything, so it can't be a bad thing”* (Interview transcript, Teacher E, Line 30). VAK/VARK learning styles lacks empirical support and is considered oversimplified. Learners benefit from a variety of instructional approaches rather than being limited to one single learning style. To provide an all-rounded and varied lesson, it is advisable to use a range of instructional approaches and materials (Kopsoyich, 2001).

Teacher E then provided her opinion on Emotional Intelligence and affirmed that *“It's important to view that (EI), you know, to manage a person's emotions and recognise them and things like that. But again, I also feel like I said, children don't always know what they're feeling, and they act out in funny ways, you know”* (Interview transcript, Teacher E, Line 32). Later, the teacher added that teachers are supposed to attend workshops whenever a new discovery or trend comes into education. She provided the example of THRASS (Teaching Handwriting Reading and Spelling Skills) which is a teaching method for teaching learners of any age about the foundation of reading and spelling which includes the 44 phonemes (speech sounds) of spoken English and the graphemes (spelling choices) of written English. It was later discovered that this did not work effectively for second language English speakers. The teacher said that as much as teachers in the classroom want to challenge these fads, the school principal ignores and would rather listen to the so called “educational experts” and theorists. Furthermore, teachers are not trained to critically assess the validity of these myths and it is rather a money-making business. Education is a dynamic field and new ideas and approaches are constantly emerging (Geake, 2008). Teachers should

remain open to innovation and new possibilities, but always with a discerning eye and commitment to the best interests of the learning of the learners (Howard-Jones, 2010).

Although there is an academic distinction, it is evident that teachers have drawn an imaginary wall and think it is beneficial to apply neuromyths into their teaching methodologies. Teachers have taken the useful components of each myth and have incorporated it to suit what they deem as a best teaching practice. While these ideas are debated among researchers and experts, teachers are constantly adopting and personalising their approach to cater to the diverse needs of their learners.

5.5 Conclusion

In conclusion, this chapter has identified and discussed the patterns observed in the data of the survey and interview. The survey has included a discussion on the prevalence of the common neuromyths. This chapter has also incorporated a step-by-step thematic analysis of the interview which shows the process through graphs. The thematic analysis of the data generated five main themes that are linked to the main research questions which include the extent that neuromyths have permeated the pedagogical practices of intermediate phase teachers, teachers' awareness of neuromyths, the ways in which EI and VAK/VARK learning styles are influencing pedagogical practices as well as teachers' opinions on the value of these neuromyths despite the information derived from scientific research.

Chapter 6: Conclusion of the findings

6.1 Introduction

The main purpose of the research was to shed light on the prevalence of neuromyths but also to understand how they are impacting teaching practices with regards to inclusive education. This section aims to consolidate the findings from the report and discuss them in relation to the main research questions presented in the first Chapter. It will deliberate on the significance of the findings, provide recommendations for future research areas as well as information on the limitations of the results. It also entails a personal reflection on the study itself and the new insights that were exposed throughout the development of the report. Lastly, this chapter will include a final conclusion to the report in its totality.

6.2 Relating Overall Findings to the Research Question

The background of this study was based on a main research question with three sub-questions aimed to provide a thorough and comprehensive answer to the focal question. This section entails a discussion on how the findings of the study addresses these questions and attempts to present the answers. This section first provides answers to the sub-question which builds up to the main question which is answered as the final question.

Sub-question one:

- What percentage of teachers are aware of the concept of Neuromyths?

According to the survey definitions of a neuromyth provided by the teachers, only 3% out of the 57 participants were able to provide a correct and precise meaning of the term. Furthermore, only one educator out of five teachers from the interviews gave a correct definition of a neuromyth. From this information, it is evident that most of the teachers do not know what a neuromyth is as an individual concept. The findings do indicate that teachers are generally familiar with the common examples of a neuromyth and do utilise it in their teaching practices but do not know that these examples are considered to be neuromyths. The term is unknown to the majority of teachers which

emphasises on the divide between neuroscience and educational practice. This moves to the next point on how the common examples of neuromyths are influencing the teachers' pedagogical choices.

Sub-question two:

- In what ways are the common neuromyths (Emotional Intelligence and VAK/VARK- Visual, auditory, reading/writing, and kinaesthetic Learning Styles) permeating/influencing intermediate phase education pedagogical choices?

According to the responses from the interviews, participants indicated that Emotional Intelligence has been used as an instrument for empathy in which teachers make judgements on a learner's behaviour by probing into the root cause of a problem derived from the child's household instead of ranting at the learner. Emotional Intelligence has allowed teachers to be conscientious about emotional responses and its impact on the emotions of the learner. It also supports teachers in thinking of ways that will make learners find a lesson relatable and bringing life into the classroom for learners to identify with the content.

Emotional Intelligence has allowed teachers to be cognisant and aware about their learners' mental health as there is a common link between an individual's emotions and academic grades because an emotionally unstable child cannot learn. It has also been used as an outlet for learners to be open to their teacher and to express their emotional concerns when going through a problem at home or an academic as well as a friendship issue.

A participant in the interview asserted that Emotional Intelligence is a myth and is an aspect that occurs unconsciously but was not able to justify a reason for this assertion. Later, after grappling to articulate a reason, the teacher said it is a means of guiding teachers to break down the content into manageable parts for the learner to not create anxiety. Another teacher expressed a similar opposing view that Emotional Intelligence could be a fad by stating that most children are not able to articulate their emotions and justify how they feel when a teacher questions them. However, it is necessary to an extent to be mindful that emotions can affect a child's work.

VAK/VARK learning styles has been a means for teachers to move away from utilising merely chalk and talk and using various modes of representing information including videos, audio clips, various concrete objects, and audio clips to get the learners to listen to a different voice. It is a positive aspect that assists teachers to reach out to every learner in the classroom because people do have learning preferences that remain the same throughout their life. A teacher added that learning styles allows teachers to make provision for all learners by incorporating remedial education into their pedagogies.

The participants did state that VAK/VARK learning styles may not always be necessary in a lesson and is dependant according to the levels and abilities of the learners. A teacher would be guided by the levels of the learners. It is effective for learners who are on the low autism spectrum and high maintenance learners who cannot think on an advanced level and need concrete objects. If a class includes low maintenance learners, it is not necessary to have all the modes. In a class that comprises of learners of mixed abilities, it would be useful to incorporate all the modes of learning. It also allows teachers to integrate technology into the classroom as there is a lot of visual and auditory activity. Children of today have short attention spans and are able to spend hours on a phone, iPad and television. This is to say that if a child can learn from an iPad or a video, which makes learning easier, learning styles should be used by all means. In addition, it is appropriate for the direction that South Africa is heading towards of implementing the 4th Industrial Revolution.

There was an opposing argument from one of the teachers who was dubious and had previously read an article on the contestations of learning styles. The teacher explained that from her person experience, a child may state that they have a particular learning style and yet when a teacher tests them, it is not how they ended up learning. However, it is still necessary to a degree because children enjoy a lesson that is varied in order to have an all-rounded experience as opposed to merely putting up a power point and expecting the learners to work. The educator added that learning styles was encouraged at the school during the lock down when teachers compiled power points by adding their voices to the slides for learners to have an opportunity not to only read but for them to also play the sound of the power point to cater for all children.

In summary, the main points are that Emotional Intelligence has permeated teaching practices by making teachers be more aware and conscientious about managing emotions of themselves and the learners. Learning styles are permeating teacher practices by being the common accepted argument for method variations during class. The last sub-question aims to provide information on what teachers make of neuromyths and how they value it despite the criticisms against these myths.

Sub-question three:

- What are teachers' opinions/impressions of neuromyths despite the information derived from scientific research?

The literature states that the application of neuromyths can be a waste of time and prevent teachers from using effective teaching practices backed by scientific evidence (Geake, 2008). In practical terms the negative consequences of neuromyths are limited and teachers have found effective pedagogies from this concept to make their lessons inclusive. Throughout the entire interview process, there was a consensus that VAK/VARK learning styles can still be useful and of value in an everyday context based on the teachers' anecdotal evidence. As stated in the literature review, there is no empirical evidence that supports learning styles but there is plenty of personal experience amongst the teachers as evidence from the interviews. The teachers have also found Emotional Intelligence as a beneficial concept in raising awareness of emotional issues, managing learners' emotions and utilising it in their teaching practises to motivate learners to perform better in their schoolwork.

According to Kopsoich (2011), by dismissing the fact that every learner takes in information in a preferred way should not excuse instructors of the need to try and adapt and tailor their teaching styles to cover as many learning styles as possible in their classrooms. Teacher A asserted that teachers cannot possibly match every learner's learning style but what they can do is adjust how they teach by using a multitude of different learning styles in their classrooms. An example would be using PowerPoint slides for the visual learner, explaining the concepts for the auditory learner, and showing learners how to take notes for the kinaesthetic learner as stated by Teacher C and Teacher E.

The interviews with the teachers indicate that there are things that exist in the world that people accept without any proof by scientific measures which are often referred to as old wives' tales which entail anecdotal evidence. These old wives' tales are always accepted with a sense of scepticism by scientific thinkers. However, some of those old wives' tales turned out to be true scientifically (American College of Chest Physicians, 2000). Anecdotal evidence may be just as valid as what science tells us (Cassidy, 2004). The self-reported data of the teachers is just as valid as something that was studied in a laboratory setting (Akkonyunlu & Solyu, 2008). It was evident from the findings that the teachers did not place value on the academic/scientific theories, but rather based their beliefs on what they have witnessed and experienced in their teaching practices.

The main question is:

To what extent have Neuromyths permeated pedagogical practices of intermediate phase Teachers?

The qualitative from the interview and quantitative data from the survey indicates that neuromyths are influencing teachers' pedagogical practices to a large extent. According to the survey, the neuromyths that were utilised the most were VAK/VARK learning styles as it forms the core of the CAPS curriculum and has been widely accepted in education as a way to promote the idea that every learner learns differently. Due to these results, the interviews pertained only to Emotional Intelligence and VAK/VARK learning styles which were the most prominent myths as indicated on the survey. The least known and applied concepts were Multiple Intelligences (MI) and Left/Right brain dominance.

Even when presented with contradictory information, teachers were highly resistant to letting the concepts go. This could be for various reasons, but the ones revealed in this study are that their misinterpretation of the concepts are perceived to have helped them in managing the learners in their class. EI has made teachers more cognisant, careful, and conscientious about managing emotions of themselves and the learners as well as using their discretion in certain situations. Learning styles has been an effective teaching strategy for variation in order to keep the learners captivated in the lesson and it has been an inclusive tool to support learners with different levels and

abilities. Although academia discredits and finds flaws in neuromyths, teachers in reality still recognise their value and employ them to enhance their teaching methodologies. Therefore, neuromyths have greatly permeated and have a significant impact on pedagogical practices.

6.3 Significance of the findings

This research prompts teachers to engage in critical thinking and self-reflection, pondering on how they can effectively utilise information on neuromyths to enhance their teaching practices with a focus on inclusivity while delivering a lesson. Furthermore, despite the concerns regarding the rapid propagation of neuromyths, not much is known about the prevalence of neuromyths among professionals in the field of education due to the lack of effective communication between the fields of neuroscience and education. This research helps to advance knowledge create an awareness of the misconceptions among teachers and into the education itself.

At an educational level, schools and educational departments do not address and create an awareness of the widespread misconceptions of this topic in a South African context. It is common to find data on this topic in a Western context, but the literature based on how prevalent neuromyths are in South Africa is limited. This research project contributes to the knowledge gap by providing data and statistics of neuromyths in South African schools. This can assist future teachers and policy makers to look at the CAPS curriculum critically and teacher education program as a whole which propagate the widespread of neuromyths.

