

**Towards inclusive education:
Exploring perceptions of natural
science pre-service
teachers in a B. Ed Programme**

A de Nysschen

 orcid.org/0000-0002-9438-197X

Dissertation accepted in fulfilment of the
requirements for the degree *Master of Education in
Learner Support*
at the North-West University

Supervisor: Prof M Nel
Co-supervisor: Mr FG Minnie

Graduation: May 2022
Student number: 23081597

EDITORS CERTIFICATE



Coordinators: Wendy Barrow & Sarita Antunes
Tel: 016 910 3483
E-mail: wendy.barrow@nwu.ac.za
sarita.antunes@nwu.ac.za

7 December 2021

EDITING CERTIFICATE: 21-217

To whom it may concern

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Yours sincerely

A handwritten signature in black ink, appearing to read 'W Barrow', written in a cursive style.

Wendy Barrow

CTrans Coordinator

DECLARATION

I, Anne-Marie De Nysschen declare that this script TOWARDS INCLUSIVE EDUCATION: EXPLORING PERCEPTIONS OF NATURAL SCIENCE PRE-SERVICE TEACHERS IN A B.ED PROGRAMME submitted to obtain the MEd degree at the North-West University, is the result of the research I have done. I further declare that this research has never been submitted at any other faculty or university.



A. De Nysschen

09/12/2021

DEDICATION

I dedicate this research study to all the participants who participated in the research. Without your participation I would not have been able to successfully complete my research. I know for many of you it was extremely difficult to complete your studies during the remote online teaching and learning period, instigated by the global pandemic, Covid-19. Still you took the time to assist me in completing my study, I really appreciate your efforts.

My wish for all of you is that you will become “*agents of change*” in your communities, schools and classrooms for inclusive education and thus help realizing the dream of truly providing “*education for all*” in South Africa.

Big thanks!

Me A De Nysschen

ACKNOWLEDGEMENTS

- I give all the glory, honour and praise to my Lord, Jesus Christ for providing me with this opportunity to further my studies. Lord, I want to thank You for all the support and strength You have provided me throughout the completion of my research study. I can truly say that the verse of Philippians 4:13: *"I can do all things through Christ who strengthens me"* have been my comfort throughout this process. Thank You Lord for listening to all my prayers and sometimes my complaints too.
- A special thank you to Prof Mirna Nel, my supervisor, for all the guidance and support she provided throughout my studies. Prof Nel, you have taught me so much about research and inclusive education throughout this time. I appreciate your help, thank you!
- My co-supervisor Mr Francois Minnie, thank you for your support and encouragement.
- Thanks to my husband, Ruan Horne for your unconditional love, encouragement and support.
- My parents, Frikkie and Meisie De Nysschen, thank you for all your prayers, inspiration, encouragement, love and support, and for always believing in me.
- My grandparents, Piet Spangenberg and Hanneltjie Spangenberg, thank you for your prayers, support, motivation and love.
- My mother in law, Sophia Horne, thank you for your understanding, support and encouragement.
- To my fellow master's students and colleagues, Mr Eddie Kok and Mr Nicolaas van Deventer, thank you for assisting me when I needed help or just brainstorming ideas with me.
- To all my other colleagues at the Faculty of Education, thank you for your encouraging words throughout this time, I really appreciate all of you.
- To my editor, Me Wendy Barrow. Thank you for availing yourself to assist me. I appreciate your help.

ABSTRACT

This research study aimed to explore the perceptions of Natural Science pre-service teachers in a B.Ed Programme regarding their training for inclusive education. In order to ensure that current and future pre-service teacher education programmes prepare undergraduate pre-service teacher adequately for the practice of teaching in an inclusive classroom, the Departments of Basic Education (DBE) and Higher Education and Training (DHET) have requested several South African Higher Education Institutions (HEIs) to focus on determining how inclusive education can be infused into their B.Ed Programmes. This research study was a sub-study within the broader project.

The HEI where this study was conducted recently completed one cycle of the implementation of the revised B.Ed Programme and therefore it was important to explore how pre-service teachers perceive their training for inclusive education in their teacher education programmes. This research study specifically focused on the Natural Sciences (NS) pre-service teachers currently in the B.Ed Programme at a specific HEI.

A qualitative research design was employed within an interpretivist paradigm and a case study research was used as the strategy of inquiry. The lived experience of the participants in this research study included the perceptions of fourth year NS pre-service teachers currently in a B.Ed Programme at a specific HEI regarding their training for inclusive education. For the data collection instruments document analysis, online open-ended questionnaires and online focus group interviews was implemented. A thematic analysis was done and constantly compared during the analysis and interpretation process.

The findings of the literature review and the document analysis has shown that a number of national policies are in place that provide guidance to HEIs and Initial Teacher Education (ITE) programme developers regarding the essential knowledge and skills needed in the training of pre-service teachers for inclusive education. However, inclusive education is mainly addressed in a few generic, stand alone modules and does not appear to be infused into the entire B.Ed curriculum, including the NS specialisation subject as part of the didactics and methodology. The exposure to inclusive education in

the generic modules has led the participants to define it as based on equality, non-discrimination and inclusion all learners.

Some of the other key findings show that the participants seem satisfied with the theoretical knowledge they have obtained throughout their studies but they feel that they need more practical exposure and experience on how to deal with a diversity of learning needs. What was also notable in the findings is that the pre-service teachers indicated that they do not have sufficient, in-depth knowledge of Education White Paper 6 and the Screening, Identification, Assessment and Support (SIAS) policy which are two critical documents for preparing pre-service teachers adequately for inclusive education.

Key terms: pre-service teacher, inclusive education, inclusive classroom, inclusive education policies, requirements for teacher training and qualifications, Initial Teacher Education (ITE), B.Ed Programmes and Natural Science (NS)

ABSTRAK

Hierdie navorsingstudie het ten doel om die persepsies van Natuurwetenskap voordiensonderwysers in 'n B.Ed Program oor hul opleiding vir inklusiewe onderwys te ondersoek. Ten einde te verseker dat huidige en toekomstige voordiensonderwyser-opleidingsprogramme voorgraadse voordiensonderwyser voldoende voorberei vir die praktyk van onderrig in 'n inklusiewe klaskamer, het die Departemente van Basiese Onderwys (DBE) en Hoër Onderwys en Opleiding (DHET) verskeie Suid-Afrikaanse Hoëronderwys en Opleidings Instellings (HEI) versoek om te fokus op die bepaling van hoe inklusiewe onderwys in hul B.Ed Programme ingesluit kan word. Hierdie studie was 'n substudie binne die breër projek.

Die HEI waar hierdie studie gedoen is, het onlangs een siklus van die implementering van 'n hersiene B.Ed Program voltooi en daarom was dit belangrik om te ondersoek hoe voordiensonderwysers hul opleiding vir inklusiewe onderwys in hul onderwyser opvoedingsprogramme waarneem. Hierdie navorsingstudie het spesifiek gefokus op die Natuurwetenskappe (NS) voordiensonderwysers wat tans in die B.Ed Program is.

'n Kwalitatiewe gevallestudie navorsingsontwerp binne 'n interpretivistiese paradigma is as die strategie van ondersoek gebruik. Die geleefde ervaring van die deelnemers aan hierdie navorsingstudie het die persepsies van vierdejaar NS-voordiensonderwysers ingesluit wat tans in 'n B.Ed Program by 'n spesifieke HEI is oor hul opleiding vir inklusiewe onderwys. Vir die data-insamelingsinstrumente is dokument analise, aanlyn oop vraelyste en aanlyn fokus groep onderhoude geïmplementeer. 'n Tematiese analise is gedoen en voortdurend vergelyk tydens die analise- en interpretasieproses.

Die bevindings van die literatuuroorsig en die dokument analise het getoon dat 'n aantal nasionale beleide in plek is wat leiding aan HEIs- en Aanvanklike Onderwysersopvoeding (ITE) programontwikkelaars verskaf oor die noodsaaklike kennis en vaardighede wat nodig is in die opleiding van voordiensonderwysers vir inklusiewe onderwys. Inklusiewe onderwys is hoofsaaklik aangespreek in 'n paar generiese, alleen-stande modules en blyk nie verweef te wees in die hele B.Ed kurrikulum nie, insluitend die NS spesialisering vakke binne die didaktiek en metodologie. Die blootstelling aan inklusiewe onderwys in

die generiese modules het daartoe gelei dat die deelnemers dit definieer as gebaseer op gelykheid, nie-diskriminerend en die insluiting van alle leerders.

Sommige van die ander belangrike bevindings toon dat die deelnemers tevrede is met die teoretiese kennis wat hulle gedurende hul studies verkry het, maar hulle voel dat hulle meer praktiese blootstelling en ervaring nodig het oor hoe om 'n verskeidenheid leerbehoefte te hanteer. Wat ook opvallend was in die bevindinge, is dat die voordiensonderwysers aangedui het dat hulle nie voldoende, diepgaande kennis van Onderwys Witskrif 6 en die Sifting-, Identifikasie-, Assesserings- en Ondersteuningsbeleid (SIAS) het wat twee kritieke dokumente is vir die voorbereiding van voordiensonderwysers vir voldoende inklusiewe onderwys nie.

Sleuteltermes: voordiensonderwyser, inklusiewe onderwys, inklusiewe klaskamer, inklusiewe onderwysbeleid, vereistes vir onderwysersopleiding en kwalifikasies, Aanvanklike Onderwysersopvoeding (ITE), B.Ed-Programme en Natuurwetenskap (NS)

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LIST OF ABBREVIATIONS

B. Ed	- Bachelor of Education
CAPS	- Curriculum and Identification Policy Statement
DBE	- Department of Basic Education
DBST	- District Based Support Team
DHET	- Department of Higher Education and Training
DoE	- Department of Education
EADSNE	- European Agency for the Development of Special Needs Education
EduREC	- Research Ethics Committee of the Faculty of Education
EFA	- Education for All
EWP6	- Education White Paper 6
GPK	- General Pedagogical Knowledge
HEI/HEIs	- Higher Education Institution/s
ITE	- Initial Teacher Education
LOLT	- Language of Learning and Teaching
LSEN	- Learners with Special Educational Needs
LTSM	- Learning and Teaching Support Material
MRTEQ	- Minimum Requirements for Teacher Education Qualifications

NCESS	- National Committee for Education Support Services
NCSNET	- National Commission on Special Needs in Education and Training
NGOs	- Non Governmental Organisations
NS	- Natural Science
NSE	- Norms and Standards for Educators
RDGC	- Research Data Gatekeepers Committee
SBST	- School Based Support Team
SDG 4	- Sustainable Development Goal 4
SEN	- Special Needs Education
SIAS	- Policy on Screening, Assessment and Support
SMT	- School Management Team
SPCK	- Special Pedagogical Content Knowledge
TASC	- Thinking Actively in a Social Context
UDL	- Universal Design of Learning
UN	- United Nations
UNESCO	- United Nations Education Scientific and Cultural Organisation

CHAPTER 1: INTRODUCTION, PROBLEM STATEMENT AND RATIONALE OF THE STUDY

1.1 Introduction

Before 1994 and under the apartheid system, the South African education system was characterised by a lack of human rights where exclusion from education was based on race and disability (Nel et al., 2016; Dalton et al., 2012). After the political transformation in 1994, it became obvious that the education system should be a focal point of change to a more inclusive education system where human dignity, equality and human rights are respected (Nel et al., 2016; Dalton et al., 2012; Savolainen et al., 2011). Consequently, South Africa joined the international movement to a more inclusive education system at the World Conference for Special Educational Needs in Salamanca, Spain in 1994 (UNESCO, 1994). At this conference, inclusive education was accepted as an international approach to education (UNESCO, 1994). The Salamanca Statements resulted from this conference as a bid to move inclusive education forward and were accepted by 92 countries, of which South Africa was one (UNESCO 1994). These Salamanca statements specified that education systems should accommodate all children, regardless of their physical, intellectual, social, emotional, linguistic or other conditions. This accommodation included disabled and gifted learners, street and working children, children from remote or nomadic populations, children from linguistic, ethnic or cultural minorities and children from marginalised areas or groups (UNESCO, 1994).

To formalise inclusive education in South Africa, Education White Paper 6 (EWP6), Special Needs Education - Building an Inclusive Education and Training System, was released in 2001 (Oswald, 2014; Du Plessis, 2013; DoE, 2001). EWP6 introduced a unitary inclusive education system, which is committed to ensure that all learners have access to quality education where equity and equality are embraced (Murungi, 2015). EWP6 (DoE, 2001) acknowledges that all learners can learn and need support. It emphasises that education structures, systems and learning methodologies should meet the needs of all learners and that differences in learners must be respected. The fact that learning goes beyond formal schooling and also occurs in the home and community, as well as formal and informal settings and structures, is also recognized.

Changing attitudes, behaviour, teaching methods, curricula and the environment to meet the needs of all learners, as well as ensuring maximum participation of all learners in the culture and the curriculum of educational institutions, including uncovering and minimizing barriers to learning, is regarded as priorities in an inclusive education environment (DoE, 2001).

The introduction of inclusive education in South African schools brought major changes to teaching practices and challenged the role of especially teachers in ensuring the effective implementation thereof (Nel et al., 2016; Lebona, 2013; Persence, 2006; Wildeman & Nomdo, 2007). In an attempt to capacitate teachers, the education department embarked on workshops for in-service teachers, which was not deemed as very successful (Kelly & McKenzie, 2018; Walton, 2014; Eloff & Kgwete, 2007). However, adapting pre-service teacher education programmes only became a priority with the introduction of the Minimum Requirements for Teacher Education Qualifications (MRTEQ) (DHET, 2011). Before 1994 teacher education programmes in South Africa followed a dual system approach, where pre-service training occurred along a two-fold system of mainstream or special education (Oswald & Swart, 2011). Pre-service teachers were trained in mainstream teaching, but if they wanted to teach in special education they needed an additional qualification. As a result, most teachers trained before the introduction of EWP6 did not have adequate exposure to inclusive education or dealt with barriers to learning in their mainstream classrooms during their formative training years (Schäfer & Wilmot, 2012; Oswald & Swart, 2011).

The South African Norms and Standards for Educators (NSE) (2000) was the first policy document that set out the terms and conditions in terms of academic qualifications for teachers in the new democratic South Africa. This policy document asserted that teachers must be competent in responding to diversity and democracy in various ways. However, since EWP6 was only published in 2001, the NSE did not specifically make provision for the training of teachers for inclusive education (Schäfer & Wilmot, 2012; Oswald & Swart, 2011). In order to address this gap in pre-service teacher education programmes the Minimum Requirements for Teacher Education Qualifications (MRTEQ) (DHET, 2011) replaced the NSE and was revised again in 2015 (DHET, 2015). Competence to teach in an inclusive education environment and the ability to address diverse learning needs are emphasised in the MRTEQ (DHET, 2015). After the introduction of the MRTEQ it was required that teacher education

programmes be revised to ensure that an understanding of the complex and differentiated nature of the South African society and the ability to work effectively with diverse challenges experienced by learners in schools and communities are addressed (DHET, 2015). The Higher Education Institution (HEI) where this study was conducted were in the initial implementation stage of the revised B.Ed Programme in 2017, and recently completed one cycle in this revised B.Ed Programme in 2020, therefore I believed it important to explore how pre-service teachers currently perceive their teacher education programmes in order to ensure that future training fully prepare them for inclusive education.

Research has shown that when novice teachers are confronted with a diversity of learning needs, as well as with a variety of learners experiencing barriers to learning in one classroom, they often struggle with the recurring complexities and find it challenging to collaborate with families and the wider community to assist in making the inclusive classroom a reality (Taole; 2020; Du Plessis, 2020; Dalton et al., 2012; Henning & Gravett, 2011). An inclusive education approach asserts that every learner has the right to be supported in an educational system that will value them as human beings; provide them with equal, quality education; and develop their full potential (Nel et al., 2016, p. 20-21; Swart & Pettipher, 2016; Forlin & Engelbrecht, 1998). Some exclusionary practices can be contributed to the fact that teachers, especially novice teachers, lack the basic knowledge, skills and competencies required to deal with diversity amongst learners (Du Plessis, 2020; Hick et al., 2019; Kelly & McKenzie; 2018; Kumar & Rana, 2014; Oswald & Swart, 2011). It is therefore essential that pre-service teachers are well trained in being able to accommodate and provide support to learners who experience barriers to learning as well as have proficient knowledge and skills of inclusive teaching methods, strategies and assessment in order to prevent these learners' exclusion (Nel et al., 2016; Swart & Pettipher, 2016; Henning & Gravett: 2011; Gravett & De Beer, 2010; Kumar & Rana, 2014; DBE, 2011). Research done by Gravett and De Beer (2010), Kumar and Rana (2014) as well as Malak (2013) indicated that pre-service teachers yearn for simple and effective solutions to deal with diverse learners in the inclusive classroom, so that they can be effective mediators for the successful implementation of inclusive practices. The aim of teacher education programmes should therefore be to equip pre-service teachers with all the tools necessary to give them a sense of control over the uncertainties of teaching in an

inclusive education system (Walton, 2017; Walton & Rusznyak, 2014; Gravett & De Beer, 2010).

In recent studies done by Nel et al. (2019), Kelly and McKenzie (2018), as well as Walton (2017) it was emphasised that there seems to be a lack of teacher education at HEI that fully prepare pre-service teachers with the skills that are needed for inclusive education. The aforementioned may be attributed to the fact that in many HEIs in South Africa inclusive education is presented in separate, isolated, stand-alone modules (Nel et al., 2019). According to Nel et al. (2019) if aspects of inclusive education such as, identifying and addressing barriers to learning, and accommodating diversity amongst learners are only presented in stand-alone modules and is not integrated into the whole curriculum it can lead to inclusive education being seen as supplementary to education rather than a fundamental part of teaching in diverse classrooms. However, the MRTEQ policy (DHET, 2015, p. 23, p.29 and p. 37) specifically states that pre-service teachers must be *“knowledgeable about inclusive education and skilled in identifying and addressing barriers to learning, as well as in curriculum differentiation to address the needs of individual learners”* in all grades and across all subjects.

For the purpose of this research, subjects of interest were those that link to the field of NS, including Physical Science, Life Science and a few others. There is a notion that NS subjects are difficult to learn, because of its abstract nature and high cognitive demand (Davidson, 2021), which results in most NS teachers being focused on transferring knowledge and content. Hayes (2017) adds that NS teachers are required to constantly keep-up with new content, while planning and presenting lessons that are meaningful, and accommodative to all learners (Hayes, 2017). However, research has reported that NS teachers are sometimes inadequately trained and prepared to teach subjects in the field of NS to diverse learners, including learners who experience barriers to learning and struggle to achieve (Davidson, 2021; De Beer & Mothwa, 2013; Kaptan & Timurlenk, 2012). In recent research done by Neuböck-Hunbinger et al. (2020), their findings affirmed that aspects of equality, diversity and inclusion are not yet evident in educational science programmes, especially NS.

1.2 Background

In order to ensure that current and future pre-service teacher education programmes prepare undergraduate students adequately for the practice of teaching in an inclusive classroom, the Departments of Basic Education (DBE) and Higher Education and Training (DHET) have requested several South African HEI to focus on determining how inclusive education can be infused into the Foundation and Intermediate Phases of the B.Ed Programme and to enable teacher educators to model and impart an inclusive pedagogy (cf. 3.2). The project focused specifically on the areas of Natural Science, Social Science, Mathematics, Languages and Life skills (cf. 3.2 & 4.2). This research study formed part of the broader study by specifically focusing on the NS pre-service teachers currently in the B.Ed Programme at a specific HEI. I decided to centre my research on subjects linked to the field of NS, because these subjects are seen as at risk subjects that are difficult for learners to achieve in. In my literature search on several databases I noted that limited research is available on how NS teachers are prepared to implement inclusive education within these subjects (cf. 4.2).

1.3 Problem statement

It was clear from the discussion in the introduction that there seemed to be a gap in teacher education programmes' preparation of pre-service teachers, especially in NS, to be effective teachers in dealing with diverse needs in an inclusive education system. Therefore, the aim of this research study was to *explore the perceptions of fourth year NS pre-service teachers in a B.Ed Programme regarding their training for inclusive education.*

1.4 Purpose statement

The purpose of this research was to *explore the perceptions of Natural Science pre-service teachers in a B.Ed Programme regarding their training for inclusive education.*

1.5 Primary research question

The primary research question that was explored in this research study included; *what are the perceptions of fourth year NS pre-service teachers in a B.Ed Programme regarding their training for inclusive education?*

1.6 Secondary research questions

The following secondary research questions are applicable to this research study:

- What is inclusive education?
- What are policy requirements with regard to the training of pre-service teachers in inclusive education?
- How does the B.Ed Programme for Natural Science pre-service teachers at a specific campus of a Higher Education Institution address inclusive education?
- What is the understanding of Natural Science pre-service teachers at a specific campus of a Higher Education Institution regarding inclusive education?
- How do Natural Science pre-service teachers at a specific campus of a Higher Education Institution perceive their training with regard to the successes, shortcomings or vulnerabilities of inclusive education?

1.7 Research objectives

The following objectives were applicable to this research study:

- To describe what inclusive education is according to literature.
- To determine what the policy requirements with regard to the training of pre-service teachers in inclusive education entails.
- To explore the depth in which the B.Ed Programme for Natural Science pre-service teachers at a specific campus of a Higher Education Institution address inclusive education.
- To explore the understanding of Natural Science pre-service teachers at a specific campus of a Higher Education Institution regarding inclusive education.

- To investigate how Natural Science pre-service teachers at a specific campus of a Higher Education Institution perceive their training with regard to the successes, shortcomings or vulnerabilities of inclusive education.

1.8 Conceptual framework

The following central concepts were deemed integral to enhance the understanding of the focus of this study: pre-service teacher, inclusive education, inclusive classroom and B.Ed Programmes.

1.8.1 Pre-service teachers

Pre-service teachers can be described as individuals entering the education and training phase at tertiary institutions for a number of years in order to gain competencies related to the field of education with the expectation of entering the teaching profession (Russell & Martin, 2015).

1.8.2 Inclusive education

Nel et al. (2016) state that inclusive education will enable the construction of a more democratic society where learners can claim their most basic human rights, including their right to have access to more equal and quality education. Inclusive education does not place the responsibility of providing equal and quality education on special schools only, but calls on mainstream schools to accept and accommodate all learners with various barriers to learning (Nel et al., 2016; Payne Van Staden, 2015; Swart & Pettipher, 2016; Booth, 2011). Inclusive education does not only focus on including learners with disabilities in mainstream classrooms, but also focuses on intervening when exclusion can occur based on factors such as race, language, religion, gender, and low socio-economic circumstances. Ainscow and Miles (2008), as well as EWP6 (DoE, 2001), emphasises that inclusive education can only be a success when all schools and teachers embrace the fact that all learners can learn and develop their full potential no matter what difficulties and barriers to learning they are experiencing.

1.8.3 Inclusive classrooms

Taking the previous mentioned description of inclusive education into consideration, Motitswe (2012) defines an inclusive classroom as a classroom setting consisting of a variety of learners from different cultural backgrounds facing a diverse-range of learning needs. Links (2009) holds the position that pre-service teachers should be trained to create a classroom climate where the learners will feel like they belong or where the learners are included in the learning process despite the barriers they are experiencing. Nel (2013) and Links (2009) assert that the inclusive classroom needs to become an inclusive community where diverse learners are respected, valued and accommodated.

1.8.4 B.Ed Programmes

The B.Ed Programme refers to the specific training and curricula presented to pre-service teachers for a Bachelor's Degree in Education at the Higher Education Institution (HEI). The curricula include all the modules that the pre-service teachers must complete to fulfil the requirements for a qualified teaching degree. The curricula presented at tertiary institutions have to adhere to all policies related to education and educational matters (DHET, 2015).

1.9 Research Methodology

Potgieter (2017) and Welman et al. (2005) stated that research is a process that includes obtaining scientific knowledge by means of implementing various methods, procedures and techniques (cf. 3.3). Research methodology considers and explains the logic behind the use of various research methods, procedures and techniques (Potgieter, 2017; Welman et al. (2005). In the following points I briefly discussed the various methods, procedures and techniques that have been used during this research study. More detail of the different aspects pertaining to the research methodology were provided in Chapter 3 and 4.

1.9.1 Theoretical framework

I have conducted my research within a constructivist theoretical framework (cf. 3.3.1). The constructivist framework asserts that meaning is constructed by the participants based on their experience of a phenomenon or situation (Niewenhuis, 2013). The reality is not objectively determined, but is socially constructed (Niewenhuis, 2013). Merriam (2009) stated that the constructivist framework is mainly inductive, but may include certain deductive elements and the research findings are descriptive in nature. It is also an instrument through which meaning is mediated in order to construct a deeper understanding of the phenomenon being studied (Niewenhuis, 2013). The constructivist theoretical framework best supports the interpretivism paradigm and qualitative research design (Davis, 2021) which was employed in this study. Moreover, this theoretical framework was applicable to my research study since the constructivist theory involves key elements such as culture, context, language, participants' interest and needs, participants' personal experiences and interpretation of the phenomenon being studied (Davis, 2021; Mogashoa, 2014). Consequently, the researcher together with the participants co-constructed knowledge and understanding about the participants' perceptions regarding their training for inclusive education. The constructivist theoretical framework is discussed in more detail in Chapter 2 and 3 (cf. 2.6.2. & 3.3.1).

1.9.2 Research paradigm

A research paradigm can be defined as a set of suppositions and philosophies about the world, and what is perceived as real or true (Moyo et al., 2015; Taylor et al., 2007). Before research can be undertaken it is important for a researcher to establish from which research paradigm they will be working, because it will frame a researcher's worldview and how the research will be conducted (Moyo et al., 2015) (cf 3.3.2). A researcher's worldview will shape and provide the researcher with a broad outline and direction for what he or she holds to be true and as relative important evidence (Moyo et al., 2015; Bakkabulindi, 2015; King & Horrocks, 2010) (cf. 3.3.2). The paradigm serves as a guide when the researcher is interpreting certain facts and evidence obtained throughout the research. In research there are a number of paradigms that a researcher can utilize to conduct research from.

For the purpose of this research I only made use of interpretivism. Interpretivism was developed in contrast to the positivist paradigm. It is largely associated with the qualitative research design due to its concern with subjective, narrative and written data that provide a very detailed description and explanations about the specific phenomenon and population being researched (Moyo et al., 2015; Bakkabulindi, 2015; Creswell, 2014) (cf. 3.3.2).

Creswell (2014) mentions that in order to achieve the abovementioned, it is important that the participants and researcher are actively involved in constructing meaning through interaction. For my research to have been conducted successfully, I needed to be positioned in the natural setting of the participants (cf. 1.9.1; 1.9.3 & 3.3.2) to develop a shared understanding of their reality and how they perceive the phenomenon under exploration (cf. 1.4), which was to explore the perceptions of NS pre-service teachers in a B.Ed Programme regarding their training for inclusive education. I have attempted to make sense of the meanings that participants attribute to the phenomenon being studied by using a variety of data collection methods (cf. 1.9.5.3 & 3.3.5.3) to explore and uncover truth and meaning (Moyo et al., 2015; Bakkabulindi, 2015).

1.9.3 Research Design

As mentioned above (cf. 1.9.2), the research paradigm directed the research design I have used.

Because I have been working from an interpretivist paradigm, I conducted my research using the qualitative research design (cf. 3.3.3). Qualitative research is characterised as research that attempts to collect rich descriptive data with the intention of exploring and developing deeper understanding of a particular phenomenon or context being studied (Bakkabulindi, 2015; Nieuwenhuis, 2013). It therefore focuses on how participants view and understand truth and reality about the phenomenon being studied, as well as how the participants construct meaning out of their experience (Nieuwenhuis, 2013) (cf. 3.3.3).

Qualitative research focuses on comprehending and interpreting the meaning of social phenomena and experiences in the natural setting without disrupting the natural functioning (Moyo et al., 2015; Merriam, 2009, p. 13). Furthermore, it is categorized by

an emergent feature where the research is subjective in nature and the researcher is the primary instrument for data collection and analysis.

The qualitative research design was deemed suitable for this research because I wanted to explore and gain a deeper understanding on the perceptions, experience and feelings of NS pre-service teachers regarding their training for inclusive education (cf. 3.3.3).

1.9.4 Literature review

I have used the following keywords/phrases which guided the literature review (cf. 3.3.4):

- pre-service teacher,
- inclusive education,
- inclusive classroom,
- inclusive education policies
- Requirements for teacher training and qualifications
- Initial Teacher Education (ITE)
- B.Ed Programmes.
- Natural Science (NS)
- pedagogy

The library services at the North-West University, as well as scientific databases like EBSCOhost and ERIC were used to look for mainly primary literature sources (cf. 3.3,4). The relevant articles in journals, educational dissertations and theses, and books have been studied in order to help me provide a thorough literature base for my empirical research (cf. 3.3.4).

1.9.5 Empirical study

This section provided a brief overview regarding the methods and techniques that have been used to collect the data, which assisted me to gain insight and knowledge relating to the phenomenon that was studied (cf. 3.3.5).

1.9.5.1 Strategy of inquiry

A case study research design was used as the strategy of inquiry (cf. 3.3.5.1). Hill and Millar (2015) explain that a case study in research is a bounded unit relating to a group or an institution and has the main purpose to explore participants' living experiences of a specific phenomenon (Hill & Millar, 2015; Creswell, 2009). The lived experience of the participants in this research study included the perceptions of fourth year NS pre-service teachers currently in a B.Ed Programme at a specific HEI regarding their training for inclusive education. The case study in this research enabled me to collect detailed and rich data (Hill & Millar, 2015) (cf. 3.3.5.1).

1.9.5.2 Population and sample

Keeping in mind that this research formed part of a broader research project the participants who were included in this research study fitted into the sample identified for the broader project (cf. 1.2 & 3.3.5.2). For this reason, the target population included the fourth year foundation- and intermediate phase pre-service teachers in South Africa, but also expanded to the Senior/FET (Further Education and Training) Phase (cf. 3.3.5.2). The reason for including the Senior/FET phase students is that all the phases attend many modules together and I believed it was important to include them in the study in order to gain a holistic view of the whole B.Ed Teacher Education Curriculum for NS. According to Creswell (2014) the study population can be seen as a heterogeneous smaller unit of the target population from which a sample is selected to be included in the research. Therefore, my sample included all fourth year NS pre-service teachers of a specific HEI (cf. 3.3.5.2).

Convenience sampling (cf. 3.3.5.2) has been employed to select a sample from a particular campus of the specific HEI, which served as the setting where the research was conducted. The selected campus of the specific HEI was included because I am already part of the structure and working in the B.Ed Programme for NS. It made logistical arrangements easier and limited costs.

Purposive sampling (cf. 3.3.5.2) has also been used in my study. The participants were purposefully selected to complete the open-ended questionnaire because they had the characteristics I needed to understand and gain insight regarding the meanings and

experiences the participants have concerning the phenomenon being studied (Creswell, 2014; Maree & Pietersen, 2013; Merriam, 2009). Furthermore, the fourth year NS pre-service teachers were purposefully invited to participate in this research study because they have already completed three years in the B.Ed Programme for NS and therefore have more knowledge and practical experience in teaching NS. Consequently, it was assumed that they would most probably be able to provide a more informed opinion than all the other year groups majoring in NS.

In addition, purposive sampling (cf. 3.3.5.2) was used again to invite participants from the fourth year NS pre-service teachers who completed the open-questionnaire to take part in the focus group interviews. Participants was mainly invited on the basis of voluntary participation. Participants were invited to indicate their willingness to participate in the focus group interviews on the informed consent forms of the open-ended questionnaires. If the participants who were willing to voluntary participate did not ensure an appropriate sample size, I would have made use of a class list and select every fifth NS pre-service teacher to be included in the focus group interviews. Should these participants have been unwilling to participate, I would have moved to the next participant on the class list. I planned to include a maximum of two to three participants in each focus group. Out of the participants who completed the open-ended questionnaire a sufficient number of participants voluntarily indicated they would take part in the focus group interviews. Therefore, I did not make use of a class list to invite participants to take part in the focus group interviews. More details regarding the population and sample are provided in Chapter 3 (cf. 3.3.5.2).

1.9.5.3 Data collection methods

The data collection methods that were used in this research included a document analysis, an open-ended questionnaire and focus group interviews (cf. 3.3.5.3).

1.9.5.3.1 Method 1: Document analysis

Blundell, (2015) explains that a document analysis is a valid research strategy with substantial worth as a procedure for policy evaluation and reform (cf. 3.3.5.3.1). Therefore, a document analysis is valuable for collecting qualitative data because it could provide rich data. For the purpose of my research study I collected, analysed

and compared policies and B.Ed curriculum documents, i.e. programme outcomes, module outcomes, study guides, planning documents of lecturers based in NS, etc. (cf. 3.3.5.3.1).

1.9.5.3.2 Method 2: Open - ended questionnaires

Open-ended questionnaires provided the participants in this study an opportunity to express, qualify and clarify their understanding and perceptions of various aspects regarding their training for inclusive education (Ganga & Maphalala, 2015) (cf. 3.3.5.3.2). Originally it was planned to disseminate a paper based questionnaire. However, due to the Covid-19 pandemic the participants were requested to complete an online questionnaire that contained mostly open-ended questions (cf. 3.3.5.3.2). The open-ended questions have been formulated and constructed in such a manner that the responses of the participants could provide me with rich and relevant information regarding their understanding and perceptions of inclusive education as well as certain aspects regarding their training for inclusive education at their HEI in the NS B.Ed Programme (cf. 3.3.5.3.2). The same questionnaire was used for the initial broader study (cf. Addendum A2 & 3.3.5.3.2).

1.9.5.3.3 Method 3: Focus group interviews

The semi-structured focus group interview is commonly used in research studies to corroborate data that emerges from other data sources (Nieuwenhuis, 2013). By using semi-structured focus group interviews the participants were probed to respond to a number of questions to elaborate on some of the answers given in the open-ended questionnaire (cf. 3.3.5.3.3). The same interview schedule as employed for the broader study was used (cf. Addendum B3). This ensured that more in-depth and rich data were gathered to provide more detail on aspects of inclusive education and the participants' training for inclusive education at their HEI in the NS B.Ed Programme. The focus group interviews were scheduled to be face to face, but due to the Covid-19 pandemic had to move to an online platform (cf. 3.3.5.3.3).

There were four focus group interviews scheduled with two to three participants in each group. I manage to conduct a total number of three focus groups with two participants in two of the interviews and one participant in the other. This occurred due to some of

the participants who withdrew from the focus group interviews. The focus group interviews were voice recorded and transcribed verbatim for data interpretation and analysis. Although some of the participants withdrew from the focus group interviews and I only managed to conduct three out of the four focus group interviews, I still reached data saturation (cf. 3.3.5.3.3).

1.9.5.4 Data collection process

The data collection process commenced by following the subsequent steps (cf. 3.3.5.4):

Step 1: Permission was requested and approval was obtained for the research to be conducted from the NWU Optentia Research Focus Areas' scientific committee

Step 2: After the scientific committee granted permission for the research an extensive literature review was conducted and Chapter 2 was written.

Step 3: Permission was requested and approval was obtained for ethical approval from the NWU Research Ethics Committee of the Faculty of Education (EduREC), the following ethical clearance number was provided - N W U - 0 1 6 1 8 - 1 9 - A 2.

Step 4: After the outbreak of the international pandemic, Covid-19, permission was requested again from the NWU Research Ethics Committee of the Faculty of Education (EduREC) to amend the paper based open-ended questionnaires and face to face focus group interviews and change these data collection methods to an online platform. The ethic committee approved these amendments under the same ethical clearance number above.

Step 5: As the participants are students at the specific HEI permission was requested and approval was obtained from the HEI's Research Data Gatekeepers Committee (RDGC) to allow me to invite the participants to take part in the research study.

Step 6: The document analysis took place. I collected, analysed and compared policies and B.Ed curriculum documents – including the programme outcomes, module outcomes, study guides, planning documents of lecturers based in NS.

Step 7: The research advertisement and invitation to participate in the research study were placed on the various module sites that relate with NS via efundi through an independent researcher.

Step 8: More information was provided about the research study to the participants and the informed consent form was administered to the participants through an online link via efundi.

Step 9: The online open-ended questionnaires were administered to the fourth year NS pre-service teachers regarding their understanding and perceptions of inclusive education. The participants who completed the online informed consent form received the link to the online open-ended questionnaires.

Step 10: Then I collected and analysed the data from the online open-ended questionnaires.

Step 11: Participants who took part in the open-ended questionnaires were invited to indicate whether they will be willing to take part in the online focus group interview.

Step 12: The participants who indicated that they were willing to participate in the focus group interviews received the links to another informed consent form as well as an additional information letter. They were requested to indicate on what time and day and on which online platform they will be able to conduct the focus group interviews. Participants could also specify whether they would need additional online data to take part in the focus group interviews. The participants were informed that they may receive online data in the additional information leaflet and the data was sent by the independent researcher, to the contact details that they provided.

Step 13: After the participants completed the informed consent forms and the additional information was received from the participants, the online focus group interviews were conducted. The purpose of the focus group interviews with fourth year NS pre-service teachers was to gather more in depth data regarding how NS pre-service teachers perceive their training with regard to dealing with diversity amongst learners in an inclusive education system.

Step 14: The voice recorded interviews were transcribed and analysed.

Step 15: A constant comparative thematic analysis of all data collection methods were done.

Step 16: I then Interpreted, discussed and concluded the research findings.