At a theoretical level, most of the articles that discuss the academic perspective of neuromyths tend to focus solely on the debates and criticisms of the common neuromyths which are inclined to be biased. This research project presents a more balanced perspective of neuromyths which includes the arguments surrounding the concepts as well as the practicality and usefulness that neuromyths have from the teachers' anecdotal information. This study also reveals the separation of the concepts of EI and emotional management and learning styles from teaching variety. This adds to the current academic discourse on the separation of neuromyths from education,

but also poses the question that should there not be more research into developing these teaching methods as stand-alone concepts?

From an inclusive education perspective, this study has presented how neuromyths are useful from an everyday and practical standpoint. It has shown how teachers have chosen particular facets of EI and VAK/VARK learning styles to make a lesson relevant to their learners' lives and to implement differentiation in the classroom. While it is true that including neuromyths such as Emotional Intelligence, VAK/VARK learning styles, multiple intelligences and left/right brain dominance can have negative effects on inclusive education practices due to their lack of scientific evidence, there may be perceived practical benefits associated with their use in certain contexts. By categorising individuals into different learning styles or intelligences, it can create a perception of personalisation and tailor-made educational approaches which is appealing in settings where diverse learners require individual attention and support. Some individuals may find comfort and motivation in believing that they have a specific learning style or type of intelligence that determines their academic success. This can act as a confidence booster and encourage students to persevere through challenges. It also allows for a sense of uniqueness and personal identity. However, it is important to acknowledge that the practical benefits derived from neuromyths should be viewed with caution. Relying solely on neuromyths can lead to a bias in teaching practices and overlook the complex and dynamic nature of learning. Inclusive education practices should also look at evidence-based strategies that accommodate the diverse learning needs and preferences of all students, providing multiple means of representation and tailoring instruction on individual strengths and weaknesses.

6.4 Recommendations for Future Research

The first recommendation would be to conduct research into how the South African Department can find a way to bridge the gap between education and neuroscience in South African schools. Furthermore, alternatives need to be found on how teachers and neuroscientists can have an effective communication on understanding each others realities. Teachers need to have more exposure to scientific findings derived from neuroscience and neuroscientists should comprehend the reality of the classroom context. An understanding of neuroscience research on learning and the

fundamental constituents of learning is as crucial as the study of child development or educational psychology or other aspects of teacher training. Just as doctors and psychologists attend professional development workshops to stay updated, teachers must be updated on information about the brain, emotions, and motivation from scientific research in order to gain information about the implications neuroscience has in education to execute inclusion in lessons. Updating teachers on neuroscience in education equips them with valuable insights into the brain's functioning and how it relates to inclusive education. By incorporating this knowledge, teachers can create inclusive learning environments, celebrate neurodiversity, support learners' emotional well-being and ensure equitable educational opportunities for all learners.

During the interview, one of the teachers mentioned that kinaesthetic learning styles can be beneficial for learners who are on the lower spectrum of autism. This idea can be explored further as there is a lack of understanding of autism in mainstream education as well as little structure in the education system to ensure that learners receive a wide-ranging and all-encompassing education.

This research may open doors to a possible opportunity to explore an alternative to neuromyths. This research project has only provided a comprehensive overview of the contestations and arguments derived from academic sources as well as the teachers' anecdotal experience based on the practicalities that these myths have in their pedagogical practises. There is currently no information on an alternate pedagogical practice to replace neuromyths. This may be a prospective inquiry which can be explored further in PhD level research. This study could potentially result in a novel concept in the domain of inclusive education.

6.5 Limitations of this Study

The scope of this research only included teachers from schools situated in Johannesburg. Furthermore, all the schools that participated in this research were suburban public and private schools. This is a comparatively narrow sample that does not reflect an all-encompassing and an in-depth perspective on how neuromyths are prevalent and influence teachers' practices because it focuses on a particular context. South Africa comprises of diverse environments and backgrounds and this research

may be viewed as a partial reflection of neuromyths that is based on one type of environment and setting that share a common culture.

I intended to have 100 teachers participating in this survey, however only 57 teachers responded. This may have happened for a variety of reasons such as disinterest in the survey and the lack of confidence to answer an online survey. Furthermore, it was a period of assessments and the teachers felt overwhelmed to participate. This may be limiting in terms of variability and may not be truly aligned or representative to the real statistics making the parameters less precise.

6.6 Personal Reflection

When I had learnt about neuromyths during my Honours year, it made me think and reflect on how the vast majority of teachers, including myself accepted these widespread myths uncritically. In addition, it is a conception which only a few individuals are exposed to. When conducting this research, I was curious to find out about what teachers would make of neuromyths after informing them about the contestations behind these common myths.

I went to over 37 schools in person to ask for permission to conduct research and sent emails with information about the research which also included the link to the online survey. Thirty-one out of the 37 schools agreed to participate in this study. Initially my aim was to get a sample of 100 teachers to complete the survey. Only 57 teachers responded to the survey over a period of three months. I did feel frustrated during this process because it did slow the progress of my research and it made me anxious about not having a sufficient sample of participants that would add substance and significance to this project.

Before conducting this research, I previously had a strong bias that neuromyths should be eliminated from education because they are typically viewed as a negative approach to education in academic sources. This academic stance influenced my personal bias in which I viewed neuromyths as detrimental to education and it also made me think about teachers adopting ineffective teaching practices. This project shifted my perspective and allowed me to see the flipside of the coin as well as new

ideas and insights that neuromyths still contain parts and components which can add value to teaching pedagogies.

This includes aspects such as incorporating an emotional facet into the curriculum because CAPS has resulted in learners not being able to see the value, essence and meaning of learning because they are robotically moving from exercise, activity, project, and task. Teachers need to include an emotional facet into their lessons for learners to see the value of the content in their lives as well as how it would assist them. This research project also gave me fresh ideas on how learning styles may be effectual to learners on the lower spectrum of autism. It has also given new insights that learning modes can be useful to learners of today's generation because learners have low attention spans. It provides learners with various ways of information being presented for a wide-ranging learning experience so that they are captivated throughout the lesson. Moreover, it has been an outlet of exposure to technology which is aligned to the direction of the 4th Industrial Revolution which South Africa is heading towards. This has made me realise that although neuromyths are related to false beliefs, it can still stimulate valuable research and a deeper understanding on a topic.

6.7 Conclusion

This research report set out to explore the main question on how widely known the concept of a neuromyth is and how it is influencing intermediate phase teachers' pedagogical practices. This was done by conducting an online survey and interview to find out about the percentage of teachers who were aware of the concept of a neuromyth. Furthermore, it explored the ways in which the 4 common neuromyths (Emotional Intelligence, Multiple Intelligences, VAK- visual, auditory & kinaesthetic Learning Styles, left/ right brain dominance) are permeating/influencing intermediate phase education pedagogical choices and the teachers' opinions/impressions of neuromyths despite the information from academic research.

These questions were answered by including a review of the current literature of neuromyths which entailed a comprehensive exposition surrounding the arguments about the common neuromyths and its use in education, the arguments against each

neuromyth as well as the issues and considerations of these myths in education. This set the stage for the next part of the study which probed deeper into the practicality these neuromyths may have from an experienced teacher's perspective. This was done by conducting an online survey and semi-structured interviews.

A thematic analysis was done to draw links and common themes between the literature and results of the interview. The survey was utilised as a supporting source to the interview in order to answer the research questions. From the information provided in the empirical research, it is clear that neuromyths are prevalent in education and do have a significant impact on teaching practices. Even though the actual academic concepts are being warped and scrutinised, the teachers as a whole are inclined to finding the parts that align with their experiences and observations in class. Therefore, neuromyths from a technical standpoint is problematic, but in practical terms, it has been utilised as an inclusive tool to bring the policy of inclusion into education. Inclusive education aims to provides equal opportunities and support to all learners, regardless of their abilities or backgrounds. By addressing and debunking neuromyths, teachers can create a more inclusive learning environment based on accurate information about the brain and learning. This allows for evidence-based teaching strategies that accommodate diverse learning needs, it promotes learner engagement and fosters an overall inclusivity in education.

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Appendix A

An example of the online survey:

Completion time: **3 minutes**

The information you provide on this survey will be both anonymous and confidential. By completing this survey, you are automatically consenting to participate in this study.

1. Do you know what a neuromyth is? (Circle the letter of your answer.)
 - a. Yes
 - b. No
 - c. Maybe, I have heard about it before.

2. What do you think a neuromyth is? Answer in a sentence.

3. Which of the following concepts are you familiar with? (Circle the letter of your answer.)

Emotional Intelligence

- a. I don't know the concept.
- b. I have heard about it but don't know too much.
- c. I know the concept.
- d. I know the concept very well.

Multiple Intelligences

- a. I don't know the concept.
- b. I have heard about it but don't know too much.

- c. I know the concept.
- d. I know the concept very well.

VAK (Visual, auditory & kinesthetic) learning styles

- a. I don't know the concept.
- b. I have heard about it but don't know too much.
- c. I know the concept.
- d. I know the concept very well.

Left/right brain dominance theory

- a. I don't know the concept.
- b. I have heard about it but don't know too much.
- c. I know the concept.
- d. I know the concept very well.

4. How often do you incorporate these each of these concepts into your teaching practices? (Circle the letter of your answer.)

Emotional Intelligence

- a. Always
- b. Often
- c. Sometimes
- d. Rarely
- e. Never

Multiple Intelligences

- a. Always
- b. Often
- c. Sometimes

- d. Rarely
- e. Never

VAK (Visual, auditory & kinesthetic) learning styles

- a. Always
- b. Often
- c. Sometimes
- d. Rarely
- e. Never

Left/right brain dominance theory

- a. Always
- b. Often
- c. Sometimes
- d. Rarely
- e. Never

Appendix B

Example of the semi- structured interview schedule:

Time: 45 minutes

Section A

1. How long have you been teaching?
2. What are your qualifications?
3. How long have you been teaching at this school?
4. Which subjects do you teach?

Section B

Emotional Intelligence (EI)

1. Do you know what is EI?
2. Do you think it is valid to use EI in the intermediate phase?
3. What are your thoughts about EI?
4. How do you incorporate EI into your teaching practises?

VAK (visual, auditory & kinaesthetic) Learning Styles

5. Do you know what are VAK learning styles?
6. Do you think it is valid to use VAK learning styles in the intermediate phase?
7. What are your thoughts about VAK learning styles?
8. How do you incorporate VAK learning styles into your teaching practises?

Section C

1. Are you familiar with the concept of a neuromyth? (If the answer is no, I will provide an explanation of neuromyths to the participant.)
2. What do you think about neuromyths and how do you value it despite the critical information derived from academic sources?

Appendix C

Permission letter to the school principal and SGB



University of the Witwatersrand,

[Date]

Dear Sir/Madam,

Re: Permission to conduct research at [insert organisation name].

My name is Debora Leal.

I am studying for a Master's degree by Coursework and Research in the School of Education at the University of the Witwatersrand. I am seeking permission to do research at [insert organisation name].