1.9.6 Researcher situatedness

I was aware that the subjective nature of qualitative research could pose many ethical problems and make it hard for me to stay objective throughout this research. I am a white female from the Vanderbijlpark area. I am a Christian and my religion may have affected my worldview. This might have caused bias in the way I interpreted some of the research findings. Being part and working in the B.Ed Programme of the specific university may have caused me to have some preconceived ideas about the research topic. Therefore, I consulted with an independent researcher and my supervisors on a regular basis to make sure that I remained objective and unbiased in the data collection process, as well as during the data analysis and interpretation (Nieuwenhuis, 2013). By declaring my situatedness, I reduced the chances that these factors affected the reliability of my research findings.

1.9.7 Data analysis and interpretation

I made use of constant comparative thematic data analysis (Merriam, 2009) (cf. 3.4). The first step in the data analysis and interpretation process was to read and transcribe all the data collected. In the second step I made use of thematic analysis and read through the entire set of data collected and then grouped the data into manageable sections for comparison. In the third step these sections of data were placed into categories for similarities and contrasts. The fourth step entailed identifying, from the inferences placed into similarities and contrasts, codes that emerged. The fifth step involved the analysis and evaluation of the codes that emerged in the data, in order to construct them into themes and subthemes (Feza, 2015) (cf. 3.4 & 4.3.1). The themes and subthemes related to the perceptions of NS pre-service teachers in a B.Ed Programme regarding their training for inclusive education. Data collected from all three data collection methods, namely the document analysis, open-ended questionnaire and focus group interviews were constantly compared with the purpose

of identifying patterns in the data that was arranged in relation to each other (Merriam, 2009) (cf. 3.4 & 4.3.1).

1.10 Quality Criteria

For the purpose of this qualitative research study I made use of member checking, transferability, crystallisation, dependability and conformability in order to contribute to the trustworthiness and reliability of a study (cf. 3.5).

1.10.1 Member checking

According to Mike (2011) (cf. 3.5.2) credibility is involved when a researcher wants to establish whether the results of the research can be believed and trusted. The credibility of qualitative research depends more on the richness and quality of the in-depth information gathered, rather than the amount of data gathered as the case will be in quantitative research (Nieuwenhuis, 2013; Mike, 2011). By using member checking or applicability I assured the credibility of the research results. The interviews were voice-recorded and transcribed verbatim. I used these voice recordings to continually analyse and compare the data and did cross checking of my understanding of the data with the participants to ensure that my interpretation was accurate (3.5.2).

1.10.2 Transferability

Transferability is viewed as the degree to which the research findings can be transferred to other contexts, other than the context being studied (Mike, 2011) (cf. 3.5.3). De Vos (2005) describes that ultimately transferability can be established on the grounds of whether the research findings would deliver similar results if the research was conducted with another group of participants in a different context. I made sure that all the procedures I used to obtain my data were transparent and clear for other researchers to use if they want to apply them in a different context (cf. 3.5.3).

1.10.3 Crystallisation

Nieuwenhuis (2013) as well as Leedy and Ormrod (2013) (cf. 3.5.4) define crystallisation as a strategy where the researcher makes use of several investigators, different methods and multiple sources of data collection to constantly compare, with the hope that they will all converge to support particular findings. In my research study

I consulted with an independent researcher and my supervisors as well as made use of different data collection methods namely, document analysis, open-ended questionnaire and focus-group interviews to compare whether the research results were trustworthy and reliable (cf. 3.5.4).

1.10.4 Dependability

Mike (2011) explains that dependability ensures that the research findings are reliable and the research could be repeated (cf. 3.5.5). Dependability can be ensured by reporting in detail the processes and methods used in the research study to enable an external researcher to repeat the research with the same participants in the same context and achieve similar results (Mike, 2011; De Vos, 2005). I assured that all the procedures I used to obtain my data were clearly documented (cf. 3.5.5).

1.10.5 Conformability

Conformability can be described as the extent to which research findings are supported by the data collected (Mike, 2011) (cf. 3.5.6). The researcher in qualitative research plays an integral part in the data collection process and brings a unique perspective to the research study. This freedom can make it difficult for a researcher to remain unbiased. Ensuring conformability allows an external researcher to judge whether the final results of the research correlate with the data collected (Mike, 2011; Denzin & Lincoln, 2005). By using member checking and ensuring crystallisation I made sure that my research results correlated with the data I collected during the research (cf. 3.5.6).

1.11 Ethical considerations

According to Sanjari et al., (2014), the researcher should get ethical clearance and agreement from all necessary authorities. In order for this research to be conducted it was subjected to ethical clearance by a certified board and members of the **Research Ethics Committee of the Faculty of Education (EduREC) and the Research Data Gatekeepers Committee (RDGC)** of a specific HEI (cf. 3.6). After approval and appointment of a gatekeeper (cf. Addendum D) as well as ethical clearance have been granted (cf. Addendum C), all the invited participants received an informed consent form (cf. Addendum A1 & B2) that explained the nature and purpose of the research study to the participants (Mertler, 2016) (cf. 3.6). This informed consent has assured

the participants of confidentiality, anonymity, privacy and voluntary participation in the research, as well as the benefits and the risks if they took part in the study (cf. 3.6.1). Only after the participants agreed and signed the informed consent forms was data collected and used in this research study (Mertler, 2016; Leedy & Ormrod, 2013).

Mertler (2016) states that any research that is being conducted should not disregard harm or disempower the participants. I ensured that participants remain anonymous (cf. 3.6.2). I did not mention the names of any participant in any report. I kept the data in a safe place until the research were concluded. I also limited the amount of people that had access to the data. Because I am a staff member and working in the B.Ed Programme of the specific university, I included an independent researcher, not involved with the students, to do the recruitment and distribution of the questionnaires as well as acting as an independent observer during the interviews (Sanjari et al., 2014) (cf. 3.7). Findings were reflected on with my supervisors as well as the independent researcher and the participants to confirm the true interpretation of data (cf. 3.6).

1.12 Chapter division

Chapter one: Introduction and problem statement

Chapter two: Literature review

Chapter three: Empirical research

Chapter four: Data analyses and interpretation

Chapter five: Summary of the findings, conclusion, recommendations and limitations of the Study

1.13 Conclusion

In this chapter, I introduced the general aims and purposes of my research study and highlighted the main research methods and procedures I used to conduct the research. In the next chapter I am going to expand on some general information around certain concepts underpinning the research in the form of a literature review. The literature review will consist of a more detailed explanation of the concepts pre-service teacher, inclusive education, inclusive classroom, inclusive education policies and the B.Ed Programme.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter aims to situate the research in an existing body of knowledge by exploring the literature relating to the key concepts in order to provide theoretical background and enhance the understanding of the focus of this research study. The topics will include: the development of inclusive education globally, as well as in the South African context; clarifying the concept of inclusive education; elucidating what an inclusive classroom is, as well as what diversity in such a classroom entails; and defining the concept of inclusive pedagogy and comparing it to the pedagogy used in NS. Since the focus of this research is on NS pre-service teachers and teacher education for inclusion, relevant issues to this are key focal points of this chapter.

2.2. Global context

For many centuries it was believed that learners with disabilities are uneducable and thus governments only provided limited opportunities for these learners to be educated (Inclusion BC, 2018). After the atrocities of World War II, a forceful movement towards global human rights lead to the adoption of the United Nations (UN) Universal Declaration of Human Rights in 1948 (Brown, 2016). This declaration strived to protect the rights of every individual, focusing on non-discrimination, equality, fairness and the confirmation of inherent human dignity and worth for individuals all over the world (Nel et al., 2016; UN, 1948). In addition, Article 26 of this declaration proclaimed the right of every citizen to an appropriate education regardless of gender, race, colour and religion (Netshitahame, 2008). Thus, the Universal Declaration of Human Rights laid the foundation for the movement to more inclusive education systems. After several years, the movement towards inclusion was further strengthened by the UN Convention on the Rights of the Child in 1987, which ensures learners the right to receive education without discrimination on any grounds (Maciver et al., 2018; Du Plessis, 2013). Thereafter, the gateway was opened for educationists globally to bring the world together and institute movements to ensure that all children have equal access to education.

The first meeting was the convention at the World Education Forum in Jomtien, Thailand in 1990. At this convention it was reported that in almost every country around the world, a large number of learners were being excluded from formal education and some of the learners who go to school do not complete their initial general education and training stages of schooling, specifically age six to fifteen (Du Plessis, 2013; Krohn-Nydal, 2008; UNESCO, 2000). Nel et al. (2016) mention that this conference also highlighted that learners with disabilities were progressively and intentionally pushed out of the school system, because schools were not sensitive to their learning needs. This resulted in the development of two separate threads of education where some learners were labelled and placed in separate special education settings, away from other learners in regular mainstream education (Swart & Pettipher, 2016). In 1990, a World Declaration on Education for All and the Framework of Action to Meet Basic Learning Needs were developed and accepted at a world conference on Education for All (EFA) in Jomtien, Thailand, as a means to overcome the challenges in the global education system (Nel et al., 2016; Du Plessis, 2013). This declaration and framework lead to the development of the 1993 UN Standard Rule on Equalization of Opportunities for Persons with Disabilities, which affirmed the rights of all learners with disabilities equal access to education and that education should be provided in “an integrated school setting” in the “general school setting.” (Du Plessis, 2013).

The Jomtien declaration and EFA framework set the stage for the international movement to a more inclusive education system. However, the World Conference for Special Educational Needs in Salamanca, Spain in 1994 (UNESCO, 1994) set the foundational base for inclusive education to become a very strong focus in international education policies. At this conference inclusive education was accepted as an international approach to education when 92 countries accepted and signed the Salamanca Statement (Maciver et al., 2018; Nel et al., 2016; UNESCO, 1994). The Salamanca Statement specifies that education systems should accommodate all learners, irrespective of their various learning needs and unique backgrounds. *“This accommodation should include disabled and gifted learners, street and working children, children from remote or nomadic populations, children from linguistic, ethnic or cultural minorities and children from marginalised areas or groups”* (UNESCO, 1994, p. 6).

At the 2000 World Education Forum Framework for Action; Education for All: meeting our collective commitments in Dakar, Senegal the forum confirmed that many countries were far from reaching the goals established at the World Conference on Education for All in 1990 (UNESCO, 2000). Consequently, one of the primary objectives for EFA highlighted at this World Education Forum was that all children would receive primary education by 2015, which required that every country should take responsibility for the promotion of EFA as stipulated in the Jomtien Declaration and Salamanca Statement (Nel et al., 2016; UNESCO; 2015b; UNESCO, 2000). Six goals were established in this Dakar Framework for Action namely, expanding early childhood care and education; providing free and compulsory primary education for all; promoting learning and life skills for young people and adults; increasing adult literacy by 50 %; achieving gender parity by 2005; gender equality by 2015; and improving the general quality of education (UNESCO, 2000).

In 2005, the Convention on the Rights of Persons with Disabilities (CRPD) strengthened the demand for a more inclusive society and thus a more inclusive education system for people with disabilities (Du Plessis, 2013). The purpose of the convention was to ensure the protection and promotion of equal enjoyment of all human rights and fundamental freedoms by all persons with disabilities, as well as respect for their inherent dignity (UN, 2005). This convention prohibits the unlawful discrimination and exclusion of people with disabilities and stipulates that all people, especially the ones with disabilities, should be equally included in society and all facets thereof (UN, 2005). According to the UN (2005) this also confirms the right to inclusive education, regardless of age, without discrimination and on the basis of equal opportunity. This implies that children should be included in schools and school-related activities irrespective of their disabilities or barriers to learning by providing sufficient support and resources in schools (Schulze, 2009; UN, 2005).

The most recent development in the global quest towards a functional inclusive education system involves the World Education Forum that took place in Incheon, Republic of Korea, in May 2015 (Nel et al., 2016). This declaration followed a report released by UNESCO (2015, a) called *Fixing the Broken Promise of Education for All (EFA)* that mentioned the remaining challenges still faced in many international societies years after the adoption of the 1994 Salamanca Statement. Some of these

challenges include: children not having access to primary education; high dropout rates towards secondary education; many children not acquiring basic skills in reading and mathematics; equity issues based on socio-economic circumstances; the lack of trained teachers; the poor condition of schools in many parts of the world; and the lack of access to resources, especially technology (UNESCO, 2015a). Thus, the declaration sets out ways to assure equality and access, improvement of outcomes and funding to ensure inclusive education for all. A 15-year plan for the implementation of a new vision for inclusive education based on Sustainable Developmental Goal (SDG) 4; “*ensuring inclusive and equitable quality education and the promotion of lifelong learning*” (UNESCO, 2015a, p. 7) was accepted at this conference. Consequently, various stakeholders and international organisations as well as participants from 160 countries adopted the Incheon Declaration for Education 2030 (Nel et al., 2016; UNESCO, 2015a). The declaration confirmed the continuation of the EFA movement and outlined practical strategies that can be implemented globally, as well as nationally, with the aim of mobilising countries and other important stakeholders with regard to SDG 4. SDG 4 is specifically aimed at redressing marginalisation, discrimination and exclusion in education by ensuring equitable quality education and learning opportunities for all learners by building and upgrading schools to be all inclusive and safe, providing free primary and secondary education, and increasing the supply of qualified inclusive teachers (UNESCO, 2017).

South Africa was an active participant in all the above-mentioned global actions towards a more inclusive education system, but it is important to provide a background to the South African context.

2.3. The South African context

The South African education system, under the apartheid system, was characterised by exclusion from education based on race and disability, which was further reinforced by the lack of human rights (Dalton et al., 2012; De Wet & Wolhuter, 2009). Nel (2018) as well as Swart and Pettipher (2016), elucidate that the history of South Africa was filled with discriminatory actions and irregularities which impeded the provision of equal education to all children in the country. Whites received well-developed education resources and support services, but departments serving Black Africans, Coloured and

Indians were lacking or were underdeveloped – and resourced (Swart & Pettipher, 2016; De Wet & Wolhuter, 2009).

Furthermore, the majority of learners who experienced barriers to learning and development¹(cf. 2.4.4) especially those with disabilities, were discriminated against by policies and legislation (Martínez, 2015; Du Plessis, 2013; Dalton et al., 2012). These learners were labelled as having “special needs” and were separated from the so-called “normal” learners in the mainstream by being placed in special education. Misperceptions about disability, such as learners having disabilities are uneducable and that learners with barriers to learning place an extra burden on education, as well as the overemphasis on “special educational needs” (SEN), further enhanced segregation that lead to exclusionary and discriminatory practices against these children (Algraigray & Boyle, 2017; Swart & Pettipher, 2016; Dalton et al., 2012).

Support for learners who experienced barriers to learning focused mainly on the medical model of diagnosis, which further augmented segregation and exclusion (Landsberg et al., 2016; Mkhuma et al., 2014) (cf. 2.4.3). The medical model is based on the view that barriers to learning arise only within the learner, the so-called deficit-within-child approach, and that the child should be remedied in order to alleviate the deficit (cf. 2.4.3). Learners who experienced barriers to learning were subjected to diagnostic tests as a measure of identification which presented opportunities for categorisation and labelling them (Landsberg et al., 2016; Mkhuma et al., 2014). Learners, even those with mild barriers to learning who were labelled as having SEN and received a Learner with Special Educational Needs (LSEN) number were excluded from mainstream classrooms in South Africa even though their educational needs could have been met in mainstream classrooms with slight adaptations and support from the teacher (Du Plessis, 2013). This practice enforced the provision of specialised and isolated education for learners who experienced barriers to learning (Swart & Pettipher, 2016; Du Plessis, 2013).

¹ A barrier to learning can be described as all the factors that make learning different or causes learning breakdown to occur, hindering a learner’s ability to learn effectively (Hays, 2010; Nel et al., 2016).

The transformation of the education system was initiated after South Africa became a democratic country in 1994 and adopted the new South African Constitution (Act 108 of 1996) which is founded on the democratic values of human dignity, equality, human rights and freedom (Duvenhage, 2006; DoE, 2001). The educational policies followed suit in order to address the imbalances of the past apartheid educational system and started to work towards infusing democratic values in the new education system (Dalton et al., 2012; Savolainen et al., 2012; De Wet & Wolhuter, 2009). Since South Africa was a signatory of the Salamanca Statement and Framework for Action on Special Needs Education (cf. 2.2) it also directed South African educational policy makers to a new educational system that was obligated to embrace inclusivity (Nel et al., 2016; Oswald, 2014).

Nel et al. (2016) stipulate that the South African educational policy makers began the transformation process in the educational system to a more inclusive approach with the implementation of the South African Schools Act (Act 84 of 1996). This Act indicates that the South African government will ensure that all the injustices and discrimination of the past will be mended and that the rights of all learners will be respected and upheld. Following the implementation of the South African Schools Act (1996) the Department of Education established the National Commission on Special Needs in Education and Training (NCSNET) and National Committee for Education Support Services (NCESS) and delegated them to investigate and make recommendations on all aspects of special needs and support services in South Africa (Nel et al., 2016; Du Plessis, 2013). The joint report of these investigative bodies recommended that the education system of South Africa should endorse a single education system for all and nurture the development of inclusive schools and supportive centres of learning that will allow all learners to be active participants in the curriculum. The education system should, therefore, be built on the principles of human dignity and social justice (Engelbrecht et al., 2016). This will ensure that all learners develop and extend their potential and participate as equal members of society (Engelbrecht et al., 2016; Nel et al., 2016; DoE, 1997).

Based on the findings of the NCSNET and NCESS report, EWP6: Special Needs Education - Building and inclusive education and training system was released in 2001 (Oswald, 2014; Du Plessis, 2013; DoE, 2001). The aim of EWP6 (DoE, 2001, p. 10)

was to facilitate the implementation of inclusive education through:

- Systematically moving away from using segregation according to categories of disabilities as an organising principle for institutions.
- Basing the provision of education for learners with disabilities on the intensity of support needed to overcome the debilitating impact of those disabilities.
- Placing an emphasis on supporting learners through full-service schools that will have a bias towards particular disabilities depending on need and support.
- Directing how the initial facilities will be set up and how the additional resources required will be accessed.
- Indicating how learners with disability will be identified, assessed and incorporated into special, full-service and ordinary schools in an incremental manner.
- Introducing strategies and interventions that will assist educators to cope with a diversity of learning and teaching needs to ensure transitory learning difficulties are ameliorated.
- Giving direction for the Education Support System needed.

After the introduction of EWP6, several operational policies followed. These include (Nel et al., 2016; Du Plessis, 2013):

- Republic of South Africa. Department of Education. (2002). *Draft conceptual and operational guidelines for the implementation of inclusive education*. Pretoria: Government Printer.
- Republic of South Africa. Department of Education. (2005). *Conceptual and operational guidelines for special schools as resource centres*. Pretoria: Government Printer.
- Republic of South Africa. Department of Education. (2005). *Conceptual and operational guidelines for district based support teams*. Pretoria: Government Printer.
- Republic of South Africa. Department of Education. (2010). *Guidelines for inclusive learning programmes*. Pretoria: Government Printer.

- Republic of South Africa. (2007). National Education Policy Act (27 / 1996): *national policy on assessment and qualifications for schools in the general education and training band*. Pretoria: Government Printer.
- Republic of South Africa. (2010). Department of Education (DoE). 2009. *Guidelines for full service / inclusive schools*. Pretoria: Department of Education.
- Republic of South Africa. Department of Education (DoE). (2010). *Guidelines for inclusive learning programmes*. Pretoria: Government Printer.
- Republic of South Africa. Department of Education (DoE). (2014). *Policy on Screening, Identification, Assessment and Support*. Pretoria: Government Printer.

It is evident from the above discussion that the South African government took the implementation of an inclusive education system seriously with the introduction of several guiding and operational policies. However, there are several challenges with regard to the realisation of these policies in practice, which will be addressed later in this chapter (cf. 2.4.5.1.2 & 2.5). In the next section, an understanding of what inclusive education entails will be deliberated.

2.4. What is inclusive education?

2.4.1. Defining inclusive education

Globally, inclusive education means different things to different people resulting in it having multiple interpretations (Masalela, 2008; Artiles & Kozleski, 2007) which leads to uncertainties among researchers and the education community about what the concept really means (Soriano et al., 2017; Allan, 2012; Masalela, 2008). Florian and Spratt (2013) argue that due to the existence of inconsistencies and the absence of a clear understanding about inclusive education and what it specifically entails, the development and successful implementation of inclusive education in many countries are hindered. In many instances, inclusive education is still regarded as an approach to teaching that primarily serves learners with disabilities in a general education setting. Van Rooyen and De Beer (2011) state that simply placing previously excluded learners within a mainstream context does not in itself achieve inclusive education. However, a

broader view of inclusive education relates to a reform that responds to accommodating a diversity of learning needs among all learners and highlights their right to receive quality education in any educational setting without discrimination (Symeonidou, 2018; Ainscow et al., 2014; Chiner & Cardona, 2013; Dalton et al., 2012; Van Rooyen & De Beer, 2011; Booth, 2009; Ainscow, 2009).

Dale McManis (2017), as well as Horne and Timmons (2009), explain that inclusive education refers to a process when all learners, irrespective of the challenges they are experiencing, are included in an age-appropriate class that are in their own neighbourhood mainstream schools. Moreover, inclusive education requires that all learners receive high-quality education, interventions, and support where needed, that will enable them to reach their full potential in the fundamental curriculum (Dale McManis, 2017; Mitchell, 2010). In the global perspective inclusive education is deemed as a, “human right, a principle that values all learners’ well-being, a means for realising other human rights and a process for eliminating barriers” (Symeonidou, 2018, p. 21). The before mentioned indicated that a social and rights based approach to inclusion should be adopted (Nel et al., 2019; Teaching for All, 2019). These two approaches to inclusive education includes the notion that education is a basic human right and the cornerstone for a more just society (Nel et al., 2019; Teaching for All, 2019; Ainscow, 2014).

In South Africa, inclusive education can generally be defined and condensed as: *“to build a more democratic society, a more equitable and quality education system and a belief that extend the responsibility of regular schools to accommodate the diverse learning needs of all learners”* (Swart & Pettipher, 2016, p. 4). This definition is quite descriptive if one takes into consideration that inclusive education is based on fundamental democratic principles such as human rights as mentioned by Symeonidou, (2018), in conjunction with equal opportunities, social justice and participation without exclusion (Nel et al., 2016; Ainscow et al., 2014; Chiner & Cardona, 2013; Booth, 2009; Masalela, 2008).

EWP6 defines inclusive education (DoE, 2001a, p. 6-7) (cf. 2.3) in the following broad categories. The education system:

- i) recognizes that all children and youth can learn and that all children and youth need support;
- ii) will assist education structures, systems and learning methodologies to meet the needs of all learners;
- iii) acknowledges and respects differences in learners, whether due to age, gender, ethnicity, language, class, disability, HIV or other infectious diseases;
- iv) accepts that learning goes beyond formal schooling and acknowledges that learning may also occur in the home and community, as well as within formal and informal settings and structures;
- v) will aim to change attitudes, behaviour, teaching methods, curricula and environment to meet the needs of all learners; and
- vi) will attempt to maximise the participation of all learners in the culture and the curriculum of educational institutions and uncovering and minimising barriers to learning.

This above-mentioned comprehensive definition affirms that inclusive education does not place the responsibility of providing equal and quality education on special schools only, but calls on mainstream schools to also accept and accommodate all learners, including those who experience various barriers to learning (Dale McManis, 2017; Nel et al., 2016; Swart & Pettipher, 2016; O'Toole & Burke 2013; Sharma et al., 2012; Booth, 2011; DoE, 2001). Masalela (2008) explains that inclusive education should consider differences in the learning and physical abilities of learners as opportunities for making the education system and schools more receptive and active towards accommodating diversity. The aim of inclusive education should, therefore, be to create a community that will enable teachers and learners to feel comfortable with diversity in one classroom and to see it as a challenge for enrichment in the learning environment, not a means to restrict it (Nel et al., 2014; Florian & Spratt, 2013; Van Rooyen & De Beer, 2011; Masalela, 2008; Engelbrecht, 2007; Sapon-Shevin, 2007; Potterton et al., 2005). Ainscow et al. (2012); Savolainen et al. (2012); as well as Horne and Timmons (2009) emphasise that inclusive education can only be a success when all communities, schools and teachers embrace the fact that all learners can learn and achieve no matter what barriers to learning they are experiencing. Inclusivity in education is thus used to respond to diversity in the classroom (Van Rooyen & De Beer, 2011).

2.4.2 What is an inclusive classroom?

As already mentioned, traditional South African classrooms were characterised by separation of learners according to ability levels, behaviours or physical limitations (cf. 2.3). This practice resulted in learners who were deemed as not belonging in mainstream classrooms, ultimately being excluded from valuable educational opportunities (cf. 2.2). Conversely, an inclusive classroom is a setting where diverse learners from different socio-economic, cultural and ability, as well as different backgrounds learn together and are supported in one classroom (Kozleski et al., 2014; Florian, 2009). This allows for all learners to participate equally in learning (Engelbrecht et al., 2015; Motitswe, 2012; Thomas and Loxley, 2001), although some of them might experience a wide range of barriers to learning and development including, but not limited to, differences in aptitude levels and/or behavioural or physical restrictions (Engelbrecht et al., 2015; Nel, 2013; Forlin, 2004).

Picard (2015) asserts that all learners of all abilities and backgrounds deserve classrooms that are inclusive and convey respect for diversity. Nel (2013) and Mitchell (2010) affirm that the teacher of such a classroom should ensure that equal opportunities are created for all learners to succeed and must embrace the challenges that accompany diversity in order to provide the best possible learning environment for all learners in the classroom. The inclusive classroom needs to be an inclusive society that is safe and secure, and where diversity amongst learners are respected, valued, accepted and accommodated (Nel, 2013; Links, 2009; UNESCO, 1994).

Such a classroom consequently implies that all teachers are enabled and should be competently trained to deal with learners who experience various barriers to learning. It is then important to elucidate on the main approaches that are applied when learners who experience barriers to learning are identified and need to be assessed and supported.

2.4.3. Medical model versus socio-ecological model approach

Before the inception of EWP6, health practitioners and teachers predominantly applied the medical deficit model to diagnose and treat learners who had disabilities (Swart & Pettipher, 2016). The medical model emphasises that a disability or defect originates within the learner (Haegele & Hodge, 2016; Swart & Pettipher, 2016; Walton, 2006) resulting in the limited functioning of the body including the mind, and are caused by disease, injury, or health conditions (Forhan, 2009). In this approach, a learner is diagnosed as being disabled, and then health practitioners predominantly intervene in trying to remedy the learner and fix the impairment (Swart & Pettipher, 2016; Haegele & Hodge, 2016; Bingham et al., 2013). However, there is little acknowledgement of the impact of contextual factors, such as systemic, socio-economic, cultural and environmental influences on a learners' learning. Trans-disciplinary collaboration with essential role players such as teachers and parents to alleviate the effects the disability might have on the learners' learning in the classroom is mostly ignored (Engelbrecht & Hay, 2018; Nel et al., 2016; Swart & Pettipher, 2016). In the application of the medical model, learners who are identified as having a disability are generally removed from the mainstream classrooms and placed into special schools or centres, which results in stereotyping and labelling based on the belief that most of these learners are unable to function as an alleged '*normal learner*' (Engelbrecht & Hay, 2018; Motitswe, 2017; Swart & Pettipher, 2016; Haegele & Hodge, 2016) (cf. 2.3). Consequently, in the application of this model, it is not really acknowledged that external factors such as the home environment, poverty, lack of resources and an inflexible curriculum could also inhibit effective learning (Motitswe, 2017; Walton, 2006). Thus, the use of this model promoted exclusion in the South African education system previously and continues to do so. Yet, the value of a medical diagnosis as part of the assessment process should not be disregarded (Nel et al, 2016); it should, however, not be used as the primary tool of information when deciding on what kind of support the learner should receive (Swart & Pettipher, 2016).

On the contrary, the shift towards inclusive education required a new approach in order to provide comprehensive and adequate support to learners who experienced difficulties in learning and development, which did not result in focusing only on the deficit-within-child (Swart & Pettipher, 2016; Nel, 2013). The socio-ecological model

acknowledges that difficulties in learning and development does not only originate within learners themselves, but external systemic, social, cultural and environmental factors in the environment can also lead to barriers to learning and development (Nel, 2018; Nel et al., 2016; Walton, 2006). This includes factors such as societal and home environments, poverty, a lack of resources including funding, infrastructure and Learning and Teaching Support Materials (LTSM) in the classrooms, an inflexible curriculum, as well as negative attitudes towards inclusive education and inadequate teacher training (Oswald & Swart, 2011).

The main focus of this model is towards the removal of barriers not only within the learners, but also within the society to allow all learners to fully participate in the school community (Oliva, 2016). This requires health practitioners and teachers to change their attitude from believing that learners who experience barriers to learning should rather be placed in separate special education settings towards accommodating diverse learning needs in their classroom and providing collaborative support (Engelbrecht & Hay, 2018; Nel et al., 2016; Swart & Pettipher, 2016; Oswald, 2010). Collaborative support entails all role players in the education system working together in the learner support process towards a collective goal (Engelbrecht & Hay, 2018; Sanahuja-Gavald et al., 2016; Nel et al, 2014). According to Nel et al. (2014), these role players must comprise of the whole school community (including the School Management Team (SMT), School based Support Team (SBST), teachers and parents) as well as the school district (including the District Based Support Team (DBST) which comprises of psychologists, learning support teachers, experts on specific disabilities and other health and welfare professionals, curriculum and management specialists as well as administrative experts).

As the accommodation of diverse learning needs is the priority in an inclusive classroom, where a socio-ecological model is incorporated, it is important to understand what diversity entails and will be discussed next.

2.4.4. Conceptualising diversity amongst learners in the inclusive classroom

South Africa, as many countries internationally, has incorporated inclusive education as a reform that supports and welcomes diversity among all learners (Motitswe, 2017). Van Rooyen and De Beer (2011) assert that diversity refers to a wide range of capabilities, physical skills, and other characteristics that learners bring to the learning situation. Learner diversity in South African classrooms is also characterised by different learning needs which result from the presence of different races, cultures, languages, religions, abilities, socio-economic backgrounds, genders, as well as barriers to learning (Mudzingwa, 2019; Lebona, 2013; Engelbrecht & Green, 2007). According to research done by Inclusive Education South Africa (IESA) (2019), Mahlo (2017), Vandeyar (2010) and Meier and Hartell (2007), the management of diversity in the South African educational context appears to be very complex. The reason for this seems to be that there are many factors that influence how teachers respond to learner diversity. These factors include teachers' perceptions of inclusive education, diversity or differences amongst learners, the manner in which teachers implement inclusive pedagogy as well as the resources and support available to the teachers (Singh, 2004). Moreover, De Jager (2013) and Meier and Hartell (2007), affirm that the diversity of learners who experience barriers to learning poses many challenges for teachers in the South African classroom. The challenges might be that teachers do not fully understand the barriers to learning that the learners are experiencing; teachers are not adequately trained in inclusive pedagogy; and teachers need to accommodate learners in overcrowded classes with a lack of proper infrastructure, resources and support (Afungmeyu Abongdia et al., 2015).

Barriers to learning can refer to all the variables that make learning different or causes learning breakdown to occur for particular learners (Right to Education for Children with Disabilities (R2ECWD), 2018; Nel et al., 2016; Hays, 2010) (cf. 2.3). These barriers to learning can be grouped into intrinsic and extrinsic barriers (Falk, 2009). The origin of intrinsic barriers lies within the learners and include difficulties such as medical, organic and/or biological conditions and disabilities (Nel et al., 2016). Learners experiencing intrinsic barriers to learning can be born with a condition or disability, but it can also be the result of an illness or accident (Nel et al., 2016; Swart & Pettipher, 2016).

Extrinsic barriers are factors or conditions from outside the learner (Nel et al., 2016). These are, for example, socio-economic factors, poverty, lack of basic amenities and resources, language and cultural differences, as well as problems within the educational system itself, like an inflexible curriculum and learners not learning in their mother tongue (Nel et al., 2016; Swart & Pettipher, 2016) (cf. 2.4.3.). Very often learners can experience a combination of both intrinsic and extrinsic barriers to learning (Swart & Pettipher, 2016).

Furthermore, research indicates that teachers perceive large classes; a lack of parental support; insufficient training for teachers; lack of resources and infrastructure; and increasing conflict as well as social problems of the learners as catalysts for making teaching in diverse classrooms challenging (Mahlo, 2017; Khan et al., 2017). Increasing the challenge of dealing with diversity is that teachers are also expected to recognise the cogency of increased heterogeneity amongst learners, while at the same time adapt to constantly changing curricula and implement new educational legislations (Inclusive Education South Africa (IESA), 2019; Meier & Hartell, 2007). Meier and Hartell, (2007) emphasise that in order to achieve inclusion, it is important to reappraise personal and institutional ideologies as well as perceptions of learner diversity and inclusive education together with fostering the conviction and devotion to facilitate and manage learner diversity. Consequently, there is an increase pressure on teachers to respond to this increased diversity in their classrooms by providing accommodation through the adoption of an inclusive pedagogy (Mahlo, 2017; Florian, 2016; Singal, 2011) (cf. 2.4.5.1).

In the research of Inclusive Education South Africa (IESA) (2019) as well as Meier and Hartell (2007), it is mentioned that the belief of just simply opening schools to all does not inevitably ensure a reciprocal understanding and acceptance of diversity between teachers and learners. Moreover, a school for all also does not necessarily lead to an attitudinal change amongst teachers, but can instead initiate heightened tension and prejudice towards diversity amongst learners (Meier & Hartell, 2007). This could complicate the transformation to a fully inclusive school as in an inclusive education system, it is essential to respect and acknowledge learners' diversity in order to provide support and accommodate the unique learning needs of each learner (Oswald & De Villiers, 2013; Pather, 2011; Kozleski et al., 2007). Theron and Engelbrecht (2012)

highlight that if teachers are open and accepting of diversity in their classrooms, their learners could display a positive attitude towards learning and participating interactively with others in the same class.

The above discussion confirms that teaching in a diverse context involves much more than just regular teaching, but requires teachers who are equipped for teaching in diverse classrooms. Teachers need to have the ability to select the most appropriate teaching strategies and methods to convey subject content knowledge to the learners and, at the same time, address and accommodate diversity amongst learners, including learners experiencing barriers to learning (Van Rooyen & De Beer, 2011). However, in such an approach it is essential for teachers to create a network where learners, teachers, parents, and the wider community can collaborate to make teaching and learning for all possible (Nind & Lewthwaite, 2018; Florian, 2015; Spratt & Florian, 2013). Thus, for teachers to be fully prepared to take up their role in embracing diversity they need to be emotionally, morally, and intellectually ready to deal with inclusive education, addressing diverse learning needs and implementing a productive inclusive pedagogy (Motitswe, 2017; Savolainen et al., 2012). Ruzsnyak and Bertram (2013) assert that this will require teachers to have a special set of skills, knowledge and proficiencies. Teaching in a classroom with diverse learners is a complex endeavour, which means that teachers should be aware of learners' abilities and interests; the teachers needs to respond to diverse situations and accommodate learners experiencing barriers to learning through the application of different teaching strategies; and teachers need to know how to differentiate various types of activities in the classroom (Abd Rahman et al., 2010).

2.4.5.1. Inclusive pedagogy

2.4.5.1.1 What is an inclusive pedagogy?

Luckner and Pianta (2011) stated that the question concerning education on a global level is whether or not teachers will be able to effectively teach and provide quality inclusive education. According to Makoelle and Malindi (2015), multiple strategies and methods have been suggested for supporting and accommodating diversity amongst learners in the inclusive classroom. Some of these strategies include a more heuristic,

learner-centred and differentiated form of instruction (Lake, 2016). These types of methods contribute to learning processes by actively involving learners and focusing on accommodating the diverse learning needs and cognitive capabilities of all learners in the classroom (De Graaf et al., 2019).

Over the last few years, research about inclusive teaching methods has concentrated mainly on what strategies, methods, and assessment procedures will be beneficial to the development of an inclusive pedagogy (Nel & Nel, 2016; Makoelle & Malindi, 2015; Florian, 2009). As established in the previous section, diversity is a very broad concept, and it acknowledges the fact that learners are different and that these differences have to be considered very seriously when designing and developing learning tasks and lesson plans, especially in NS (Van Rooyen & De Beer, 2011). NS is regarded as one of the most difficult subject fields and wider research (like that of Mnguni, 2014) indicates that there are many different barriers to learning science. These barriers result from a variety of factors and may include barriers in the cognitive development of the learner; physical limitations to take part in practical science activities; financial limitations within the school context that can result in a lack of proper infrastructure and resources; as well as psycho-social barriers like a lack of motivation or a feeling of detachment due to the abstract nature of the subject material (Anon, 2020). Ineffective teaching by teachers are also regarded as a barrier, especially when teachers are more concerned with the content that they have to teach and do not focus on important aspect like how the content is being taught to learners (Wiysahnyuy, 2019).

Nind and Lewthwaite (2018) explain that an inclusive pedagogy shifts from the idea of viewing diversity amongst learners as a deficit towards acknowledging diversity in the inclusive classroom as an asset (cf. 2.4.3). Yet, in order to really utilise an inclusive pedagogy, teachers have to recognise that this pedagogy does not only involve techniques and methods. It requires interdependence between the teacher and the learners in the classroom, with a move away from predominantly focusing on the product or what can be measured, but also placing emphasis on the process of how learners construct knowledge and meaning (Nind & Lewthwaite, 2018; Bada, 2015).

Spratt and Florian (2013), as well as Florian and Linklater (2010), define an inclusive pedagogy as an approach to teaching and learning that supports teachers to respond to diversity amongst learners by using what is ordinarily available to accommodate all barriers to learning so that all learners can achieve, but avoids the marginalisation and individualisation that can occur when some learners are treated differently in the classroom. An inclusive pedagogical approach requires teachers to take responsibility for all the learners in the classroom. This entails that teachers look past the belief that barriers to learning originate within learners, and that additional opportunities should be provided for all learners. Teachers should rather seek approaches to provide a range of learning options for every learner in the class (Nind & Lewthwaite, 2018; Florian, 2015; Spratt & Florian, 2013).

South Africa has accepted inclusive education and has embraced the principles of inclusivity and human diversity as inclusive pedagogy is emphasised by the Department of Higher Education (DHET, 2015) as the fundamental approach in which pre-service teachers should be trained in. Pedagogical learning entails developing proficiency in wide-ranging pedagogical knowledge, which requires teacher to have knowledge and understanding of the *principles, practices and methods* used in teaching as well as knowledge of what diverse learning needs entail; how learning occurs; the curriculum; and general instructional and assessment strategies including specialised pedagogical content knowledge (DHET, 2015, p.10). The DHET (2015, p.10) clearly states that *“inclusive education forms an important aspect of both general pedagogical knowledge and specialised pedagogical content knowledge”*.

Figure 2.1 illustrates the difference between general pedagogical knowledge and specialised pedagogical content knowledge.

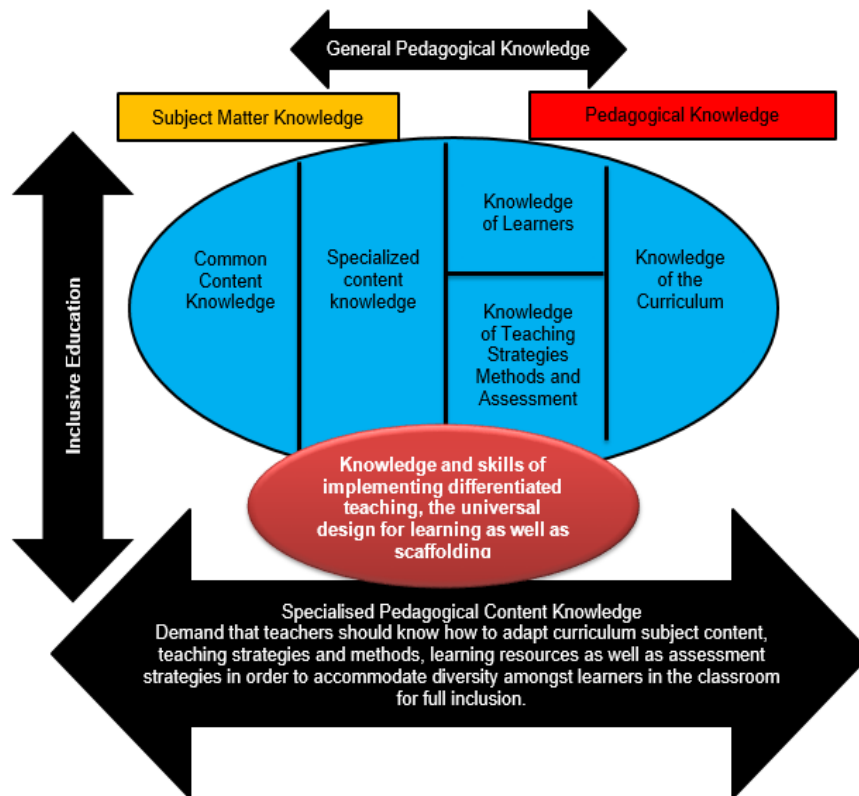


Figure 2.1: Distinction between general pedagogical knowledge and specialised pedagogical content knowledge (adapted from Hill et al., 2008; Ball et al., 2006; Shulman, 1986)

Based on Figure 2.1, it is evident that pre-service teachers should be trained to have a sound general pedagogical knowledge as it forms the foundation on which specialised pedagogical content knowledge will be built. In order to move from only having general pedagogical knowledge to specialised pedagogical content knowledge, addressing values and beliefs about inclusion which shape the teaching and learning environment; how to support all learners to achieve and reach their full potential; and how to prepare lessons that are accessible for diverse groups of learners is necessitated. As part of this specialised pedagogical content knowledge, teachers must gain an understanding of the implementation of differentiated instruction, the universal design for learning, as well as scaffolding as a manner to develop an inclusive pedagogy.

2.4.5.1.1.1 Differentiation instruction

According to Thakur (2014), the modern day classroom is required to become more inclusive in nature, fostering a positive teaching and learning atmosphere where teachers have the specialised pedagogical content knowledge that will enable them to teach a diverse group of learners. Differentiated instruction is regarded as a method that teachers use to accommodate each learner's learning style and instructional preferences. This method is one of the corner stones upon which teachers can create an inclusive classroom and build an inclusive pedagogy (Thakur, 2014). The instruction technique of differentiation is identified as a way in which diverse learner needs can be met in South African inclusive schools (Walton, 2016).

Creating a framework for differentiated instruction in the teaching and learning process calls for reform in the curriculum and the classroom. This includes teaching the same subject content to all learners by simply utilising a wide range of instructional strategies and methods, or it may oblige the teacher to teach subject content at fluctuating levels of difficulty based on factors such as learner ability, readiness and interest, etc. (Walton, 2016; Thakur, 2014; Shaw, 2013; DBE, 2011; Hall et al., 2001; DoE, 2001). The Curriculum and Assessment Policy Statement (CAPS) (DBE, 2011, p. 7) specifically states that "to address barriers in the classroom, teachers should use various curriculum differentiation strategies".

Dixon et al. (2014) explain that the goal of differentiating instruction is to optimise and capitalise on every learner's development and individual success by meeting each learner where he or she is and providing support in the learning process as needed. Implementing strategies of differentiation strive to turn away from teaching in the same way to the entire class but rather aims to identify, support, and accommodate the diverse needs of all learners through incorporating different practices of well planned, well-ordered, and flexible curriculum and teaching strategies (Thakur, 2014; Hall et al., 2001).

2.4.5.1.1.2 Universal Design for Learning (UDL)

The Universal Design for Learning (UDL) is an instrument for curriculum improvement that strives to provide every learner with opportunities to learn, regardless of their ability (Vitelli, 2015). Researchers like Nel et al. (2016) and Lorman et al. (2010) have indicated that UDL's goal is to entirely adjust to the interest, unique pace of learning, and abilities of each learner. UDL means that a teacher designs learning experiences in flexible ways like adapting learning content, teaching strategies, and forms of assessment to meet the needs of individual learners (Morin, 2019). Like differentiated instruction, UDL is recurrently emphasised as an educational methodology that facilitates inclusion and the development of an inclusive pedagogy in terms of developing many different ways to teach subject content (Morin, 2019; Nel et al., 2016; Vitelli, 2015).

2.4.5.1.1.3 Scaffolding

Vygotsky's theory of social constructivism gave rise to the theory of scaffolding that was developed by Bruner in 1976 (Wheeler, 2019). According to Wheeler (2019), Bruner postulated that when learners start learning concepts, the learning process should be facilitated by active support from teachers. Scaffolding in learning works on similar principles as scaffolds work in the construction business. After the foundation is laid, scaffolds are erected to provide support for further building to occur; once the building is able to carry and support its own weight, the scaffolds are systematically removed. Nel et al. (2016) explain that scaffolding in learning requires teachers to provide various forms of support to enable the learner to achieve and progress on their own.

As learners progress and become more independent in their learning, support can be gradually reduced (Wheeler, 2019). In many ways, scaffolding can be used as means to reduce the cognitive load on a learner that may become overwhelmed with the magnitude of subject content. With the use of scaffolding as a form of support, learners can become more focused on mainly gaining the skill or knowledge that is required of them at that specific point in time (Wheeler, 2019; Nel et al., 2016). Training pre-service teachers, and in the case of this study, NS pre-service teachers, to apply an inclusive

pedagogy could improve their knowledge and competencies to make informed decisions when they enter the inclusive classroom as well as provide them with the skill set to include all learners in every lesson (Spratt & Florian, 2013; Rusznyak & Bertram, 2013). However, the application of an inclusive pedagogy in the South African school curriculum has its challenges.

2.4.5.1.2 Challenges regarding the implementation of an inclusive pedagogy in the South African Curriculum

Over the last two-and-a-half decades South Africa has experience three school curriculum changes. The current curriculum, namely, the Curriculum and Assessment Policy Statement (CAPS), was implemented in 2012 as a means to address and rectify all the difficulties that were experienced by the preceding curriculums (Kileo, 2017). The CAPS document, which is based on inclusive education policies like EWP6, states that learners who experience barriers to learning must receive the required support to enable them to learn in mainstream classrooms (Wium & Louw, 2015; DoE, 2001a; DoE, 2001b). The objective of the CAPS curriculum is aimed at improving teaching and learning by identifying and addressing the various barriers or learning, and closing the gap between learners in under-resourced schools and those in well-resourced schools (Kileo, 2017; Wium & Louw, 2015).

Contrary to the above mentioned objective, various research done by Nel, (2018), Booysen (2018), Hodgson and Khumalo, (2016), Coetze, (2016), Payne-van Staden, (2015), Wium and Louw, (2015), as well as Mlambo, (2014) has shown that the current curriculum is not doing justice to the teachers and learners because it is too inflexible, content driven and too assessment - result oriented. In an article written by Coetze (2016) named *Five Reasons Why CAPS is Harming Our Children* she mentions the following five challenges that teachers are facing with the current curriculum:

- ***It is too content heavy:*** There is too much subject content placed into the curriculum, learners have limited time to generate a firm conceptual framework of the concepts taught causing them to only obtain superficial knowledge of subject content.

- ***There is no time for connotation:*** In the curriculum for most subjects the content topic does not chronologically follow each other, meaning that topics jump from one to the other leaving no time for learners to make associations.
- ***It is too rigid:*** The inflexibility of the current curriculum has taken away the professional initiative of many teachers. This means that teachers are inhibited from adapting and adjusting the content, teaching strategies and methods, assessment, and pace of learning to accommodate for the diverse learning needs of all learners in their classrooms.
- ***Learners are over-assessed:*** Test and exams as well as formal assessment are on the foreground in the curriculum making the curriculum more product focused than process focused. The focus is achievement, measurement and comparison of learner results.
- ***Are not producing thinkers:*** Teachers have no time to teach learners how to acquire knowledge through critical and creative thinking because they are rushed through the curriculum and have to keep to strict assessment schedules prescribed by the Department of Education.

As discussed in the preceding section (cf. 2.4.5.1.1) for teachers to utilise an inclusive pedagogy in the diverse context of teaching and learning it is important for the curriculum to be flexible (DBE, 2001). This means that the curriculum must be designed to accommodate individual learning needs of all learners in the classroom by providing the teacher with the opportunities and possibility to implement a variety of teaching, learning and assessment strategies as well as adapt the pace of learning in the classroom (Austin & Starkey, 2016; Nel et al., 2016). Van Rooyen and De Beer (2011) remark that it is important to provide an accessible curriculum; appropriate training for teachers and available information, environments and support to make sure that inclusive education becomes a reality in the South-African context.

2.4.5.2 Teaching NS inclusively

For the purpose of this study, NS is a broad term used to describe more specific Science disciplines and subjects, such as Life Sciences, Physical Sciences, Natural Science, Social Sciences and Geography. According to the CAPS (DBE, 2011, p. 8) Science are described as “a systematic way of looking for explanations and connecting

the ideas we have". In Science certain methods of inquiry and investigation are generally used. These methods lend themselves to replication and a systematic approach to scientific inquiry that attempts at objectivity. The methods include formulating hypotheses, and designing and carrying out experiments to test the hypotheses. Repeated investigations are undertaken, and the methods and results are carefully examined and debated before they are accepted as valid.

Teaching NS requires the careful selection of content, and use of a variety of approaches to teaching and learning (DBE, 2011). Importantly, from an inclusive education perspective, the emphasis of the NS CAPS is to promote understanding of the contribution of Science to social justice and societal development. Teaching NS should also emphasise the need for using scientific knowledge responsibly in the interest of individuals, of society and the environment as well as the practical and ethical consequences of decisions based on science (DBE, 2011; De Boer, 2000). Moreover, the CAPS, focusing on NS education, asserts that it must: *"prepare(s) learners for active participation in a democratic society that values human rights and promotes responsibility towards the environment"* (DBE, 2011, p. 9).

However, Fiksl et al. (2017), as well as Van Rooyen and De Beer (2011), declare that NS teachers are faced with the difficult task of adapting to dealing with diversity amongst learners in the classroom like all other teachers. Research done by Bantwini (2017) and Beni et al. (2012) has revealed that teachers in most NS classrooms use pedagogical approaches that promote exclusion instead of inclusion because they are reluctant to introduce new methods of instruction. NS teachers seem to mainly use teacher-centred teaching strategies like teaching from the textbook and do not implement active learning strategies that accommodates more diverse learners in the classroom (Lombard, 2015).

In order to provide adequate inclusive teaching and learning experiences in a classroom, it is important for the NS teacher to consider and create learner motivation, a warm and inviting classroom climate, as well as include all learners in the teaching and learning process (Fiksl et al., 2017; Van Rooyen & De Beer, 2011). Furthermore, NS teachers should place emphasis on identifying and then reducing the barriers to learning and participation in their classrooms (Van Rooyen & De Beer, 2011).

Earlier research done by Ruiz-Gallardo et al. (2009) indicates that there was a tendency in many NS classes to create few opportunities for learners to reflect on learning, or where teaching did not foster proficient critical skills and the application of learning in practice was not always evident. NS teachers have only more recently started to implement more active learner participation in the learning process (Reuell, 2019).

As the same diversity exists in NS classes as discussed in paragraphs 2.4.1 to 2.4.5.1, teaching approaches used in NS should also be learner-centred in order to promote active and productive learning in the classrooms and laboratories, where all learners must engage in realistic learning processes. This includes cooperative learning, group work, practical work, research investigations, and experiential learning strategies (Candrasekaran, 2014; Van Rooyen & De Beer, 2011; Magano, 2009). Van Rooyen and De Beer (2011) further assert that a collaborative approach between learners, parents, teachers, and community members can strengthen participation in a more inclusive classroom.

Research done by Candrasekaran (2014) has shown that learner-centred, indirect teaching strategies and methods promote a better comprehension of NS content and increases higher order and critical thinking while the traditional teacher-centred, direct teaching strategies and methods do the opposite. Indirect teaching strategies move away from the notion that teachers should fulfil the predominant role of conveying knowledge in the classroom, but advocate that learners should construct their own knowledge with the facilitation of the teacher.

When learners are able to follow the process to construct their own knowledge, they should develop better critical thinking skills and understanding of the content instead of just accepting knowledge that the teacher conveys to them (Lombaard, 2015; Goldberg & Ingram, 2011). Candrasekaran's (2014) study also reveals that there was a smaller difference in achievement between higher achievers and lower achievers when taught in a learner-centred manner.

Thus, a learner-centred, inclusive pedagogy can ensure that all learners in the NS class “consciously”, “actively”, and “comprehensively” learn the contents and reach the outcomes, while developing the necessary skills for NS (Fiksl et al., 2017).

2.5 Challenges for the successful implementation of inclusive education

As highlighted throughout the previous discussion in an integrated manner, research has identified many challenges in the South Africa education system that seem to hinder the provision of quality inclusive education to all learners (e.g. Donohue & Bornman, 2014). Some of these challenges include prevailing negative attitudes and discrimination towards difference and learners who experience barriers to learning; inadequate resources and infrastructure; inadequate teacher training programmes; inflexible curriculum; lack of funding; and an absence of enabling legislation (Donohue & Bornman, 2014; Engelbrecht, 2006) (cf. 2.4.4. & 2.4.5.1.2).

In the above section, inclusive education was clarified by discussing what it means and what it entails. The aim was to create a general understanding of the principles and practices that underpin inclusive education, as well as what teaching strategies support an inclusive pedagogy. This section also highlighted different aspects that should possibly be considered and addressed in a teacher education for inclusion programme, especially for pre-service teachers that major in the field of NS. In the next section, the focus will shift to a discussion on pre-service teacher education, which is the primary focus of this research.

2.6. Initial teacher education (ITE)

Initial teacher education (ITE) can be defined as nationally accredited training programmes or courses that are presented at HEIs before the commencement of duty as a full-time teacher (Musset, 2009). Pre-service teachers, including in the NS field, can be described as individuals entering the education and training phase at tertiary institutions for a number of years in order to gain competencies related to the field of education with the expectation of entering the teaching profession (EADSNE, 2015; Russell & Martin, 2015; Musset, 2009).

Such training entails the acquisition, integration, and application of different types of knowledge and practices (cf. Figure 2.2) that will enable pre-service teachers to become proficient in their chosen profession (DHET, 2015). Competent learning for pre-service teachers will involve them obtaining a mixture of theoretical and practical knowledge (Khan, 2017; DHET, 2015). Moreover, in order for pre-service teachers to develop the skills, experience and confidence to teach inclusively for all learners, they need to be educated in the theory and practice of inclusive education during initial teacher preparation (Graham & Scott, 2016). Thus, ITE programmes have the main responsibility to ensure that pre-service teachers are well prepared to accommodate diverse learners in mainstream classrooms (Winter, 2006).

Kaplan and Lewis (2013) assert that the theory relating to teaching and learning should provide the overall framework or approach to teaching, which includes specific subject content knowledge, pedagogy, methodology and didactics, strategies as well as assessment processes. Hence, a pre-service teacher should complete various theoretical modules that address how teaching and learning is comprehended, systematised, and implemented (Kwenda et al., 2017). Figure 2.2 was designed by Van Rooyen and De Beer (2011) to indicate what type of knowledge should be in the repertoire in the training of an effective teacher.

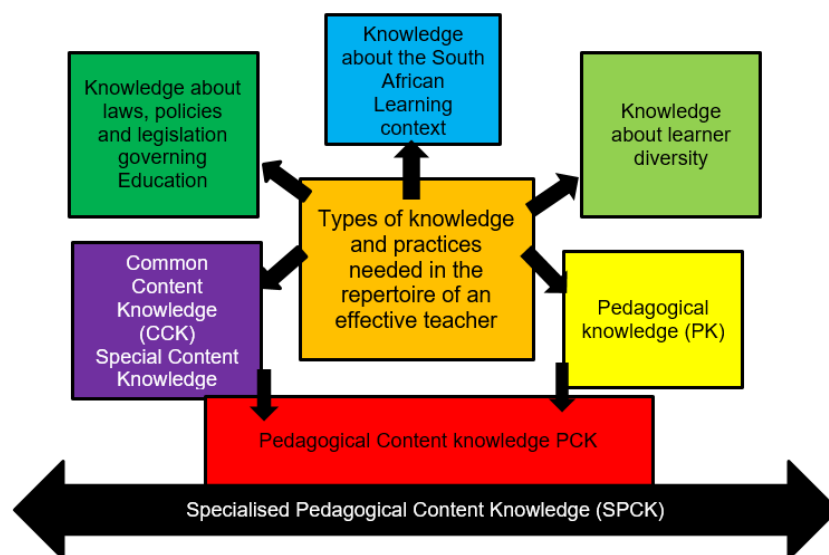


Figure 2.2: Types of knowledge and practices needed in the repertoire of an effective teacher (adapted from Van Rooyen & De Beer, 2011).

In addition, knowledge about policies and legislation governing education, including those that ensure that the human rights of all learners are protected, is of utmost importance in order to be a successful teacher (Pillay, 2014).

Due to the diversity (cf. 2.4.4) in South African society it is also important for pre-service teachers to know and understand what the typical learning context in South African schools and classrooms looks like, how it functions, and how the line of reporting works (Kimathi & Rusznyak, 2018; Nel, 2018). Developing a deep knowledge of chosen content areas is essential (UNESCO, 2018). In the South African context, teachers from Intermediate Phase up to Further Education and Training Phase (Gr 4-12) have to choose at least two content areas or subjects in which they major. Research done in South Africa has shown that when learners are taught by teachers with a more advanced knowledge in the subject content, the learners' attainment also significantly increased (UNESCO, 2018). Pedagogical knowledge entails developing expertise in the principles, practices, and methods used in teaching like different teaching strategies and assessment practices (DHET, 2015). Combining pedagogical knowledge with knowledge about learner diversity and barriers to learning, classroom management as well as content knowledge will lead to the development of proficient pedagogical content knowledge (UNESCO, 2018; Van Rooyen & De Beer, 2011). Special pedagogical content knowledge enables teachers to know "*how to organize and present the content in a way that makes it accessible for increasingly diverse groups of learners*" (UNESCO, 2018, p. 1). The specific competencies required by the South African Minimum Requirements for Teacher Education Qualifications (MRTEQ) policy for pre-service teacher education programmes will be dealt with in more detail in paragraph 2.6.3.2.

Work Integrated Learning (WIL), which involves learning from practice, also called *field experience*, is another key component needed to adequately prepare pre-service teachers (Russell & Martin, 2015; DHET, 2015). Learning from practice requires pre-service teachers to use "*discursive resources to analyse different practices across a variety of contexts, drawing from case studies, video records, lesson observations, etc., in order to theorise practice and form a basis for learning in practice*" (DHET, 2015, p. 10). However, this needs to be guided and supervised (Russell & Martin, 2015; DHET, 2015). WIL can be seen in the same light as internships, a period in which pre-

service teachers are required to go into the schools and classrooms to observe and practice actual teaching (UNESCO, 2018). This is necessary to gradually introduce pre-service teachers into the role of the professional teacher through the assistance of mentor teachers (Khan, 2017). The role of the mentor teachers is to provide support and counsel to pre-service teachers encouraging the pre-service teacher to gain more experience in teaching skills, classroom management, and disciplinary procedures (Khan, 2017; Kaplan & Lewis, 2013).

2.6.2 Theoretical framework for ITE

The same theories used to explain the learning processes of learners in a school system, can also apply to learning of pre-service teachers in their initial teacher training programmes. Since the constructivist theory, as well as Bronfenbrenner's Bio-ecological model, appear to be the predominant theories influencing inclusive education, as well as pre-service teacher education programmes in South Africa currently (Nel, 2015), they will be discussed in more detail. This will be done in the context of pre-service teachers and what may influence their learning or preparation in their initial teacher training programmes.

2.6.2.1 The constructivist theory

The constructivist theory was generated on the basis of Dewey's (1916), Piaget's (1973), and Vygotsky's (1978) cognitive theories (Suhendi & Purwarno, 2018). The social constructivist theory proclaims that knowledge and learning thereof is an active and constructive process (Nel et al., 2016). Knowledge is therefore not something that is simply passed from one person to the next, but it is constructed. This constructed knowledge is influenced by personal experiences and assumptions of the environment and is consequently closely linked to a person's social, historical, and cultural context as well as lived social experiences (Powell & Cody, 2009). Each person has a different interpretation and construction of the knowledge process, which needs to be taken into consideration while teaching (Powell & Cody, 2009).

It is important for teacher educators and developers of ITE programmes for inclusion to take this theory into consideration (Pantić & Florian, 2015). As asserted by Nel et al. (2016) and Forlin (2010), pre-service teachers are not only blank slates who should be filled with knowledge about inclusive education; they bring past experiences, cultural factors, personal beliefs, moral principles and values to the learning situation that might influence their attitude towards inclusive education (Forlin, 2010).

Consequently, when pre-service teachers are actively and collaboratively involved in developing their knowledge about inclusion by allowing them to voice their opinions and concerns, it could assist in better preparing them to cope with diversity amongst learners in the inclusive classroom (Nel et al., 2016). Figure 2.3 represents the interaction between pre-service teachers in their individual contexts and teacher educators as facilitators in order to socially co-construct knowledge about inclusive education.

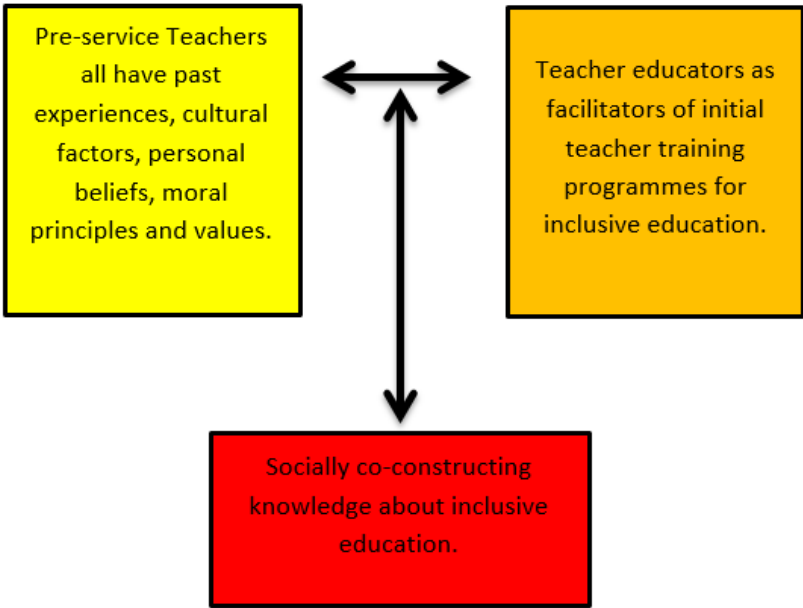


Figure 2.3: The constructivist theory in context of pre-service teachers' training for inclusive education

2.6.2.2 Bronfenbrenner's bio-ecological systems theory

Bronfenbrenner's bio-ecological systems theory is an example of a theory that explains the multi-dimensional nature of human development (Swart & Pettipher, 2016; Nel et al., 2016; Bronfenbrenner & Morris, 2006). Taylor and Gebre (2016) indicate that the bio-ecological systems theory suggests that there are levels of interacting systems, environments or contexts, in every human's life that brings forth change, growth, and development. The interactive nature of this system proposes that what happens in one system affects and is affected by other systems (Bronfenbrenner & Morris, 2006). These various systems in society can include classrooms, schools or tertiary institution, communities, and government that should all work together and assist in the successful implementation of inclusive education (Nel et al., 2016).

According to Taylor and Gebre (2016), one of the major challenges lies in understanding the complexity of the impacts, connections, and interrelationships between the pre-service teacher and the numerous other systems he/she is connected to, because they are not isolated from all the other systems that surround them. These systems pre-service teachers are connected to may include their home life, the schools and learners, the tertiary institutions, the ITE programmes, their communities, and the broader South African context in which they are going to teach. Pre-service teachers in conjunction with role players such as teacher educators, ITE programmes, tertiary institutions, schools, learners, and the education department, determine their successful training for inclusive education (Swart & Pettipher, 2016; Nel et al., 2016). To better understand this, it is important to elucidate on Bronfenbrenner's five nested systems, which are constantly interacting with one another (Bronfenbrenner & Morris, 2006).

The *microsystem* is characterised by individuals and events that directly affect and impact those persons' daily experiences (Walker, 2013; Donald et al., 2010). For example, for pre-service teachers this could be their interaction with their families, teacher educators, their ITE programmes and tertiary institution, as well as the schools where they do practical teaching.

The *mesosystem* is a system of microsystems that are constantly interacting and communicating with one another (Walker, 2013; Donald et al., 2010). This can include the teacher educators, ITE programmes, school curriculums, and school systems that interact and collaborate with each other to help the pre-service teachers construct knowledge and skills in teaching.

The *macrosystem* refers to the broader attitudes, beliefs, values and ideologies within the systems of a society and culture which may be influenced by other systems (Donald et al., 2010; Bronfenbrenner & Morris, 2006). This could represent the democratic beliefs and values in our society, an education approach (such as inclusive education), as well as policies and legalisation that influence how pre-service teachers develop as teachers.

The *exosystem* refers to environments in which the person is not directly involved, but there is still an influence on other microsystems that the person is involved with (Nel et al., 2016; Walker, 2013; Donald et al., 2010). For example, policy and curriculum changes influences the training of pre-service teachers. When policies in the education sector evolve and change, like a new or amended MRTEQ document is developed or a new school curriculum is implanted, it will influence their teaching because they will have to be trained to adhere to new policies set by the South African Government.

The *chronosystem* refers to the developmental time frame through which interactions between the systems occur and how it affects the person (Walker, 2013). For example, exploring the question of how do pre-service teachers develop over the four-year period for them to become successful inclusive teachers?

Figure 2.4 is a visual representation of Bronfenbrenner's bio-ecological systems theory adapted from Donald et al. (2010). Figure 2.4 illustrates the interactions between all the above-mentioned systems with specific reference to the context in which pre-service teachers are trained for inclusive education.

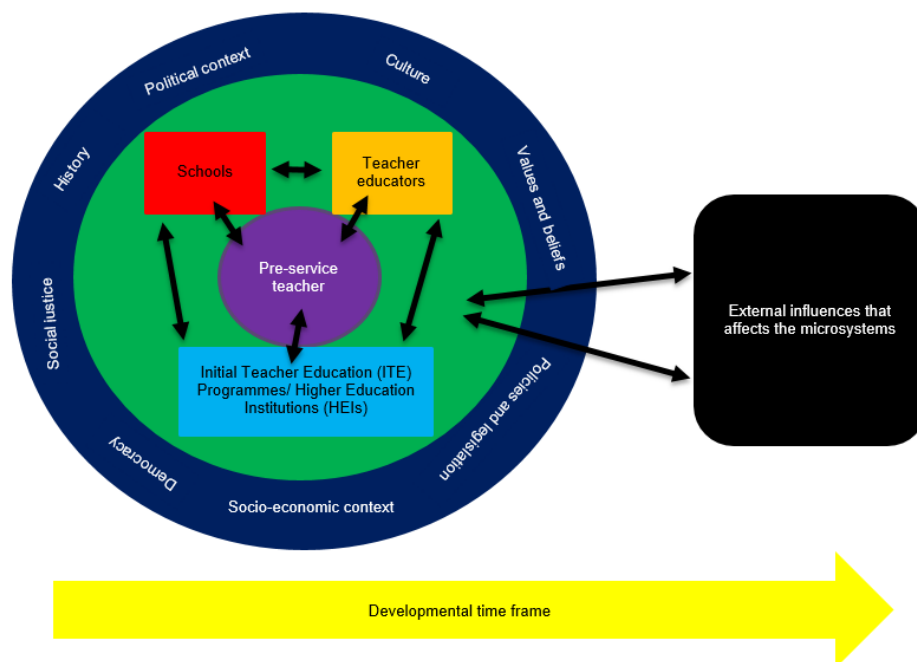


Figure 2.4: Bronfenbrenner's bio-ecological systems theory in context of pre-service teachers' training for inclusive education (adapted from Donald et al., 2010).

Walker (2013) states that ITE programmes for inclusive education can have either a positive or negative impact on the pre-service teachers' perceptions and experiences of inclusive education and thus affect the type of inclusive teachers they will be in practice. Well-designed ITE programmes that offer sufficient training in inclusive education and prepares teacher to teach learners with diverse learning needs will empower the pre-service to teach more effectively in the South African context. However, ITE programmes that do not adequately prepare pre-service teachers for inclusive education and accommodation of diverse learning needs in the classroom will limit pre-service teachers' ability to cope with the demands of teaching in the South African context. Therefore, it is also important to elucidate what is required in a teacher education for inclusion programme both internationally and nationally, in order for HEI to develop teachers that have the ability to teach in an inclusive education system.

2.6.3 Teacher education for inclusion

2.6.3.1 International context

The drive to a more inclusive education system with classrooms that contain more diverse learners from different backgrounds and with diverse levels of ability and disability, impacted on existing educational theories and practices (Polirstok, 2015). The above-mentioned movement ultimately required teachers to obtain new knowledge and skills (European Agency for Development in Special Needs Education (EADSNE), 2012; Kim, 2011; Sosu et al., 2010; Forlin, 2010). This resulted in an international consensus that there is a need to transform teacher education programmes (Arthur-Kelly et al., 2013; EADSNE, 2012; Kim, 2011). However, promoting inclusive education through ITE programmes seems to remain challenging throughout the world (Ball & Tyson, 2011).

Naturally, ITE programmes differ greatly internationally with regard to governing policies and legislations, the length of courses (ranging from three to six years) as well as the contents and structure of the curriculum (the theoretical content modules, pedagogy and practical experience that are offered) (Walton, 2017; EADSNE, 2015) (cf. 2.5.1). The European Agency for Development in Special Needs Education (EADSNE) (2015) and Kim (2011) (cf. 2.5.1.1) report that across the world many ITE programmes offer a number of modules relating to inclusive education and special need education in addition to other core modules (including subject majors like those in NS). In many instances, pre-service teachers can choose optional modules in inclusive education or do extra courses offered by special education institutes or training organisations (EADSNE, 2015). It seems, on the other hand, that in these programmes the focus of inclusive education subjects or courses is primarily on knowledge and training with regards to specific disabilities, their causes, and the support thereof (Arthur-Kelly et al., 2013). Other ITE programmes offer modules that include and integrate aspects of inclusive and special needs education, as well as practical field experience with learners who experience barriers to learning (Kim, 2011). Differentiated instruction, UDL and scaffolding (cf. 2.4.5.1.1.1; 2.4.5.1.1.2 & 2.4.5.1.1.3) are taught as a key strategy in these courses (Arthur-Kelly et al., 2013). In some ITE programmes, pre-service teachers are offered courses as a dual certification

(a combination of standalone modules and combined modules) (Kim, 2011).

A plethora of research about ITE programmes (for example, EADSNE, 2015; Arthur-Kelly et al., 2013; Young & Florian, 2013; Lambe, 2011; Kim, 2011; Sosu et al., 2010) assert that in order for teacher education to fully prepare pre-service teachers for inclusive education, the central objective of ITE programmes should be to establish and ascertain that all pre-service teachers possess the attitudes, knowledge, skills, understanding and values, as competencies to support diversity and meet individual learner needs in the classroom. Thus, pre-service teachers must be prepared to provide instruction and assessment modifications to support diverse learners, as well as be able to collaborate effectively with others in order to share knowledge and successful pedagogical approaches (EADSNE, 2015; Arthur-Kelly et al., 2013; Kim, 2011).

As the implementation of inclusive education is still in the developmental phase in most countries (including South Africa), ITE programme developers are constantly exploring ways to make inclusive education courses more effective by doing research on what components are needed for a successful approach towards addressing inclusive education in teacher preparation courses (Sosu et al., 2010). Conversely, EADSNE (2012) and Sosu et al., (2010), emphasise that such an ITE programme should have a more balanced focus between theory and practice, including presenting teaching as a *problem-solving* or *research-in-action* activity that is linked more to the learning and progress of all learners.

2.6.3.2 South African ITE context

Walton and Rusznyak (2017) state that in relation to the international context, South Africa is relatively late in transforming their teacher education for an inclusive education approach. The immediate impact of the transformation to inclusive education was more focused on changing and adapting the practice of in-service teachers than on that of pre-service teacher education (Walton and Rusznyak, 2017; Nel et al., 2016; Lebona, 2013; Wildeman & Nomdo, 2007; Persence, 2006). After the introduction of the EWP6, the DoE embarked on presenting workshops and courses to in-service teachers, in an attempt to capacitate them for inclusive practices (Eloff & Kgwete, 2007).

Nevertheless, this attempt was not deemed as very successful as a consequence of factors such as teachers' negative attitudes, lack of resources in schools, uncertainties of roles in support positions, and inadequately developed support services (Eloff & Kgwete, 2007) (cf. 1.1).

Engelbrecht (2013), as well as Oswald and Swart (2011), emphasise that before 1994 teacher education programmes in South Africa followed a dual-system approach, where training of pre-service teachers consisted of mainstream and special education. Pre-service teachers were trained in mainstream teaching, but if they wanted to teach in special education they needed an additional qualification (Walton, 2011) (cf. 1.1). As a result, most teachers trained before the introduction of EWP6 did not have adequate exposure to inclusive education or dealt with barriers to learning in their mainstream classrooms during their formative training years (Schäfer & Wilmot, 2012; Oswald & Swart, 2011). The South African Norms and Standards for Educators (NSE) (2000) was the first policy document that set out the terms and conditions in terms of academic qualifications for teachers in the new democratic South Africa. This policy document asserted that teachers must be competent in responding to diversity and democracy in various ways. However, since EWP6 was only published in 2001, the NSE did not specifically make provision for the training of teachers for inclusive education (Nel et al, 2019; Schäfer & Wilmot, 2012; Oswald & Swart, 2011) (cf. 1.1).

The adaptation of ITE programmes to train pre-service teachers on inclusive education only became a priority much later with the introduction of the Minimum Requirements for Teacher Education Qualifications (MRTEQ) (DHET, 2011), as well as the revised MRTEQ (DHET, 2015). The MRTEQ (DHET, 2015, 2011) was developed to replace the NSE and stipulates that pre-service teachers should develop competence to teach in an inclusive education environment and accommodate diverse learning needs in one classroom. The MRTEQ (2015, p. 64) includes the following competencies as part of the preparation of pre-service teachers for inclusion. Pre-service teachers must:

- have sound subject knowledge;
- know how to teach their subject(s) and how to select, determine the sequence and pace of content in accordance with both subject and learner needs;

- know who their learners are and how they learn; they must understand their individual needs and tailor their teaching accordingly;
- know how to communicate effectively in general, as well as in relation to their subject(s), in order to mediate learning;
- be knowledgeable about the school curriculum and be able to unpack its specialised content, as well as being able to use available resources appropriately, so as to plan and design suitable learning programmes;
- understand diversity in the South African context in order to teach in a manner that includes all learners. They must also be able to identify learning or social problems and work in partnership with professional service providers to address these;
- be able to manage classrooms effectively across diverse contexts in order to ensure a conducive learning environment;
- be able to assess learners in reliable and varied ways, as well as being able to use the results of assessment to improve teaching and learning; and
- be able to reflect critically on their own practice, in theoretically informed ways and in conjunction with their professional community of colleagues in order to constantly improve and adapt to evolving circumstances.