I am conducting research on the prevalence of neuromyths in the Intermediate Phase in a South African schooling context. A neuromyth is *a misconception generated by a misunderstanding, a misreading, or a misquoting of facts scientifically established by brain research to make a case for use of brain research in education and other contexts. My research project will be focusing mainly on the 4 common neuromyths which include Emotional Intelligence, Multiple Intelligences, VAK (visual, auditory & kinaesthetic) Learning Styles and left/right brain dominance. From an academic perspective these neuromyths are perpetuating misconceptions and untruths in education. The title of my research is "The Prevalence of Neuromyths in Intermediate Phase Education in a South African Context".*

It is evident that educators are endorsing in neuromyth practices because they are not aware of the academic perspective of neuromyths as well as the perpetuation of

neuromythological falsehoods which can be found in curriculum documents, textbooks, teacher training courses and workshops. While it is known that neuromyths have permeated education, there is little research to the extent of the permeation and the how educators are utilising neuromyths in the South African context. This study looks to explore how widely the concept of neuromyths is known within education and to get a sense of how some of the common neuromyths are permeating pedagogical practices in South African schools. Furthermore, it aims to show various perspectives on the extent of usefulness a neuromyth may have in education and what teachers make of neuromyths despite the criticism derived from academic sources by means of a mixed methods (qualitative and quantitative) research methodology. Keeping up to date with the information of these neuromyths can inform teaching practices in the classroom in the form of understanding students and the ability to design lessons that are effective to implement inclusion successfully.

I have chosen to conduct research at this school because I believe that the teachers have high standards, they take pride in their job and value excellence in the quality of their teaching. Thus, this attribute from the teachers would provide me with insightful and well-articulated responses of their knowledge and expertise which would assist me with devising a research project of distinction.

I am inviting the Intermediate Phase educators to take part in an online survey and an interview for this study. If they agree, they will be asked to participate in a 3-minute online survey. The teachers are automatically consenting to participate in the research when they fill out the survey. The link of the survey will be sent to the school email or the teachers' personal emails. This survey is completely voluntary, and the personal information of the teachers will be kept anonymous.

In addition, 6 different Intermediate Phase teachers have the choice to volunteer in an interview which will take 45 minutes the maximum. The interview may take place at the school at a convenient time which suits teacher, or if it is convenient to conduct the interview through an online platform such as Zoom, I will reimburse the data costs. Participants will be asked to give their written or verbal consent before the research begins. Their responses will be treated confidentially, and identities will be anonymous unless the teacher indicates so. Individual privacy will be maintained in all published

and written data resulting from the study. With the teachers' permissions, the interviews will be recorded, however it is not compulsory to consent to the recording of the interview. The data of the recording will be stored in my personal password protected device which I can access and it will be deleted in 2024. Some or all of the data may be shared with the supervisor only. The research report will be available on the University library website. If you would like to receive a summary of this report, I will be happy to send it to you.

The research participants will not be advantaged or disadvantaged in any way. They will be reassured that they can withdraw their permission at any time during this project without any penalty. There are no foreseeable risks in participating in this study. The participants will not be paid for this study.

I therefore request permission in writing to conduct my research at your organisation. The permission letter should be on your organisation's headed paper, signed and dated, and specifically referring to myself by name and the title of my study.

Please let me know if you require any further information. I look forward to your response as soon as is convenient.

Yours sincerely,

Debora Leal



Debora Leal

Contact number: 073 131 4851

Wits email address: 1687699@students.wits.ac.za

Supervisor's name: Dr. Cameron Martin

Email address: cameron.r.martin@gmail.com

Appendix D

Participant Information Sheet



Dear Sir / Madam

My name is Debora Leal. I am a Master's student in Education by Coursework and Research at the University of the Witwatersrand, Johannesburg. My supervisor is Dr. Cameron Martin. I am inviting Intermediate Phase educators to take part in an interview for my Master's research project based on the prevalence of neuromyths in South African schools. While it is known that neuromyths have permeated education, there is little research to the extent of the permeation and how educators are utilising neuromyths in the South African context. Therefore, this study looks to investigate how widely known is the concept of neuromyths within intermediate phase education, and to get a sense of how common neuromyths are permeating pedagogical practices. Keeping up to date with the information of these neuromyths can inform teaching practices in the classroom in the form of understanding students and the ability to design lessons that are effective to implement inclusion successfully. The study title of this research is "The Prevalence of Neuromyths in Intermediate Phase Education in a South African Context".

If you decide to take part, your participation in this research study will last about 45 minutes the maximum. The interview will take place at the school at a convenient time which suits you. If it is convenient to conduct the interview through an online platform such as Zoom, I will reimburse the data costs. With your permission, I would like to audio record the interview, however it is not compulsory to consent to the recording of the interview. The recording will be kept in my personal password protected device during 2022 and 2023 which I can access.

During the research interview, I will need to ask for some personal information about you, including years of work experience, qualifications, the subjects you teach, your

prior knowledge of neuromyths as well as the influence these myths have had on your pedagogical practises.

When I share the results of the research study from the interview, I will not include your name or anything else that could identify you. With your permission, other researchers may use the data collected from this research study, but your name and any personal information will not be used or passed on. Some or all the data may be shared with the supervisor only.

If you decide to take part in the research study, it should be because you want to volunteer. You do not have to take part. You can stop being in the study at any time. You do not have to answer any questions if you do not want to. You will not get any direct benefits if you choose to join the research study. You will not lose any services, benefits or rights you would normally have if you decide not to join. Taking part in the research study will not cost you anything. You will not be paid for being in this research study. The risks for this research study are no more than what happens in everyday life.

This research study will be written up as a research report. The report will be available on the university library website. If you would like to receive a summary of this report, I will be happy to send it to you.

If you have any questions during or afterwards about this research study, feel free to contact me or my supervisor on the details listed below. If you have any concerns or complaints about the ethical procedures of this research 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,

Debora Leal



Researcher: Debora Leal, 1687699@students.wits.ac.za, 073 131 4851

Supervisor: Dr. Cameron Martin, cameron.r.martin@gmail.com

Appendix E

Consent form for semi- structured interview participants

Title of project: The Prevalence of Neuromyths in Intermediate Phase Education in a South African Context

Name of researcher: Debora Leal (student number: 1687699)

I,, agree to participate in this research project.

I agree to the following:

(Please circle the relevant options below)

The research study was explained to me. I understand what this study is about.	YES	NO
--	-----	----

I understand that I can volunteer to take part in the study.	YES	NO
--	-----	----

I agree that the interview may be audio recorded.	YES	NO
---	-----	----

I agree that some or all of the data may be shared with the supervisor only.	YES	NO
--	-----	----

I agree that direct quotations from my interview may be used by the researcher in their research report.	YES	NO
--	-----	----

I agree that my participation will remain anonymous (my name will not be used by the researcher in their research report).	YES	NO
--	-----	----

I agree that other researchers may use the information I provide in my interview (depending on their own ethics clearance being obtained) but my name and any personal information will not be used or passed on.	YES	NO
---	-----	----

..... (signature)

..... (name of participant)

..... (date)

..... (signature)

..... (name of researcher/person seeking consent)

..... (date)

Appendix F

Interview transcripts

Teacher A

Interviewer: Ok. Yeah, it's recording. So, of experience 19 years. Wow. Ok. And then the next one is what are your qualifications?

Teacher A: My highest qualification at the moment is my Honours specialising in Education Management.

Interviewer: Ok. And then how long have you been teaching at the current school you're teaching at?

Teacher A: Three week. I was in an institute for 17 years. I've just done the change.

Interviewer: Then which subjects do you teach? [5]

Teacher A: Mathematics.

Interviewer: Have you taught other subjects besides maths?

Teacher A: Maths, life skills, life orientation.

Interviewer: And was maths your major?

Teacher A: One of my majors, yes. [10]

Interviewer: Right. So, on the next section, I'm going to be looking at emotional intelligence. So, do you know what is emotional intelligence?

Teacher A: Yes. So that would be EQ. Or maybe, uh yeah, I do know trying to explain it to you, it's emotionally coping. It's not about how intelligent I am. It's not about answering accurately. It's more about trying to get the right words. Yeah, I think I do know. I'm just not explaining it because you can elaborate if I've got.

Interviewer: No, no problem, no problem.

Teacher A: Emotional intelligence. Anything else that comes with life.

Interviewer: So, do you think it is valid to have emotional intelligence in intermediate phase education? And what are your thoughts about emotional intelligence? [15]

Teacher A: I feel that the curriculum doesn't accommodate it enough.

Interviewer: Ok.

Teacher A: Because you can cover it in the intermediate phase, you can cover it in life skills, because there are certain topics in the life skills syllabus that you could cover it. But we don't do enough to groom our children, to listen to them, to hear them, to actually see what's going on.

Interviewer: Alright. Um, how do you incorporate emotional intelligence into your teaching practices?

Teacher A: Yes, I have to because there's times you want to offer daily. You don't want to attack the child, shout at them when they out of line. But if you just do a little bit of research or you find out what led to the child behaving that way, why wasn't the homework done? Why is the child behaving this way? And always there's been a very valid reason from the home front, be it divorce, be it parents fighting. It just explains why the child is behaving in that way. So, you've got to incorporate it before you attack. Ask what's going on. [20]

Interviewer: Ok. And then the next section that I'm going to be looking at is VARK learning styles. So, V for visual, A for auditory, R for reading and writing and K for kinaesthetic. Again, I am going to follow the same format, so do you know about VAK/VARK learning?

Teacher A: Styles yeah. I didn't know what R stood for. So visual would be you learn through sight. Yeah, what I'm seeing, auditory is what I'm hearing. I learned through listening more and what I hear. Kinaesthetic would-be movement. So, I'm learning through doing actions here.

Interviewer: Do you think that it is valid to use these learning styles?

Teacher A: Absolutely, you have to use this style. Not every learner learns the same. And also, not every child is right brained or left brained. So, depending on the brain dominance of your child, you have to incorporate colour, you have to incorporate sound because every child has a learning strength at one of them.

Interviewer: Ok. What are your thoughts about learning styles? [25]

Teacher A: I think it's very important. I think I never understood it very well until I became a teacher. And you see how everyone learns differently. Um, also being a

parent, I've seen how both my children learn completely differently. When I was furthering my studies, I needed colour and notes all over my room and it worked for me. I couldn't just sit down and study. So, I think it's important and it works.

Interviewer: Definitely. And then my last one on this section is how do you incorporate learning styles into your teaching practices?

Teacher A: So, I have to move away from chalk and talk because then I'm not incorporating the different styles. I try to play videos just to get a child to hear a different voice because they get tired of my voice. So that helps the auditory learner. And then visual aids, real life objects. They may see a certain picture or example in a textbook, but I bring in something a bit more real that they can relate to. So, I try that as well.

Interviewer: Ok. I'm now going to bring a different perspective into what was just said. Firstly, are you familiar with the concept of a neuromyth?

Teacher A: No. [30]

Interviewer: Have you ever heard of it before?

Teacher A: It's sounding familiar, but I can't place it. Not at all.

Interviewer: Ok, so I'm going to give a brief overview of the concept.

Teacher A: Ok.

Interviewer: So, what we just spoke about, emotional intelligence and learning styles are considered to be neuromyths. A neuromyth is a misconception of the brain which comes from a misunderstanding, misreading or a misquoting of scientific facts and brain research. This information is derived from science and has become misinterpreted and distorted overtime. An example of this would be multiple intelligences, Left/right brain dominance is a neuro myth. Another famous one is the Mozart Effect. The idea that if you listen to classical music, you will be more intelligent. And another common one is where people say that we only use 10% of our brain.

[35]

Teacher A: So, you're saying these are myths?

Interviewer: Yes, these are myths according to the academic perspective. So, there's different schools of thoughts in this. So according to the academic perspective, it's a

myth, but I'm not trying to say that we should completely discarded it. And so, these myths are prevalent in education because it's spread through popular media like magazines. And the magazines also put it in a way to market the information. It's also very believable because it's so widespread and a lot of people don't know about neuroscience. So, in education, there's this gap between neuro education and neuroscience. So, teachers only know what is going on in the class, and neuroscientists only know about the brain, but they don't know about what's happening inside a class. So, in order for you to know what is a neuro myth, you need to do a course in psychology, specifically focusing on neuroscience to be exposed to this. Um, also the reason why people believe in this is because when you see it on a magazine or on a book, there's always like a picture of a brain or an MRI scan next to it. So, then it tricks you into thinking that it's scientifically valid.

Teacher A: Okay. Yeah.

Interviewer: And then another reason for this, for example, with the left and right brain and the multiple intelligences, it is like a confirmation bias which comforts people into thinking that they are intelligent in some sort of way. So, you may not be great in maths and science, but if you are artistic, it's just comforting to hear that you are intelligent.

Teacher A: Okay. Makes sense.

[40]

Interviewer: So, the reason why emotional intelligence is considered a myth is because if you read, if you go into more detail about it, there's a lot of different definitions. Um, there isn't much consensus and it's not clear. So, it's very overwhelming. So, in the beginning, it was first defined as social intelligence.

Teacher A: Ok.

Interviewer: Which is the ability to understand and manage men and women, and act wisely in human relations. And then afterwards it changed from that definition to being able to introspect, discriminate between emotions, to read people's thinking, their intentions, motivations, and develop empathy. And I mean, by doing things like that, you don't necessarily need an intelligence for you to do something like that. It's just the ability to look within yourself and to empathise with other people. Then there's also another definition where people say that it's related to being able to motivate yourself,

self-control, delay of gratification. It also, it's also linked to effective leadership and social skills.

Teacher A: Okay. Lots of definitions.

Interviewer: Yeah. So, the argument is that emotional intelligence could be linked to general intelligence. It may not necessarily be related only to emotions. And so being able to monitor your emotions does not require any special degree of intelligence. It's rather just skills, choices, and habits that you do. Um, also there could be a political agenda behind it. People trying to redefine intelligence so that everyone is equal in intelligence. Um, there's another argument that, uh, you know, some people are cleverer in grasping certain concepts and others are not. With others, it's reflected more in emotions. Okay. And then also if you've gone through trauma or something, you know, some people need to go through years of therapy to overcome that experience. And the awareness of emotional intelligence does not necessarily help us get over certain pitfalls or self-destructive tendencies immediately. So, what I'm trying to say is that self-awareness is a positive thing, but it can't be mistaken for what lies on the surface because we all have feelings that are buried deep in our psyche.

[45]

Teacher A: Correct. Yeah.

Interviewer: But then again, I'm also not discrediting it. It is good because it brings awareness of emotional issues. Um, also when, you know, there's workshops at schools, it can help foster competencies of conflict management and assertiveness. And there is a consistent link between good mental health and good grades.

Teacher A: Okay. Yeah.

Interviewer: So that's the whole contestation behind emotional intelligence. So, I'm going to move onto learning styles. The reason why it is so prevalent, it's there in the education system and people don't really know about it, is because a lot of teachers don't know about the science that disputes it. It's that gap between neuroscience and education, and we need to bridge that gap. And, it has been emphasized a lot in teacher training programs. Also, when we must do the lesson plans, the teachers always tend to ask if you did accommodate the different modes of learning. It's also

emphasised a lot in textbooks. Even the whole right/left brain dominance is emphasized in textbooks and is implied in CAPS as well.

Teacher A: No, it is because, uh, the whole CAPS curriculum, because I used to do OBE before, the CAPS curriculum is a lot more for the different learning styles. It's evident. Yeah. The group work, the hands-on projects, which wasn't, wasn't like that before. Before it was a lot of just writing and doing and writing and doing. There is a shift. Definitely.

Interviewer: So, the argument against learning styles is that learners may end up acting on their label. Like, for example, with me, before I knew about this, I always thought that I was a visual learner. And if a student believes that they have a dominant learning style, they can avoid other effective strategies or even entire subjects because they believe that this is the only learning style. This is the only way I learn.

[50]

Teacher A: No, agreed. But it's important then how you, you can't control that. You can't control how, how dominant that learner is going to make that style. Yeah. But how the child, the child also needed to be, uh, well explained of how each style works. Most people have more than one learning style, but they, they, they tend to just focus on the one. Yeah.

Interviewer: And then also, um, like you just said, focusing on different learning modes is more, is more effective for different learning tasks. And sometimes it can be a disadvantage because teachers, um, accommodate a lot of these different styles and then they end up creating cognitive overload on the students. There is an argument.

Teacher A: Ok.

Interviewer: And then also this whole idea of learning style stems from the appeal of what kind of person are you.

Teacher A: Yeah, it does. So, people label. [55]

Interviewer: Yes. People like that. And then, uh, learning is something very complex. So, there are factors like a learner's ability to learn their backgrounds, their interest, the subject matter how to apply. So therefore, not all learning can happen in the same

way or be delivered in the same way. So, it's not a black and a white thing. So, the argument here is that learning styles is too oversimplified and teachers need to find a balance and not heavily overload on one side or one modality. So, to an extent, we are all visual, auditory, and kinaesthetic.

Teacher A: Okay. Interesting.

Interviewer: Yeah, I mean, with me, I always had this mental block that I'm only a visual learner. I cannot learn just by sitting down and listening. And that's not necessarily the case.

Teacher A: True. No, it's not true. Correct. Yeah. You, you realize that. I also think it's your setting, your mode, your mood. Um, what you've been doing before, what's still going to happen afterwards. You adjust. I believe it's all mental. You have to, you can, you can control it. Yeah. You can become an auditory learner very quickly and then you can shift to be a visual learner also. Just as quick.

Interviewer: Yes. Okay. My last question is, so now that I've told you about neuro myths, how do you value it despite this criticism from academic sources?
[60]

Teacher A: I value it highly because I still feel that, like you said, there's a big gap missing, and we need to bridge that gap. If you look at education, I'm teaching for 19 years. If I look at what's happened to the curriculum from the time I was teaching to where we are at now, we've lost the value and the essence of what we need to do. So, I think if we can get kids to do was a bit more of the feeling side, it must have meaning to them, not make them these robots. They're just robotically doing, doing exercise, activity, project, task. We lost the meaning. And I think the curriculum has done that to a large extent. That when, I mean, I'm equally guilty. When lastly did I get a child to see the value in what they learn. I mean, I'm teaching, um, construction of geometric figures at the moment. When last did I even stop to ask the child, you know, what value does this have to you in your life? How is this going to help you? Just bring a little bit of them into this? I haven't done that because I am pushing for curriculum and just listening to you now, just getting a child to engage a little bit around the topic, you know, uh, can help. Where do they see angles? And we do a quick thing. Where do you see angles? You know, you mention a few things, but just get a little more into it. And we don't. So I think as a, as an educator, I'm guilty of it. We don't get enough of

the feeling about, of meaning. We just are robots. Kids have become robots. We have become robots. If there's a way to bring in this, um, I wouldn't say forcefully, but it can be part of your lesson plan. You've got to think about it. When I'm planning, I must think, how can I bring this emotional side in? We may make a difference because we don't do that. I don't take a moment, I just go, I bring in certain things. I listen to children. I understand that there's circumstances, but do I think about it in every lesson or even in introducing a concept for the first time? I don't.

Interviewer: All right. That's the end of it. Thank you so much for participating in this interview.

Teacher B

Interviewer: Okay. So my first question is, how long have you been teaching?

Teacher B: Uh, since 1987, So 1987 to 2022. So that's 35 years. Wow. 35 years of teaching.

Interviewer: Wow. That's midlife.

Teacher B: Yes.

Interviewer: Okay. And then what are your qualifications? [5]

Teacher B: Um, I have a BA degree and a Diploma in Education. And an Honours in education as well.

Interviewer: Could you perhaps list the schools that you'd been teaching at and the number of years?

Teacher B: I taught at many schools. You can put the years next to it. Um, in Durban, I was in Phoenix Pioneer, uh, in Johannesburg, Sierra Nevada Primary. I was at Rewlatch Primary and Regents Park Primary. So here I probably spent about two years, uh, and here about five years. And then for the rest of the time, you can divide.

Interviewer: Okay. That's fine. All right. And then which subjects did you teach?

Teacher B: Uh, I taught English, Maths, Natural Science. Uh, I also taught Life Orientation in the Foundation Phase. It was your Maths, LO, English and Afrikaans. In the Foundation Phase, it was four for policy, but when I taught senior, I taught English, Maths and Natural Science. [10]

Interviewer: Okay. That's fine.

Teacher B: And Foundation phase and, all right.

Interviewer: And then, okay. So, um, the next part is on emotional intelligence. So, what do you think emotional intelligence is?

Teacher B: Uh, basically thinking on your feet. Your response will be dictate, will, um, be determined by the situation or the event. You know, uh, sometimes you can have all the, the, um, theoretical knowledge, but emotional intelligence will dictate, like if you are a mother, how do you respond to a situation. If you are a teacher, how you react

to a kid in a situation. You're not going to try and dig up and think, what did I learn at college? What am I supposed to do? You react based on your emotion.

Interviewer: Ok. [15]

Teacher B: And you find that is the fitting reaction based on that situation at that point in time. As for me, what emotional intelligence would be.

Interviewer: Okay. Do you think that it is valid to us in the intermediate Phase?

Teacher B: Absolutely. Absolutely. Uh, reason being that you respond according to the situation and what your emotions are dictating at that point in time. How are you feeling with whatever's going around, how whatever you are feeling will dictate how you going to react. So, if I'm feeling like I need to rescue this child, I need to save this child, I'm going to use my emotional intelligence to say, I'm going to do X, Y, and Z. I'm not going to go study, uh, go back to my textbook. So, go back to some resource and say, How am I going to deal with it? I've got to be spontaneous, I've got to be in the moment. I've got to be present in the moment and react accordingly to make sure that it benefits the situation at hand.

Interviewer: And then how do you incorporate emotional intelligence into your teaching practices?

Teacher B: Uh, always. How would it benefit the child? The child is the core. How will the child benefit from it? Will it make a difference to my teaching? Uh, will the kids respond more effectively? And if emotional intelligence helps them respond adequately and effectively and makes teaching more interesting, I would definitely use it all the time. Because then they will be able to identify with the situation, with the event, with what's happening around them, with the concept of being taught and bring it and bring it, make it alive in the classroom. Okay. You know, so I would like want to make teaching reality and not just a concept being taught. I want to bring life into the classroom. Right. Life into the event, into the situation. Make it real so the child can identify with it. And also, it makes remembering longer. You know, the child's not going to learn it for now and forget it. It's going to become a lifelong lesson. [20]

Interviewer: Okay.

Teacher B: It could become a life skill for the learning.

Interviewer: Okay. Um, so this section is on VAK learning styles, Visual, Auditory, and Kinaesthetic. So, do you know what are the VAK learning styles?

Teacher B: Visual. I am very aware of the visual, uh, auditory. Yes. I do it at Kip as well as we do it at, uh, as in the classroom. So visual is what you're going to see. How would you react? Auditory- listening skills. It brings about the listening skills. Kinaesthetic is your feel, right? Sensory brings out all the sensory things. Uh, yes, I'm aware of that. And lots of kids, especially kids that are suffering with autism and stuff, they need, uh, kinaesthetic learning. Lots of kinaesthetic learning. So very often we would have a kid in our classroom that requires all three. Some may not require the kinaesthetic, they may benefit from the audio and the, uh, visual learning. But a kid that is slightly on the lower spectrum of autism, maybe, which is not, hasn't been fully diagnosed, can benefit from the kinaesthetic as well. So, we need to incorporate all of this.