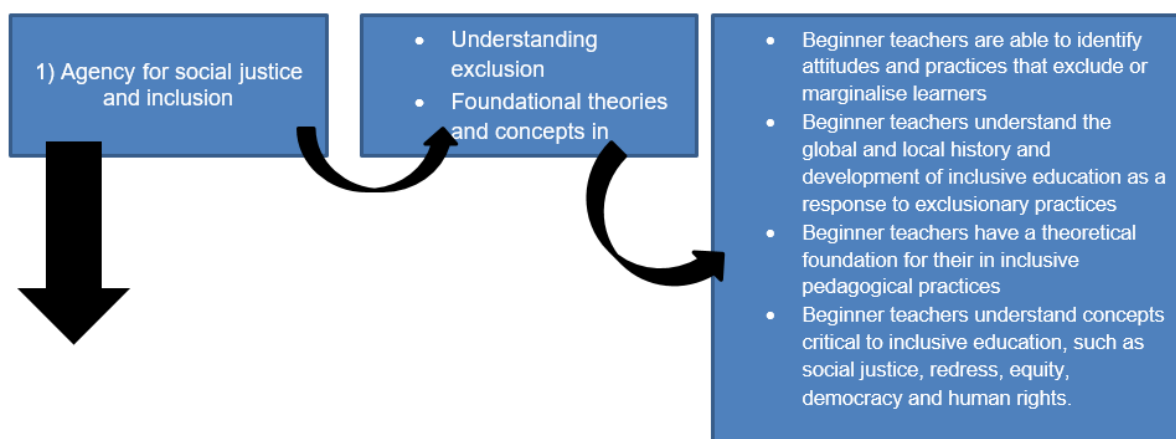
The South-African MRTEQ (DHET, 2015) (cf. 2.5.3.2) also emphasises various principles that should be incorporated in the design for ITE programmes. The principles concentrate on different types of knowledge that form the foundation of teachers' practice. This knowledge is condensed in the view of integrated and applied knowledge, which encompasses, what should be learned and how should it be incorporated in ITE programmes. The different types of learning that direct the attainment of integrated and applied knowledge include disciplinary learning, pedagogical learning, practical learning, fundamental learning, and situational learning (DHET, 2015; Rousseau, 2014). These types of learning directly link to the specific knowledge that pre-service teachers must be exposed to as described in paragraph 2.6.1.

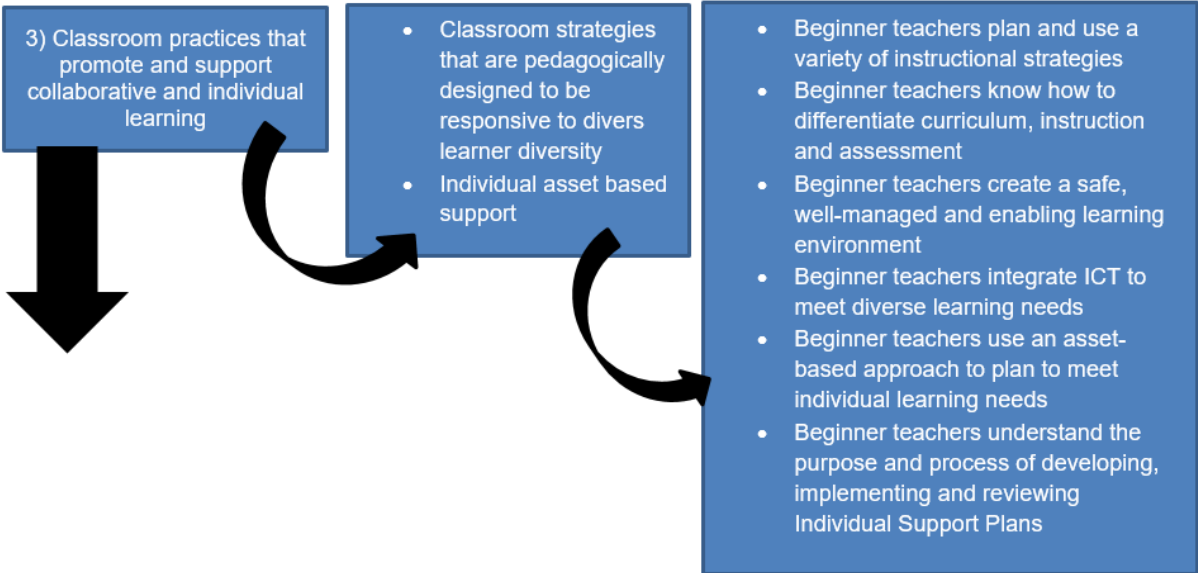
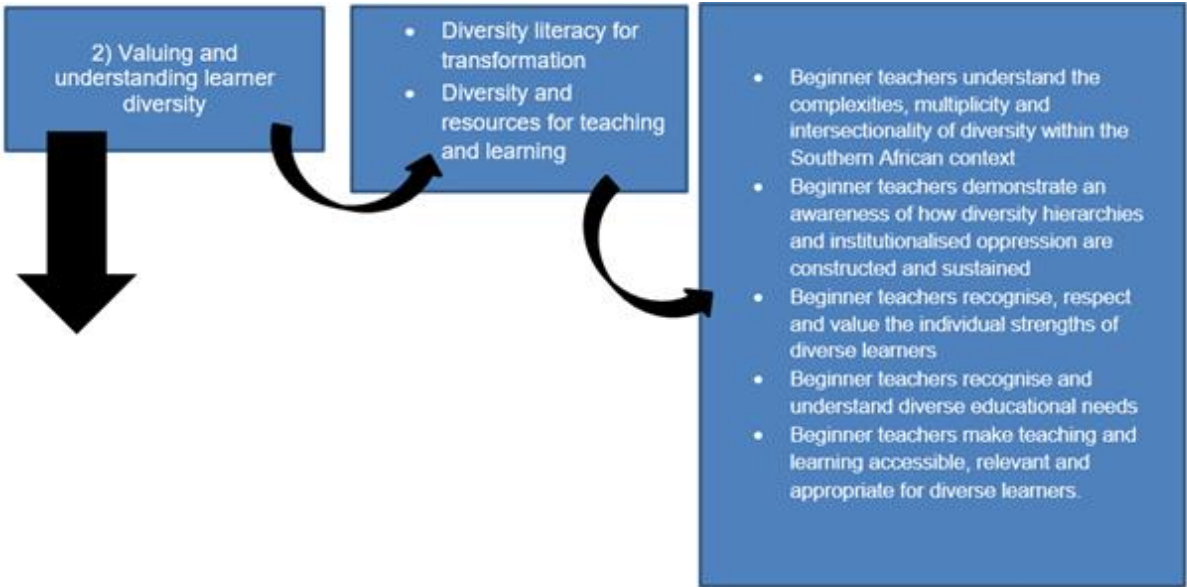
After the introduction of the MRTEQ, it was required that all teacher education programmes be revised and courses to be developed where an understanding of the complex and differentiated nature of South African society, as well as the ability to work

effectively with diverse challenges experienced by learners in schools and communities are addressed (Nel et al., 2019; Walton & Rusznyak, 2017; Walton, 2017; DHET, 2015). Consequently, many ITE programmes in South Africa are currently developing modules specifically focused on inclusive education in their curriculums (Walton, 2017). In addition, Walton and Rusznyak (2017) also highlight the fact that the policy does not only require pre-service teachers to be able to recognise learning and social difficulties, but they should also be able to work collaboratively with professional service providers to address challenges.

In an effort to adequately address challenges and enhance ITE programs towards effectively preparing pre-service teachers for the requirements for inclusive education, a group of researchers came together to develop a draft version of teaching standards for inclusive teaching for beginner teachers (DHET, 2017 & Beere et al., 2017). These teaching standards are guided by a group of five main dimensions of inclusive teaching; these are divided into sub-dimensions and elaborated on in the form of beginner teacher standards.

Figure 2.5 provide an overview of the dimensions and standards that are in the drafting stages.





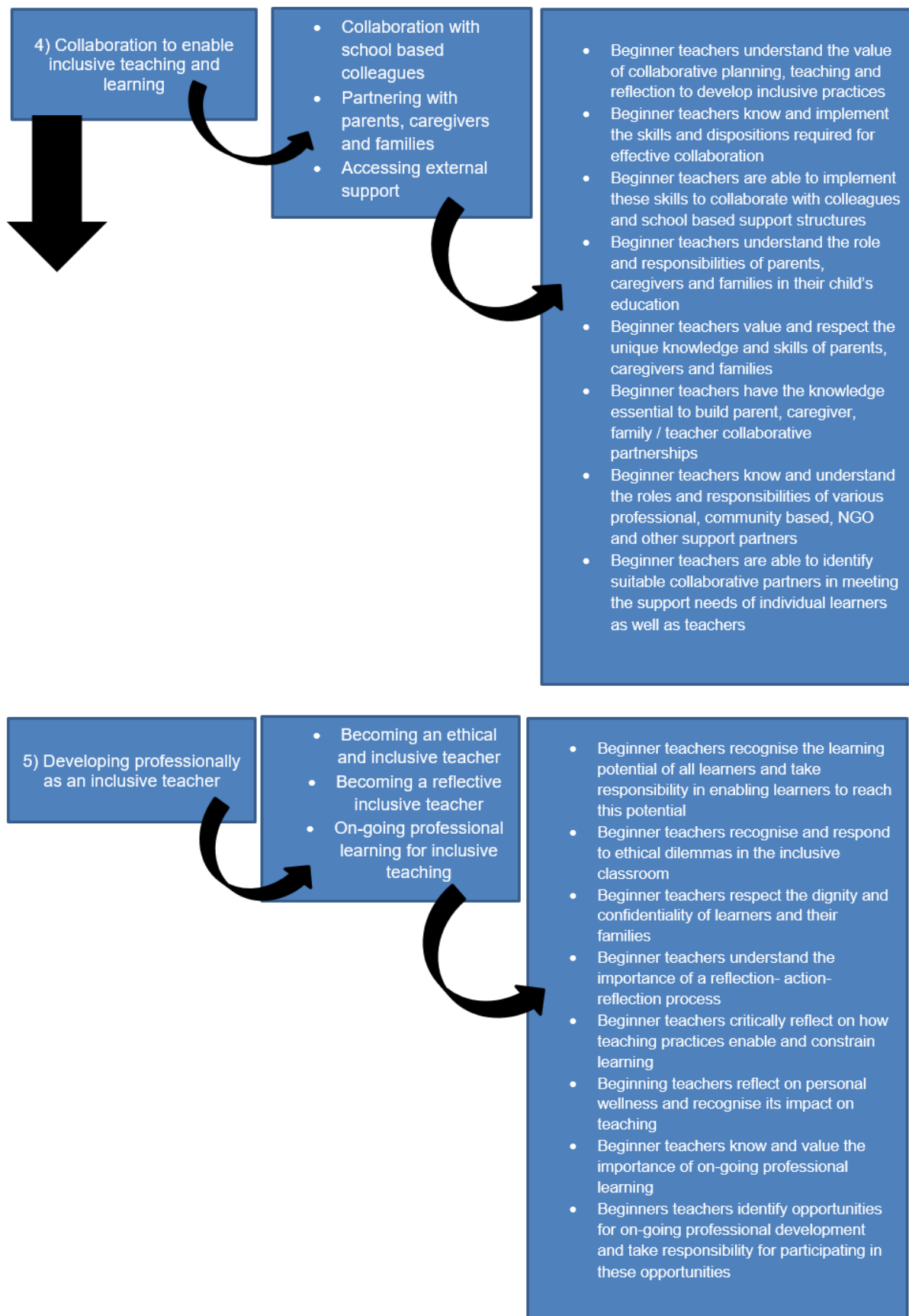


Figure 2.5: Teaching standards for inclusive teaching for beginner teachers (adapted from DHET, 2017 and Beere et al., 2017).

2.7 Teacher education for inclusion: Challenges

Engelbrecht (2013) asserts that the conceptual and philosophical challenges in developing pre-service teachers' competencies in inclusive education within suitable teacher education programmes are a concern not just on national level, but also internationally. One explanation for this concern might be because the ideology of separate special education is still very dominant in ways of thinking and practice (O'Neill et al., 2009). Jordan et al. (2008) state that amongst many teachers there is still a popular belief that inclusion of learners who experience barriers to learning in classrooms is a policy destined to be unsuccessful. One of the major concerns that support the existence of the above-mentioned belief is that teachers are not sufficiently trained to deliver specialised instruction that is demanded when teaching diverse learners with diverse learning needs (Nel et al., 2019; Nel et al., 2016; Makhalemele & Nel, 2016; Walton, 2015; Spratt & Florian, 2013; Bornman & Donohue, 2013; Florian, 2009; Jordan et al., 2008).

According to Forlin (2010), the movement towards a more inclusive education system places the onus on teacher education programmes to act as an enabling mechanism that fully prepares pre-service teachers to teach effectively in an inclusive classroom. However, for many years, training institutions internationally have been disenabling the successful implementation of inclusive education because of their slow reform processes in their ITE process (Majoko & Phasha, 2018; Forlin, 2010). The reason for this can be found in that many teacher education programmes still do not include training with regard to inclusive education or they have out-dated and poorly designed preparation programmes. The poorly designed programmes appear not to focus on preparing pre-service teachers for a deeper understanding of inclusive education and diversity because they offer it as an add-on to the existing courses presented in HEI and are not integrated into the whole programme (Nel et al., 2019; Majoko & Phasha, 2018; Walton & Rusznyak, 2017; Engelbrecht et al., 2015; Malak, 2013; Hemmings & Woodcock, 2011) (cf. 2.5.3.1). Practices like this can have a negative impact on pre-service teachers, because they can reinforce the stereotyping of differences amongst learners and reduce the pre-service teachers' knowledge and skills on inclusion (EADSNE, 2015).

The training and enablement of pre-service teachers, aimed at helping them to identify and effectively teach and support diversity amongst learners are viewed as the most important challenges to overcome in the South African education system (Walton & Rusznyak, 2019; Sharma et al., 2006; Prinsloo, 2001). Research done by Nel et al. (2019), Walton & Rusznyak, (2019), Walton (2017), Kurniawati et al. (2014), Florian and Spratt (2013), Forlin (2010) and Jordan et al. (2008) have shown that some pre-service teachers, including those in South African tertiary institutions, feel that their training relating to inclusive education does not sufficiently prepare them for the practice. They predominantly indicated that they feel that they are inadequately trained and do not have the specialised knowledge and practical skills to provide support to learners who experience barriers to learning, as well as accommodate diversity in the inclusive classroom. According to Walton and Rusznyak (2017), as well as Oswald and Swart (2011), the extent to which South African teacher education programmes have been successful in effectively preparing pre-service teachers for inclusive education and dealing with diverse needs is questionable.

Preparing teachers for inclusive education requires that pre-service teachers should gain theoretical knowledge and practical experience in terms of inclusive education (Nel et al., 2019; Majoko & Phasha, 2018; Walton 2017; DHET, 2015; Forlin, 2010). Engelbrecht (2013) and Forlin (2010) also confirm that pre-service teachers should develop competencies relating to positive values, supporting all learners, high moral principles, working with others and accepting their responsibilities for further personal and professional development to assist them in providing education for all learners. These essential values and competencies must be developed in all teacher education for inclusion programmes (Engelbrecht, 2013; Savolainen et al., 2011) (cf. 2.5.3.1). However, Chataika et al. (2012) have found that as a result of poor training many pre-service teachers are not developing appropriate values and competencies.

The degree to which teacher education programmes address the requirements of preparing pre-service teachers adequately for the implementation of inclusive teaching methods, strategies and assessment, while also focusing on preparing them for the uncertainties they might face as teachers, will directly influence their ability to effectively adapt and teach diverse learner needs in the inclusive classrooms (Oswald

& Swart, 2011; Sosu et al., 2010; Gravett & De Beer, 2010). If pre-service teachers are not adequately trained for inclusive education, they could foster negative attitudes towards including learners experiencing barriers to learning in their classrooms (EADSNE, 2015). Forlin (2010) and Sosu et al. (2010) highlight that teacher education programmes should provide pre-service teachers with a holistic view of diversity and equip them with co-constructed, specialised pedagogical content knowledge and support skills in order for them to develop inclusive pedagogies. However, from a study conducted by Engelbrecht et al. (2017) it is evident that teachers are not adequately trained to implement inclusive pedagogical methods.

Moreover, in recent research it was found that pre-service teachers experience a theory-practice gap as soon as they enter the practice (Walton & Rusznyak, 2019; Nel et al., 2019; Majoko & Phasha, 2018; Kwenda et al., 2017; McGarr et al., 2017; Kinyaduka, 2017). De Coninck et al. (2019), as well as McGarr et al. (2017), explain that this gap refers to the inconsistency and detachment pre-service teachers experience between the theory they were taught in their teacher preparation programme and their practical experiences as professionals. Teacher education programmes have been blamed for not adequately preparing pre-service teachers for the world of work (Petersen, 2017; Allen, 2009). Studies have also shown that many pre-service teachers entering the teaching practice are “told to forget everything they have been taught at the university, and they usually complain that field is the most difficult part of the training process” (Kinyaduka, 2017). What is also evident in research is that pre-service teacher preparation programmes seem to lack a strong focus on identifying and accommodating various barriers to learning in the classroom (UNESCO, 2018), which are critical in a classroom with a diversity of learning needs (Nel et al., 2019).

Robichaux and Guarino (2012) assert that the ultimate goal of pre-service training should be that pre-service teachers become capable and effective professional teachers. This does not seem to be the case in many countries including South Africa. In a report written for EFA by UNESCO (2014) with the heading “*New paper shows a chronic lack of trained teachers: Without action, it will be impossible to get all children into school by 2030*”, it was highlighted that many countries are recruiting teachers who lack the most basic training. Irina Bokova, the Director-General of UNESCO said in a

statement that the *“quality universal primary education will remain a distant dream for millions of children living in countries without enough trained teachers in classrooms”*. She continued by stating that *“teachers are the core of any education system. Hiring and training new and already established teachers is fundamental to protecting children’s ability to learn in school.”* (Gohain, 2014, p. 1; TESDA, 2014; UNESCO, 2014)

To make inclusive education a reality, teachers need to be appropriately trained to identify and accommodate diversity in the classroom (Nel et al., 2019). Several researchers confirm that if pre-service teachers are sufficiently trained in the theory of inclusive pedagogy with added practical field experience they will develop an increase in positive attitudes, self-efficacy and professional efficacy in teaching diverse learners in the inclusive classrooms (Nel et al., 2019; Payne-Van Staden, 2015; Kumar & Rana, 2014; Malak, 2013; Forlin & Chambers, 2011; Oswald & Swart, 2011; Florian & Linklater, 2010). Nel et al., (2019), Walton and Rusznyak (2017), as well as Black-Hawkins and Florian (2012), claim that in order for the aforementioned to occur, an inclusive pedagogy approach should be embedded and rooted into pre-service teacher education programmes with the goal of closing the gap between the theory and practice of inclusive pedagogy. This entails that inclusive pedagogy should not be dealt with only in an isolated or separate manner from pedagogy, but should be infused into every aspect of the ITE programme.

Developing the ability to apply an inclusive pedagogy in pre-service teacher education programmes have recently been on the forefront of research studies, both nationally and internationally. Researchers such as Walton (2017), Walton and Rusznyak (2017), Cameron (2017), Engelbrecht, (2013), Young and Florian, (2013), Kelly et al., (2013), Loreman (2010), Florian and Rouse (2008) and many others have conducted research to try and answer the most burning questions up for debate in the development of ITE programmes, including the decision whether inclusive education should be taught as stand-alone courses, if it should be infused into the entire teacher education programme, or if it should be a mixture of the two mentioned.

Key questions which seemed to have guided their research included: *What body of knowledge and skills should be addressed? How are competencies and specific values going to be supported? and What practical experiences are going to be provided to pre-service teacher with regard to inclusive teaching?* (Walton, 2017; Walton and Rusznyak, 2017; Cameron, 2017; UNESCO, 2014; Engelbrecht, 2013; Young and Florian, 2013; Kelly et al., 2013; Loreman, 2010; Florian and Rouse, 2008). Jordan et al. (2008) assert that uncertainties arise in initial teacher training programmes at tertiary institutions due to the lack of consensus between initial teacher training curriculum developers regarding to what theory should be included in training programs and how it should be implemented in practise (Harvey et al., 2010). In a new study done in 2019 by numerous universities all across South Africa, it was recommended that in most ITE programmes the *“curricula need to be critically reviewed to ensure that beginner teachers learn both theoretically informed and contextually relevant pedagogical practices suited to inclusive classrooms. As well as having dedicated modules on aspects of inclusive education, ITE should embed inclusive ways of teaching in all methodology subjects to enhance students’ knowledge, skills, practices and understanding of inclusive education.”* (Nel et al., 2019, p. 45-46).

According to Florian and Rouse (2008, p. 596), tertiary institutions should not lose focus when they are planning and developing initial teacher training programmes for inclusive education, they should keep in mind that, *“the task of initial teacher training programmes is to prepare pre-service teachers to enter the teaching profession, which accepts the individual and collective responsibility for improving the learning and participation of all learners”*. Nevertheless, it seems that internationally, tertiary institutions and education departments are continuously exploring ways to make inclusive education training programmes more sufficient and effective (Symeonidou, 2017) by conceptualising (critically thinking about inclusion and what inclusion for all should look like in the education system) and ratifying (officially designing and implementing an ITE programme that will effectively prepare pre-service teachers for inclusive education) pre-service teacher education programmes for inclusive education (Young & Florian, 2013). Consequently, in this study, it was regarded as very important to explore how South African pre-service teachers currently perceive their lived experience of existing teacher education programmes in order to inform future designs

of training preparation programmes to fully prepare them for inclusive education.

2.8 Conclusion

In this literature review the researcher situated the research study in an existing body of knowledge by exploring the key concepts in order to enhance the understanding of the focus of this research study. The development of inclusive education globally as well as in the South African context was discussed and the concept of inclusive education was clarified. An inclusive classroom as well as what diversity in such a classroom entails and the concept of inclusive pedagogy were defined and elaborated on. Since the focus of this research relates to pre-service teachers and teacher education for inclusion, relevant concerns to these aspects were key focal points discussed in this chapter.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

This chapter elucidates the research methodology that has been used for this research. The research design, sampling methods, data collection methods, the analysis and interpretation process of the data is explained. Special consideration will similarly be given in a discussion of the quality criteria and ethical guidelines that have been applied to ensure the validity and reliability of this research study.



Figure 3.1: Basic outline of Chapter 3

3.2 Background

In Chapter 1 (cf. 1.2) it was mentioned that the Departments of Basic Education (DBE) and Department of Higher Education and Training (DHET) have requested numerous South African HEI's to conduct research that will enable these institutions to determine how inclusive education can be infused into their B.Ed Programme. In addition, these institutions also needed to enable teacher educators to model and impart an inclusive pedagogy to the pre-service teachers. This research study formed part of the wider project by focusing on the NS pre-service teachers currently in the B.Ed Programme at

a specific HEI (cf. 1.2 & 4.2). The broad aim of the research project was to ensure that current and future pre-service teacher education programmes adequately prepare undergraduate students for the practice of teaching in an inclusive classroom (cf. 1.2).

3.3 Research Methodology

According to Potgieter (2017), Kowalczyk (2013) and Welman et al. (2005) research should be a careful and a well-thought-through study into a specific problem, concern, or issue using various methods, procedures, and techniques to obtain scientific knowledge (cf. 1.9). The best way to start a research study is by turning the specific problem, concern, or issue into a question statement, where the intent of the researcher will be to answer the question (Kowalczyk, 2013) (cf. 1.3 - 1.7). The research methodology is a systematic process that a researcher follows to describe, explain and predict phenomena in order to answer the research question and solve the problem (Rajasekar et al., 2013). In the following sections a discussion will follow on the various methods, procedures and techniques used in this research study (cf. 1.9). The paradigm that guided the research, interpretivism, is deliberated and the research design that will be emphasised is a qualitative research design (cf. 1.9.2; 1.9.3; 3.3.2 & 3.3.3).

3.3.1 Theoretical framework

According to Grant and Osanloo (2014), the theoretical framework forms the foundation on which all scientific knowledge relating to the research study is constructed (cf. 1.9.1). The choice guiding the selection of a theoretical framework requires a deep and thoughtful understanding of the research problem and question, the purpose and importance of the study (Grant & Osanloo, 2014). Additionally, a theoretical framework forms the groundwork for the research approach and influences the choice of the research paradigm and research design (Grant & Osanloo, 2014) (cf. 1.9.1).

After careful consideration I have chosen to adopt the constructivist theoretical framework (cf. 1.9.1). Adom et al. (2016) and Nieuwenhuis (2013) assert that in the constructivist framework, human participants construct their own meaning of a phenomenon or situation based on their lived experience and reflections thereof (cf. 1.9.1 & 2.6.2). Therefore, a researcher working out of a constructivist theoretical

framework argues that there is no single reality for a given phenomenon, but various, relative dimensions of reality exist (Kielmann et al., 2012).

The understanding and knowledge of reality is consequently not objectively determined, but is subjectively and socially constructed (Adom et al., 2016; Nieuwenhuis, 2013; Denzin & Lincoln, 2011) (cf. 1.9.1). This framework calls to be used as an instrument through which meaning is mediated, by the researcher through interaction with the participants, in order to co-construct a deeper understanding of the phenomenon being studied (Davis, 2021; Mogashoa, 2014; Denzin & Lincoln, 2011; Nieuwenhuis, 2013) (cf. 1.9.1).

The constructivist framework depends on substantive, inductive reasoning and the research findings are mainly descriptive in nature, but elements of deductive reasoning may be included (Merriam, 2009) (cf. 1.9.1). Davis (2021) and Denzin and Lincoln (2011) explain that the constructivist theoretical framework best supports the interpretivism paradigm and qualitative research design that forms the main methodological components included in the research methodology that applies to this research (cf. 1.9.1).

3.3.2 Research paradigm

Kivunja and Kuyini (2017), Moyo et al. (2015), as well as Taylor et al. (2007) highlight that a research paradigm can be defined as a worldview, a set of shared suppositions and philosophies about the world, and what is perceived as real or true (cf. 1.9.2). The research paradigm informs the meaning and the interpretation of research data (Kivunja & Kuyini, 2017). It is important for a researcher to establish from which research paradigm they will be working from before the research can commence (Moyo et al., 2015) (cf. 1.9.2).

A worldview will shape and provide the researcher with a broad outline and direction for what they hold to be true and as relative important evidence (Moyo et al. 2015; Bakkabulindi, 2015; King & Horrocks, 2010). The research paradigm also serves as a guide when the researcher is interpreting certain facts and evidence obtained in the gathered data throughout the research. In research, there are a number of paradigms

that a researcher can utilise to conduct research from (Nieuwenhuis, 2013) (cf. 1.9.2). The two most contrasting paradigms are *Interpretivism* and *Positivism*.

In Table 3.1 a brief summary presents the most visible differences between these two paradigms.

Table 3.1: Comparison of differences between Interpretivism and Positivism

Interpretivism	Positivism
Individuals can create and construct meaning about reality.	Objective social facts shared by society about reality
Individuals own meanings' influences their actions.	External forces in society influence the members.
Qualitative data.	Quantitative data.
Subjective.	Objective.
Researcher immersed in research.	Researcher detached from research.

(Adapted from <https://www.slideshare.net/lucylee79/positivism-vs-interpretivism>)

Interpretivism is the paradigm that supported this study, because it is largely associated with the qualitative research design which focuses on subjective, narrative and written data (Creswell, 2014; Nieuwenhuis, 2013) (cf. 1.9.2; 1.9.3 & 3.3.3). Using this research paradigm best supported my study and helped to explore the perceptions of NS pre-service teachers in a B.Ed Programme regarding their training for inclusive education. To do this, I needed to be positioned in the natural setting of the participants to develop a shared understanding of their reality and how they perceived the phenomenon under exploration. I attempted to make sense of the meanings that participants attributed to the phenomenon being studied by using a variety of methods to explore and uncover truth and meaning (Moyo et al., 2015; Bakkabulindi, 2015). (cf. 1.9.2). I tried to ensure staying true to the aforementioned by interacting and actively participating with the participants, listening to the meanings they attach to their experiences while aiming to extract detailed, rich and descriptive data through interpreting their understanding and experiences regarding their training in the NS B.Ed Programme for inclusive education.

3.3.3 Research design

Due to the fact that this study is underpinned by a constructivist framework and uses the interpretivist paradigm, I conducted my research using the qualitative research design (cf. 1.9.3). Bakkabulindi (2015) and Nieuwenhuis, (2013) (cf. 1.9.3) mention that qualitative research is a process of investigation that attempts to comprehend social and human problems through constructing a holistic view. The aim of qualitative research is to collect rich descriptive data that is presented in narrative and written form (Ravitch & Mittenfelner-Carl, 2016), while the intention is exploring and developing a deeper understanding of a particular phenomenon or context being studied (Ravitch & Mittenfelner-Carl, 2016).

Nieuwenhuis, (2013) continues by stating that qualitative research focuses on how participants view and understand truth and reality about the phenomenon being studied, as well as how the participants construct meaning out of their experience (cf. 1.9.3). A qualitative researcher should also acknowledge that the social phenomena being studied can have many dimensions because individual participants are involved in constructing meaning. Consequently, a researcher largely depends on the ability to analyse, interpret, and report of what they observe (Ravitch & Mittenfelner-Carl, 2016; Denzin & Lincoln, 2011).

The qualitative research design aided me as researcher in comprehending and interpreting the meaning of social phenomena and experiences in the natural setting without interfering with the natural functioning even though I was immersed and situated within the research context (Moyo et al., 2015; Merriam, 2009) (cf. 1.9.3). Qualitative research is seen as an emergent design where the research is subjective in nature and the researcher is the primary instrument for data collection and analysis (Nieuwenhuis, 2013) (cf. 1.9.3).

I regarded the qualitative research design as suitable for this research study because I wanted to explore the perceptions, experience and feelings of NS pre-service teachers regarding their training for inclusive education within their B.Ed Programme (cf. 1.9.3). Trying to understand this phenomenon through interacting with different participants

ensured that a multidimensional perspective has been presented in the data. In Table 3.2, a summary of the concepts and main characteristics of qualitative research is provided.

Table 3.2: Summary of concepts and main characteristics of qualitative research

Concepts and Characteristic	Brief Description
Positionality	The qualitative researcher becomes the main instrument of data collection by co-constructing meaning through interaction with the research participants in the natural setting.
Epistemology	In qualitative research knowledge is constructed through the subjective experiences of the participants in their natural setting.
Ontology	In qualitative research truth and reality can take on a multidimensional perspectives or realities. The aim of qualitative research is to engage with, comprehend and report these rich multiple views and meanings.
Methodology	
The Qualitative Design	Naturalistic Emergent Purposeful
The Collection of Qualitative Data	Personal experience and engagement Empathic impartiality Dynamic systems

The Analysis of Qualitative Data

Unique case orientation

Inductive analysis

Holistic perspective

Context sensitive

(Adapted from Ravitch & Mittenfelner-Carl, 2016:6-10; Kielmann et al., 2012 and

<http://library.spalding.edu/c.php?g=461133&p=3153021>)

3.3.4 Literature review

Okland (2018) emphasises that in qualitative research, a literature review has a few key goals. The first goal of a literature review is to position the research topic and problem in the already existing body of knowledge to establish what is already known about the phenomenon being researched. A second aim of a literature review is to evaluate and identify the gaps in previous research within a field, topic or problem that may validate the research of a phenomenon. The last objective is to select concepts, theories, assumptions and perspectives in the study by viewing other research.

The following keywords/phrases were used to guide this study in finding the relevant literature (cf. 1.9.4):

- pre-service teacher;
- inclusive education;
- inclusive classroom;
- inclusive education policies;
- requirements for teacher training and qualifications;
- Initial Teacher Education (ITE);
- B.Ed programmes;
- Natural Science (NS); and
- pedagogy.

Both primary and secondary sources were used to compile relevant literature for this study. These sources were gathered by using the library services at the North-West University as well as making use of scientific Internet databases like EBSCOhost and ERIC (cf. 1.9.4). The relevant articles in journals, educational dissertations and theses,

and books were read and studied to gain extensive information on the different key words and phrases that helped me build on the theory to support my research study (cf. 1.9.4).

3.3.5 Empirical study

As part of the empirical study, all the methods and techniques that were included and used to collect the relevant data to gain insight and knowledge relating to the phenomenon being studied are subsequently discussed (cf. 1.9.5).

3.3.5.1 Strategy of inquiry

A strategy of inquiry refers to a specific method of investigation that will enable the researcher to conduct a research study in a systematic manner, while also guiding the manner in which the researcher views the participant and the research setting. Furthermore, it aids the researcher in selecting appropriate participants and choosing the correct manner to gather relevant data (Nieuwenhuis, 2013) (cf. 1.9.5.1). This study made use of an exploratory case study research as the strategy of inquiry. Case study research can be seen as an empirical strategy of inquiry that examines a contemporary phenomenon in depth and within its real-world context especially when the boundaries between the phenomenon and context may not be obvious (Harrison et al., 2017; Yin, 2014). Harrison et al. (2017), as well as Hill and Millar (2015) (cf. 1.9.5.1) mention that case study research focus mainly on a limited unit, namely a specific group of participants within a specific institution.

As mentioned in Chapter 1 (cf. 1.9.5.1) the exploratory case study strategy of inquiry allows a researcher to explore and gain insights into the participants' lived experiences of a phenomenon (Harrison et al., 2017; Hill & Millar, 2015; Yin, 2014; Creswell, 2009). Case study research allows the researcher to employ multiple data collection methods that will enable the researcher to collect detailed and rich data (Hill & Millar, 2015) (cf. 1.9.5.1). An exploratory case study strategy of inquiry was deemed appropriate to use in this research study because the perceptions of NS pre-service teachers in a B.Ed Programme of a specific HEI with regard to their preparation and training for inclusive education was explored.

Figure 3.2 demonstrates how different elements included in the description of case study research fit into this study's problem statement (cf. 1.3).

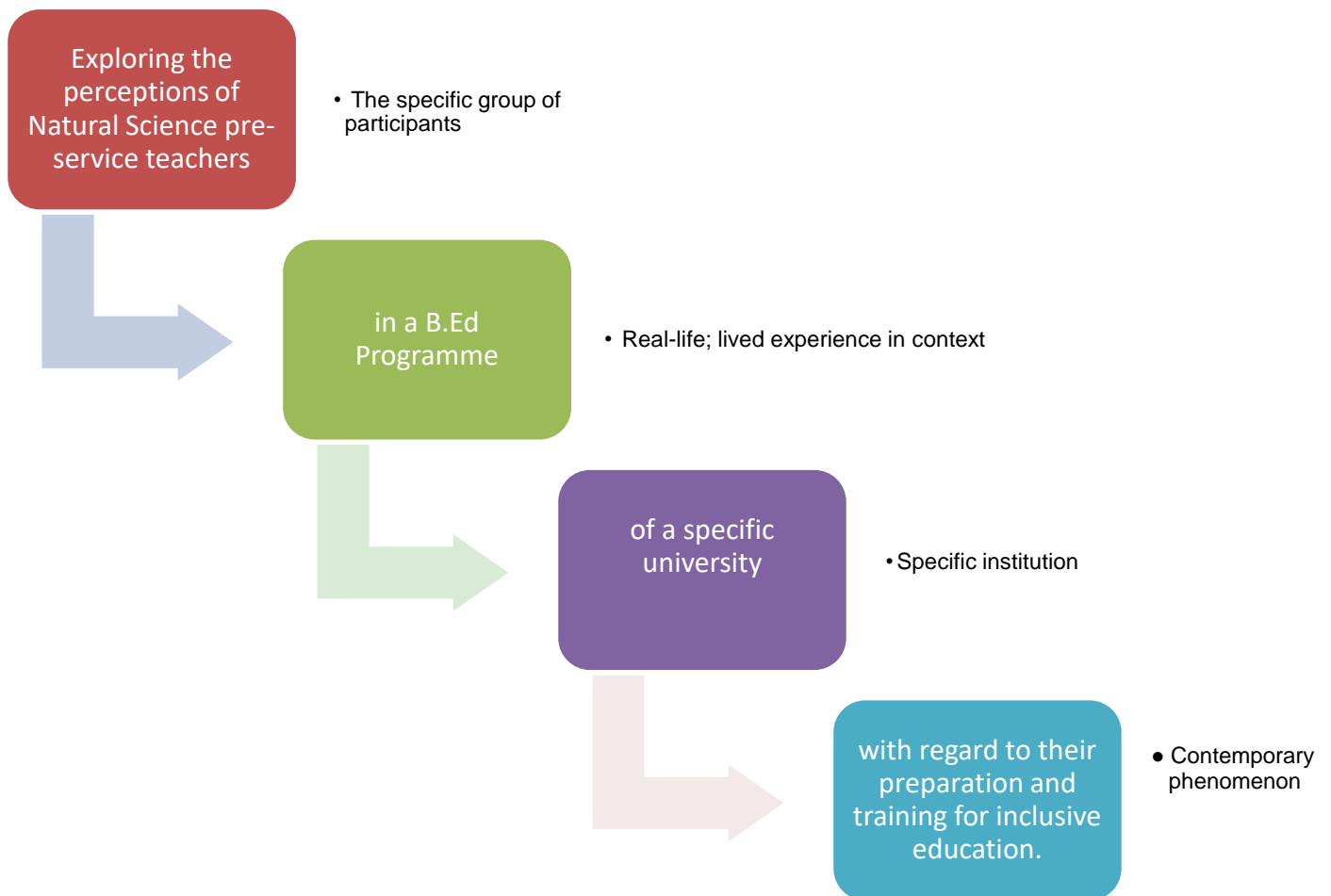


Figure 3.2: Elements of case study research present in the problem statement

3.3.5.2 Population and sample

Trochim (2006) explains that sampling is the process of selecting participants from a population of interest so that by studying the sample, researchers may justly generalise their findings back to the population from which the participants were chosen. The target population is usually a large group of individuals who forms the focal point of the research (Maree et al., 2013; Creswell, 2009) (cf. 1.9.5.2). Qualitative research is mainly done to highlight certain understandings of and improve the social experiences of the population in relation to the phenomenon being studied (Maree et al., 2013). Creswell

(2009) states that it is important to note that individuals in a target population share common characteristics and traits (cf. 1.9.5.2).

Because a researcher often cannot access every individual in the population, they normally use sampling techniques to extract a subsection of the population. The sample must be representative of the target population in order for the researcher to gather relevant data and record valid findings (Maree et al., 2013; Creswell, 2009). In qualitative research, the sample size is typically smaller than in quantitative research and participants are selected to satisfy a given proportion until data saturation is achieved (Infosurv, 2018). According to Payne and Williams (2005) it is difficult in qualitative research to generalize findings. Generalisation is thus less explicit in qualitative research due to the use of a small sample size (Payne & Williams, 2005). Carminati (2018) also mentions that the purpose of qualitative research is to provide in-depth explanations and meanings rather than generalize findings, like in quantitative research.

The target population of interest in my study included fourth-year Intermediate phase and Senior/FET (Further Education and Training) phase pre-service teachers in South Africa. This study's sample included all fourth-year NS pre-service teachers of a specific HEI. The participants who were included in this research study had to fit into the sample identified in the broader project and additional inclusions as described in Chapter 1 and 4 (cf. 1.2; 1.9.5.2 & 4.2).

Two types of sampling were employed in this study, namely convenience and purposive sampling.

Convenience sampling (cf. 1.9.5.2) can be described as a method of sampling that involves selecting participants or settings that are easily and conveniently obtained or most accessible to conduct research (Kielmann et al., 2012; Welman et al., 2005). Convenience sampling was used in this study to select a sample from a particular campus of a specific HEI in South Africa, which served as the setting where the research was conducted. The selected campus of the specific HEI was conveniently included to be the setting where my research was conducted. The reason for employing this specific sampling method was due to the fact that I am already part of the structure and working in the B.Ed Programme for NS. It also assisted me to limit the constraints that are

associated with logistical arrangements, time and possible cost involved in conducting this research (cf. 1.9.5.2).

Purposive sampling was also used in this study (cf. 1.9.5.2). The participants were purposefully selected because they had the characteristics I needed to understand and gain insight regarding the meanings and experiences the participants have concerning the phenomenon being studied (Creswell, 2014; Maree & Pietersen, 2013; Merriam, 2009) (cf. 1.9.5.2). The fourth-year NS pre-service teachers were purposefully selected because they have already completed three years in the B.Ed Programme for NS and have more knowledge and practical experience in teaching NS. Consequently, they were able to provide a more informed opinion than all the other year groups majoring in NS (cf. 1.9.5.2).

In the original planning of the research study, the open-ended questionnaires would have been distributed to the participants, in a paper-based manner, in a specific time and place that would have been convenient for the participants. However, before the data collection process could commence, South Africa was placed under “lockdown” due to the outbreak of the Covid-19 pandemic (cf. 1.9.5.3.2). The informed consent form (cf. Addendum A1) and the open-ended questionnaires (cf. Addendum A2) then had to be distributed to the participants via an online platform, namely Google-forms.

The Table 3.3 provides a brief overview of the number of participants who participated in the online open-ended questionnaires. It can be noted from the table that many of the participants who signed the informed consent form indicated their willingness to participate in this research, but then did not continue to complete the online open-ended questionnaire. This may have been attributed to the fact that these participants either did not understand fully how to complete the online questionnaire or they did not have sufficient data or network coverage.

Table 3.3: Summary of how the participants for the online open-ended questionnaire was sampled

Purposive Sampling for the open-ended questionnaire	
Number of Participants who signed the online informed consent (cf. Addendum A1)	Number of participants who completed the online open-ended questionnaire (cf. Addendum A2)
68 (66 participants indicated they are willing to participate while 2 indicated they are not willing to participate).	45 participants completed the online open-ended questionnaire.

In addition, purposive sampling was again used to select participants from the fourth year NS pre-service teachers who completed the online open-ended questionnaire to participate in the focus group interviews. Participants were mainly included on the basis of voluntary participation (cf. 1.9.5.2). They had an option to indicate whether they are willing to participate in the focus group interview by choosing the option provided to on the online consent form that accompanied the online open-ended questionnaire (cf. Addendum A1). In Chapter 1 (cf. 1.9.5.2) I indicated that if the participants willing to participate did not ensure a sufficient sample size, I would have made use of a class list and selected every fifth NS pre-service teacher to be included in the focus group interviews. However, I did not make use of a class list to invite participants to take part in the focus group interviews because the participants who voluntarily indicated their willingness to participate were sufficient to obtain saturated data.

The focus group interviews were also originally planned to take place during face to face contact with the participants (cf. 1.9.5.3.3). Due to the outbreak of Covid-19 and the social distancing regulations that had to be adhered to the focus group interviews also had to be conducted on an online platform. In order to make the arrangement for the online focus group interviews easier, an additional information leaflet (cf. Addendum B1) was provided to the participants who indicated their willingness to participate in the focus group interviews. In this leaflet participants were asked to reaffirm their willingness to participate in the focus group interviews. They were also asked to indicate on which online platform they would like the focus group interviews to be conducted and they could indicate whether they will require additional data to participate. The participant

was only made aware of the online data provision in the additional information leaflet (cf. Addendum B1) and the data was sent to the participants, by the independent researcher, on the contact details the participant provided. After this information were gathered the informed consent form (cf. Addendum B2) were distributed to the participants via the online platform of Google-forms. Participants could complete the consent form before the focus group interviews were conducted. These participants were also asked on which day and on what time they will be available to participate in the focus group interviews, and thus grouped together in the focus group based on availability.

In Table 3.4 information is provided on the number of participants who indicated their willingness to participate in the focus group interviews and how that number of participants declined to those who actually participated in the focus group interviews. The decline in the number of participants willing to participate in the focus group interviews may have been caused by the context relating to the Covid-19 pandemic and participants being subjected to the time-consuming and strenuous online-remote learning in their B.Ed Programme. Although only three focus group interviews with five participants were conducted, I did manage to reach data saturation. The data obtained from the open-ended questionnaires and the data from the focus group interviews did provide me with sufficient, rich and descriptive data.

Table 3.4: Summary of how the participants for the online focus group interviews was sampled

Purposive sampling for the focus group interviews		
Number of participants who indicated on the online open-ended questionnaire informed consent (cf. Addendum A1) that they want to take part in the focus group interviews	Number of participants who completed the additional information leaflet (cf. Addendum B1) and focus group interview informed consent (cf. Addendum B2)	Number of participants who actually took part in the focus group interviews

<p>23 participants indicated they are not willing to participate in the focus group interviews.</p> <p>26 participants indicated that they are maybe willing to participate in the focus group interviews.</p> <p>19 participants indicated that they are willing to participate in the focus group interviews.</p>	<p>8 participants indicated on the additional information leaflet that they are willing to participate in the focus group interviews but only 6 of these participants completed the focus group interview informed consent.</p>	<p>Only 5 participants participated in the focus group interviews.</p> <ul style="list-style-type: none"> • Participants 1 and 2 participated in focus group 1. • Participant 3 participated in focus group 2. Participant 4 withdrew on the day of the interview, but participant 3 agreed to continue. Thus, this was an individual interview in the end. • Participants 5 and 6 participated in focus group 3.
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3.3.5.3 Data collection methods

The data collection methods that were used in this qualitative study is presented in Figure 3.3, followed by a discussion of each method.

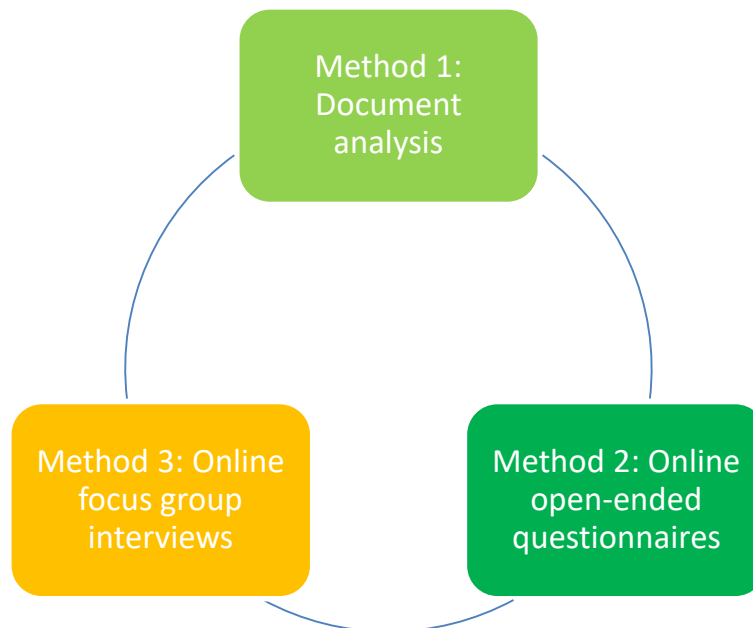


Figure 3.3: Data collection methods used in this qualitative study

3.3.5.3.1 Method 1: Document analysis

Frey (2018) and Bowen (2009) describe that document analysis is a systematic procedure, used in qualitative research, to analyse various documents with the purpose to answer the research questions (cf. 1.9.5.3.1). A document analysis is often used in combination with other data collection methods as a manner of triangulation (Frey, 2018; Bowen, 2009) and require of the researcher to repeatedly review, interpret and examine the data obtained in order to make meaning, gain insight and extract vital empirical facts (Frey, 2018: Browen, 2009; Labuschagne, 2003). Browen, (2009) and Labuschagne, (2003) explain that the data obtained through document analysis produces information extracts, quotes and paragraphs that are re-organised into major categories and themes through content analysis (cf. 1.9.5.3.1).

Before I commenced with the document analysis I first determined a set of inclusion criteria. These criteria included:

- The fundamental policies underpinning inclusive education in South Africa.
- The policies covering the practical expression of inclusive education in South Africa.
- Policies governing Teacher Education for Inclusive Education in Higher Education Programmes.
- ITE and NS B.Ed Programme at the specific HEI
- Generic module outcomes in the B.Ed Programme linking to inclusive education.
- NS related subject module outcomes.

After I determined the inclusion criteria for the documents, I conducted a search to collect the relevant documents. These documents were obtained on the official governmental websites of the DBE and the DHET of South Africa as well as on the website of the specific HEI. I downloaded these documents from the relevant sites and started with the analysis process of each.

3.3.5.3.2 Method 2: Online open-ended questionnaires

According to O' Cathain and Thomas (2004) open-ended questionnaires allow participants to write their views, experiences and understanding in their own words. These questionnaires are usually semi-structured, and in narrative, written form, and the analysis of the data uses techniques associated with qualitative research (O' Cathain & Thomas, 2004). Ganga and Maphalala (2015) (cf.1.9.5.3.2) affirm that open-ended questionnaires provide the participants an opportunity to express, qualify and clarify their understanding and perceptions.

The participants were asked to complete an online questionnaire that contained open-ended questions (cf. Addendum A2). An informed consent form was shared with the participants for completion via a link to a Google-form document. After the participants completed the informed consent form, the questionnaires were also shared by means of Google-form link to the participants (cf. 3.3.5.2), by the independent researcher. The decision of using an open-ended questionnaire can be attributed to the fact that a larger number of participants can simultaneously complete it. The open-ended questions were formulated and constructed so that the responses of the participant provided rich and relevant information regarding their understanding and perceptions of inclusive

education as well as their training for inclusive education (cf. 1.9.5.3.2).

3.3.5.3.3 Method 3: Online focus group interviews

The semi-structured focus group interview is commonly used in research studies to corroborate data that emerges from other data sources (Nieuwenhuis, 2013). Leedy and Ormrod (2010) describe focus group interviews as a small group of participants who are interviewed at the same time. When choosing participants for a focus group interview, all participants should have experience of the phenomenon being studied.

An advantage of focus group interviews is that, through group interaction and participant responses can be broadened by the sharing of experiences and can consequently result in the activation of valuable forgotten detail as well as new perspectives (Nieuwenhuis, 2013).

For the focus group semi-structured questions were used. Kielmann et al. (2012) elucidate that with semi-structured questions the researcher predetermines a set of questions he/she want to cover but these questions can be probed to extract more detailed descriptions and explanations from participants. By using online semi-structured focus group interviews, the participants responded to a number of pre-set questions (cf. Addendum B3). Participants were further probed in order to reveal more in-depth and rich data (De Vos et al., 2002) (cf. 1.9.5.2.3). This additional data to the open-ended questionnaire assisted in better understanding and gaining more insight into how NS pre-service teachers perceived their training with regard to dealing with diversity amongst learners in an inclusive education system.

As mentioned earlier in this chapter (cf. 3.3.5.2) the focus group interviews would have been conducted in a face to face manner, but the outbreak of the Covid-19 pandemic inhibited this from occurring. The focus group interviews were moved to an online platform that the participants indicated would suite them best, as they indicated on the additional information leaflet (cf. Addendum B1). The majority of the participants chose to use WhatsApp as the online platform through which the interviews were then conducted. This worked well since the researcher, independent researcher and participants could use the voice recording function of the App to provide information,

asked and answer the questions.

Participants were added to a specific group that was created on the App by the independent researcher. Participants were grouped according to the date and time they indicated they would be available to participate in the focus group interviews (cf. 3.3.5.2). Before the commencement of the interview an elaborate explanation about how the interviews would proceed, as well as a description of confidentiality were provided on the specific group. The link to the informed consent form (cf. Addendum B2) was also provided to the participants that they could sign before the interviews started. In each focus group interview the researcher asked a question from the interview schedule (cf. Addendum B3) and the participants were provided a chance to respond to the question via voice recording. Probing questions were then asked after a response from the participants if more elaborated information or clarification of an answer was required. As indicated in Table 3.4 (cf. 3.3.5.2) a total of three focus group interviews were scheduled with mainly two participants in each group. These interviews were voice recorded and transcribed for data interpretation and analysis.

All three data collection methods namely, the document analysis, online open-ended questionnaires and online focus group interviews assured that data saturation was achieved.

3.3.5.4 Data collection process

Table 3.5 provides an outline of the different steps that were followed during the data collection process (cf. 1.9.5.4).

Table 3.5: The data collection process

Step 1	The literature review.
Step 2	Collected, analysed and compared policies and B.Ed curriculum documents – including the programme outcomes, module outcomes and subject study guides.

Step 3	Advertised the research on the various module sites that link with NS via eFundi through the independent researcher (cf. Addendum A)
Step 4	<p>Provided more information about the study to the participants and administered the informed consent form and information letter via efundi using a link.</p> <p>Link to the online informed consent form for the online open-ended questionnaire (cf. Addendum A1):</p> <p>https://docs.google.com/forms/d/e/1FAIpQLSfM-SZKkjAAQNryiWcXhQDLcGjCKPMPS2rniMrbuqAR-Q3YVA/viewform?usp=pp_url</p>
Step 5	<p>Administered the link to the online open-ended questionnaires for completion by fourth-year NS pre-service teachers regarding their understanding and perceptions of inclusive education. Then collected and analysed the data that the participants provided in the online open-ended questionnaires.</p> <p>Link to the online open-ended questionnaire (cf. Addendum A2):</p> <p>https://docs.google.com/forms/d/e/1FAIpQLScwSSo3O3jPgNucjGkXoEcJH5H5Tlz3jaG7cNBcLww4qaH1Ng/viewform?usp=pp_url</p>
Step 6	<p>Participants who participated in the online open-ended questionnaires, were invited to take part in the online focus group interviews.</p> <p>The link to an additional information letter and the informed consent for the online focus group interviews was shared with the invited participants.</p> <p>Link to the additional information letter (cf. Addendum B1):</p> <p>https://docs.google.com/forms/d/e/1FAIpQLSdS--zP_BfTT5T-FU42KIsaZY01aOZfKjTMmVTTnGQGaqj2cg/viewform?usp=pp_url</p> <p>Link to the online informed consent form for the online focus group interview (cf. Addendum B2):</p>

	https://docs.google.com/forms/d/e/1FAIpQLSdS--zP_BfTT5T-FU42KIsaZY01aOZfKjTMmVTTnGQGaqj2cg/viewform?usp=pp_url
Step 7	<p>Conducted online focus group interviews with fourth -year NS pre-service teachers to understand and gain insight on how NS pre-service teachers perceive their training with regards to dealing with diversity amongst learners in an inclusive education system. Voice-recorded interviews were transcribed and analysed.</p> <p>Link to the interview schedule (cf. Addendum B3):</p> <p>https://docs.google.com/forms/d/e/1FAIpQLSfrKPeyQ_afgQLQ-uFeoXgCsZ5yYr87-kvKZuxbwxqK5XblwA/viewform?usp=pp_url</p>
Step 8	A constant comparative thematic analysis of all data collection instruments have been done.
Step 9	Interpreted, discussed and concluded the research findings in Chapter 4 and 5 of this study.

3.4 Data analysis and interpretation

Qualitative data analysis and interpretation is the systematic process of examining the data collected through the data collection methods. Data analysis ultimately provides the researcher with an understanding of the research objectives and reveals patterns and themes in the data. I made use of constant comparative thematic data analysis to analyse the data collected for my study (Merriam, 2009) (cf. 1.9.7 & 4.3.1).

Lewis-Beck et al. (2004) explain that constant comparison is the process of data analysis where every clarification and result is compared with existing findings as it emerges from the data analysis. Data collected from all three data collection methods, namely the document analysis, open-ended questionnaire, and focus group interviews were constantly compared with the purpose of identifying patterns in the data that can be arranged in relationship to each other (Merriam, 2009) (cf. 1.9.7 & 4.3.1). Figure 3.4 provides an illustration of the various steps that were followed during the data analysis and interpretation of the data.



Figure 3.4: Steps in data analysis and interpretation process

3.5 Quality criteria

Nieuwenhuis (2013) mentions that quality criteria link to the processes that will be followed to ensure that the research should be trustworthy, reliable and valid (cf. 1.10). According to McMillan and Schumacher (2010) in order to ensure validity of qualitative research the researcher needs to make sure that the research findings are representative of the participants answers and feelings. I made use of member checking, transferability, crystallisation, dependability, conformability in order to contribute to the trustworthiness, reliability and validity of the study (cf. 1.10).

3.5.1 Credibility

Ensuring credibility is one of most important factors in establishing trustworthiness. Credibility in qualitative research aims to answer the question of how consistent the research findings are in reality (Shenton, 2004). According to Nieuwenhuis (2013) and Mike (2010) the credibility of qualitative research depends more on the richness and quality of the in-depth information gathered, rather than the amount of data gathered as the case is in quantitative research (Nieuwenhuis, 2013; Mike, 2011). By means of credibility, I made sure that the research results reflect the views of the participants (Polit & Beck, 2012). Ensuring credibility, enables the researcher to establish confidence in the data (Anon, 2021). The two most important techniques to ensure credibility in the research are through member checking (cf. 3.5.2.) and crystallisation (cf. 3.5.3).

3.5.2. Member checking

Member checking is an important part of establishing trustworthiness in qualitative research (Candela, 2019; Brit et al., 2016). By using member checking I attempted to assure the credibility of the research results (cf. 1.10.1). The responses of the participants to the open-ended questionnaire were exported to an excel spread sheet. The online interviews were voice-recorded and transcribed verbatim. I used the spread sheet and voice-recordings to continually analyse and compare the data to substantiate my understanding of the data with participants to ensure that the interpretation was accurate (Candela, 2019) (cf. 1.10.1).

3.5.3 Transferability

According to Ness (2020) transferability can be regarded as a component of qualitative validity, which is comparable with validity and reliability in quantitative research. Transferability can be proven in terms of whether or not the research findings would deliver similar results if the research was conducted with another group of participants in a different context (Ness, 2020; Cope, 2020; Houghton et al., 2013; Mike, 2011; De Vos, 2005). That was achieved by ensuring that I described the research context and the expectations that were essential to the research in detail (Ness, 2020). I also made sure that all the procedures that I used in obtaining the data were transparent and clear for other researchers to use if they want to apply them in a different context (Mike, 2011; De Vos, 2005). (cf. 1.10.2). The researcher who then wants to transfer the procedures and findings to a different context is accountable for making an evaluation of how practical the transfer is (Ness, 2020).

3.5.4 Crystallisation

Crystallisation can be defined as a strategy where the researcher makes use of several investigators, different methods, and multiple sources of data collection to constantly compare the data (Nieuwenhuis; 2013 & Leedy and Ormrod; 2013). In this research study I adhered to the principle of crystallisation by continuously consulting with the independent researcher and my research supervisors to ensure that I analysed and interpreted the data correctly (cf. 1.10.3). I also included three different data collection methods in my research study namely, document analysis, an online open-ended questionnaire and an online focus-group interviews to constantly compare. This ensured that my research results were trustworthy and reliable (cf. 1.10.3).

3.5.5 Dependability

Polit and Beck (2012), Mike, (2011) as well as Tobin and Begley, (2004) are of meaning that dependability ensures that the research findings are reliable and the research can be repeated in similar conditions with similar participants. According to Mike (2011) and De Vos (2005) (cf. 1.10.4) dependability can be guaranteed by reporting detailed accounts of all the processes and methods used in the research study to enable an

external researcher to repeat the research with similar participants in a similar context and achieve similar results (Mike, 2011; De Vos, 2005). I ensured that all the procedures I used to obtain my data were clearly documented and is described in this chapter as well as in Chapter 4.

3.5.6 Conformability

Conformability refers to the researcher's ability to prove that the data gathered, analysed and interpreted, represent the participants' responses and not the researcher's perceptions or viewpoints (Cope, 2020; Polit & Beck, 2012; Tobin & Begley, 2004). According to Mike (2011), as well as Denzin and Lincoln (2005), the researcher in qualitative research plays an integral part in the data collection process, while bringing a unique perspective to the research study, but it can be difficult for a researcher to remain unbiased (cf. 1.10.5). Thus, ensuring conformability must allow an external researcher to judge whether the final results of the research correlate with the data collected (Mike, 2011; Denzin & Lincoln, 2005). By using member checking and ensuring crystallisation, I endeavoured to make sure that the results correlated with the data collected during the research (cf. 1.10.5).

3.6 Ethical considerations

Before a researcher can start with the data collection for a research study, they should get ethical clearance and agreement from all necessary authorities (Sanjari et al., 2014) (cf. 1.11). The reason for the aforementioned is that primary data collection is subject to formal ethics review, usually by a committee to ensure that no harm is caused to the participants who will be taking part in the research (Kielmann et al., 2012). This study was subjected to ethical clearance by a certified board and members of the *Research Ethics Committee of the Faculty of Education (Edu-REC)* of the North-West University as well as the Research Data Gatekeepers Committee (RDGC) (cf. 1.11). The following ethics clearance number was provided as evidence of this review process; **N W U - 0 1 6 1 8 - 1 9 - A 2**. (cf. Addendum C) and an approval letter from the RDGC committee was obtained to conduct the research on the specific HEI with the fourth year NS pre-service teachers (cf. Addendum D).

3.6.1 Informed consent

An important aspect of conducting ethical research is providing the participants with an informed consent form. Kielmann et al. (2012) mentions that informed consent is when potential participants voluntarily agree to participate in the research. After approval and ethical clearance was granted (cf. 1.11), all the invited participants received an advertisement on their NS subject e-fundi sites. This advertisement was placed on the participants' respected sites by the independent researcher.

After the advertisement was shared with the participants, an online informed consent form that explained the nature and purpose of the research study was made available. This informed consent assured the participants of confidentiality, anonymity, privacy and voluntary participation in the research, as well as the benefits and the risks if they took part in the study. Only after the participants agreed and signed the online informed consent forms was data collected and used in this research study. It is important to note that participants received two online consent forms, the first form gave consent for participation in the online open-ended questionnaire, and the second form gave consent for participation in the online focus group interviews. The second consent form was only provided after the participants completed the online open-ended questionnaires. This form was also only provided to the participants who indicated their willingness to participate in the online focus group interviews (cf. 1.11).

3.6.2 Privacy and confidentiality

According to Kielmann et al. (2012) any participants' privacy should be ensured in any ethical research project. Mertler (2016) states that any research that is being conducted should not cause any harm or disempower the participants. I ensured that participants remained anonymous and did not mention the names of any participant in any report (cf. 1.11). Codes were created for each participant who completed the questionnaire as well as took part in the focus group interviews, for example OQP5 (open-ended questionnaire, participant 5) and FGP2 (focus group interviews, participant 2). I only used these codes to refer to the responses of the participants in Chapter 4.

The consent forms, completed questionnaires and transcribes of the focus group interviews as well as the voice recordings were saved on my password protected computer in a designated folder at my office on the specific campus. These records will be kept for five years after which it will be destroyed. I also tried to limit the amount of people that had access to the data. Because I am working in the B.Ed Programme of the specific university, an independent researcher, not involved with the students, was involved in this research (cf. 3.7). Findings were reflected on with the supervisors as well as the independent researcher and the participants confirmed the interpretation of data (cf. 1.11).

3.7 The role of the independent researcher

In order to make sure that I remained unbiased toward my research and the participants, the ethics committee suggested that I make use of an independent researcher to assist me with the data collection process of this research study. The independent researcher was a fellow master's student and colleague. The role of the independent researcher was to recruit the participants through an advertisement, distribute the informed consent forms and act as an independent observer during the focus group interviews.

3.8 The role of the researcher

In qualitative research the researcher acts as the "research instrument" and is therefore subjective in nature, since the researcher ultimately plays an integral role in the data collection process (Nieuwenhuis, 2013). As the researcher of this research, I was actively involved in the data collection process as I have managed and conducted the collection of the research data. I was also engaged throughout the research process by co-constructing meaning with the participants (Nieuwenhuis, 2013; Creswell, 2009).

3.9 Conclusion

The purpose of this chapter was to outline the methodological procedure that was used to conduct this research study. A clear description of the research design and paradigm were given. The process used to select the participants, the method used to collect data as well as the approach that was used to analyse and interpreted the data was highlighted and explained. Lastly, special consideration of the quality criteria and ethical guidelines to ensure the trustworthiness, validity, and reliability of this research study was given. In the next chapter, extensive data analysis and interpretation will be done.

CHAPTER 4: DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

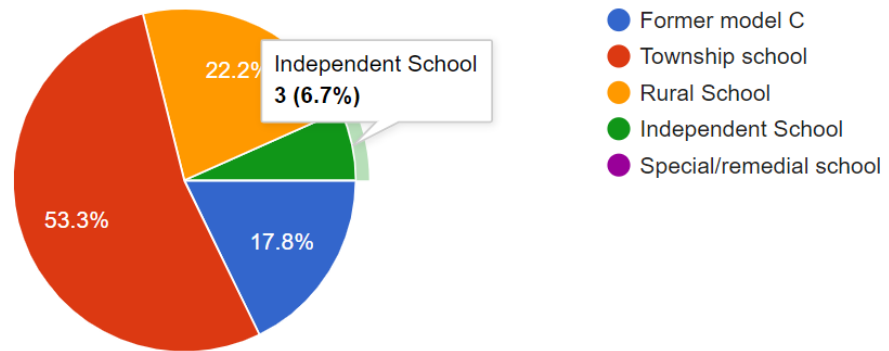
In Chapter 3 an outline was given in terms of the research methodology that was used in this study. The primary purpose of this research is to provide insight into the perceptions of fourth year NS pre-service teachers in a B.Ed Programme regarding their training for inclusive education. This chapter aims to present the data that has been collected by implementing an analysis and interpretation process. During the analysis, verbatim quotations from the document analysis, open-ended questionnaires and focus group interviews will be used to substantiate the categories, themes and sub-themes.

Before data analysis and the interpretation thereof is initiated, a detailed description of the participants will be provided as well as of the Natural Science B.Ed Programme at the HEI where the study was conducted to create a comprehensive background of the participants and the context in which the research took place.

4.2 Participant profile and background

The participants who took part in this study came from a variety of school backgrounds. Graph 4.1 shows the type of school where the participants completed their schooling until Grade 12. The majority of participants completed their Grade 12 in a township school, while a substantial number of participants either completed their Grade 12 in a rural school or former model C school. A few participants were in an independent school. None of the participants indicated that they were in a special/remedial school.

45 responses

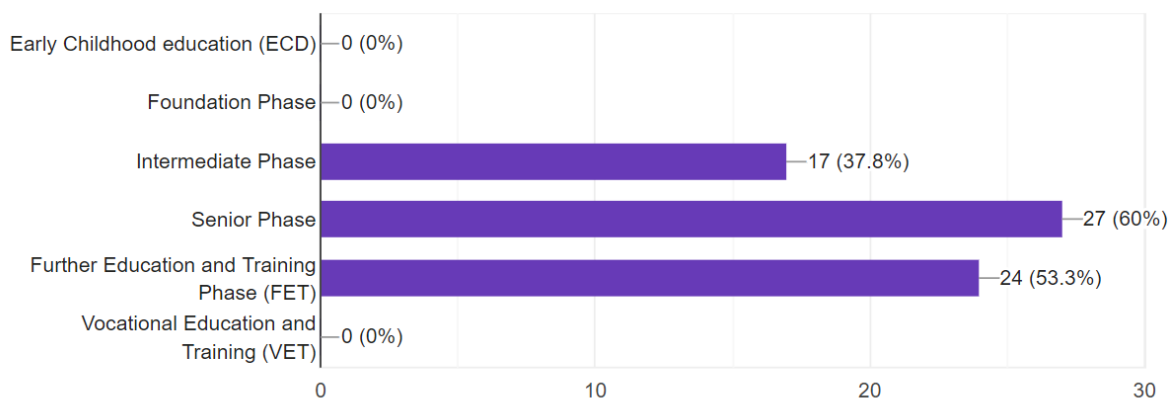


Graph 4.1: Type of school where participants completed Grade 12

As mentioned in Chapter 1 (cf.1.2), this research forms part of a broader research project and it was important to make sure that participants who were invited to take part in this research study matched the sample identified in the broader project.

Graph 4.2 indicates the different phases in which the participating pre-service teachers are studying for their B.Ed degree. It is essential to note that the B.Ed Programme at the HEI, where the research was conducted, presents combined programmes, namely Intermediate and Senior Phase, as well as Senior and FET phase. Consequently, students could have indicated two phases as exhibited in Graph 4.2. Vocational Education and Training (VET) is not offered at the HEI.

45 responses



Graph 4.2: The phase/s that participants are specializing in

The participants who were invited to take part in this study are all enrolled for a B.Ed Degree at a specific HEI and one or more of their major subjects fall into the Natural

Science B.Ed curriculum. In this research NS is a broad term used to describe more specific science disciplines and subjects, such as Life Sciences, Physical Sciences, Natural Science, Social Sciences (the Geography Part) and Geography (cf. 2.4.5.2).

The NS B.Ed curriculum forms part of the School of Mathematics, Science and Technology as indicated in Figure 4.1 (Anon², 2021). The Natural Science Education subject group functions separately from that of the Geography and Environmental Education subject group. It was necessary for the purpose of this study to include Geography and Social Sciences as part of the NS B.Ed Programme because many of the modules presented are interdisciplinary within the Science programme and the subject content overlap in gap-covering modules.

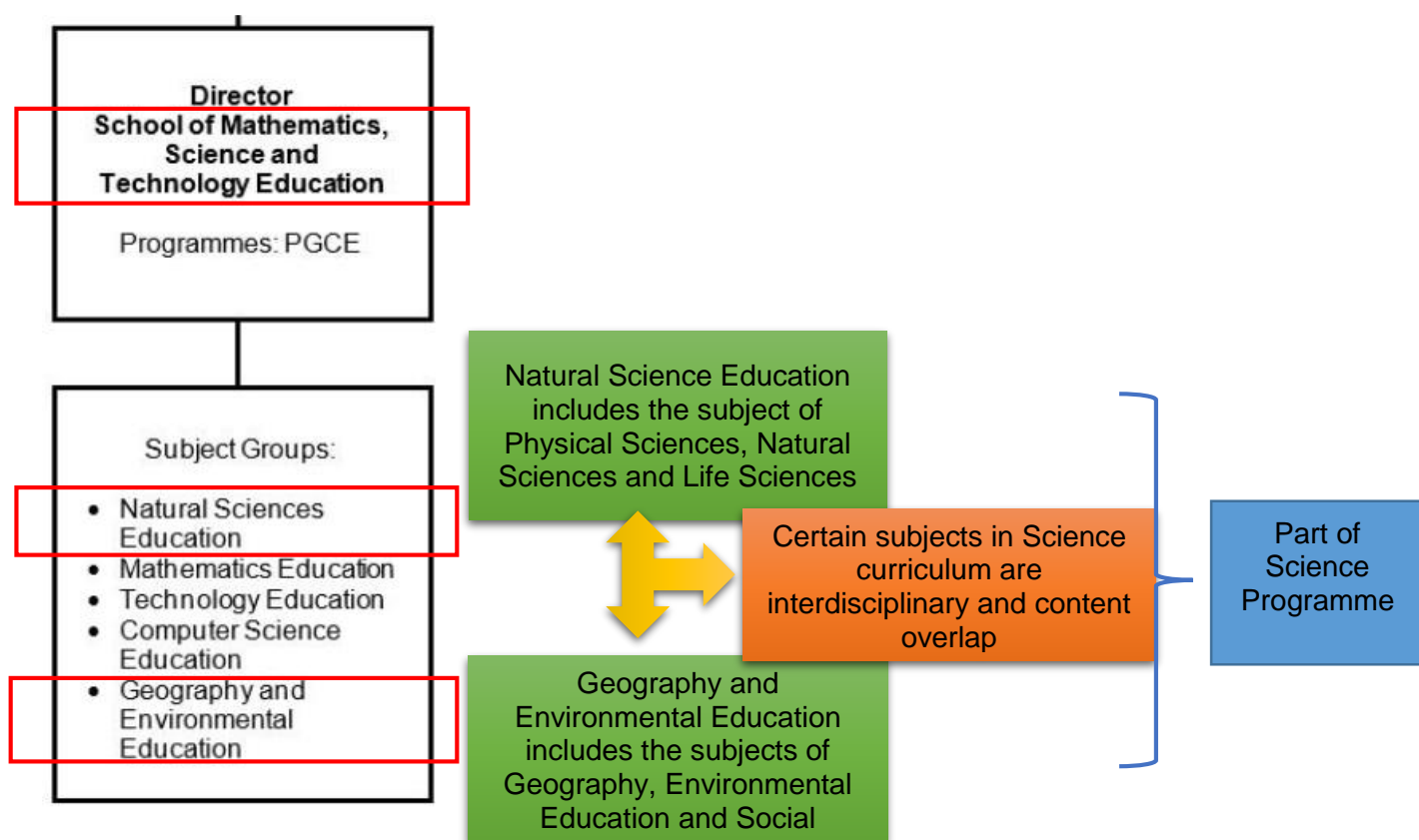


Figure 4.1: Place of Natural Science within the School of Mathematics, Science and Technology (Anon², 2021).

The NS B.Ed Programme is offered over a four-year period. Throughout this four-year period the pre-service teachers have a number of *Fundamental modules*, referred to as generic modules. They also have a number of *Specialisation subjects*, which include their 1st and 2nd major subjects with a number of gap-covering modules. Both the

² In order to keep the institution anonymous, the name is removed and Anon will be used

Intermediate- and Senior/FET phase has a total of 12 generic modules that is shared across the B.Ed Programme over the four-year period. They also have eight modules over the four-year period, that relate to Work Integrated Learning (WIL) and a number of other fundamental modules that may also be shared across the B.Ed Programmes or vary depending on the phase in which the pre-service teachers study. The fourth year Natural Science pre-service teachers were included in the study because they have already completed three years in the B.Ed. Programme within their field of Natural Science and have gained more knowledge and practical experience in teaching Natural Science (cf. 1.9.5.2.)

Tables 4.1 and 4.2 were extracted from the 2021 yearbook of the specific HEI (Anon³, 2021), and these tables serve as an example of how the Natural Science B.Ed Programme is structured for a pre-service teacher in the Intermediate as well as Senior/FET phases. The generic modules that are shared across the B.Ed Programme are indicated in the green blocks. The red blocks highlight the modules that link to a specific major in NS. The blue blocks indicate some of the overlapping-gap-covering modules. More detail based on the module outcomes of these generic modules as well as the specific major in NS will be shown later on in this chapter (cf. 4.3.2.2).