Interviewer: Could you give me a specific example where you'd include all three learning styles when it comes to teaching a child with autism? [25]

Teacher B: If I'm going to teach a child with autism, I could use a video, uh, to explain the concept and also use concrete objects. Say I'm doing a painting class at school, I'm doing, uh, art class. I can play the video and say, give them the instructions. So, they listening to the instructions. I can, the video will also explain how to be, so there's the visual part that comes in, and then I can bring in the concrete objects to the class. For example, if we're doing, uh, spring trees, I can actually get them to create, paint the tree, uh, use tissues for blossoms and create the kinaesthetic where they feel they're using also their senses. I can feel what this, what it is, like the, the tree. Or we go out into the garden, touch the bark of a tree, touch the blossoms, touch the leaves, uh, get the feel of it, and then come back into the class and actually do the activity based on what I felt. And that brings in the kinaesthetic part of the, uh, lesson. I don't know if that makes sense.

Interviewer: That's perfect. Okay. Um, do you think it is valid to use VAK learning styles in intermediate phase?

Teacher B: Not all the time. It would be valid. Like I'm saying, if we got kids that, uh, have sensory challenges or kids that definitely visual definitely, um, auditory. Kinaesthetic can become very useful for a child that cannot think on a more advanced

level that needs concrete objects. They need to actually draw pictures or hold counters, or then need to be valid. But if you got a class that's mixed with remedial learners and so forth, it's, it's a must. But if you got a class that are low maintenance kids way the kids are coping, uh, they're doing well, they do not need all the levels, then you don't need to. But where you see you need to in classes that are mixed, like you've got different levels of learners, some cope very well, some average, some struggling, then you would incorporate all three. Again, if you feel that the kinaesthetic is not needed because kids cope without using concrete objects, you can move on to using your visual and your auditory skills. Yeah. You will, as an educator, you'll be guided by the type of class you have. You'll be guided by, uh, the type of learners that you are teaching. So when you are in a classroom situation, you know your children and you know what their needs are. Based on those needs, you'll decide, shall I incorporate if the auditory is not working, children are not listening, maybe I need to use a visual aid, or maybe I need to use a kinaesthetic aid because the kids, their listening skills are not developed. Then you will make that decision, which is the most suitable in the different learning, in the learning of different concepts. You as a teacher will make that decision.

Interviewer: Okay. What are your thoughts about VAK learning styles?

Teacher B: When you talk about VAK learning styles, you talking about a good thing or a bad thing? [30]

Interviewer: Both can be mentioned.

Teacher B: No, it's not bad. Uh, I think it's a good thing because it exposes kids to technology. For one, they're going to listen, lots of listening, lots of visual activity happening. And that enhances their learning styles. Not all kids want to learn by writing and reading in a book. Kids have different learning styles. So, I think that is with the new in the direction were going with technology becoming the focus. I think that is, for me, that's brilliant. It's, it's a lot more exposure. Kids learn a lot. Kids enjoy that, and they start to grasp faster as opposed to a teacher standing in front and saying a whole lot of stuff. But if they can learn from an iPad, if they can learn from a video, why not? And if it makes learning easier, by all means. And I think that makes great sense to have those kind of teaching styles or learning styles in the classroom to complement your normal classroom. It, it'll play a big, big part in complimenting the teacher in the

classroom. For me, I think that will make teaching exciting, fun, interesting, you know, and the kids of today need that because they have such low attention spans. They can't concentrate for long, but they can watch TV for long. They can watch, sit and watch their phones for a longer period of time. They can sit and watch their iPads for a longer period of time, as opposed to listening to a teacher. So, if teaching can happen using those styles, and if it is effective, why not?

Interviewer: Ok. Do you know what a neuromyth is?

Teacher B: Neuro is related to the brain and a myth is something that isn't true. So, it is a myth about the brain.

Interviewer: Okay. Okay. So, I'm now going to give you information on how these ideas have been contested in academia. So firstly, a neuro myth is a misconception of the brain, which comes from a misunderstanding, a misreading or misquoting of scientific, uh, research and, uh, scientific facts and brain research. So, it's established scientific ideas that have become distorted over time. And this includes emotional intelligence, multiple intelligences, right and left-brain dominance. VAK learning styles and the Mozart Effect, the idea that listening to classical music makes you more intelligent. And also, the idea that we only use 10% of our brains are all myths. [35]

Teacher B: Mm.

Interviewer: And so, these myths have become so prevalent and so popularized through, uh, pop, uh, pop psychology magazines. And these magazines have a way of marketing these ideas to make money out of it. Um, it's also believable because a lot of people do not know about the science behind these theories. So, there's a gap between neuroscience and education. So, neuroscientists know a lot about the scientific theories.

Teacher B: About neurosciences are brain, right? Yes. Because of the brain. Okay.

Interviewer: Yes. So, they know a lot about the science behind the brain, and teachers only know what is happening in the classroom. So, we need to bridge that gap. And a few people have that knowledge, unless they have a degree in psychology, then they would know about this. Also, uh, when you read about these neuromyths, there's usually an image of a brain or an MRI scan, which makes it believable. Also, uh, the idea of confirmation bias, people like to know what is their learning style, um, what

kind of person they are. So that's what makes it believable. The idea of multiple intelligences does comfort people that you are intelligent in some way. So, you may not be great in science, but if you are artistic, you are intelligent in some kind of way.

Teacher B: Can I interrupt for a second then? Yes. I watched a movie, it's a very interest Indian movie, and never have I ever, I don't know if you watched it, and it's so interesting where an Indian girl goes into an American school and, uh, it shows you the kids that are academic and the kids that are cultural, the kids that are artistic, and how the kids that are academically inclined feel they are way superior to those that are artistic or... [40]

Interviewer: It creates a hierarchy.

Teacher B: And you know this hierarchy, uh, towards the end was disputed because he found that, uh, the kids that were not academically inclined, they were different in personality. They were less stressed. They had a more fun loving, easy-going nature and life wasn't so stressful. They were all equally successful in their own right.

Interviewer: Okay. That's quite an interesting movie.

Teacher B: Very interesting. Uh, it's a, a series. I've been watching it and I've finished the third series. Very interesting that you think, oh, you're getting A's in your Sciences and your Maths and your AP Maths and whatever, and the kids are getting A for art, you know, are have no value kind of thing. But it's not true. And it shows you that the kids that are in the art class and cultural arenas of their courses, how they got into varsity, how playing, uh, violin took them into the Chopin School and French school and whatever. So, and they got scholarships and kids that were academically inclined and did exceptionally well didn't even get the scholarships to those musical schools. Those are schools of renowned schools that, that not anyone can get into.

Interviewer: Interesting, so I'm going to move on to emotional intelligence. So, the problem with emotional intelligence is that there are so many definitions surrounding that concept. There's, there isn't a consensus, and it's not clear on what it really is. So, at first, um, it was defined as social intelligence, which was the ability to understand and manage men and women, and also act wisely in human relations. And then the definition changed to introspection, the ability to discriminate between emotions and also to read people's thinking and the intentions. And then other people define it as

self-motivation, being able to control yourself, the delay of gratifications and also being an effective leader by having those social skills. All of these definitions show that there isn't a clear consensus on what it actually is. [45]

Teacher B: Yes.

Interviewer: So then, um, others argue that emotional intelligence is related to general intelligence because you don't necessarily need to be emotionally intelligent to be able to read people's emotions and show interest. Being able to monitor emotions does not require a special degree of intelligence. It's rather skills, choices and habits, not intelligence. And then also there could be a political agenda behind it, trying to redefine intelligence so that everyone is intelligent in some kind of way. You'll find other people who are cleverer in grasping concepts and others who are better in reflecting and understanding emotions. Um, also when people go through a lot of, of trauma, uh, they need many years of therapy. And when they go through this, um, it's not like they can stop their self-destructive tendencies immediately. It takes a lot of years of therapy to get through that. Therefore, this self-awareness is a positive thing, but then it can't be mistaken for what lies on the surface because there are feelings that are buried deep down.

Teacher B: Alright.

Interviewer: So that's the contestation around emotional intelligence. But then again, I'm not trying to discredit it because it is still a good thing. Um, I think that in schools it brings awareness of emotional issues. Um, it also helps with conflict management and people being more assertive. There's also a link between having good grades and a good mental health

Teacher B: Definitely. [50]

Interviewer: VAK learning styles, has also been contested. There isn't evidence to show that if you teach a learner in a particular learning style, it will improve their grades. The reason why it's so prevalent is because a lot of teachers do not know the science that disproves it. It goes back to that bridge between neuroscience and teachers in the classroom. It's also a concept that has been encouraged a lot in teacher training. Uh, for example, my lecturers used, they used to ask us, "How did you incorporate the various modes of learning into your lesson plans? It's also in

textbooks when teachers go to workshops, they emphasise a lot on it as well as the meetings with the district. They talk about these things. So, the problem with this is that if you label a student with a particular learning mode, they may act on their label. And if a student believes that they have a particular dominant learning style, they could avoid other effective strategies that could benefit them because they believe in this label. I always thought that I was a visual learner. So, you may find that other learning, uh, modes are more effective in other learning tasks. Another argument is sometimes when teachers incorporate all of these learning modes into their lessons, it can create cognitive overload on the students instead of focusing on the most effective strategy. And then this whole idea stems from the appeal of what person are you. Uh, and then there are various factors like a person's ability to learn their background and their interests, the subject matter, and how to apply this concept in practice. So, it's not a black and white thing, it all depends on what skills and content you are learning. So, you can incorporate the different modes of learning into a lesson.

Teacher B: So, I think as may, I may have not expressed it in the same manner. Some needs visual, some needs auditory, some needs all of it. Some needs, depending on also the kids.

Interviewer: And then also, uh, people argue that it's been too oversimplified. And that teachers need to find a balance, so that they do not heavily overload one side or modality. So, we are all visual kinaesthetic and auditory, uh, when particular material calls for it. So that's the contestations behind emotional intelligence and VAK learning.

Teacher B: Okay. Interesting.

Interviewer: Okay. So now that I've given this information, what do you think about neuromyths and how do you value it despite the information that I've given from academic sources? [55]

Teacher B: I think for me it's so valuable in, uh, the fact that, prior to this knowledge of the contestation, for me, I felt that in my teaching it does work. So, uh, I would still, uh, not disagree totally. I would still, I think use emotional intelligence. I'd still use the VAK learning because they did prove to be beneficial in my teaching and in my years of training or interaction with the kids. It proved to be beneficial for different kids at different points in time. So, I would continue to use it unless scientists can prove it has no value at all, then and provide me with alternative, then I would maybe consider it.

If you can provide me with an alternative to VAK learning and emotional intelligence, then I'd look that way. But for now, I'll stick to what I know.

Interviewer: Thank you so much. That was very insightful.

Teacher C

Interviewer: Okay, It's recording. So, my first question is, for how long have you been teaching?

Teacher C: Seven years.

Interviewer: And obviously, now you're teaching intermediate phase. Right? Okay, but then you specialised in foundation phase. What are your qualifications?

Teacher C: I have got a BEd in foundation phase with a major in English and a sub major in physical education.

Interviewer: Um, so can you list me the schools that you've been teaching at and for how many years have you taught at those schools? **[5]**

Teacher C: So first school I taught at was Regents Park Primary. And that was from 2016 to, um 2018. And then from 2019 until present. I've been teaching at Malusi Primary School. So, the first one was three years, and this one will be now four years.

Interviewer: Okay. And then which subject do you teach?

Teacher C: At the moment, I teach grade 4 to 7 Afrikaans and grade 4 to 7 robotics and computer literacy.

Interviewer: So, my next question is, do you know what emotional intelligence is?

Teacher C: So, it is, um, the intelligence of emotions. So how you handle situations emotionally? You can be, um, intellectually smart. Yet you can still be at the emotional level of a 10-year-old. So, there's different IQ's, you get EQ and IQ and there's another one. It's SQ, social or spiritual. So emotional intelligence has to do with how you handle situations emotionally. Can you read people's emotions, things like that. **[10]**

Interviewer: Okay. Do you think it is valid for us to use emotional intelligence in intermediate phase?