³ In order to keep the institution anonymous, the name is removed and Anon will be used

Table 4.1: Example of Natural Science B.Ed Programme for Intermediate Phase pre-service teachers – with Specialisation subjects in Mathematics, Science and Technology

YEAR LEVEL 1 / JAARVLAK 1			YEAR LEVEL 2 / JAARVLAK 2			YEAR LEVEL 3 / JAARVLAK 3			YEAR LEVEL 4 / JAARVLAK 4		
Module code Modulekode	Cr Kr	Type Tipe	Module code Modulekode	Cr Kr	Type Tipe	Module code Modulekode	Cr Kr	Type Tipe	Module code Modulekode	Cr Kr	Type Tipe
FIRST SEMESTER / EERSTE SEMESTER											
Fundamental modules <i>Fundamentele modules</i>			Fundamental modules <i>Fundamentele modules</i>			Fundamental modules <i>Fundamentele modules</i>			Fundamental modules <i>Fundamentele modules</i>		
EDCC114	8	H	EDCC214	8	H				EDCC413	8	H
EDCC115	8	H	EDCC215	8	H	EDCC315	8	H	EDCC414	8	H
EDCC117	8	H	EDCC217	8	H	EDCC317	8	H	EDCC417	8	H
EDTC111	8	X	MTLS211	12	X	EDTM312	8	X	RESF412	8	X
SSSE112	8	X				12	X				
Specialisation Subjects <i>Spesialiseringsvakke</i>			Overlap of Social Sciences in Natural Science Curriculum – Compulsory gap – cover module			Subjects <i>svakke</i>			Specialisation Subjects <i>Spesialiseringsvakke</i>		
Choose one Home Language <i>Kies een Huistaal</i>						Continuation of Choice <i>Voortsetting van Keuse</i>			Continuation of Choice <i>Voortsetting van Keuse</i>		
AFRI111 / PEFI111 / SEFI111 / SOFI111 / ZUFI111	12	H	AFRI211 / PEFI211 / SEFI211 / SOFI211 / ZUFI211	12	H	AFRI311 / PEFI311 / SEFI311 /	12	H	AFRI411 / PEFI411 / SEFI411 / SOFI411 / ZUFI411	12	H
			ENIP212	8	H				ENIP412	8	H
			MAIP211	8	H				MAIP411	8	H
NSTL111	12	H	NSTL211	8	H	NSTL311	8	H	NSTL411	8	H
Total 1 st semester <i>Totaal 1^{ste} semester</i>	64		Total 1 st semester <i>Totaal 1^{ste} semester</i>	72		Total 1 st semester <i>Totaal 1^{ste} semester</i>	72		Total 1 st semester <i>Totaal 1^{ste} semester</i>	68	
SECOND SEMESTER / TWEDE SEMESTER											
Fundamental modules <i>Fundamentele modules</i>			Fundamental modules <i>Fundamentele modules</i>			Fundamental modules <i>Fundamentele modules</i>			Fundamental modules <i>Fundamentele modules</i>		
EDCC125	8	H	EDCC224	8	H	EDCC323	16	H	EDCC423	8	H
						EDCC325	8	H			
EDCC127	8	H	EDCC227	8	H	EDCC327	8	H	EDCC427	8	H
Choose one <i>Kies een</i>	12	X	WVOS222	12	X				RESF422	8	X
ALDA122 / ALDE122									LOLT422	1	X
Choose one <i>Kies een:</i>	8	X							LOLT423	1	X
AFCL121 ¹ / PECL121 ² / SECL121 ² / SOLC121 ² / ZUCL121 ²									LOCC421	1	X
LSIN121	8	X									
Specialisation Subjects <i>Spesialiseringsvakke</i>			Specialisation Subjects <i>Spesialiseringsvakke</i>			Specialisation Subjects <i>Spesialiseringsvakke</i>			Specialisation Subjects <i>Spesialiseringsvakke</i>		
Continuation of Choice <i>Voortsetting van Keuse</i>			Continuation of Choice <i>Voortsetting van Keuse</i>			Continuation of Choice <i>Voortsetting van Keuse</i>			Continuation of Choice <i>Voortsetting van Keuse</i>		
AFRI121 / PEFI121 / SEFI121 / SOFI121 / ZUFI121	12	H	AFRI221 / PEFI221 / SEFI221 / SOFI221 / ZUFI221	12	H	AFRI321 / PEFI321 / SEFI321 /	12	H	AFRI421 / PEFI421 / SEFI421 / SOFI421 / ZUFI421	12	H
			ENIP222	8	H				ENIP422	8	H
			MAIP221	8	H				MAIP421	8	H
			NSTL221	8	H	NSTL321	8	H	NSTL421	8	H
Total 2 nd semester <i>Totaal 2^{de} semester</i>	68		Total 2 nd semester <i>Totaal 2^{de} semester</i>	64		Total 2 nd semester <i>Totaal 2^{de} semester</i>	68		Total 2 nd semester <i>Totaal 2^{de} semester</i>	63	
Total Year level 1 <i>Totaal Jaarvlak 1</i>	132		Total Year level 2 <i>Totaal Jaarvlak 2</i>	136		Total Year level 3 <i>Totaal Jaarvlak 3</i>	140		Total Year level 4 <i>Totaal Jaarvlak 4</i>	131	
TOTAL FOR THE PROGRAMME / TOTAAL VIR DIE PROGRAM										539	

Table 4.2: Example of Natural Science B.Ed Programme for Senior/ FET phase pre-service teachers - with a Specialisation in Life Sciences (1st Major) and Geography (2nd Major)

YEAR LEVEL 1 / JAARVLAK 1			YEAR LEVEL 2 / JAARVLAK 2			YEAR LEVEL 3 / JAARVLAK 3			YEAR LEVEL 4 / JAARVLAK 4		
Module code Modulekode	Cr Kr	Type Type	Module code Modulekode	Cr Kr	Type Type	Module code Modulekode	Cr Kr	Type Type	Module code Modulekode	Cr Kr	Type Type
FIRST SEMESTER / EERSTE SEMESTER											
Fundamental modules <i>Fundamentele modules</i>			Fundamental modules <i>Fundamentele modules</i>			Fundamental modules <i>Fundamentele modules</i>			Fundamental modules <i>Fundamentele modules</i>		
EDCC114	8	H	EDCC214	8	H	EDCC315	8	H	EDCC413	8	H
EDCC115	8	H	EDCC215	8	H	EDCC318	8	H	EDCC414	8	H
EDCC118	8	H	EDCC218	8	H	EDTM312	8	X	EDCC418	8	H
EDTC111	8	X	ENAC211	8	X	WVOS312	12	X	RESF412	8	X
Specialisation Subject 1 <i>Spesialiseringssvak 1</i>			Specialisation Subject 1 <i>Spesialiseringssvak 1</i>			Specialisation Subject 1 <i>Spesialiseringssvak 1</i>			Specialisation Subject 1 <i>Spesialiseringssvak 1</i>		
LIFE112	12	H	LIFE212	12	H	LIFE312	16	H	LIFE411	16	H
Specialisation subject 2 [and GET subject] <i>Spesialiseringssvak 2 [en AOO vak]</i> CHOOSE ONE / KIES EEN			Specialisation subject 2 [and GET subject] <i>Spesialiseringssvak 2 [en AOO vak]</i>			Specialisation subject 2 <i>Spesialiseringssvak 2</i>			Specialisation subject 2 <i>Spesialiseringssvak 2</i>		
AFRE112 [NSSP112]	12 8	H H	AFRE212 [NSSP212]	12 8	H H	AFRE312	16	H	AFRE412	16	H
BSTE112 [NSSP112]	12 8	H H	BSTE212 [NSSP212]	12 8	H H	BSTE312	16	H	BSTE412	16	H
CATE112 [NSSP112]	12 8	H H	CATE212 [NSSP212]	12 8	H H	CATE312	16	H	CATE412	16	H
ENGV111 [NSSP112]	12 8	H H	ENGV211 [NSSP212]	12 8	H H	ENGV311	16	H	ENGV411	16	H
GEOE112 [NSSP112]	12 8	H H	GEOE212 [HISV211]	12 8	H H	GEOE312	16	H	GEOE411	16	H
Overlap of Physical Sciences in Natural			Overlap of History in Social Science			MLIT311	16	H	MLIT411	16	H
[NSSP112]			[NSSP211]			PHSE312	16	H	PHSE412	16	H
[NSSP112]			[NSSP211]			SOFV311	16	H	SOFV411	16	H
Total 1 st semester <i>Totaal 1^{ste} semester</i>			Total 1 st semester <i>Totaal 1^{ste} semester</i>			Total 1 st semester <i>Totaal 1^{ste} semester</i>			Total 1 st semester <i>Totaal 1^{ste} semester</i>		
64			64			68			64		
SECOND SEMESTER / TWEDE SEMESTER											
Fundamental modules <i>Fundamentele modules</i>			Fundamental modules <i>Fundamentele modules</i>			Fundamental modules <i>Fundamentele modules</i>			Fundamental modules <i>Fundamentele modules</i>		
EDCC215	8	H	EDCC224	8	H	EDCC323	16	H	EDCC423	8	H
EDCC218	8	H	EDCC228	8	H	EDCC325	8	H	EDCC428	8	H
Choose one Kies een ALDA122 / ALDE122	12	X	WVOS222	12	X				RESF422	8	X
			ENAC221	8	X				LOCC421	1	X
									LOLT424	1	X
Choose one Kies een AFCL121 ¹ / SOLC121 ² / ZUC121 ²	8	X							Choose one Kies een LTSF420 / LTSF421 / LTSF422 / LTSF423 / LTSF424 / LTSF425 / LTSF426 / LTSF427 / LTSF428 / LTSF429	1	X
Specialisation Subject 1 <i>Spesialiseringssvak 1</i>			Specialisation Subject 1 <i>Spesialiseringssvak 1</i>			Specialisation Subject 1 <i>Spesialiseringssvak 1</i>			Specialisation Subject 1 <i>Spesialiseringssvak 1</i>		
LIFE222	12	H	LIFE222	16	H	LIFE322	16	H	LIFE421	16	H
Specialisation subject 2 [and GET subject] <i>Spesialiseringssvak 2 [en AOO vak]</i>			Specialisation subject 2 <i>Spesialiseringssvak 2</i>			Specialisation subject 2 <i>Spesialiseringssvak 2</i>			Specialisation subject 2 <i>Spesialiseringssvak 2</i>		
AFRE122 [NSSP212]	12 8	H H	AFRE222 [NSSP212]	16 8	H H	AFRE322	16	H	AFRE422	16	H
BSTE122 [NSSP212]	12 8	H H	BSTE222	16	H	BSTE322	16	H	BSTE422	16	H
CATE122 [NSSP212]	12 8	H H	CATE222	16	H	CATE322	16	H	CATE422	16	H
ENGV121 [NSSP212]	12 8	H H	ENGV221	16	H	ENGV321	16	H	ENGV421	16	H
GEOE122 [NSSP212]	12 8	H H	GEOE222	16	H	GEOE322	16	H	GEOE421	16	H
Overlap of Physical Sciences in Natural Science			MLIT221	16	H	MLIT321	16	H	MLIT421	16	H
[NSSP121]			PHSE222	16	H	PHSE322	16	H	PHSE422	16	H
[NSSP121]			SOFV221	16	H	SOFV321	16	H	SOFV421	16	H
Total 2 nd semester <i>Totaal 2^{de} semester</i>			Total 2 nd semester <i>Totaal 2^{de} semester</i>			Total 2 nd semester <i>Totaal 2^{de} semester</i>			Total 2 nd semester <i>Totaal 2^{de} semester</i>		
68			68			64			59		
Total Year level 1 <i>Totaal Jaarvlak 1</i>			Total Year level 2 <i>Totaal Jaarvlak 2</i>			Total Year level 3 <i>Totaal Jaarvlak 3</i>			Total Year level 4 <i>Totaal Jaarvlak 4</i>		
132			132			132			123		
TOTAL FOR THE PROGRAMME / TOTAAL VIR DIE PROGRAM											
519											

Geography – with the 2nd major the pre-service teachers also have compulsory gap-cover modules

From Tables 4.1 and 4.2, under the specialisation subjects, one can also see that pre-service teachers can choose a second major from a number of options to accompany their first major. For the pre-service teacher who participated in this research their first

major links to one of the subjects within the field of NS.

Table 4.3 provides a summary of major subjects' combinations that the participants could have.

Table 4.3: Summary of subject combinations of Natural Science pre-service teachers

Subject Combinations of Natural Science Pre-Service Teachers		
Number of Participant	First Major	Second Major
9	Life Sciences	Geography
5	Life Sciences	English
1	Life Sciences	Afrikaans
1	Life Sciences	Sesotho
2	Life Sciences	Business studies
1	Life Sciences	Mathematics
4	Physical Sciences	Life Sciences
1	Physical Sciences	Geography
1	Physical Sciences	Mathematics
9	NS and Technology	Mathematics
2	Geography	History
2	Geography	Mathematic
1	Geography	English
3	Social Sciences	Life Skills
1	Only indicated Life Sciences	
2	Only indicated NS and Technology	
Total	45 Participants	

The abovementioned information provides a description of the Natural Science B.Ed Programme at the specific HEI where the study was conducted. Please see Chapter 1 and 3 (cf. 1.9.5.2 & 3.3.5.2) for an explanation of the sampling methods followed and a description of the sample selected. The following part of this chapter will elaborate on the research findings after an analysis of the research data. Thereafter the findings will be discussed and interpreted.

4.3 Analysis of the research findings

4.3.1 Constant comparative thematic analysis

In Chapter 3 (cf. 3.4) it was explained that a constant comparative thematic analysis was used during the data analysis and interpretation process. The constant comparative method involves breaking down the data into separate components and coding them into categories (QDATRAINING, 2012). Categories arising from this method usually take two forms. This first form includes the data that the researcher identifies as significant to the research focus of inquiry and the second form are data derived from the participant (QDATRAINING, 2012).

Constant comparison is the process of data analysis, where every clarification and result are compared with existing findings as it emerges from the data analysis, leading to both descriptive and explanatory categories (Lewis-Beck et al., 2004). Data collected from all three data collection methods, namely the document analysis, open-ended questionnaire and focus group interviews were constantly compared with the purpose of identifying patterns in the data that can be arranged in relationship to each other (Merriam, 2009).

With regard to the data analysed from the questionnaire and focus group interviews, a mixture of both deductive and inductive data analyses was followed. A deductive analysis was used to identify the categories and themes which emanated from the questions asked in the questionnaire and focus groups. This “top-down” method of data analysis helped to explicitly answer the different issues addressed in the questions.

There after an inductive analysis was used to identify the sub-themes that support the

categories and themes. Davis (2021) explains that an inductive analysis is more emergent, as the researcher analyses the data new sub-themes can emerge. This “bottom-up” method of data analysis helped with working through the data that was presented by the participants in their responses to the open-ended questionnaire, as well as the focus group interviews (Davis, 2021; Azungah, 2018; Gabriel, 2013). It needs to be further mentioned that the themes and sub-themes of the document analysis were inductively done and emerged from the documents itself.

Figure 4.2 provides an overview of how the data was analysed.

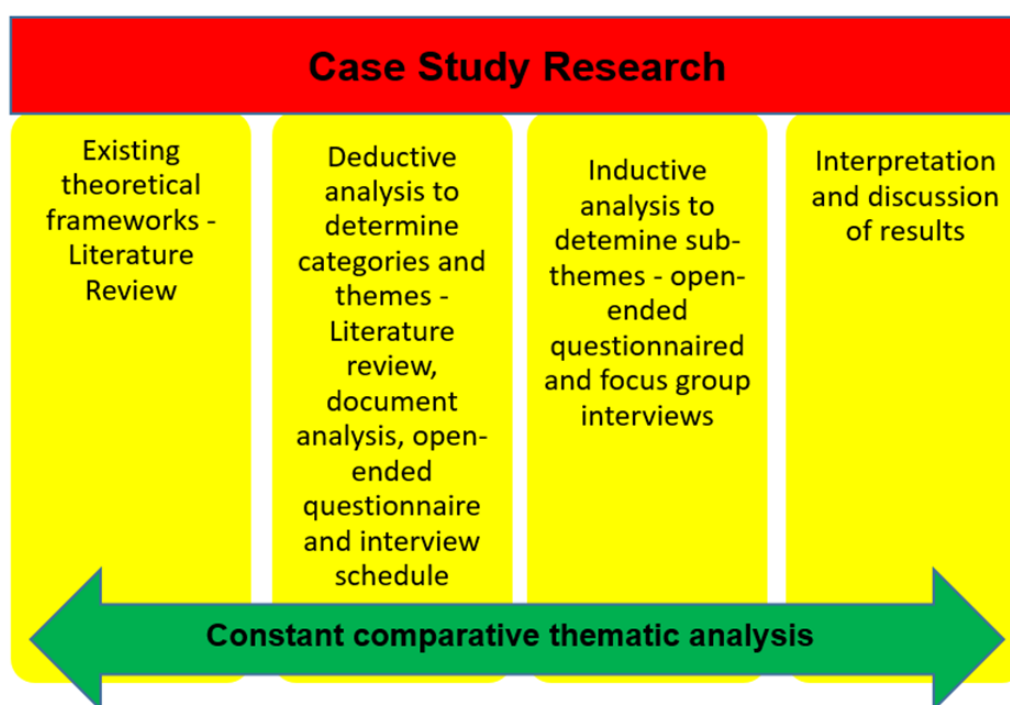


Figure 4.2: Graphical description of data analysis

4.3.2 Research findings

In this section the research findings will be presented.

In order to make reporting of the three data sets more comprehensible, a sequencing code was used to highlight from which data set the quotation is taken and which participant’s or document’s data is used. For example:

- DA1 – will be used to refer to document analysis and document 1 is quoted.
- GMOD2– will be used to refer to the generic module outcome document.

- NSS1 – will refer to the specific subject in the field of NS.
- OQP3 – will be used to refer to the open- ended questionnaire and the quote of participant 3 is reported.
- FGP5 – will be used to refer to the focus group interviews and the data of participant 5 will be quoted.

In my explanation of the categories, themes and sub-themes, I made reference to the number of participants out of a total of 45 who took part in this research study. In my study I refer to the number of responses from participants as follows:

- “few” refers to between one and five participants.
- “some” refers to between five and ten.
- “many” refers to between ten and 20 participants.
- “most” refers to between 20 to 30 participants.
- “A substantial number” refers to between 30-45 participants.

In some instances, a sub-theme was identified even if only one participant mentioned it distinctly. The reason for this is that it was deemed an important factor to take note of for teacher education on inclusion and possible further exploration in future research.

Table 4.4 provides an overview of the main document that was analysed and part of the document analysis. Some of these documents will be referred to during the data analysis (cf. 4.3.2.2) and others will be mentioned in the interpretation and discussion of the data (cf. 4.4).

Table 4.4: List of documents analysed

Documents that were analysed	Document code name
The Constitution of the Republic of South Africa, Act No. 108 of 1996	DA1
The South African Schools Act, Act No. 84 of 1996	DA2
The White Paper on Education and Training of 1995	DA3
The National Education Policy Act (NEPA) of 1996	DA4
Education White Paper 6: Special Needs Education: Building an Inclusive Education and Training System of 2001	DA5
The National Policy Framework for Teacher Education Development of 2006	DA6
The integrated strategic planning framework for teacher education and development in South Africa of 2011	DA7
The policy on the Minimum Requirements for Teacher Education (MRTEQ) of 2015	DA8
The 2021 yearbook of the specific HEI containing the B.Ed. Programme and the various module outcomes	DA9
The Policy on Screening, Identification, Assessment and Support (SIAS) of 2014	DA10
The Policy on Guidelines for full service/ inclusive schools of 2010	DA11
The National Curriculum Statement (NCS): Curriculum and Assessment Policy Statement (CAPS) Grades R-12 of 2011	DA12
The Guidelines for responding to learner diversity of 2012	DA13

The Teacher Professional Development Master Plan for 2017-2022 of 2017	DA14
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A number of generic module outcome documents and specific subject module outcome documents in the field of the NS B.Ed Programme were also analysed. Tables 4.5 and 4.6 provide a description of these documents.

Table 4.5: List of B.Ed Generic modules analysed

Generic Module	Document code name
Introduction to curriculum and professional studies	GMOD1
Education law	GMOD2
Educational psychology: human development	GMOD3
Educational psychology: introduction to educational psychology	GMOD4
Educational psychology: learner support	GMOD5
Social justice and critical thinking	GMOD6

Table 4.6: List of B.Ed Natural Science subjects analysed

NS Subjects	Document code name
Natural Sciences	NSS1
Physical Sciences	NSS2
Life Sciences	NSS3
Geography	NSS4

Social Sciences	NSS5
------------------------	------

The following categories, themes and subthemes were identified of which a summarised outline is presented in Table 4.7.

Table 4.7: Categories, themes and sub-themes

Categories	Themes	Sub-themes
1) Conceptualisation of inclusive education	Equal chance to learning	
	Non-discriminatory	
	Include everyone	
2) Policies relevant to teacher education for inclusion	DHET teacher education policies and guidelines	<ul style="list-style-type: none"> • Pedagogical knowledge • Study of practice • Learning to converse competently in a second official language, ICTs and academic literacy • Knowledge of a variety of situations, context and environments • Professional development in inclusive education • Ability to reflect

		<ul style="list-style-type: none"> • Role of the teacher • Training in identifying and accommodating barriers to learning • Training in curriculum differentiation
	B.Ed curriculum for NS	<ul style="list-style-type: none"> • Inclusive Education in South Africa • Professional ethical conduct towards learners and their diverse needs • Social-educational barriers • Physical and behavioural barriers • Learning support processes • Lesson planning • Teaching theories • Teaching and learning strategies • Teaching methods • Assessment strategies

		<ul style="list-style-type: none"> • Learning and teaching support material • Reflective practices • Indigenous knowledge
3) Knowledge and skills obtained to teach in an inclusive classroom	Knowing learners' needs and abilities	<ul style="list-style-type: none"> • Potential and ability • Grouping learners with different abilities • Addressing learner needs
	Theory learned	<ul style="list-style-type: none"> • Theory helped • Learnt about inclusive education • Identifying different learning barriers • Accommodate learners • Language • Content knowledge
	Forms of pedagogy	<ul style="list-style-type: none"> • Learner-centred teaching and learning • Different teaching strategies

		<ul style="list-style-type: none"> • Using different material • Offering content to diverse learners • Fair assessment • Creating a warm and friendly atmosphere • Nurturing skills
4) Knowledge and skills needed to teach in an inclusive classroom	Planning and conducting inclusive lessons	
	Accommodating learning barriers	
	More effective teaching strategies	
	Identifying learners' weaknesses and strong points	
	Knowledge of the context and study material	
	Flexible curriculum implementation	
	More languages	
	Additional training	<ul style="list-style-type: none"> • Courses • Workshops

		<ul style="list-style-type: none"> • Lifelong learner
	Management skills	<ul style="list-style-type: none"> • Time management • Classroom management
	Patience	
	Communication	
5) Responding to diversity of learning needs	Using cooperative learning strategies	
	Group work	<ul style="list-style-type: none"> • Problem based learning • Jig saw
	Class discussions	
	Experiential learning	
	Play	
	Including different learning styles	
	Use simple language	
	Using resources to promote inclusion	<ul style="list-style-type: none"> • Sharing resources • Using the resources that I have • Using resources for learning out of the class

	Achievement	
	Assessment	
6) Forms of learning support	One-on-one support	
	Extra classes	
	Counselling	
	ELSEN classes	
7) Practical experience	Experience gained	<ul style="list-style-type: none"> • WIL experience • Language barriers • ADHD and concentration barriers • Learners struggling to read and write • Under privileged learners
	Need more experience	<ul style="list-style-type: none"> • More practical experience • Never taught learners with physical disabilities
8) Learners at risk of marginalisation	Learners from disadvantaged backgrounds	

	Learners who struggle	
9) Working together	Adults working together	<ul style="list-style-type: none"> • Fellow colleagues • Parents • Other community members
	Benefits of working together	
	No cooperation	
10) Elimination of discrimination	Knowledge of legislation	<ul style="list-style-type: none"> • Knowledge of the Constitution and SASA • Lack of knowledge about EWP6 and SIAS • The need for one policy • Policies not practically applied • Reinforce policies • Teachers don't have enough knowledge • Schools not inclusive due to lack of knowledge

11) Reinforce inequality	Unequal resource distribution	
	Many learners in the class	
	Top achieving learners	
	Science learners are held in high regard	
	Gr 10 F known as delinquents	
	The curriculum	
	Physical structures of schools	
	Teachers	
	Not considering all	
	Separate institutions	

4.3.2.1 Category 1: Conceptualisation of Inclusive Education

The themes related to category 1 is presented Table 4.8:

Table 4.8: Themes within category 1

Themes
Equal chance to learning
Non-discriminatory
Include everyone

In order to answer the first research question, namely, “*What is inclusive education?*” the literature review in Chapter 2 already provided an outline and discussion of how inclusive education is conceptualised in different sources. Although, this was not specifically asked in the open-ended questionnaire or the focus group interviews, it was deemed appropriate to gain some understanding of how the participants conceptualised inclusive education. This was important as the focus of this research is on the perspectives of the participants regarding their training on inclusive education. Thus, from the comments the participants made a number of themes appeared that could describe their conceptualisation of inclusive education. The data indicated that the participants’ conceptualisation of inclusive education is supported by providing learners with an equal chance to learning, for teachers to be non-discriminatory and include everyone in the classroom.

4.3.2.1.1 Theme: Equal chance to learning

One participant emphasised the importance of equal chances in inclusive education. The participant mentioned that inclusive education requires the teacher to provide all learners an equal chance to participate to learning.

OQP1: “... giving all learners an equal chance to learning.”

4.3.2.1.2 Theme: Non-discriminatory

Another participant responded that inclusive education necessitates the teacher to be non-discriminatory in the classroom.

OQP1: "...To be non-discriminatory..."

4.3.2.1.3 Theme: Include everyone

Some of the participants indicated that everyone should be included and accommodated in an inclusive education system. This finding is supported by the subsequent responses of the participants:

OQP3: "...to include everyone in the class..."

OQP12: "...inclusive education state that when you plan for a lesson you need to accommodate all learners including those with learning disabilities..."

OQP14: "...it is important to accommodate everyone. Learners who need extra help should be given the opportunity to better themselves by the teacher providing more support."

OQP15: "It is important as a teacher to adhere to the rule that says educations needs to be inclusive..."

OQP16: "Inclusiveness: the teacher should use a teaching strategy that will effectively accommodate all learners."

OQP21: "That Inclusive Education means to include everyone in your classroom..."

4.3.2.2 Category 2: Policies relevant to teacher education for inclusion

The following themes and sub-themes were identified from policy documents that guide teacher education for inclusion specifically for pre-service teachers who are studying in Natural Science subjects:

Table 4.9: Themes and sub-themes within category 2

Themes	Sub-themes
DHET teacher education policies and guidelines	<ul style="list-style-type: none"> • Pedagogical knowledge • Study of practice • Learning to converse competently in a second official language, ICTs and academic literacy • Knowledge of a variety of situations, context and environments • Professional development in inclusive education • Ability to reflect • Role of the teacher • Training in identifying and accommodating barriers to learning • Training in curriculum differentiation
B.Ed curriculum for NS	<ul style="list-style-type: none"> • Inclusive Education in South Africa • Professional ethical conduct towards learners and their diverse needs • Social-educational barriers • Physical and behavioural barriers

	<ul style="list-style-type: none"> • Learning support processes • Lesson planning • Teaching theories • Teaching and learning strategies • Teaching methods • Assessment strategies • Learning and teaching support material • Reflective practices • Indigenous knowledge
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As part of the document analysis, policies relevant to teacher education for inclusion were explored. These documents included:

- The National Policy Framework for Teacher Education Development of 2006.
- The integrated strategic planning framework for teacher education and development in South Africa of 2011.
- The policy on the Minimum Requirements for Teacher Education (MRTEQ) of 2015.
- The Teacher Professional Development Master Plan for 2017-2022, of 2017.

The policies and guidelines that directly influence the implementation of inclusive education in South African classrooms and that also impact teacher education for inclusive education include:

- Education White Paper 6: Special Needs Education: Building an Inclusive Education and Training System (EWP6) of 2001.
- The National Curriculum Statement (NCS): Curriculum and Assessment Policy

Statement (CAPS) Grades R-12 of 2011.

- The Guidelines for responding to learner diversity of 2012.
- The Policy on Screening, Identification, Assessment and Support (SIAS) of 2014.

These policy documents also contain specific requirements that should be considered by HEIs as part of training pre-service teachers for inclusive education.

Furthermore, it was also deemed important to explore the B.Ed curriculum for the different Natural Science subjects in order to ascertain if inclusive education, and more specifically dealing with diverse learners, are addressed in the curriculum. These document analyses were essential as it helped me to understand the teacher education context from which the participants' perspectives could have developed. The themes for this category include; the DHET teacher education policies and guidelines as well as B.Ed curriculum for NS. Please note that the sub-themes did not emanate from the questionnaire or focus group directly, but emerged from the analysed documents.

4.3.2.2.1 Theme: DHET teacher education policies and guidelines

The sub-themes that seem to be supported by these policy documents as requirements for teacher education encompassed the following: the development of pedagogical knowledge, study of practice, using multiple forms of literacy to communicate, situational knowledge, professional development in inclusive education, the ability to reflect, the role of the teacher, training in identifying and accommodating barriers to learning and training in curriculum differentiation.

4.3.2.2.1.1 Sub-theme: Pedagogical knowledge

The objective of the National Policy Framework for Teacher Education Development (DoE, 2006) (DA6) was to ensure that an adequate number of well-trained and motivated teachers were recruited for the teaching profession. A key stipulation in this policy is that “*conceptual and content knowledge and pedagogical knowledge are necessary for effective teaching.*” (DoE, 2006, p. 16) (DA6). The policy document further states that it will be necessary for many pre-service and in-service teachers to reinforce their “*subject knowledge base, pedagogical content knowledge and teaching skills*”. It is also reiterated that teachers need to “*develop specialised skills*” like managing diversity in the inclusive classroom. In the context of this study the policy framework stated that

teachers must be equipped to prepare all learners with the “*appropriate knowledge, skills and values*” and help them to “*fulfil their personal potential and aspirations*” (DoE, 2006, p. 7) (DA6). The onus is placed on ITE programmes to equip teachers to embark on the before mentioned task (DoE, 2006) (DA6)

The most recent policy, the Minimum Requirements for Teacher Education Qualifications (MRTEQ) (DHET, 2015) (DA8) emphasises the critical need for B.Ed graduates to have pedagogical knowledge about inclusive education and skills in identifying and addressing barriers to learning. An essential requirement in this document seems to be that pre-service teachers must obtain knowledge about the extent of diversity in the South African context in order to teach in a manner that includes all learners by utilizing curriculum differentiation as part of an inclusive pedagogy. The MRTEQ (DHET, 2015) identifies that inclusive education should be an integral focal point of both “*general pedagogical knowledge*” and “*specialised pedagogical content knowledge*”.

The abovementioned two policy documents highlight that essential elements that should be incorporated into any ITE programme is “*subject content knowledge, knowledge of learners, knowledge of learning, knowledge of the curriculum, knowledge of instructional strategies, knowledge of assessment strategies*” and “*creating learning opportunities for diverse learners*”. Another document, the Integrated Strategic Planning Framework for Teacher Education and Development in South Africa, indicated that “*teacher development activities should lead to improved competence in professional practice in education, including improved knowledge, skills and dispositions for teaching*” (DBE and DHET, 2011, p. 10) (DA7).

4.3.2.2.1.2 Sub-theme: Study of practice

The MRTEQ (2015, p. 10) (DA8) mentions that a crucial part of pre-service teacher development in ITE programmes includes the “*study of practice*”. This will require pre-service teachers to observe and analyse a variety of practices in different contexts in order to build theory that maybe applied later while learning in practice. Resources that can be used by pre-service teachers to learn from practice comprises of “*case studies, video recordings and lesson observation*”. Another finding from the MRTEQ (2015, p. 10) (DA8) emphasises the following stipulation that pre-service teachers are required to learn in practice. “*Learning in practice involves teaching in authentic and simulated*

classroom environments” (MRTEQ, 2015, p. 10) (DA8).

4.3.2.2.1.3 Sub-theme: Learning to converse competently in a second official language, ICTs and academic literacy

Aspects like learning to teach using “*a second language, the ability to use Information and Communication Technologies (ICTs)*” as well as the “*acquisition of academic literacy*” seem to be affirmed as important requirements for pre-service teachers that will enable them to develop as teachers (MRTEQ, 2015, p. 10) (DA8).

4.3.2.2.1.4 Sub-theme: Knowledge of a variety of situations, context and environments

A finding from the Integrated Strategic Planning Framework for Teacher Education and Development in South Africa (DBE and DHET, 2011, p. 10) (DA7) states that “*teacher development should foster renewed commitment to the vital role of the teaching profession in the development of our country*”. Knowledge of a variety of “*situations, context and environments*” are regarded as vital for teaching in the South African classroom (MRTEQ, 2015, p. 11) (DA8). Pre-service teachers are required to be acquainted with the “*complex and differentiated nature of the South African society*” (MRTEQ, 2015, p. 11) (DA8). Knowledge about the context in which teaching will occur can enable pre-service teachers to approach their planning and execution of teaching and learning in a well thought through manner, taking into account the “*diverse challenges*” faced by learners in South African schools (MRTEQ, 2015, p. 11) (DA8).

4.3.2.2.1.5 Sub-theme: Professional development in inclusive education

In the Teacher Professional Development Master Plan for 2017-2022 (DA15) it was highlighted that Teacher Education for Inclusive Teaching (TEFiT) should receive priority in teacher development. It is stipulated that HEI teacher education programmes must strengthen pre-service teachers’ capacity for inclusive and special needs education, ensuring that all new teacher graduates have a high level ability to implement inclusive education approaches in their practice (DBE, 2017, p.11) (DA15).

The abovementioned stipulation is supported in the MRTEQ (DHET, 2015) (DA 8) and the Integrated Strategic Planning Framework for Teacher Education and Development in South Africa (DBE and DHET, 2011, p.10). The MRTEQ (DHET, 2015) specify that all teachers’ need to be familiar with the requirements for the successful implementation

of inclusive education. These requirements are emphasised in the following quotation out of the MRTEQ (DHET, 2015, p. 23); *“All B.Ed. graduates must be knowledgeable about inclusive education and skilled in identifying and addressing barriers to learning, as well as in curriculum differentiation to address the needs of individual learners within a grade”*.

While the Integrated Strategic Planning Framework for Teacher Education and Development in South Africa stress that ITE programmes at HEI’s should *“provide targeted”* and *“continuing professional development courses focused on developing teachers’ knowledge and competence to teach the national curriculum”* inclusively in all the phases (including Foundation, Intermediate, Snr and FET phases) and all the subject specialisations (like those in the field of NS). Furthermore, professional development in inclusive education should be focused on *“multi-level/ inclusive teaching”* that are concentrated on *“curriculum adaptation”* (DBE and DHET, 2011, p.10) (DA7).

4.3.2.2.1.6 Sub-theme: Ability to reflect

In two of the policy documents (DA 6 & 8) emphasis is also placed on pre-service teachers’ ability to *“reflect”*. The National Policy Framework for Teacher Education Development (DoE, 2006, p. 16) (DA6) asserts that *“the teacher’s willingness and ability to reflect on practice”* should be supported in ITE programmes. The MRTEQ (2015, p. 10) (DA8) refers to reflection that can be used to improve practice and to learn from experience: *“observing and reflecting on lessons taught by others”* and *“preparing, teaching and reflecting on lessons presented by oneself.”*

4.3.2.2.1.7 Sub-theme: Role of the teacher

In many of the policy documents the role of the teacher in the successful implementation of inclusive education is reiterated. In EWP6 (DoE, 2001, p. 3) (DA5) the *“central role played”* by teachers in inclusive education is emphasised. The SIAS document (DBE, 2014, p. 33) (DA10) also affirms that *“the teachers’ role in an inclusive environment is crucial”*.

4.3.2.2.1.8 Sub-theme: Training in identifying and accommodating barriers to learning

All of the policy documents mentioned in Table 4.4 support the fact that pre-service teachers need to be trained in identifying and accommodating barriers to learning. For example, EWP6 (DoE, 2001, p. 19) (DA5) stipulates that teacher *“training will focus on how to identify and address barriers to learning”*. It is also emphasised by the SIAS document that teachers need to be trained *“to gather information and identify learners”* who might experience barriers to learning and *“accommodate the diversity of learning needs in order to facilitate learners’ achievement to the fullest”* (DBE, 2014, p. 10) (DA10). The CAPS document (DBE, 2011, p. 5) (DA 12) also supports the sub-theme by stating that inclusive education can *“only happen if all teachers have a sound understanding of how to recognise and address barriers to learning, and how to plan for diversity.”*

4.3.2.2.1.9 Sub-theme: Training in curriculum differentiation

According to the CAPS document (DBE, 2011, p. 5) in order *“to address barriers in the classroom, teachers should use various curriculum differentiation strategies such as those included in the Department of Basic Education’s Guidelines for Inclusive Teaching and Learning (2010).”* The guidelines for responding to learner diversity (DoE, 2012, p. 2) specifically address *“how to respond to learner diversity in the classrooms through the curriculum”* by *“differentiation”*. The guidelines for responding to learner diversity in the Classroom as well as the DBE’s Guidelines for Inclusive Teaching and Learning (DBE, 2010b) (DA12 & DA13) suggest that pre-service teachers and in-service teachers must be trained for curriculum differentiation. This is evidenced in the following statement: *“differentiate the content, “differentiate the learning environment”, “differentiate teaching strategies and methods” and differentiate assessment.”* (DBE, 2012, p. 4-12).

4.3.2.2.2 Theme: B.Ed. curriculum for NS

In the Natural Science B.Ed Programme students have a total number of 12 shared generic modules (cf. 4.1). These 12 modules were analysed to determine how they address inclusive education. Of the 12 modules it seems that only six of them specifically link to inclusive education or aspects thereof. As mentioned in Chapter 2 (cf. 2.4.5.2) and earlier in this chapter (cf. 4.2) several subjects in the field of NS were included in

the study. The module outcomes of five subjects were analysed. These subjects include Natural Sciences, Physical Sciences, Life Sciences, Geography, and Social Sciences. None of these modules specifically address inclusive education in their didactical or methodological outcomes and content. These subject modules and the remaining 6 generic modules address basic pedagogical content.

The sub-themes were taken from the B.Ed curriculum for NS to explore how the NS pre-service teachers are trained for inclusive education.

4.3.2.2.1 Sub-theme: Inclusive education in South Africa

In the second year of study pre-service teachers need to master the following generic module outcomes in relation to inclusive education in South Africa:

GMOD 4: “understand, explain and apply Bronfenbrenner’s exosystemic model⁴ to education, human development, diverse social problems and contextual disadvantages; understand the concept inclusive education; describe and discuss the international and national movements towards inclusive education; understand the national policies that guide the implementation of inclusive education in south Africa; apply the principles and guidelines for developing inclusive schools and classrooms; critically evaluate the implications of implementing inclusive education in South African classrooms and schools.”