Teacher C: I do very much so, because if, for example, they're not emotionally ready to cope with changing from one subject to the next in a rapid pace, they might then struggle to actually handle the work given or if they are easily frustrated because they

haven't learned how to handle frustration, they will struggle with workload. So, the emotional intelligence is very important, I think.

Interviewer: Okay, what are your thoughts about emotional intelligence?

Teacher C: Well, like if you heard from a previous answers, I think that's a very important aspect of teaching because you need to focus on the child holistically. Which means you need to focus on their social things, the emotional part of them as well as the educational part of them.

Interviewer: And then how do you incorporate emotional intelligence into your teaching practises? [15]

Teacher C: So, I try to make sure that my kids know we are a family class and that my door is always open for them to come and talk to me about any problem whether it be an academic problem, a friend problem or a home problem. Um, for example, two weeks ago, one of my learners lost their mother in my class from cancer. So, before he came back to school, I sat down with my whole class and I said, this is what's happened. Please make sure to, you know, when he comes back, don't ask him what happened, but make sure he knows that you're there to support him and love him and care for him. If he's missed out on work, help him to catch up all of those kind of things, and we discussed it, um, and how it would affect them. A lot of my kids were some were crying afterwards, and some were very hurt or sad because, you know, it's losing a parent, and it makes them think of their own parents. So, we had a whole day of, you know, discussing emotions and everything like that. So, we try to always bring emotions back into the classroom in that way.

Interviewer: Okay, then the next neuromyth that I'm going to look at is called VAK learning styles, visual, auditory and kinaesthetic. But then later on, they added an R, so it became VARK. So, R stands for reading and writing which basically refers to someone who enjoys making lists when they study reading definitions, um, and finds reading textbooks as a way to learn. But then it's still commonly known as VAK. So, do you know what are the VAK learning styles?

Teacher C: Yes, I do.

Interviewer: Do you think it is valid to use VARK learning styles in intermediate phase?

Teacher C: Yes, I do. Even though we're going from concrete to more abstract thinking, you can still learn in different ways because the way you learn doesn't change throughout in your lifetime. I'm, for example, I'm still a very visual person. Someone else might be more listening person. So, and that stays with you from, you know, foundation phase all the way up. So, it's good to have teaching styles that incorporate those different aspects so that you reach every single child in your classroom.

[20]

Interviewer: Um, my final question is, how do you incorporate these learning styles into your teaching practises?

Teacher C: So, sometimes what I'll do is I will find a little YouTube videos, for example, um describing parts of speech and I'll create songs as well to describe the different parts of speech. I will also have a video. Um, also make sure I have flash cards, and I also make sure that I have some space for the kids to write down every single definition that we've done so that I incorporate every one of those aspects into one whole lesson.

Interviewer: And then my final section is, are you familiar with the concept of a neuromyth with? What do you think it is?

Teacher C: So, I would say neuro has to do with mind or thinking, and a myth would be, um, thoughts about how we do things or how things are done or perceived. So, a neuro myth would be something based on how we perceive or how we think of things to do with thought, processes, and learning. So that's what I would think a neuromyth is.

Interviewer: Okay, so now what I'm going to do is I'm going to give you the academic perspective of emotional intelligence and VARK learning styles. So, these are ideas have been contested in academia. Firstly, a neuromyth is a misconception of the brain, which comes from a misunderstanding, a misreading or misquoting of scientific facts and brain research. So, it's basically scientific facts that have become distorted over time. And this includes emotional intelligence, multiple intelligences, things such as left right brain dominance and VAK learning styles. The idea that humans only use 10% of their brains and the Mozart effect. So, the Mozart effect is the idea that if you listen to classical music, it will make you more intelligent. And so, these are things that have been spread through popular media such as magazines. And also, the authors of these texts tend to market these things to make money out of it. And it's

believable and so prevalent because a lot of people do not know about the science behind it. So, you have neuroscience. Okay, so neuroscientists generally know what is a neuromyth, and then you have obviously teachers in the classroom. So, there's a gap between neuroscience and education. Neuroscientists don't know what's happening in the classroom, and educators don't know about neuroscience. That's the reason why it's so pervasive. And then, when you read articles about these things, they tend to put an image of the brain or an MRI scan, which makes it believable. [25]

Teacher C: Okay.

Interviewer: People like this myth because it's comforting to hear that you are intelligent in some kind of way, and also people like to know what kind of person they are. So, the problem with emotional intelligence is that there are various definitions about it. People have defined it differently over time, and so it's not very clear and there isn't a common agreement on what it is. So firstly, emotional intelligence was defined as social intelligence, which was the ability to understand and manage humans in human relations. And then afterwards it changed into being able to introspect, to discriminate between emotions and to read people's thinking, their intention and their motivation, and also to develop empathy. And then afterwards it changed into self-motivation, being able to control yourself and delay of gratification. They also linked it to effective leadership and also being able to have social skills. So, the argument here is that emotional intelligence can be linked to general intelligence. So, it's not really a special degree of intelligence. It could rather be skills, choices and habits, not necessarily intelligence. And then also, there's an argument that there could be a political agenda behind it, that people are trying to redefine intelligence so that everyone is equal in intelligence because you may find people who are not that great in grasping concepts, but they better at understanding other people's emotions. And then also another argument is you know, when you go through a lot of trauma in life, you need years of therapy to get through that, and this emotional intelligence awareness does not help you get over it immediately. So, self-awareness is a positive thing but it can't be mistaken for what lies on the surface, because we all have feelings that are buried deep down. So that's the argument. But then again, I'm not saying that it's a bad thing. It is still good because it can bring awareness on issues on emotional issues, and it can foster competencies such as conflict management. It also helps

people to be more assertive. And there is generally a consistent pattern between a good mental health and getting good grades.

Teacher C: Okay.

Interviewer: Okay, so now I'm going to move onto VAK learning styles, which is also another neuromyth. Like I said before, the reason why it's so pervasive is because teachers don't know the science that disproves it. The gap between neuroscience and education. And so, it's also encouraged in, uh, textbooks, teacher training in workshops as well. And, when you do teacher training at university, they expect you to accommodate the various modes of learning into your lesson plans. So now the problem with this is that students may act on their label, and if a student believes that he or she has a particular dominant learning style, they can avoid other effective strategies or even entire subjects because they believe in this label. So, there isn't really much evidence to prove that if you teach a child in this particular way, they're going to achieve to their full potential. And so, you may find that a different learning mode is more effective in other learning tasks. The next argument is that when you accommodate all of these learning styles, you can also create cognitive overload on the students instead of focusing on the most effective strategy. This idea is so prevalent because people like the appeal of 'what kind of person you are.' Um, and then there are various factors, like a person's ability to learn their background, their interest, the subject matter, what you want to get out of this subject. All of these things come into play, and therefore learning cannot be taught in the same way for everything. So, it's not a black and a white thing. We are all visual, auditory and kinaesthetic, depending on the context and what's the subject matter calls for. And so, VAK is actually, quite, um, it's too oversimplified. So what neuroscientists are encouraging is that teachers need to find a balance to not heavily overload one side or one modality. So that's basically the argument for neuromyths.

Teacher C: Alright.

[30]

Interviewer: So, my final question here is based on what I've told you. What do you think about neuro myths and how do you value it despite these contest stations derived from academia?

Teacher C: I guess because, like, you know, like you say, it's prevalent out that I believe like, I mean, my sister and I grew up in the exact same household. Yet we

handle our emotions or the way we handle things completely differently, you know? So, I think, like you said, it's not an intelligence, it's more of a skill or something. So yes. Okay, maybe that is true. Um, but I think it's an intelligence still in that, like there's retrospect. I can look at it and say I'm able to handle it this way because these are the skills I've taken and learned and taken to into myself. Compared to my sister, who would have been given those exact same skills, however, chose not to use them because that it brings into that like, you know, that nurture nature kind of question. And we both have completely different ways of handling things. She'll break down easily, whereas I'm more emotionally strong and things I can handle things that are more emotional to others with a bit more hardness. I don't know. Um and then with, like, the you know, the VAK one I, for example, like if someone is talking about a subject that is difficult to me and I don't have something in front of me that I can see, I won't know what you're talking about. So, like you said, you need to use them unanimously and, like, you know, make it into one whole thing. So, I agree with that.

Interviewer: Okay.

Teacher C: But I do agree that sometimes, but I still believe that sometimes I am more of a visual or not. I have to say it in front of me, or I'm going to sit there looking at you like what's the point? I have no clue what's going on here. But still, I can you can I can see it and might not understand it. But then that's where the auditory will come in. So, yes, you can't just focus on exactly one thing, and you shouldn't have all of them in one go. I agree with that. So that's a good thing. I've learned something new there, so yeah, that's what I think.

Interviewer: That's the end of it. Okay. Much appreciated.

[35]

Teacher D

Interviewer: Even if it's an estimation, it's okay.

Teacher D: Okay, write 42 years.

Interviewer: Wow. That's a really long time.

Teacher D: It is. That's why it's time for me. But okay.

Interviewer: What are your qualifications? [5]

Teacher D: I've only got a teacher's diploma.

Interviewer: And then my next question is for how long have you been teaching at the school that you currently teach at?

Teacher D: Currently? 16 years.

Interviewer: And which schools did you teach at?

Teacher D: The oh, I'll give you all the names of the schools. Scottsville Primary, Lorentia Primary Poseidon Primary. [10]

Interviewer: Is that all in the Cape?

Teacher D: Yeah, those three. No, two is in the Cape. Then Poseidon is in Ennerdale. And then Suidhewels and now Rewlatch. It's five schools.

Interviewer: And then my last question is, which subjects do you teach? Have you ever taught any other subjects besides Afrikaans?

Teacher D: Oh, yeah. You just teach what they give you. Maths, Social Science, Life skills, Life Orientation, Technology and Natural Science.

Interviewer: My next question focuses on emotional intelligence. Do you know what is emotional intelligence? [15]

Teacher D: I'll say emotional intelligence is what you know. And how emotions affect you. We all have different emotions and we all experience different emotions in different situations.

Interviewer: OK.

Teacher D: I was explaining to your emotions now, but the word, intelligence I didn't tell you. Intelligence is like...

Interviewer: So you can just explain what it means to you. Your own interpretation.

Teacher D: Oh, my own interpretation? It is what you know about emotions, how does it affect people? You know? Is it me or is it children that you want to know emotions? [20]

Interviewer: Just in general.

Teacher D: In general? Because in children it's totally different.

Interviewer: Okay. Why is it different?

Teacher D: It's different in children because it depends on what situation they are. Because adults are stronger. Like children will just cry. Their emotions is mainly crying.

Interviewer: So, you'd say that adults have a higher emotional intelligence. [25]

Teacher D: Yes.

Interviewer: Also because of maturity.

Teacher D: Of maturity.

Interviewer: Okay, then my second question is do you think it is valid to use emotional intelligence in intermediate phase grade four to seven?

Teacher D: It's it also depends on the situation. And also, it depends what you do. Don't do too many things at the same time. You confuse the child if you do too many

things. You confuse the child's emotions. The child gets nervous because you teach them too many things at the same time. So, you need to watch out for that in the classroom set up. [30]

Interviewer: Okay. So, you need to break things down into management.

Teacher D: Yes. And also, the child yeah, also on the child level, in the child's age group.

Interviewer: My third question is, what are your thoughts about emotional intelligence in general? Do you think it's valid? Is it not valid? I think it's not valid.

Teacher D: I think it's not valid.

Interviewer: Why? [35]

Teacher D: It doesn't matter.

Interviewer: Okay. Why would you say that?

Teacher D: I think it's a myth. People say you emotionally this.