4.3.2.2.2 Sub-theme: Professional ethical conduct towards learners and their diverse needs

Pre-service teachers are also required to develop professional ethical conduct towards learners and their diverse needs. The aforementioned is addressed in the B.Ed. Programme when pre-service teachers need to develop the following skills as part of a generic module:

GMOD 4: “understand the classroom in its social context; identify and understand the fundamental aspects for developing a positive and inclusive classroom environment; reflect on your own personal characteristics that will exert a positive or negative influence in the classroom; reflect about your professional and ethical conduct towards

⁴ The term “exosystemic model” (cf. 4.3.2.2.1) is mostly referred to as the “bio-ecological systems theory” (cf. 2.6.2.2).

learners and their diverse needs...

4.3.2.2.2.3 Sub-theme: Social-educational barriers

The ability to recognise different types of “*social and educational barriers*” are addressed in two of the pre-service teachers’ generic modules in the third year. The module outcomes state the following:

On completion of this module pre-service teachers should be able to:

GMOD5: “offer an explanation of the influence of the society on educational barriers; give an overview of the various types of social and educational barriers” and “demonstrate skills to support learners with different types of social and educational skills.”

GMOD6: “Show an understanding of social justice by critically engaging in debates on selected issues, such as gender, sexism, racism and patriarchy.”

4.3.2.2.2.4 Sub-theme: Physical and behavioural barriers

The following generic module outcomes specifically require that pre-service teachers need to be competent in identifying and accommodate “*physical and behavioural barriers*”

On completion of this module pre-service teachers should be able to:

GMOD5: “elaborate on your understanding of physical barriers in education; give an overview of different physical barriers in education; and demonstrate skills to support learners with different types of physical barriers in educational... demonstrate your understanding of the complexity of behavioural barriers in education; describe how different behavioural barriers in education can be managed; and discuss strategies to positively approach learners with behavioural barriers in educational.”

4.3.2.2.2.5 Sub-theme: Learning support processes

In one generic module it is expected that students will be able to analyse and develop a learning support process plan.

On completion of this module pre-service teachers should be able to:

GMOD5: “analyse the learning support process for learners who experience barriers to

learning” and “develop a learning support process plan”

4.3.2.2.2.6 Sub-theme: Lesson planning

In all the modules relating to the field of NS lesson planning seems to be an aspect of teaching that receives a lot of attention in the didactical component of each subject. Pre-service teachers are required to plan, design and present lessons in these subjects. The following quotes provides evidence for this finding:

NSS1: “integrate knowledge regarding teaching and learning with specialized content knowledge when planning and executing lessons...knowledge of the CAPS document for Natural Sciences and skills relating to planning lesson plans...design an appropriate lesson that can be presented practically...describe the place and significance of annual teaching plans and a lesson plan in Natural Science...”

NSS2: “...facilitating the teaching of Physical Sciences...”

NSS3: “...compile and develop a lesson plan... present a micro-lesson... critically evaluate the value that proper and thorough planning has for a Life Sciences teacher... design a lesson and complete a lesson plan through alignment of outcomes, content, strategies, as well as assessment.”

NSS4: “Planning a basic micro Geography lesson...design and plan a basic micro lesson...emphasising the approach in the three main phases of a lesson, namely the introduction moment, teaching-learning phase and the conclusion phase...”

NSS5: “...Plan a basic micro lesson...design a lesson...”

4.3.2.2.2.7 Sub-theme: Teaching theories

In three of the subjects linking to the field of NS teaching theories are addressed. The teaching theories that are most commonly addressed include that of social-constructivism, behaviourism and the cognitive theory. This can be seen in the quotations below:

NSS2: “Discuss and implement the constructivist theory in Physical Sciences.”

NSS4: “...social constructivist teaching-learning theory...to teach learners effectively within the framework of the CAPS as modelled on the social constructivist learning theory and behaviouristic teaching approaches...Analyse the relation between

traditional Geography and the behaviouristic approach...analyse the role of the geography teacher and learner in the traditional behaviouristic teaching approach...argue the implication of social constructivist teaching approach for Geography teaching and learning...practically implement the contribution of constructivism to cognitive acceleration in Geography education.”

NSS5: “the ability to apply theories in teaching geography: the cognitive approach...”

4.3.2.2.8 Sub-theme: Teaching and learning strategies

It is also evident in the findings that different teaching strategies are addressed in the didactical content of the subjects within the field of NS. Both teacher centred and learner centred teaching and learning strategies are dealt with in these subjects, as indicated by the subject module outcomes below:

NSS1: “...plan a learner –centred investigation...”

NSS3: “Teaching strategies and methods for effective science teaching...distinguish between ostensive and heuristic teaching strategies...the ability to select and implement suitable teaching and learning strategies to guarantee effective learning regarding module content”

NSS4: “demonstrate the ability to integrate teaching techniques and strategies into lesson plans...analysed the paradigm shift from a teacher-centred approach to a learner-centred approach in geography...understanding of contested knowledge and understanding of major teaching-learning theories and related direct, indirect, independent and interactive learning strategies in Geography education...make applicable choices of teaching – learning strategies to challenge learners to think and thereby promote effective, meaningful and self-directed learning in Geography...”

NSS5: “apply learning and teaching techniques and strategies...active teaching – learning strategies... make applicable choices of teaching – learning strategies to challenge learners to think and thereby promote effective, meaningful and self-directed learning in Social Sciences...”

4.3.2.2.9 Sub-theme: Teaching methods

Different teaching methods appear to be addressed in all the subjects as part of the methodology. Various teaching methods like, practical investigations, problem based

learning, inquiry learning, projects based learning, active learning, cooperative learning, field excursions as well as case studies are commonly focused on in these subjects. This sub-theme is supported by the following subject outcomes:

NSS1: “describe and demonstrated different investigations...make a decision regarding the type of investigation that will be suitable...case study...describe inquiry learning as a preferred strategy for teaching and learning in the Natural Science...classroom as indicated by the CAPS...describe the principles on which Inquiry Learning is based...explain the teaching methods which will promote inquiry learning...

NSS2: “the use of simulations to enhance practical work...interpret and discuss research findings regarding the use of simulations to enhance practical work... reflect on your experience regarding the use of simulations in Physics and compare it to physical investigations...group work in Physical Sciences.”

NSS3: “to provide sufficient scaffolding in order to support the student in using the scientific method and cooperative group work as learning and teaching strategies...motivate the educational value of an excursion and compile a framework to guide the planning of an excursion...plan and execute an experimental investigation... identify and motivate the selection of problem-based learning as an inquiry teaching-learning strategy for the effective learning of the content... plan and evaluate the educational value of problem-based learning as a teaching-learning strategy and to design relevant teaching aids to facilitate this approach.... use suitable tools, such as the TASC-wheel⁵, to solve and execute a problem-based activity and to evaluate the educational value thereof in teaching Life Sciences... identify and motivate the selection of cooperative learning as an inquiry-based teaching-learning strategy, such as the jigsaw and De Bono methods, for the effective learning of the content; and plan and evaluate the educational value of cooperative learning as a teaching-learning strategy...implement and evaluate the use of case studies.”

NSS4: “...use different teaching methods e.g. teacher method, question and answer, simulation games, role-play, use of newspapers and magazines, worksheets and debates...collaborate with individuals, in groups as well as in class, according to CAPS principles on cooperative learning...effectively apply role-play as a teaching and learning method...effectively use debates as a teaching and learning method in the

⁵ TASC Wheel - Thinking Actively in a Social Context Framework

classroom...critically discuss problem-based learning, issue-based learning, case-studies/case-based learning, decision, cooperative learning and resource based teaching-learning strategies...plan, organised and effectively implement a field work task...

NSS5: "...use of different teaching and learning methods e.g. project methods, teacher methods and tutorials...evaluate and design an example of a field excursion ...

4.3.2.2.2.10 Sub-theme: Assessment strategies

In all Natural Science subjects' pre-service teachers are required to learn how assessment strategies can be applied. Pre-service teachers need to plan and design practical assignments and worksheets as well as various activities based on specific topics in the related subject. Pre-service teachers also need to develop suitable assessment instruments that will enable them to assess affectively. The following quotations provide an idea of how assessment practices are incorporated into different subjects relating to the field of NS:

NSS1: "the ability to plan a practical for the teaching environment... draw up a well-structured worksheet to guide learners in the teaching environment to carry out an experiment or investigation...design an assessment task for the teaching environment... design suitable learner activities which promote active learning...plan assessment strategies and design suitable assessment tools/instruments...peer-assessment...explain assessment strategies to be used for inquiry learning...design a variety of inquiry-based learning activities..."

NSS2: "design worksheets and assessment tools...assessment of group work..."

NSS3: "plan and design suitable assessment opportunities as part of the broader assessment plan as stipulated in the policy documents... design a practical worksheet and project...develop assessment tasks on all levels of Bloom's taxonomy...designing reliable and varied assessment instruments to improve and promote learning."

NSS4:" ...assessment methods...assessment policies...act as an assessor by using different assessment strategies and methods to effectively promote effective teaching and learning...an understanding of the basic practice of and an ability to apply and evaluate assessment in geography education...act as an assessor of learning"

NSS5: "...prepare a practical learning activity for learners in a classroom situation."

4.3.2.2.2.11 Sub-theme: Learning and teaching support material

In many subject module outcomes pre-service teachers are required to use and design their own teaching and learning media to enhance the teaching and learning experience of their lessons. The quotations below show, how the use and design of teaching media are addressed in four different subjects.

NSS1: "develop an infographic as teaching aid...create visual and/or tangible learning and teaching support material...select, create and practically implement suitable LTSM ...design and construct a model...discuss the advantages and disadvantages of learning and teaching support material (LTSM) as part of a lesson"

NSS3: "Design and build a model about the content and evaluate the educational value of models and other media to facilitate teaching and learning...design relevant teaching aids and media to facilitate cooperative learning as a teaching-learning strategy"

NSS4: "...use of suitable educational media, to optimise teaching and learning e.g. overhead projector, transparencies, data projector, posters and models..."

NSS5: "practically explain and illustrate, with suitable teaching aid, certain aspects of topics...use newspapers as teaching and learning support material...incorporate specific LTSM..."

4.3.2.2.2.12 Sub-theme: Reflective practices

Only in one subject is reference made to reflective practices. Various aspects of reflection form part of this subject outcomes, namely;

NSS3: "...describe the characteristics that a Life Sciences teacher must dispose of to practice good reflective practices...differentiate between three types of reflections to indicate the connection or relation thereof and critically evaluate the execution thereof in a Life Sciences lesson..."

4.3.2.2.2.13 Sub-theme: Indigenous knowledge

Two subjects regard indigenous knowledge as important in preparing pre-service teachers for effective teaching. The following statements support this finding:

NSS2: “The nature of indigenous knowledge, collateral learning and indigenous knowledge, comparison of scientific and indigenous knowledge...incorporate indigenous knowledge in a Physics theme...”

NSS3: “formulate an own definition of indigenous knowledge systems and to demonstrate an appreciation of its contribution in Life Sciences.”

4.3.2.3 Category 3: Knowledge and skills obtained to teach in an inclusive classroom

The themes and subthemes of this category is presented in the Table 4.10:

Table 4.10: Themes and sub-themes within category 3

Themes	Sub-theme
Knowing learners’ needs and abilities	<ul style="list-style-type: none"> • Potential and ability • Grouping learners with different abilities • Addressing learner needs
Theory learned	<ul style="list-style-type: none"> • Theory helped • Learnt about inclusive education • Identifying different learning barriers • Accommodate learners • Language • Content knowledge
Forms of pedagogy	<ul style="list-style-type: none"> • Learner-centred teaching and learning • Different teaching strategies

	<ul style="list-style-type: none"> • Using different material • Offering content to diverse learners • Fair assessment • Creating a warm and friendly atmosphere • Nurturing skills
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The participants were asked: *What knowledge and skills have you obtained in your B.Ed Programme that will enable you to teach in the class described in the scenario (cf. Addendum A2)?* The themes identified under this category included knowing learners' needs and abilities, theory learned and forms of pedagogy. Different sub-themes have been identified under each of the abovementioned themes to aid in substantiating them. The sub-themes were formulated out of the participants' responses in the open-ended questionnaire, as well as the focus group interviews.

4.3.2.3.1 Theme: Knowing learners' needs and abilities

The supporting sub-themes under this theme consist of abilities and potential, identifying needs and abilities of learners, grouping learners with different abilities and addressing learner needs.

4.3.2.3.1.1 Sub-theme: Potential and ability

The participants who took part in the focus group interview, indicated that they have a clear understanding of what the difference between a learners' ability and potential is. These participants were asked to answer the following question; *What is meant by ability and potential so you can voice your views on what would you regard as a learners' ability? And what would you regard as a learner's potential?* They concurred that a learners' ability is what the learner can do and achieve at the moment, and that a learners' potential is what the learner will be able to do and achieve with continuous support and accommodation. This is reflected in the following quotes:

FGP1: I have two words have potential and ability, okay I can define ability as the extent

in which something can be done excellently. The extent in which a certain skill can be exercised excellently. That's the ability but the potential is the probability if, if that's the right word, but the probability in which a certain skill a certain umm, trick that can be exercised to a very large extent if the yeah, it's the probability if somebody has the potentially has a probability of performing to a great extent, right. If we say in how we take it to learners, we could say learners' potential is the probability of a learner to perform to their utmost best and then ability of the learner is what the learner can do best. For example, a learner could speak very well in class, teach very well as a student teacher or umm, do math very well. That's their ability. But if the learner has got that fire in them, to do certain things in a very excellent way. That's a potential of a learner... Furthermore, I could also add if that's okay, that the ability is what I can do for the time being absolutely without question something that I can do even if my eyes were closed even if I was sleeping at 12 o'clock at night and you pour me with very cold water I can still do it. But potential requires a lot of I, I can do it, but I need a bit of a motivation or a push, Yes..."

FGP2: "Personally I feel like learners' abilities are what they're already good at what, what the teacher can already see that learners are getting this or that specifically in is good in this and this and this that's that abilities and potential. I believe that it is where the teacher sees or where learners can improve on but they have the potential to actually be good at something but they're not good at it, but like they have the space to actually improve and be good at."

FGP5: "A learners' ability is when a learner is able to do something, they do not need any help or something to boost them or someone to help them with any, with that thing. They are able to do it. They are good at it. And then a learners' potential is that they have the qualities that they can be, they have the qualities that they can be able to do something, but they need help and development from other people."

FGP6: "what is meant by ability and potential? Eeh, ability, I think, is the stage of being able, having the means of doing something and then eeh, what I mean by potential, potential is more like eeh, unrealized capacity or unrealized, unrealized ability or able-ness. Now to this question, what do you regard as a learners' ability and what would you regards learners' potential. Now what I can regard as learners' ability, eeh, I can regard learners' ability as being able to read, being able to link ideas, being able to, to do to reason with logic. And then now, to what would I regard as a learners' ability, eeh,

potential? I will say if a learner eeh, is able to, to. For example, let's say maybe there's this particular learner, the learner usually doesn't perform well in school subjects such as mathematics. Now a teacher realizes this at an early stage. And then now the teacher decides to conclude with the means of seeing the learner doesn't understand mathematics or mathematics eeh, give challenge to that particular learner. Now later on, the teacher decides to, to, to assess the learners with test and assignments. Now it so happened that the learner went home to study and wrote the test. Unsurprisingly so the learner gets good marks. That's how I can regard as a learner potential."

4.3.2.3.1.2 Sub-theme: Grouping learners with different abilities

Some of the participants indicated that they have obtained the knowledge and skills to group learners with different abilities.

OQP4: "...I have group my learners by their different abilities to learn so that the ones who understand easily can assist those who have difficulty understanding."

OQP8: "...I will group learners according to capabilities, each group should have an advanced learner, an average learner and a below average learner this allows group participation and collaboration..."

OQP26: "...Another thing is, I will merge learners with special needs with learners who are not struggling with the content anyhow, this will lead them to learn from each other and the disadvantaged ones will feel equal..."

FGP1: "... group work, you teach learners how to work in groups, interact with their learners, interact with the fellow learners and talk, you know, it's actually really easy for a person to learn with their peers that it will learn somebody older, but as the teacher, there we just have to facilitate that... I would group them with specific differences with specific capabilities. I know which learner does what, which learned doesn't do what, although it might be difficult for a very big class..."

FGP2: "I'll group learners umm, in diverse, with their diverse learning abilities, simply because umm, most times it kind of helps to just create a spark of creativity, because none of them thinks the same none of them applies content the same way... that just helps them enjoy and most times when that's the case it's, they tend to debate a lot just in, just in a cooperative way because I'm there as teacher to make sure that there is cooperation..."

FGP5: "...I will group them where they have mixed abilities so that from each and every one of them, they can learn something new..."

4.3.2.3.1.3 Sub-theme: Addressing learner needs

A few participants emphasised that they have obtained the skills of addressing learner needs in the inclusive classroom.

OQP27: "...addressing the learner need..."

OQP29: "...The skill to work with people with different needs while understanding their situation..."

4.3.2.3.2 Theme: Theory learned

In the focus group interviews, the participants were asked: *How did the theory you have learned throughout your B.Ed training help you to teach diverse learners?*

4.3.2.3.2.1 Sub-theme: Theory helped

Some of the participants had mixed responses, but overall it appears as if the participants felt that the theory they were taught helped enough to enable them to teach diverse learners. The following quotes reflect the aforementioned statement:

FGP1: ... "so umm this Bronfenbrenner umm model, it's some kind of theory and it helps us understand that there are so many factors that are impacting one life right, one life of a learner is a system on its own right! So it has all the factors that are actually embedded within it that makes it be sustained or umm live, come to life. So it helped me understand that if a learner comes to class they might have certain hindrances. They might have certain factors in their life that are somehow perpetuating their lives, you understand that are somehow affecting their being as humans, you understand. So it helped me to restructure and shape my approach, right? So you must always approach people with with humbleness with humility with with with with empathy to understand that people regardless of how a person greets, you know, sometimes they could do it with such enthusiasm but deep down they're actually going through so much and you could be a trigger, you understand. So it helped me to understand this particular theory help you to understand that learners are very different people. They are exposed to different aspects of Life are exposed to different factors determinant's, external determines, you understand. So it helps me to tone myself down, grind myself down and say you know

what? Let me come and try to lower my standards to these learners and lower myself my academic umm success rather, to these learners' standards to accommodate them because now I've, I've somehow encountered a different theory that taught me that learners have come from different backgrounds. So it has shaped my thinking capacity that no learners are different. They come from different backgrounds. They have deferent systems in their lives instead, so I have to tone myself down."

FGP2: ... "I don't think the, the course that I did umm, taught me how to teach diverse learners practically. I feel like they, we were actually given just umm theory behind it and just the values behind it umm, values such as like we must treat all learners the same and all of that, but as for the practical application of it, its, I think that's the challenge in part because I'm thinking of it in terms of such as that there are some disabled learners in the class and umm, as much as I must treat all learners the same, but there is a certain level of discrimination that must be applied. We were, we were told that, but umm the extended which I can go to, the extended to which this discrimination may be applied, I either didn't get the hang of it umm, or I didn't, I wasn't taught that. But I feel like I just didn't get the hang of it.

FGP3: "Ek sou sê die teorie wat ons leer het, het definitief gehelp. Ek onthou in ons tweede jaar het ons 'n klas gehad wat ons geleer het hoe om umm, 'n "multigrade classroom" vir jou te hanteer en hoe om 'n les plan op te stel vir 'n "multigrade classroom", en dan het ons ook die sielkundige, of die sielkundige vakke gehad... wat ons ook oor sielkunde self gepraat het, ek kan onthou dat ons geleer het, dit was in tweede jaar, toe leer ons van soos sekere umm, soos eers wat dit begin by die brein en so aan, wat mens kan leer as daar dalk enige psigologiese probleme is, dat mense kan raaksien en verlede jaar se een module wat ons gehad het... was gewees oor hoe om sekere umm, "disabilities" te hanteer... Soos ek kan onthou spesifiek die spina bifida, en ek onthou dit was ook in daai eerste "questionnaire" gewees wat ons moes invul en ek onthou spesifiek dat ons daai behandel het en ons het nog daaroor toets geskryf en dan was daar nog 'n vraag gewees, hoe sal ons 'n leerder help of umm, hoe sal ons in die klaskamer te werk gaan met 'n leerder wat so is. Soos ek glo definitief ons het die nodige teorie" [English translation: "I would say the theory we've learned has definitely helped. I remember in our second year we had a class that taught us how to handle um, a "multigrade classroom", and how to come up with a lesson plan for a "multigrade classroom," and then we also had the psychologist, or the psychology

subjects...modules, what we also talked about psychology itself, I can remember that we learned, it was in second years, then we learned about like certain um, as first it starts with the brain and so on, what one can learn if there might be any psychological problems, that people can spot and last year's one module we had... was about how to handle certain um, "disabilities". As I can remember specifically the spina bifida, and I remember it was also in that first "questionnaire" that we had to fill in and I specifically remember that we dealt with that and we still wrote test about it and then there was another question, how would we help a learner or um, how would we go about in the classroom with a learner who is like that. Like I said, we have the necessary theory."]

FGP5: "Theory has helped me to learn how to be able to have an inclusive classroom and how to be able to use the resources that I have in the classroom to include each and every learner and most of the different learning styles so that all of them can learn. So the theory has helped with, has helped me with creating a more inclusive classroom and know how to deliver content to their learners and know how to check if the learners understand the content delivered and also check the learners progress and be able to identify where the learners need help with their schoolwork.... they teach us how to be able to include all of the learners, they provide us with different teaching styles and in my content modules they mostly give us specific topics to deal with, and then they tell us to teach it or elaborate the topic to learn us in a way that they will be able to understand. So also in my contact modules they, they teach us how to have an inclusive classroom and how to deliver theory.

A few participants in the open-ended questionnaire also highlighted that the content they were exposed to in a few of their modules helped them in preparing for inclusive education.

OQP35: "...We have had a few...modules that helped us in this regard pertaining to helping learners from an inclusive education background..."

One of the participants mentioned that he/she cannot recall that inclusive education was addressed in his/her Natural Science subject modules.

FGP3: "...In meeste van die modules het ons net basies gepraat oor inhoud daar was dalk net soos die didaktiek gewees soos die lesplanne en so. Maar, ek kan nie regtig onthou dat ons juis gepraat het oor inklusiewe onderwys juis in daardie vakke nie. Dit was dalk net so vinnig genoem wat die dosent dalk gesê het soos leerders wat dalk

sukkel kan mens op so manier doen... ek kan nie regtig onthou dat ons in umm, soos dalk in Wetenskap of so dit regtig aangeraak het om leerders wat umm, inklusiewe onderwys nodig het, dat daar 'n manier uitgedink was of uitgeredeneer was dat, hoe mens hulle kan help nie...” [English Translation: “In most of the modules, we just basically talked about content there might have been just like the didactics, like the lesson plans and so on. But, I can't really remember talking about inclusive education precisely in those subjects. It may have been mentioned just as quickly, what the lecturer might have said as learners who might struggle one can do in this way... I can't really remember being in um, like maybe in Science or so, that it really touched on learners who needed um, inclusive education, that there was a way out and reasoned out that, how one could help them...”]

While another participant indicated that he/she learned about inclusive education in both the generic modules as well as Natural Science subject modules.

FGP5: “...It is both in my [generic] modules and content modules, they teach us how to be able to include all of the learners, they provide us with different teaching styles and in my content modules they mostly give us specific topics to deal with, and then they tell us to teach it or elaborate the topic to learn us in a way that they will be able to understand. So also in my content modules they, they teach us how to have an inclusive classroom and how to deliver theory.”

4.3.2.3.2.2 Sub-theme: Learnt about inclusive education

Some of the participants responded that they learnt about inclusive education and that it will accommodate the educational needs of all learners in the classroom. This is evidenced in the following responses:

OQP6: “...I learnt about inclusive education.”

OQP7: “...we have been taught about inclusive education which will also come in handy.”

OQP15: “It is important as a teacher to adhere to the rule that says education needs to be inclusive...”

OQP26: “In this case an inclusive education is necessary and there has to be an innovated strategy which must be in place and be used to improve the levels of

education system to an extent that it will accommodate the educational needs of all learners in the classroom...

4.3.2.3.2.3 Sub-theme: Identifying different learning barriers

One of the findings from the research data indicated that identifying different learning barriers were also a skill that a few participants obtained in the B.Ed. training. This is evidenced in the following responses:

OQP2: "... I also learned about different learning barriers and how to identify them."

OQP11: "...I have knowledge that I obtained from the educational psychology module that I did that outlines how I can help each student without pinpointing them out..."

OQP18: "...I have obtained knowledge, what to expect and how to acknowledge these children, out of a group..."

4.3.2.3.2.4 Sub-theme: Accommodate learners

Many of participants pointed out that in their B.Ed. training, they have learnt how to accommodate learners. The quotations below provide evidence to support this sub-theme:

OQP3: "...Find teaching strategies that will accommodate every learner in class... Including the one in a wheelchair."

OQP6: "Learnt how to deal with learners who have learning barriers..."

OQP7: "learned skills on how to accommodate learners with different learning styles..."

OQP8: "...a learner in a wheelchair, this learner cannot be left behind, all activities needs to be suitable for the learner to participate..."

OPQ12: "...need to accommodate all learners including those with learning disabilities."

OPQ15: ". A learner who is disable must get special attention from the teacher based on his or her condition. The teacher must learn certain skills that will help in accommodating that learner."

OPQ17: "I've learned that no matter the differences each child is important and needs to be helped in a way so they can understand the work."

OQP39: "...how to accommodate learners with different needs in my class."

4.3.2.3.2.5 Sub-theme: Language

Some participants alluded that they have obtained knowledge and skills relating to language. These knowledge and skills seem to include making use of different languages to teach diverse learners in the inclusive classroom.

OQP3: "... I have to use a language that they all understand for teaching and learning. Also as a teacher you are supposed to make learners familiar with the teaching and learning language so that they understand..."

OQP6: "Learning an additional language..."

OQP18: "I have obtained, the ability, to talk and teach in a different language, that will help, the immigrant learners, that talk in a different language, to help them to develop, with the other learners, in the same class, that however talk another language."

OQP33: "...code switching to aid learners with language barriers."

OQP35: "... a subject that deals with learners' who has a different home language, so I believe that I would be capable in helping learners in that regard as well."

OQP39: "...knowledge of different languages for communication..."

4.3.2.3.2.6 Sub-theme: Content knowledge

A few participants mentioned that in their B.Ed. programme they obtained knowledge about content. This is reflected in the following response:

OQP9: "Content knowledge..."

4.3.2.3.3 Theme: Forms of pedagogy

The participants were asked: *What forms of pedagogy promotes children and young people's learning?* Sub-themes that support the theme of forms of pedagogy include: learner-centred teaching and learning, different teaching strategies, using different material, offering content to diverse learners, fair assessment, creating a warm and friendly atmosphere and nurturing skills.

4.3.2.3.3.1 Sub-theme: Learner-centred teaching and learning

A few participants stated that they have learnt to apply learner-centred teaching and learning approaches in their classrooms. The following statements from the participants support this sub-theme:

FGP2: "So I will then opt for the teaching learners that will develop learning in the classroom. I want to believe it through heuristic learning and in simpler terms just learner centred learning. It's umm, the teacher trying to apply methods and strategies that are learner based... I'm fully going for learner-centred, umm fully, fully going for learner-centred. Learners applying the content or trying to come to understand the, the content themselves as much as I am the teacher just being that the teacher with a facilitator, and facilitating them, umm managing them, making sure that things don't get out of hand, but I believe that my much of it must be based on me giving and having space for learners to actually apply the content themselves."

FGP5: "I will use the, mostly the learner centred approach because the learners are able to find answers for themselves. Learners are able to develop answers a for themselves, which makes them able to learn more and understand more of the content because they have found their information for themselves... using the learner centred approach, the most important one that I think I can use for learners to, to develop their learning ability."

OQP8: "...As a teacher, creating a more learner centred classroom helps in such cases, because learners are able to learn but in a way which best suits the learner..."

4.3.2.3.3.2 Sub-theme: Different teaching strategies

Many of the participants shared that they learnt about different teaching strategies and how to use these strategies in the classroom in order to increase learner participation in the classroom.

OQP2: "I studied different teaching strategies and methods in our...modules."

OQP4: "I have to use different strategies such as integrating audios, visuals and use my own explanations to clarify the information being I am teaching..."

OQP6: "...Learnt about different strategies to use in the classroom to teach..."

OQP13: "...I've obtained various teaching approaches and techniques which I can use in unique classes like this one, this includes approaches such as class discussions and collaborative work."

OQP19: *“Different teaching strategies and methodology to teach science and math e.g. problem based learning and project based learning...”*

OQP21: *“... I've learnt about strategies to increase classroom participation and how to get learners to express themselves and to actively participate in classroom discussions...”*

OQP32: *“We have learned about and how to incorporate different teaching techniques when we teach. We can use different teaching techniques to support learners with learning difficulties. Pictures, diagrams and displaying information rather than just verbally presenting it all the time can help support immigrant learners to also contribute to successful teaching and learning...”*

OQP45: *“...teaching methodologies.”*

4.3.2.3.3.3 Sub-theme: Using different material

Only a few participants indicated that they have the ability to use different material and resources to help learners in their learning. This is reflected in the following responses:

OQP8: *“...I will use different content and materials in the class which will be suitable to the learner...”*

OQP21: *“...learning with relevant resources to help the learner to achieve learning goals...”*

4.3.2.3.3.4 Sub-theme: Offering content to diverse learners

Many of the participants emphasised that they have obtained knowledge and skills in their B.Ed programme that will enable them to offer content to diverse learners in an inclusive class. The aforementioned is evident in the following responses of the participants:

OQP1: *“Delivering in the lesson in a way that appeals to all learners whilst honing in on the lesson aims...”*

OQP5: *“I have acquired to offer the content to many diverse learners regardless of their background...”*

OQP8: *“I have obtained knowledge and skills that will allow me to teach all learners fairly*

according to their capabilities...

OQP18: "I have obtained, the knowledge, on how to teach and control, these children in the class..."

OQP23: "I gained knowledge in terms of learning how different learners receive information based on their background."

OQP31: "...teach to adapt their lessons so as to be inclusive of the diversity in the class."

OQP34: "Teach in such a way that learners are able to understand."

4.3.2.3.3.5 Sub-theme: Fair assessment

A few participants stated that they will be able to provide assessment that is fair and equal. This is reflected in the following response:

OQP25: "...To give assessments that can be done by all different types of learners for fairness and equality to be observed..."

4.3.2.3.3.6 Sub-theme: Creating a warm and friendly atmosphere

Creating a warm and friendly atmosphere were also skills that a few participants highlighted. The following responses affirm this sub-theme:

OQP15: "Make the classroom a friendly environment that will encourage learners to be excited and open up to learning so that they feel safe and secured in the classroom."

OQP38: "Creating a warm and friendly atmosphere for learners so they would be comfortable around the teacher and participate."

FGP2: "I know that in the first stages of me and the class just trying to create an environment where everybody feels safe to voice their opinion everybody feels safe and knowing that they wouldn't be judge".

4.3.2.3.3.7 Sub-theme: Nurturing skills

A few participants also mentioned that they have obtained nurturing skills in their B.Ed. programme. This is reflected in the following responses

OQP13: "BEd programme has imparted me with nurturing skills, being a good communicator and class organiser..."

OQP41: “The skill to nurture younger ones and transfer knowledge”

4.3.2.4 Category 4: Knowledge and skills needed to teach in an inclusive classroom

The themes and sub-themes of category 4 is presented in Table 11:

Table 4.11: Themes and sub-themes within category 4

Theme	Sub-theme
Planning and conducting inclusive lessons	
Accommodating learning barriers	
More effective teaching strategies	
Identifying learners’ weaknesses and strong points	
Knowledge of the context and study material	
Flexible curriculum implementation	
More languages	
Additional training	<ul style="list-style-type: none"> • Courses • Workshops • Lifelong learner
Management skills	<ul style="list-style-type: none"> • Time management • Classroom management
Patience	
Communication	

All of the participants affirmed that there are still knowledge and skills that they need to obtain in order for them to teach in an inclusive classroom when they were asked: *What knowledge and skills do you still need, that will enable you to teach in the class described in the scenario (cf. Addendum A2)?* The themes and sub-themes below represent the knowledge and skills the participants indicated that they need.

4.3.2.4.1 Theme: Planning and conducting inclusive lessons

Some participants highlighted that they still require knowledge and skills in planning and conducting inclusive lessons. The following responses affirm this theme;

OQP12: "I still need skills on how to plan and conduct a lesson that is inclusive."

OQP26: "The skill that I might need that will enable me to teach in the class is the one of managing learners from different cultures, so that whenever I say or do something while in the classroom will not be offensive to some of the learners."

OQP30: "...to deliver a lesson that is inclusive for all types of learners and what kind of resources I should use to reach all those learners."

OQP40: "I still require the skills of being able to transform a normal classroom into a complete inclusive environment of which learners of different disabilities and languages will be able to make use of it effectively..."

4.3.2.4.2 Theme: Accommodating learning barriers

Some of the participants indicated that they still need to obtain knowledge and skills in accommodating different learning barriers and is demonstrated in the following responses:

OQP1: "Dealing with learners who have disabilities, diversifying the classroom."

OQP2: "...I still need to know how to accommodate all the different learning barriers."

OQP7: "how to fully accommodate learners with disabilities."

OQP24: "Understanding learning barriers of the learners, incorporate inclusive education..."

4.3.2.4.3 Theme: More effective teaching strategies

Some of the participants mentioned their need to obtain knowledge and skills relating to more effective teaching strategies that can be used in the inclusive classroom and is indicated in the following responses:

OQP2: "...what teaching strategies can I use to help the learners."

OQP13: "Maybe more effective teaching strategies that I can be use specifically for this case."

OQP18: "I will need more knowledge, on different models of teaching strategies, for special needs learners, that have problems with writing, learning, walking, emotional, physical etc."

4.3.2.4.4 Theme: Identifying learners' weaknesses and strong points

A few participants referred to their need for the skill of being able to identify learners' weakness and strong points. The following responses support the abovementioned theme:

OQP19: "Linking learners' short comings to enable learning- special needs education. How to make the classroom user friendly for special needs children?"

OQP20: "...to be able to identify those learners with learning disabilities..."

OQP23: "Skill of being able to identify my learners' weakness and strong points."

4.3.2.4.5 Theme: Knowledge of the context and study material

One participant indicated a need to gain knowledge of the contexts, knowledge of the study material and knowledge of assessment strategies that can be used to effectively teach diverse learners.

OQP36: "Knowledge of the contexts, knowledge of the study material that will be used, knowledge of assessment strategies that will be effective for variety of learners."

4.3.2.4.6 Theme: Flexible curriculum implementation

A few participants responded that they want knowledge and skills relating to flexible curriculum implementation and are affirmed in the following responses:

OQP20: *“...curriculum to include the inclusive education where these learners are able to learn according to their talents or capabilities.”*

OQP24: *“...Flexible curriculum implementation...”*

4.3.2.4.7 Theme: More languages

A few of the participants emphasised the necessity and ability to speak more languages and are demonstrated in the following responses:

OQP6: *“Knowledge of more languages...”*

OQP8: *“The ability to speak more than the 2 languages I already know.”*

OQP31: *“Language skills. I only have the fairly good ability to speak and write English and Sesotho.”*

4.3.2.4.8 Theme: Additional training

Some participants indicated a need for additional training. Sub-themes that emerged out of the data that supports this theme includes, courses, workshops and maintaining the principle of being a lifelong learner.

4.3.2.4.8.1 Sub-theme: Courses

A few participants highlighted that attending certain courses may provide them with certain skills to deal with learner problems in the inclusive classroom and is shown in the following responses:

OQP6: *“...Maybe a first aid course or training on how to help learners with a disability physically.”*

OQP15: *“...So it is important to attend certain classes or take a course that will provide you with certain skills as to how you must handle learners with problems...”*

4.3.2.4.8.2 Sub-theme: Workshops

One participant included a response that he/she needs to engage in workshops which includes training in inclusive education.

OQP20: *“To engage in workshops which include training that will educate me as a teacher to infuse inclusive education in my class...”*

4.3.2.4.8.3 Sub-theme: Lifelong learner

A few participants alluded the need to be lifelong learners and is reflected in the following responses.

OQP15: "As a teacher you need to be a long life learner..."

OQP33: "No one knows everything. The term life long learner should and needs to be a common phrase used amongst teachers and learners. There is still plenty knowledge I could learn to better aid my learners in the classroom and make them feel even more welcome and included."

4.3.2.4.9 Theme: Management skills

Management skills were also highlighted by some of the participant as a necessity they still need to obtain. The sub-themes that were mentioned by the participants included time management and classroom management.

4.3.2.4.9.1 Sub-theme: Time management

A few participants mentioned they still needed to obtain time management skills and are demonstrated in the following responses:

OQP4: "I need to have time management skills so that I can teach while I am taking time assessing whether my struggling learners are making progress."

OQP30: "How to manage time in a class..."

4.3.2.4.9.2 Sub-theme: Classroom management

Classroom management skills were also perceived by a few participants as a skill they still need to master. The following responses affirm this:

OQP9: "Skill - management of workload."

OQP11: "Class management of such a class."

OQP38: "Classroom management. To create a set of rules for learners to abide and be flexible."

OQP39: "Classroom management skills"

4.3.2.4.10 Theme: Patience

A few participants indicated they need to develop the skill of being patient in order to accommodate learners with barriers in the classrooms. This is affirmed in the following responses:

OQP32: "I think the most important skill I still need to learn is how to be patient, because learners with these barriers takes longer than normal to, for example, master the work."