Interviewer: I like your responses. You'll see exactly what I mean when I get towards the end.

Teacher D: Oh my goodness. I just feel like eating my chocolate. I always do badly in interviews. Haha. [40]

Interviewer: No, it's fine. Then my fourth question is, how do you incorporate emotional intelligence into your teaching practices? Okay, so you said that it isn't valid. It's a myth. But even though you have that belief, do you incorporate it into teaching?

Teacher D: Somehow it just happens without you even realizing it.

Interviewer: Can you give me a particular situation where it happened? Or where you've used it? But you have used it a lot without realising it?

Teacher D: Yeah, I think it just happens.

Interviewer: Okay. All right, that's fine then. My next section is on VA K learning styles. It's commonly known as VA K, but over time, it's changed to VARK. So, V stands for visual, A stands for auditory, K stands for kind of kinaesthetic, and R stands for reading and writing learning styles. So, do you know what are VA K learning styles? [45]

Teacher D: Well, I prefer visual learning styles and also a lot of children because all children are different. Some children grasp easily, others grasp by writing down, others grasp by seeing it, others graph by just listening. So, you need to use different types of VAK styles.

Interviewer: Okay, then do you think it is valid to use VAK learning styles in intermediate teaching?

Teacher D: Yes, I do think.

Interviewer: Okay, and why would you say so? What are your thoughts about it? Why is it valid?

Teacher D: It is valid I would say because you use different techniques and different styles and you cater for different children. So, if the child is weak, he learns through a different style. So make provision for all learners. That's how I feel. Which I do, because I learned by seeing things and I remember it like that. I'm visually orientated. [50]

Interviewer: Okay, and then how do you incorporate VA K learning styles into your lessons?

Teacher D: I use a lot of technology, visual aids for the children to hear and see. I make things colourful because they like colourful things. I use repetition okay. For children to understand and to learn. I do remedial.

Interviewer: How do you incorporate the VA K into remedial?

Teacher D: One on one.

Interviewer: Okay. All right. And then the last section. So, this entire research project is actually on neuromyths and emotional intelligence and VAK learning styles according to the academic perspective. [55]

Teacher D: Was there research on those things?

Interviewer: Yes. These concepts I mentioned are neuromyths and a lot of people don't know that. So, I'm just going to explain and break it down. So, you're actually the first interviewee that I come across actually telling me that this could be a myth. Because the other people that I've interviewed just accepted uncritically with the emotional intelligence. A neuromyth is basically a misconception of the brain, which comes from a misunderstanding, a misreading or misquoting of scientific facts and brain research. So, it's developed from actual scientific facts that have been proven, but then over time, people have misunderstood it.

Teacher D: okay, so the misunderstood it and it wasn't clear to them.

Interviewer: Yes.

Teacher D: And, you know, they do research, but they don't bring you the facts. [60]

Interviewer: Yes. Another thing, there's a huge gap between teachers in the class and neuroscience.

Teacher D: Because those things, they don't bring to you, and it so that you are aware.

Interviewer: Yes. So, the concepts that are neuromyths are emotionally intelligence. I'm sure you've heard of multiple intelligence.

Teacher D: Yes, I heard that one.

Interviewer: Left right brain, VAK learning styles, which I mentioned, the Mozart effect. The idea that listening to classical music makes you more intelligent. [65]

Teacher D: But a lot of people are doing it. I see them playing their Mozart music, and the children, right? They listen. The music is softly in the background, but I don't believe in it. Why do they do it? Is it a myth?

Interviewer: It is a myth.

Teacher D: Because I don't do it. But I see people believe in it, and they do it. I've never done it, but I've seen it. I don't know what well, today I asked them, why are you doing it? And they told me the children are more calm.

Interviewer: Yeah. They also say that it's good for plants as well.

Teacher D: Yes. But I believe talking to plants is good. So, I don't play music. [70]

Interviewer: Yeah classical music, apparently. But that's a myth.

Teacher D: Yeah, but those things are not true. Like you say, I don't believe in it.

Interviewer: Yeah. And then also, the common idea that humans only use 10% of their brains. That's all that's a myth because if that was the case, then we would all be in a vegetable state. And the reason why these myths are so prevalent is because it spread through popular media, pop psychology magazines.

Teacher D: And it's so true.

Interviewer: Yes. And also, whenever you see an article on these things, there's always like a picture of a brain or an MRI scan that makes it even more believable. And then also people like that idea, especially with multiple intelligences, it's just comforting to hear that you are intelligent in some kind of way. So I'm going to start with emotional intelligence and just explain how it's contested. So, the problem with emotional intelligence is that there are various definitions. There isn't much consensus on it and it's not clear, so it's very overwhelming. So, at first it was defined as social intelligence, which is the ability to understand and manage people and act wisely in human relations. Then it changed to introspection, being able to discriminate between emotions, read people's thinkings, their intentions and their motivations, and then also changed into developing empathy towards others. Then other people say

that it's being able to motivate yourself, to control yourself, delay of gratification. And also, it's linked to having effective leadership skills and social skills. [75]

Teacher D: So this is all scientific?

Interviewer: Yeah. So, there's just too many definitions. So, we don't really know what exactly emotional intelligence is. And then other people, the reason why you said that it's a myth is because other people argue that it's linked to general intelligence. You don't really need a particular form of intelligence to be emotionally intelligent, so it could rather be skills and choices instead of actual intelligence. Yeah. And then others argue that there's a political agenda behind it in terms of redefining intelligence, so that everyone is intelligent because not everyone is academic. Other people are better at understanding emotions and that sort of thing. And then also, when you go through a lot in life, some people have to undergo years of therapy. And so, by having this basic awareness of emotional intelligence, it does not really help you to get over those pitfalls that you've experienced or even self-destructive tendencies you may have. And then self-awareness is a positive thing, but then it cannot be mistaken for something that lies on the surface because we all have feelings that are buried deep inside our psyche. But then again, I'm also not discrediting it in everyday day life. It's still a good thing because it brings awareness of emotional issues.

Teacher D: It does.

Interviewer: And it also does help, especially in the teacher workshops, it helps in terms of conflict management, being assertive. And then there's been this, how can I say constant link between good grades and having a good mental health. So that's basically emotional intelligence. And then the next one, the next neuromyth is VAK learning styles. So, the problem with this is that it's so prevalent because teachers do not know the science that disproves it. And it's also encouraged a lot in teacher training. Lectures tend to ask, so how did you accommodate the different modes?

Teacher D: Yes, they do ask. It's so true. [80]

Interviewer: Yeah. And it's also encouraged a lot in textbooks when teachers have workshops, even meetings with the district as well, they talk a lot about it.

Teacher D: They talk a lot about it, and they keep training even in it.

Interviewer: Yeah. So, the problem with this is that if you believe that you are a visual learner, that's what I also used to believe in, you may act on that particular label. And if a student believes that he or she has a particular dominant style, they can avoid other effects of strategies or even entire subjects because that's what they believe.

Teacher D: So true.

Interviewer: Yeah. So, you may find that a different learning mode is more effective for you in other learning tasks. So sometimes when teachers accommodate the various multiple learning styles, there's an argument that it can actually create cognitive conflict, cognitive overload on the students instead of focusing on the most effective strategy. And then also people like VAK learning styles because it stems from the appeal of what kind of person are you? So, when it comes to this, there are various factors, like a person's ability to learn, their background interests, what they learning, how to apply. So therefore, not all learning can happen in the same way. So, we are all visual, auditory, and kind of aesthetic to a certain extent, depending on what the subject matter calls for. Teachers just need to find the balance in these learning styles and not heavily overload one side or modality. And that's the science behind it. So now my next question is what do you think about neuromyths and how do you value it despite the information I've given you? [85]

Teacher D: No, I don't even believe in anything.

Interviewer: Okay, but do you think that it is still useful? Do you think we should still use it in the classroom?

Teacher D: I think we should still use it. The reason why I think things like that just because we are all different. We all learned through different methods. Some is weak, some is strong, some is very weak. So, it depends how you come across in your methods you use for people to understand.

Interviewer: And do you think that emotional intelligence is still valid?

Teacher D: No.

[90]

Interviewer: So, if a child is going through a difficult situation like, for example, a parent here and dies or something, what should we use then instead of emotional intelligence?

Teacher D: I also think now there we should actually because the child is going through a difficult time.

Interviewer: Even if they find the content overwhelming like CAPS has so much. It's like the learners are robots. We also need that time to incorporate emotion.

Teacher D: And recreational learning. That's how I feel otherwise what's the point? You have to incorporate emotions and things within your learning environment. And when children are emotionally not stable they don't actually learn.

Interviewer: That's true. So despite these things being a myth, is it still valid? **[95]**

Teacher D: It is still valid because you have to use it in your everyday life but not everything but some are still valid I think it depends on the situation. I think they teach you so many things in your brain, they tell you so many things, do things this way and that way, but I think everybody just have to do things the way they feel what they are comfortable with and forget about all these books and what people do research and things because you can do without those books.

Interviewer: Thank you so much. I really appreciate it.

Teacher E

Interviewer: Okay, it's recording. All right. So, my first question is, for how long have you been teaching?

Teacher E: At the end of this year, it will be 30 years. I've taught for 28 years at this current school, and I taught at three schools before that over two years.

Interviewer: What are your qualifications?

Teacher E: I have a national primary education diploma. And then I also did my honours through Wits. The full time one.

Interviewer: And then which subjects do you teach? Have you taught any other subjects besides English? [5]

Teacher E: I teach English to grade 5. I have taught religion. A while back in, you know, in the dinosaurs ruled the planet. I taught things like bible education, and I taught geography. And then we switched it to Social Science. So, I taught Social Science to I think grade six and seven. And then when they made the English so many periods, and I just switched to straight teaching English.

Interviewer: Okay. All right. So, the next section that I'm going to ask you questions are based on emotional intelligence. So, do you know what is emotional intelligence?

Teacher E: Um, I would think that that it would mean something along the lines of how your feelings relate to what you're doing out in the world.

Interviewer: Okay. And do you think that it is valid to use emotional intelligence in intermediate phase?

Teacher E: Um, I'm not sure about that, because the thing is, a lot of children don't really know what they're feeling that they'll be sort of being naughty. But when you ask them why they did it, they don't know. So to me, that's more of looking onto a psychological thing. Um, so if, for example, you could understand, like if a child's father died or something, we had that this year where the child's father died of covid. And, um, he was sleeping in the class and things like that. I mean, you do have to be cognisant of that kind of thing that that can affect the child's work and so on. Um, but I wouldn't make a sort of official policy that you would have to, you know, like find out

how the child is feeling or whatever, because I mean to me, then you are just devolving the class into sort of a large encounter session. [10]

Interviewer: Okay, so you have basically explained your thoughts of emotional intelligence. Do you incorporate that into your teaching practises?

Teacher E: Um, I tried to I tried to do things that the children will enjoy. So, when they were explaining things, I try to explain things in a way that they will find fun because I think if they don't like something, they're not going to really pay much attention to it. So, I tried to, um, to keep things quite upbeat. And, um not to scream and shout too much. Not too, you know, and like, if the child is feeling upset or whatever, then I will stop and say, what's wrong? Is everything okay? But on the other hand, as well, sometimes children don't want you to stop the lesson and sort of put the spotlight on them. And then they'll say, It's nothing, ma'am. It's nothing, man. Then I sat with us and just leave them alone and let's carry on, you know, because you don't want to force a child into revealing something that they're not comfortable with.

Interviewer: Okay. And then my next question is on VAK learning styles. So, these stands for visual audio, kinaesthetic learning styles. But then, later on, they actually changed it to VARK. The R stood for reading and writing which basically means someone who learns through reading definitions. They find reading textbooks as a way of learning. They take a lot of notes during class, and they just prefer, uh, overheads and handouts in order to learn a concept. So, do you know one of the VAK learning styles?

Teacher E: um well, as far as I can tell, because they did make us do a course in our school. And they are talking about you have to. You have to not only have visual because there are children in the class who are auditory, so you must have something auditory for the children. For example. during the pandemic, they told us we mustn't only put up, um, this was when the children were not at school. They told us we must not only upload power points. We must include our voice. So, when so they don't just read it so they can play the sound so they can hear so that children who were auditory can hear. And then kinaesthetic has to do with movement and the kind of thing. So, they said we should try to incorporate all of that. And, you know, I was quite dubious, actually, because from my own reading, just you know, not I haven't read anything specific, just my random readings of educational papers and things, they said that it

doesn't really make a difference to how the child learns. So, when people go on and on about, you must have auditory, and you must have this and you must try to cater for all children. It seems to be that there's not really evidence that that actually does anything. However, I do like to, because I think that the children enjoy a lesson more if it's varied. So, I do try to incorporate a bit of visual, a bit of auditory, a bit of reading in in all the lessons, as much as possible.

Interviewer: Okay, so where exactly did you find that article? Where it states that VAK Learning styles doesn't make a difference in learning. [15]

Teacher E: Um, I believe it. I'm not sure if you know, like sometimes you'll just be randomly scrolling through Facebook and you'll see something. I think it was something like it. But then I did also look up at some stage. I think you can find it on Wikipedia where it's got, but you know, they have to include their references. So, it's got the they there appears to be no, um, no evidence that catering for learning styles. And also, one thing I found very interesting was that a child might say they prefer visual, or they prefer auditory. And yet when you test them, that's not how they ended up learning. So, I honestly don't think that it really makes a difference.

Interviewer: Okay, so from what you just said, do you think that it's still valid to use it in intermediate phase?

Teacher E: Yes, because like I said, just for variation, because I mean, like anybody else, a child is going to get bored, so any variation will make the child feel a lot better. So, I try to always have a video, some type of sound. Sometimes when we are reading our because, you know, we have to read a reader, um, during the year. So, I sometimes record my voice, and then I play it to the Children. Sometimes I make them read. Sometimes I play the full stop game where they each read one. You know, actually, vary it and for all things, sometimes I'll show them a video on a concept. Sometimes I'll make them watch a video as a visual, like reading and viewing for reading and viewing, for example. You know, just for variation. Not because I want to strictly adhere to the learning styles just for variation. Because I think variation is never a bad thing.

Interviewer: Okay, so you basically answered my two next questions, your thoughts about learning styles and also how you incorporated into learning styles. Um, so I just want to ask you, are you familiar with the concept of a neuromyth?

Teacher E: Um, I'm assuming, I read about it is that it's ideas about how the brain works that are perpetuated, even though there's not really evidence to back it up.
[20]

Interviewer: Okay, that is right. So now what I'm going to do is I'm just going to explain what is a neuro myth into more details. And then I'm going to give the academic perspective of emotional intelligence and VAK learning styles. So basically, what you said is right, it is a misconception of the brain, which comes from a misunderstanding misreading all misquoting of scientific facts and brain research. So, it's basically scientific fact on the brain which have been established. But over time it became distorted and misinterpreted. And this includes things such as, I mentioned emotional intelligence, multiple intelligences, right, left brain dominance VAK learning styles, the Mozart Effect. The idea that listening to classical music makes you more intelligence. And a lot of people say that we only use 10% of our brains, which is not true. And the reason why this is so prevalent is because it's been spread through popular media from pop psychology and magazines, and also it has been presented in a way to make money. Another reason why it's also so widespread is because there's a gap in education between what is happening in the classroom and neuroscience. So neuroscientists don't know what's happening in the classroom, and teachers don't know don't have much information about neuroscience. Another reason why it's so believable is because whenever you read these articles, you always see an image of a brain or an MRI scan, which makes it believable. And then also, people like the idea. It's very comforting to hear that you are intelligent in some way, So the problem with emotional intelligence is that there are various definitions about it. So, in the beginning it was first defined as social intelligence, which is the ability to understand and manage people and act wisely in human relations. It then afterwards changed into introspection and being to being able to discriminate between emotions and read people, their intentions, motivations and also a way of developing empathy.

Teacher E: Ok.

Interviewer: Then, later on, it changed to self-motivation, self-control, being able to control your mood and your impulses, and people also linked it to effective leadership and social skills. So, the problem with this is that we don't know what exactly emotional intelligence is. And then other people argue that emotional intelligence could be linked

to general intelligence. So being able to monitor your own emotions does not require a special degree of intelligence. It's rather skills, habits and choices instead of intelligence. Other people also state that there could be a political agenda behind it. Uh, as in trying to redefine intelligence so that everyone is equal in intelligence because you may find that other people are better at grasping concepts and others are better at understanding emotions. And then also, when you go through a lot of trauma in life, some people need years of therapy to get through this. And this basic awareness from emotional intelligence will not necessarily help you get over certain pitfalls in your life or self-destructive tendencies. So self-awareness is a positive thing. But it can't be mistaken for an emotion that lies on the surface because we all have feelings buried deep below. So, from all of these facts that I'm stating, I'm not necessarily saying that it's a bad thing, it could be good in an everyday schooling context because it can bring about awareness on emotional issues. It also fosters competencies in conflict management and helps people become more assertive. And then there's also this link between having good grades and a good mental health. So that's the contestation on emotional intelligence.

Teacher E: Ok interesting.

Interviewer: So, with VAK learning styles, a lot of teachers are not aware of the science that disproves it. So, there's that gap between neuroscience and education, what happens in the classroom and neuroscience, and also, it's so prevalent because it's encouraged a lot in teacher training. It's also something that is emphasised in textbooks, workshops, and meetings with the district, and during your student teacher training. Your lecturers do ask whether you've incorporated the different modes of learning into your lesson plans. Now, the reason why this is a problem and you're actually one of the first people that I've come across that is aware that it does not necessarily mean that you will thrive through school if you focus on a particular learning style. So, the problem with this is that learners may act on their label. So, for many years I believe that I was a visual learner. And if a student believes that she has a particular dominant style of learning, they can avoid other effective strategies or even entire subjects because they genuinely believe in this label. And then also, um, you may find that a different learning mode is more effective for you in other learning tasks. So sometimes teachers who accommodate various multiple learning styles. There's an argument stating that it can also create cognitive overload on the students instead

of focusing on the most effective strategy of teaching. And another reason why it's so prevalent is because it stems mostly from the appeal of what kind of person you are. So, when it comes to learning styles, there are various factors, like a person's ability, their background, their interest, the subject matter and also how to apply that particular subject matter. And not all learning can happen or be delivered in the same way. So, it's not really a black and white thing. So, everyone is visual, auditory and kinaesthetic to an extent, and therefore the concept of V A K is too oversimplified. [25]

Teacher E: That makes a lot of sense to me that I think a lot of these things, and this is just my opinion. They become kind of a fad in education and for a while, and I'm just using this in this example. I don't know if you would have heard a few years ago, it was very into do THRASS. I don't know if you've heard of this.

Interviewer: No, I haven't heard of it.

Teacher E: Um, It was the developer and English. I'm not even sure if it is an educator guy named Alan Davies and it's cool. It stands for teaching handwriting reading and spelling skills. And on the one hand, it it's not too bad, because it talks about the different sounds that you get in English because obviously we've got fewer letters than we have sounds, and you try to overcome this, he made it into kind of a table and it became sort of you had to go for three days training and you had to implement it. And after a few years they discuss so that it doesn't work for second language learners. You know, in this kind of thing. And this seems to happen with every single so called new discovery. Whether you start with learning styles, left brain, right brain, all those kind of things, it becomes a fad in education. And you have to implement this and you implemented. And a lot of the time you don't even realise that. I mean, I could have told them right at the beginning that it was never going to work. But of course, nobody listens to the people on the ground. They just listen to this theorist test. This this person says this, this school says it's wonderful and I actually get quite irritated because I can tell when something is sort of an educational fad. I'm thinking, that's a fad. Why are we doing it? But when you say to the principal, I don't think that's going to work, then they just do it because you know they're in charge. And who are you to tell them that you know it's not right or whatever. So, I'm not a fan of educational fads.

Interviewer: Okay. So, despite the information that I've given you, and you view it as an educational fad. Uh, do you still value it? Do you still think that it's useful in some way in education? This is for emotional intelligence and VAK learning styles.

Teacher E: Um, I would say to to a degree, because you can't just come in the class, stick the power point on and say, there's the work. You have to, to a degree make sure that the child gets an all-round experience. You want them to have something to look at, something to listen to a bit of movement. You want them to not only be staring at a screen, you want them to maybe be cutting, sticking, you know, doing various things. I think. I mean, I don't have the this is the technical background, uh, to explain why. I like to have a bit of everything because, as I said, you want the child to have a bit a bit of everything, so it can't be a bad thing. I mean, I'm not saying it's like the most fantastic thing ever, but I do think it makes for a better, even if it's not, even if it's not something you can measure in a concretation. Um, it's something that that the child is getting an all round, better experience in the classroom, and I don't think that can ever be a baby.

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Interviewer: Okay? And then what about emotional intelligence? Do you think it's still a good thing?

Teacher E: Um, look, I think this. It's important to view that, you know, to manage a person's emotions and recognise them and things like that. But again, I also feel like I said, children don't always know what they're feeling, and they act out in funny ways, you know? And, um, I'm not too sure how you would even go about, you know, talking about emotional intelligence in that context, because you know that the child. The child suspect someone, and they never normally smack someone. There's something going on, you know? And I mean, most teachers will tell you they know there's something there, but they couldn't give you the theoretic background for why they know, they just know that. I would have, uh yeah, that's another thing they made us do at school. And they made us do a test. Are you right brained or left brained? And I say they're thinking this is not and so again, if the child is right, brain this and if it's dead. But how do you even test that? Because, I mean, you can test it, but often what teachers do is they say you have to take something so you get it over as soon as possible so you can concentrate on the work, you know? And I read I also I can't remember where exactly,

that teachers often are not trained in how to test it properly. And even if they do train you to test it properly, I think that's another thing that's not 100% you. It's not going to help you to actually do the work and whatever you know. So again, it's just a fad that will eventually die down, I hope.

Interviewer: Yeah, so, um, it actually came from the idea where there's a part of that. There's a side of your right brain which, uh, focuses on languages. And then that's where that whole entire conception came. But it's not true because our left and right brain both worked together.

Teacher E: Exactly. Exactly. Yeah, yeah. And I mean, when they started and I say I must be right brain because I'm left handed and they said, no, no, that's not what we're talking about. Well, excuse me for living, you know. And then they sort of explained it. And I immediately also thought that's also nonsense, because like you say your your brain talks to itself across hemispheres, you know? And I mean, there have been lots of instances of people who have of their brain. It was destroyed, and yet they still managed to survive. And the things that was control may have been controlled by the one side were able to be switched to the other side. So, you know, I think again a lot of it is actually just people looking for things to do or to make themselves. You know, like we like you say money is involved so they want to go out and give courses on how to do all these things. And really most teachers will say, I don't care. Just tell me what to do, you know, because it's in the end. It's not going to make us really do much else is in the day. You've got to collect money. You've got to make sure that that child doesn't kill that other child, you know, and there's so many other things, and then you've got all the theoretical stuff that's supposed to inform your teaching, and it's not even correctly being presented to put it that way.

Interviewer: Thank you so much for participating. That was very informative and insightful. Thank you for taking your time. I really appreciate it. **[35]**

Teacher E: You're most welcome.