OQP37: "patience"

OQP41: "Patience, dedication, care, commitment & leadership skill"

4.3.2.4.11 Theme: Communication

One participant mentioned he/she needed communication skills to effectively communicate with learners;

OPQ27: "How to communicate with the learners..."

4.3.2.5 Category 5: Responding to diversity of learning needs

The themes and sub-themes of category 5 is presented in Table 4.12.

Table 4.12: Themes and sub-themes within category 5

Themes	Sub-themes
Using cooperative learning strategies	
Group work	• Problem-based learning
	• Jig saw
Class discussions	
Experiential learning	
Play	
Including different learning styles	
Use simple language	

Using resources to promote inclusion	<ul style="list-style-type: none"> • Sharing resources • Using the resources that I have • Using resources for learning out of the class
Achievement	
Assessment	

One of the categories that were identified in this research study was to explore how participants would respond to the diverse learning needs of learners in the classroom. Two participants highlighted that accommodating the needs of diverse learners in the classroom is vital for effective inclusive education:

OQP26: “In this case an inclusive education is necessary and there has to be an innovated strategy which must be in place and be used to improve the levels of education system to an extent that it will accommodate the educational needs of all learners in the classroom. Another thing is, I will merge learners with special needs with learners who are not struggling with the content anyhow, this will lead them to learn from each other and the disadvantaged ones will feel equal and accommodated in and around the class.”

OQP28: “Promoting inclusive education is one of the key knowledge I have learned, accommodating every needs and addressing the learner need at the pace and need of the learner, being in the level of the learner so the learner cannot feel excluded during any lesson.”

The themes that emerged from the data under this category include using cooperative learning, group work, problem-based learning, Jig saw, experiential learning, play, including different learning styles, use simple language, using resources to promote inclusion, achievement and assessment.

4.3.2.5.1 Theme: Using cooperative learning

Many participants indicated in their responses that cooperative teaching and learning strategies should be used as a means to respond to diversity of learning needs. This is

evidenced in the following responses:

OQP15: "...I would promote cooperative learning in class because learners learn best from each other..."

OQP25: "I will make use of cooperative learning style in order for the learners who have learners' disability to be able to interact and engage with those that have better understanding of the subject content..."

4.3.2.5.2 Theme: Group work

Some participants indicated that they will promote group work in their classes.

FGP5: "I can use group activities. Group activities can be effective on this while learner will be sorted in groups and then they will have to work together in order to find different answers from the questions I will be giving them and then each and every group will have to present their answers to me. This will encourage working together between the learners."

OQP8: "... I will then ask learners in their respective groups to brainstorm and share ideas with each other in the group on what they think..."

OQP10: "I would divide the class in groups ensuring everyone understands someone in their group..."

OQP13: "...Firstly I will arrange the class seating to promote group work..."

OQP18: "...to let the learners work in groups..."

FGP1: "...and then constructivist approach is umm, a group work, you teach learn is how to work in groups, interact with their learners, interact with the fellow learners and talk, you know, it's actually really easy for a person to learn with their peers that it will earn somebody older but a teacher there we just have to facilitate that...."

4.3.2.5.2.1 Sub-theme: Problem-based learning

A few participants emphasised that problem-based learning is the best strategy for teaching in a cooperative learning environment and is affirmed in the following responses:

OQP1: "Problem-based learning is the best way to teach this topic with cooperative

learning. So learners should work in groups to come up with solutions for the problem-based on the topic that the teacher will provide via case-study and thereafter in search of the solution...

OQP19: *"...problem based learning and project based learning..."*

4.3.2.5.2.2 Sub-theme: Jig saw

A few participants indicated that they can make use of the jig saw method as a means to promote learner-centeredness in the classroom and is demonstrated in the following responses:

OQP5: *"Well I use the Jig Saw in the introduction of the topic so as to promote learner-centeredness within the classroom..."*

OQP16: *"I will arrange a jigsaw classroom where learners with different learning ability and performances will be grouped together in a number of 4 – 5..."*

4.3.2.5.3 Theme: Class discussions

Class discussions were highlighted by a few participants as a strategy that can be used in the classroom. This is reflected in the following responses:

OQP13: *"...class discussions and collaborative work..."*

OQP14: *"...Sharing ideas and opinions. Having discussions amongst the class."*

4.3.2.5.4 Theme: Experiential learning

A few participants indicated that they will make use of experiments in the classroom and is evidenced in the following responses:

FGP1: *"Umm, we've got two to the important methods that I normally use constructivist approach for promoting learners' learning and umm, experimental or experiential umm, theory. These ones actually help me to structure my lessons very well. Umm, starting with the experiential, this is where you give an experiment to learners, you teach them exactly where things come from, right, you give them the basics, you do not necessarily give them the answer and the solution. But you, you give them away to the solution. We teach them how to get to the solution instead of teaching them what the solution is, ..."*

OQP35: *"The teaching strategy that would be used is one of practical enquiry. I want*

the learners to be physically involved in the lesson to make it fun for them...

OQP39: *"Learners will conduct an experiment for a hands-on experience."*

4.3.2.5.5 Theme: Play

One of the participants indicated that he/she also learned about the pedagogy of play and how it can be beneficial to effective teaching and learning in the classroom;

FGP3: "... fokus ons baie op die pedagogie van "spel" [speel]. Ons dosent sy het...sy het soos haar meesters, sy het vir ons vertel sy het haar meesters en haar honneurs, het sy gedoen oor die pedagogie van spel, en sy het dit baie inkorporeer in ons module self in. Want sy het self gaan sien dat die leerders hou daarvan om te speel..."[Eng. Translation: "...we focus a lot on the pedagogy of "game" [play]. Our lecturer she did...she did like her masters, she told us she had her masters and her honours, she did about the pedagogy of play, and she incorporated it very much into our module itself. Because she went to see for herself that the learners liked to play..."]

4.3.2.5.6 Theme: Including different learning styles

Some of the participants emphasised how they will make sure to accommodate different learning styles in the classroom, and is affirmed in the following responses:

OQP4: *"There would be use of visual diagrams, videos explaining the process and the learner would be given an opportunity to take over by compiling their own information on A2s..."*

OQP7: *"I will accommodate all the different styles of learning, the lesson will include audio, visuals and tactile activities."*

OQP20: *"As a teacher I will use different learning styles... my content will include visual aids so that they can learn by seeing the lesson and understanding the creativity of the lesson and to encounter skills as they cannot read or write for example in a lesson of the social science the geography subject like climate I could include visual aids like maps and pictures of places having different climate changes and also include videos of the lesson for learners to watch and interpret the information ,instead of them writing I could make them draw the maps."*

OQP30: *"I will use a charts, a video, and textbooks..."*

4.3.2.5.7 Theme: Use simple language

Some participants indicated that they will accommodate language in the classroom in various ways as a means to respond to diversity. This is reflected in the following responses:

OQP27: "...Firstly, the Language of learning and teaching is very important so that all learners can understand the learning content, trying to infuse other or home language of learners will be simple and also asking learners to translate what they study on the textbook and make a short summary in their home language will make things easy for me to see where learners have misconceptions and try to address them..."

OQP31: "... I will work with one of the learners that understands the LOLT and can translate it to the learner's language..."

OQP35: "...I will use 'simple' language to help them understand this topic..."

OQP40: "...I will use the language from each ethnic groups present in my class in most of our discussions up until most of the class are exposed to the idea of diversity..."

4.3.2.5.8 Theme: Using resources to promote inclusion

An integral part of preparing lessons that are inclusive include the effective use of resources. In the open-ended questionnaire as well as in the focus group interviews the participants were asked questions with regards to the use of resources in the inclusive classroom. The sub-themes that emerged from the data are sharing resources, using resources that I have and using resources for learning out of the class.

4.3.2.5.8.1 Sub-theme: Sharing resources

A few participants mentioned that sharing resources in the classroom may promote inclusion and is affirmed in the following responses:

FGP1: "...so that learners would actually have to share a resource, you understand, particularly textbooks because it's the only, not the only resource we have but that's the most prevalent resource we have in, or profound rather. So I would literally have low number of textbooks on the classroom to ensure that learners actually have to interact for them to have books, you know, for them to read a book table have to talk to another that will somehow promote inclusion..."

4.3.2.5.8.2 Sub-theme: Using the resources that I have

The following quotations include the responses of many participants that link to the use of resources inside the classroom, such as charts, videos, PowerPoint presentations, smartboards, pictures, recycled materials, technology, visual aids, the internet and games in order to practice fairness and inclusivity (mentioned by a specific participant):

FGP5: "When I deliver a content in the classroom, I will use the resources that I have. For example, I will use a chart, I will use videos, I would use PowerPoint presentations; I will use textbooks or I will use worksheets, everything that I have just too provide the learners with just to accommodate each and every learner and their different learning styles. For example, if I have a smart board in my classroom, I will be able to teach the learners by showing them a video, or based on that topic. I will be able to show them pictures based on the topic. I will be able to read the notes or show them nodes based on the topic, and I will also be able to explain to them the content and then if I provide them with worksheets. The other one is who, who work better when they are doing something, will be able to be involved in the topic and will also be able to learn. So with the resources that I have or create an inclusive environment by adapting the topic, the content of the topic to the different learning styles of the learners. If I do not have a smart board where I can play a video or show pictures and all of that, I will have, I will use charts, charts in the classroom or use material, recycled materials in the, recycle material, sorry, or use recycling materials that I can find in order to teach the learners and try to be able to reach each and every learner with a different learning ability so that they can all be equal and all receive equal attention and all understand the topic. For example, when I say I can use recycling materials in Life Sciences we use the two-liter Coke bottle and balloons or plastic and then yeah, balloons and plastic where we, and straws, where we create lungs, the breathing system. So it is much easier also to use recycling materials to help the learners understand more and while showing them the materials, I will explain to them how it works and show them the charts of the breathing system, how it works, and all of that. So in that we will be able to create an inclusive environment."

OQP2: "The different textbooks can be used to obtain the information and the content that needs to be taught. A computer can help the learners to look for their own information and assist them in doing their tasks and assignments."

OQP6: *“I would consult books in the library or online resources to get the necessary resources according to these learners’ different needs.”*

OQP7: *“smart boards, can help in making the lessons more understandable like playing videos that will offer a clear example of a certain topic. library can also help with books to read in order to increase the learner’s vocabulary and improve in learning English”*

OQP11: *“For the learners that don’t fully understand the language, we will try to translate to their home language and for the visual aid, it will help gain and maintain concentration.”*

OQP13: *“Posters will be very convenient and effective for me, because they can grab learners’ attention and help in concentration difficulties and I can move around with them to accommodate learners with disabilities. Learners with language difficulties can get meaning of science processes as they observe the posters. I might use models to explain abstract science concepts. Model will be very effective because they have the ability to engage learners, I can rotate models around to accommodate learners with physical disability...Audio resources will not only help me teach very easily but it will also accommodate learners with language difficulties as they will know concepts I will use videos to boost concentration level and also use videos and animations illustrate science process, as they supplement their science knowledge. Use different gadgets which can be convenient for learners with physical disabilities”*

OQP18: *“Technology, is very important, not only for the teaching part, but the new generation, is growing into a technology world, full of new possibilities and will help in a bigger picture... I will use these resources, to help learners in a physical and mentally and emotional way possible, not only to develop but improve their way of living, by using real life examples.”*

OQP20: *“Learners with learning disabilities have different diseases therefore some are good at learning by seeing so visual aids can help them interpret information effectively or if they watch videos about some lesson they can easily understand rather than having to read or use critical thinking skills it will be better to listen and watch the lesson”*

OQP28: *“Allowing all learners to be hands on regardless of any learning impairment or barrier the learner might have. The resources will trigger learners and tests their cognitive levels.”*

OQP33: *“As stated above, posters may be utilized to engage learners in subject content in a fun and spontaneous way. As well as sort of games that may demonstrate a certain topic for easier and more efficient recognition and remembrance.”*

OQP41: *“I would use them to practice fairness & inclusivity”*

4.3.2.5.8.3 Sub-theme: Using resources for learning out of the class

The following quotations include the responses of the participants that link to the use of resources outside of the classroom, including recycled materials and resources found in the nature and environment, excursions, sport fields facilities and field trips:

OQP1: *“Practically engaging with nature, recyclable material, any other resource found in the environment has a way of keeping learners motivated regardless of the classroom diversity.”*

OQP3: *“Museums or have excursions for certain learning areas that explain certain aspects... I would first have them have notes as introduction... And then in the excursion I would explain to clarify a lot of things that they have in their notes.”*

OQP8: *“Nature, (sand, trees, leaves, sunlight) ... All these materials are very beneficial to the science teacher, it can be used to carry out an investigation and can be used as a practical example during explanations.”*

OQP20: *“The sport field facilities they can play different sport according to their suitable disabilities for example learners with spina filda have problem with mortality to move they could play netball using wheelchairs or the school might have classes where learners take part in art doing music, dancing or painting...These learners with special needs can be catered to attend these classes where art take place rather than sitting in classes learning content that they cannot provide their thinking or creative skills.”*

OQP21: *“The internet, books at the library, books from doctors explaining in depth the learning disabilities and how to work with them. Special made wheelchair for learners with physical disabilities like spina bifida.... I will use the books to read about these things and try to address them and make learning easier and joyful for the learners. I will consult some doctors on how to help learners with disabilities and find out how I can assist them in learning.”*

OQP26: *“Field trip will help learners to refresh their minds by learning out of the class*

and discover themselves by part taking in some activities. As for media, this type resource it is everywhere and it is broad, but in this case videos of the contents will be watched and learners will gain too much information and it will benefit them all in a long run based on their educational needs.”

4.3.2.5.9 Theme: Achievement

The participants highlighted that they comprehend the way in which achievement is measured in schools can influence how learners will experience learning success in the inclusive classroom. The following statements confirm the afore-mentioned finding:

FGP2: “I’m, I’m slightly laughing at this umm, because I feel like the way that achievement should be defined and the way that it’s applied in our schools or in South Africans schools are two different things. Umm I believe based on my experience that achievement according to the South African schools umm, is when a learner can get a distinction or when the learners can get most facts right or past really well, umm, because they were able to memorize facts better or reason fact better. Umm, but for me like achievement is not about that. I believe that achievement should actually be about learners finding themselves in a sense that they are able to apply their knowledge on a practical sense. So while the school system define achievement as having passed really great. I believe that achievement should not be measured that way. I believe that achievement should be measured on a level to apply knowledge practically. Umm, so yeah, that’s I think that’s where I stand.”

FGP3: “Ek sou sê prestasie is om te kan sien of die leerder wel die werk verstaan maar nie net dit kan doen nie. Vir my is dit belangrik dat dit, dit moet daar vassteek en dit die kind of die leerder moet snap hoekom ons doen wat ons doen, sê nou maar met sekere prosesse wat ons doen, dat hulle nie net kan verstaan dit word gedoen nie maar dat hulle kan verstaan waarom dit gedoen word. En ek glo die manier hoe ons die prestasie kan sien dat hulle dit wel umm, bemeester het, is as jy hulle 'n vraag vra, dat hulle nie net vir jou eintlik 'n “textbook” antwoord gee nie het nie, dat hulle vir jou in hulle eie woorde kan verduidelik waarom ons moet doen, dat hulle nie net stappe herhaal as dit dalk 'n proses was nie maar, dat hulle vir jou kan sê hoekom die stappe gebeur. Ek weet ek het altyd die goed net gememoriseer maar, ek glo dat jy vir die leerders moet sê, umm, ons moet dit nie net memoriseer nie ons moet probeer verstaan waarom dit doen, ja en as hulle dan vir jou kan verduidelik dat hulle verstaan dan voel ek het jy 'n prestasie

behaal en jy kan dit bepaal.” [Eng. Translation: “I would say achievement is to be able to see if the learner does understand the work but can't just do it. For me, it's important that this, it has to get stuck there and it's the child or the learner to understand why we're doing what we're doing, just say with certain processes we're doing, that they can't just understand it's being done but that they can understand why it's done. And I believe the way we can see the performance that they did, master it, is if you ask them a question, that they not only give you a "textbook" answer, that they can explain to you in their own words why we should do, that they not only repeat steps if it might have been a process but, that they can tell you why the steps happen. I know I've always memorized the stuff just but, I believe you have to tell the learners, um, we shouldn't just memorize it we have to try to understand why it does, yes and if they can then explain to you that they understand then I feel I've achieved an achievement and you can determine that.”]

4.3.2.5.10 Theme: Assessment

Assessment plays an important role in the measuring of learner achievement and progress (cf. 2.4.5.1). Many of the participants explained how assessment and feedback can be used in the Natural Science classroom as part of an inclusive education approach. This can be seen in the following responses:

FGP1: “And then assessment you do not have to assess only what's taught in a classroom. You also have to check on some of the aspects, like what did this, actually, what did this learner actually do well, you know, you checked for the things that are not necessarily assessed in the Caps curriculum. You check the skills obtained, you check umm, the capabilities of the, what did this learner come out as after the session, you know, change, of the it can be covered or covered traits that are shown by learners... Umm, the, the mediator between the teachers and the learners are activities. The reason why teachers and learners interact is because of activities. So the best way for me to you know, get the, the cooperation and collaboration of the ground in the classroom is to give them activities that promote such things, such things as activities or things as umm, collaboration, cooperation. So I will give them activities, experiment, practical teaching no not practical teaching, but practical experiments, you know, make them do field work, things like that. Those are the things that are going to promote collaboration because for one thing, one person has to know something and then shared with the learners, you understand. So learners will have to go out and actually have different areas of expertise where they can share with their fellow learners, you understand.

That's why I think that activities in a classroom would be very, very, very good."

FGP2: "for me what works best especially when it comes to allowing learners to participate, it's, it's, it's creating random moments for participation. Umm, so for example, if I'm in a class and we are doing a specific topic umm, now and then just to randomly ask a learner who didn't anticipate the questions like that, what do you think of this...So for me, it's to create participation, is it's allowing it to be as random and umm, intentional umm, yeah as random, intentional but sometimes kind of spontaneous so intentionally creating spontaneous moments to allow that participation, obviously group work, umm group work can work a lot umm..."

FGP5: "I will use providing them with feedback. Learners need feedback in order to know how they did and in order for them to know how they can improve next time when they are giving a task so providing them with feedback using the learner centred approach the most important ones that I think I can use for learners to, to develop their learning ability."

FGP6: "what I can do to develop opportunities for every topic that I will teach in my classroom, after every lesson of that specific topic, I would ask the learners to develop eeh, their own questions. Those questions they must be based on the dealt topic.... On collaboration what I can do, I would ask the learners to exchange their answers to peers. In other words, if there are two learners in the classroom, I would ask them to exchange their questions and each participant should answer those questions and to develop leaning I will eeh, ask eeh, the participants to give out their answers to provide their answers. In other words, I will ask each participant to correct eeh, their provided answer..."

OQP1: "The learners will present their findings and the teacher will use a rubric to check learner understanding and also use formative assessment."

OQP4: "The learners would be assessed with a rubric after their graphical and oral presentation..."

OQP8: "Verbal questions, encourage learners to speak up and answer orally. Learners with learning disabilities struggle to read and write so by answering orally the educator will see whether the learners understand the content or not."

OQP12: "at the end of the lesson I will give them questions to answer, the levels of

questions will differ learners. for learners will learning disabilities I will give them multiple choice question and then other will get multiple choice and longer questions their work will be on a higher level from the others. then I will assess their work using a memorandum.”

OQP14: “a worksheet will be used and a memorandum will be used to mark the worksheet. By doing this you will be able to determine if the learners understood the content.”

OQP16: “Class discussion: the teacher will randomly ask questions based on what learners were doing (photosynthesis). He will correct them or scaffold where necessary. This will give a clear sign on whether learners comprehended the lesson or not.”

OQP21: “I would give the learners a short quiz, where they have to verbally answer the questions in class and the learners are allowed to respond on the answers. I will make sure I ask everyone a question. I will give the learners a small group activity, where they go out of class in groups and write down the food chains they see in the school premises, I will then have them share their findings with the class and give each learner a mark.”

OQP24: “Each learner will be given a task that suit his ability based on his/her pace of learning with relevant resources to help the learner to achieve learning goals. But each task will be driver each learner to the same goal at the end of the day.”

OQP36: “Continuously ask learners to apply real life examples on the topic. Give immediate feedback, give learners classwork and mark it in class with the learners to get a variety of answers”

4.3.2.6 Category 6: Forms of learning support

The themes identified in this category are presented in Table 13:

Table 4.13 Themes within category 6

Themes
One-on-one support
Extra classes

Counselling
LSEN classes

There were four major forms of learning support identified by the participants that they have observed in schools during their school based practicals. These forms of learning support contributed to the establishment of the following themes namely, one on one support, extra classes, counselling and LSEN classes.

4.3.2.6.1 Theme: One-on-one support

A few participants identified one-on-one support as a forms of learning support that they are aware of in schools. This is reflected in the following responses:

OQP32: "One-on-one teacher support could be given to learners who needs additional support. Usually there is too much students to give individual attention and sometimes teachers can't put in extra time after hours, therefore additional support could be given by providing students with supportive activities/enhancing activities that will help with their specific area they are struggling with. We as teachers have learners how to "bend" a little and be creative in order to support detersive learners in our classroom."

FGP1: "...one-on-one sessions..."

4.3.2.6.2 Theme: Extra classes

A few participants also indicated that they are aware of extra classes being provided to learners as a form of learning support. This is affirmed in the following responses:

OQP15: "Since learners are not cognitively on the same level it is important to provide extra classes to learners that lack in certain areas of the subject."

FGP1: "have extra classes extra, classes were, I would have learners that are actually struggling to come talk to me themselves... teach in the afternoons differed with the way I taught during the day, I would be very slow, very gentle, very easy and I will not be rushing the time, you know taking my time with lessons."

FGP6: "...the teaching and learning support that I'm aware of is that educates they have after school classes; they also have morning classes..."

4.3.2.6.3 Theme: Counselling

Counselling as a form of learner support were identified by a few participants and can be seen in the following responses:

FGP5: "I've seen the teaching and learning supports in schools, the first one being the counselling offered in schools. Learners are being offered counselling if they're facing emotional breakdowns or they have situations that they, they are dealing with at home or even at the school. There's a teacher available or specifically a counsellor who is available to counsel them or they call the community counsellors like Lifeline there is a counselling place that is called Lifeline where learners are sent there or the people from Lifeline come to schools and offer the learners counselling..."

FGP2: "...meeste skole het ook 'n sielkundige by die skool wat leerders kan toets om te kan bepaal of hulle inklusiewe onderwys nodig het..." [Eng. Translation: "... most schools also have a psychologist at the school who can test learners to determine if they need inclusive education..."]

4.3.2.6.4 Sub-theme: LSEN classes

One of the participants highlighted that he/she has observed LSEN classes in mainstream schools that provide support to learners:

FGP2: "Ek weet baie skole...het LSEN klassies vir juniors en vir die seniors waar hulle die leerders heen stuur wat nie in 'n hoofstroom klas kan wees nie..." [Eng. Translation: "I know a lot of schools... have LSEN classes for juniors and for the seniors where they send the learners who cannot be in a mainstream class..."]

4.3.2.7 Category 7: Practical experience

The themes and sub-themes identified within this category are presented in Table 14.

Table 4.14: Themes and sub-themes within category 7

Themes	Sub-themes
Experience gained	<ul style="list-style-type: none">• WIL experience• Language barriers

	<ul style="list-style-type: none"> • ADHD and concentration barriers • Learners struggling to read and write • Under privileged learners
Need more experience	<ul style="list-style-type: none"> • More practical experience • Never taught learners with physical disabilities

The category of practical experience comprises out of two themes. These themes include the experience gained and need more experience.

4.3.2.7.1 Theme: Experience gained

Some of the participants indicated that they have experienced the diversity of learners in the classroom during their WIL experience. Participants were asked: In what ways is the class depicted in the scenario (cf. Addendum A2) similar or different from the classes you have taught during your teaching practical experience during your degree? The most common barriers to learning that the participants experienced included language barriers, ADHD and concentration barriers, reading and writing challenges/difficulties and contextual barriers (e.g., under privileged contexts).

4.3.2.7.1.1 Sub-theme: WIL experience

A few participants indicated that during their WIL experience they were enabled to implement inclusive education and is reflected in the following response:

OQP5: "... the WIL experience gained enables me to now be able to apply and incorporate inclusive education..."

4.3.2.7.1.2 Sub-theme: Language barriers

Some of the participants indicated that they have seen many language barriers in the classroom. This is affirmed in the following responses:

OQP2: "I see a lot of language barriers in the classroom..."

OQP6: "There were often learners whose HL was Sesotho and had no idea what was happening in class where the LOLT was English."

OQP15: "...I also encountered the problem where by learners had a barrier of understanding the language of teaching and learning because of the language spoken and home..."

OQP27: "...But language is one of the challenges that I faced, because of the scientific terms I will be using when I deliver the content. Some learners did not understand so I needed to break down those terms to simple language that they understand..."

4.3.2.7.1.3 Sub-theme: ADHD and concentration barriers

A few of the participants stated that have encountered learners experiencing ADHD as well as concentration problems and is reflected in the following responses:

OQP2: "...Also a lot of ADHD learners and learners with concentration problems..."

OQP6: "...There were learners who were ADHD and lacked concentration..."

OQP10: "Only learners with study and concentration problems."

OQP28: "...Concentration span of different learners differ, I realised that some learners get bored easily and lose focus easily and other learners they get bored if they are not involved or doing something related to the lesson topic..."

4.3.2.7.1.4 Sub-theme: Learners struggling to read and write

One participant mentioned that he/she experienced learners who struggle to read and write:

OQP2: "...learners struggling to read and write..."

4.3.2.7.1.5 Sub-theme: Under privileged learners

A few participants have encountered learners from under privileged backgrounds. This is evidenced in the following responses:

OQP6: "...However, with regard to the under privileged learners based on their backgrounds I had come across such learners throughout my teaching experience..."

OQP15: "...learners were deprived by their back grounds which makes it hard for them to understand the importance of education..."

4.3.2.7.2 Theme: Need more experience

Participants indicated in the open-ended questionnaires and the focus group interviews that they need more practical experience in inclusive classrooms to be able to fully accommodate and respond to diversity amongst learners.

4.3.2.7.2.1 Sub-theme: More practical experience

Many of the participants indicated that they need more practical experience in inclusive teaching. This is reflected in the following statements:

FGP1: "I thought I feel like the theory part is for the school. The theory part is for the course. The Practical part is for me. You understand. I need to be told something and then I put it in practice right? I might be having teachers and Mentor teachers that are helping me out. But I do really feel like it was sufficient enough for me to actually deal with learners with diverse needs, deal with umm, adverse situations, deal with variety in a classroom, you understand."

FGP2: "But as for practical tools and handles on how to actually teach diverse learners, I, if I was to be given a class with diverse Learners, I think I will take a month or two just trying to adjust to, trying to adjust to the diversity in the class and trying to find my way through it so that at the end of the day all learners disabled or different as they may be Oh, yeah difference as they may be whether it is skin colour, or race or language, that I am able to reach them all on the same level you just using different tools".... "I genuinely have grace for our lecturers and all of that. Because it's, it is hard or it is challenging is not hard, it is hard to teach somebody how to do something until you get them in a position to do it. So since we are not yet in positions to actually teach diverse learners umm, what we were given the theory because that is what that is what was available at

the time umm... So I, there's a level at which I feel like it wasn't, there's a level that it is not practical, but I have grace for that... So I have grace for what you have been taught, the theory that we've been taught because situation of the diversity."

FGP3: "... soos ek altyd dink, dit is net teorie, as jy die dag by die klas instap en jy umm, sit met 'n kind voor jou, jy sal wel weet wat om te doen want jy het die boek kennis maar, dit gaan meer oor die praktiese gedeelte, jy dit nog nooit gedoen nie. So ek dink jy sal dalk met iemand moet praat wat jou kan help om so 'n leerder wel verder te kan help en te kan akkommodeer in jou klaskamer." [Eng. Translation: "...as I always think, this is just theory, if you walk into class that day and you um, sit with a child in front of you, you'll know what to do because you have the book knowledge but, it's more about the practical part, you've never done it. So I think you might need to talk to someone who can help you further help and accommodate such a learner in your classroom."]

OQP32: "...We don't really learn how to handle a variety of disabilities in one classroom...I think teachers need more experience in the field where they can learn how to handle situations where these students with barriers gets "difficult..."

OQP35: "I believe that we have the book knowledge on how to tackle these issues, but enforcing it on a practical level might be a bit more difficult. The reason why I say this is because we haven't had to emotionally deal with situations like this. I know that I might get emotionally drained in helping these learning, because I believe it takes a lot of a person in addressing these needs that these learners require."

OQP16: "Experience, so I can put my strategies on practice and rectify where necessary in order to have progress during the course"

OQP32: "...It takes time and experience to become comfortable in teaching in "a different' way than we are used to when we go for example to a normal high school... In the scenario this is also true. We need to become experienced, more comfortable to teach different students with disabilities."

4.3.2.7.2.2 Sub-theme: Never taught learners with physical disabilities

Many of the participants also highlighted that they have never taught learners with physical disabilities. The responses that follow provide evidence of the above mentioned:

OQP1: *“The classes I have taught never had physically disabled learners.”*

OQP2: *“I do not often see learners with physical disabilities like a learner in a wheel chair in the classrooms.”*

OQP3: *“I haven’t taught a handicapped child. That would be my biggest challenge. Finding ways to include that child in everything.”*

OQP5: *“I have never experienced a class with a learner who is on wheelchair before that is the only challenge I might be faced with...”*

OQP15: *“...in my class there was no learner with a physical "disability" usually learners with such condition have their own school that will help them by giving them special attention.”*

OQP21: *“I have never worked with learners that has physical disabilities, only learning disabilities.”*

4.3.2.8 Category 8: Learners at risk of marginalisation

The themes and sub-themes identified within this category are presented in Table 15:

Table 4.15: Themes and sub-themes under category 8

Themes
Learners from disadvantaged backgrounds
Learners who struggle

A focus group interview question asked the participants, *Who are the learners who are mostly at risk of marginalisation in the South African school system?* The most prevalent responses to the question included: learners from disadvantaged backgrounds and learners who struggle.

4.3.2.8.1 Theme: Learners from disadvantaged backgrounds

A few of the participants indicated that learners from disadvantaged backgrounds are more likely to be marginalised in the South African school system. This is affirmed in the following responses:

FGP1: "...A lot of learners from very disadvantaged backgrounds are most likely to be marginalised because of certain reasons like umm, they do not necessarily have resources that can actually help them merge into the system because the system is the very demanding as far as money is concerned you understand. So learners from a very previously disadvantaged background are most likely to be marginalised in the South African education system..."

FGP2: "...those who come from disadvantaged backgrounds and I would like to further add that. I believe that most of the Township Schools students are umm learners who are at risk of being marginalised..."

FGP5: "Well, ma'am, I believe that learners from the rural areas like poor backgrounds are the ones that are at risk of being marginalised because they do not have a choice on how to go about their curriculum..."

4.3.2.8.2 Theme: Learners who struggle

One participant mentioned that learners who struggle in the mainstream classroom are possibly marginalised in the South African school system;

FGP3: "...kinders in die soos hoofstroom klasse wat definitief sukkel... ek dink nie onderwysers besef dit nie, want ek was by 'n skool waar daar omtrent ses en dertig kinders in 'n klas is en dit is baie moeilik om dan te onderskei watter tipe leerder gaan sukkel..." [Eng. Translation. "... children in like the mainstream classes who are definitely struggling... I don't think teachers realise that because I've been to a school where there are about thirty-six children in a class and it's very difficult for them to discern what type of learner is going to struggle..."]

4.3.2.9 Category 9: Working together

The themes and sub-themes identified within this category are presented in Table 4.16.

Table 4.16: Themes and sub-themes within category 9

Themes	Sub-themes
Adults working together	<ul style="list-style-type: none"> • Fellow colleagues • Parents

	<ul style="list-style-type: none"> • Other community members
Benefits of working together	
No cooperation	

Working together/collaboration in the inclusive classroom contributes to the attainment of inclusive education in the South African school system. Many of the participants acknowledged that working together should occur amongst different stakeholders.

4.3.2.9.1 Theme: Adults working together

In the focus group interview the participants were asked: *With which other adults do you expect to work when you become a teacher?* The responses of the participants to this question indicated that they will be working with fellow colleagues, parents and various other community members.

4.3.2.9.1.1 Sub-theme: Fellow colleagues

A few participants acknowledged that they expect to work with fellow colleagues/ other teachers. This is confirmed by the following responses:

FGP1: "I most definitely, most definitely umm, expect to work with my fellow colleagues', other teachers. Umm, but that's, that's one thing that I think we are compromising on, we're also compromise, we'll also compromise students in in some way or another directly or indirectly, but like other colleagues, it's, it always works out when teachers are in good relationships with each other..."

FGP5: "...the other teachers..."

4.3.2.9.1.2 Sub-theme: Parents

A few participants indicated that they will collaborate and work in close relationship with the parent or primary care givers of the learners. The following responses is evidence of this:

FGP1: "And at the same time parents, like parents are in a big deal cause or guardians for that matter because I understand some learners do not have parents but guardians umm, it's, it's umm, the thing about it, it's when parents and teachers work together

umm, towards the education of the child, it makes, it makes it way more easier for that learner to actually achieve in whatever sense that we may be referring to whether pertaining to marks or just in general life it, because of that support structure.”

FGP2: “Oh! I am anticipating to work with um, parents, the immediate guardians of the learners. Those are the people that I’m anticipated to work with...”

FGP5: “Well, one way I think when working with adults is working with the parents...”

4.3.2.9.1.3 Sub-theme: Other community members

Some participants also reported various other stakeholders that they will collaborate with to support learners in their classrooms. These identified stakeholders include:

FGP5: “...the community members...”

OQP2: “...The doctors and therapist can provide assistance to the teachers where needed.”

OQP6: “... counsellor.”

OQP25: “People around the community...Specialists.”

OQP29: “Church, Local organisation that deals with learners all learners in the society”

OQP32: “Community members especially the ones that are from the same culture as immigrant learners.”

OQP35: “We can come back to the university to some lecturers.”

OPQ36: “...Social workers.”

4.3.2.9.2. Theme: Benefits of working together

Some participants who took part in the focus group interviews also acknowledge the benefits that collaboration will have for teaching in an inclusive classroom. The following responses indicate the participants’ views on the benefits of collaboration:

FGP1: “To answer the second half of that question, umm is that the benefits of it is that if both colleagues, if both my colleagues and the parents work together towards the development of the child and the child sees a strong support and because of that, it tends to make learners really, really motivated and builds them up. Umm, it really builds,

builds them up and allows them to perform way better than if they didn't have that support, so it kind of helps him, and to see the unit for me, like it's kind of like its unity, unity helps a lot unit helps a lot. When, when learners see unity to they love it they treasure it and they commit themselves to it...

FGP2: "The benefits could be in the might make it easy because they might make it easy for me to reach out to the child as they know the child better than I do. Know, they know the struggle of this child go through goes through and they know what this child has been through and they know what, how this child functions mentally..."

FGP5: "So it can be to an advantage to the teachers that they can know more about the learners' strengths and abilities and the lenders need somewhere."

OQP32: "Community members can contribute to lessons once a week for example and the lesson can even be taken outside. This will not only help learners learn but also motivate learners, especially those that struggles to concentrate."

4.3.2.9.3 Theme: No cooperation

A few participants emphasised that a lack of support and no cooperation from parents can have a negative influence on providing support and accommodating learners who experience barriers to learning in the inclusive classroom. The following responses support this finding:

FGP1: "...for example, if I as a teacher want to cooperate with a guardian or parent of a child who does not at all want to cooperate umm, so then that pose a great challenge because then there's no unity and obviously there is then spread of opinions and that can confuse a child and bring them in a state where they don't know what is right and what is wrong, especially if they are young, especially if they're young. So yeah that that is the big challenge."

FGP2: "... and the, the challenges I might encounter is that some of the parents are not actually willing to put in a hand, you know, the only put in a hand will you did something bad to the child, that's the only time they would come and actually put the teacher. Those are the challenges, that's the challenge that I might encounter. The other thing that I may encounter is, is that I might find it very un-pleasing to actually work with the parents they might be too demanding. They might be too harsh on me the teacher and the might think that I'm not doing my job well..."

FGP5: "...So if so, the disadvantage of that can be that learner can be a problematic child, and the parents don't want involvement in their learning things or the community or the other teachers. So it can be a challenge to know how to help the learner in their learning environment..."

Another participant indicated that a lack of support and no cooperation from a fellow teacher might also hinder the development if the child:

FGP1: "if either I or the other colleagues do not cooperate when it comes to the development of the child and umm, this time I'm not speaking about just small arguments..."

4.3.2.10 Category 10: Elimination of discrimination

The themes and sub-themes identified within this category are presented in Table 4.17.

Table 4.17: Themes and sub-themes within category 10

Themes	Sub-themes
Knowledge of legislation	<ul style="list-style-type: none"> • Knowledge of the Constitution and SASA • Lack of knowledge about EWP6 and SIAS • The need for one policy • Policies not practically applied • Reinforce policies • Teachers don't have enough knowledge • Schools not inclusive due to lack of knowledge

In the focus group interviews the participants were asked: *What legislation supports the promotion of equity and the elimination of discrimination in South Africa?* A few of the participants seemed to have a general idea about the policy documents that contain the fundamental principles which should be infused into inclusive education.

4.3.2.10.1 Theme: Knowledge of legislation

Sub-themes that support this theme include: knowledge of the Constitution and SASA, a lack of knowledge about EWP6 and SIAS, the need for one policy, policies not being applied, reinforcing policies, teacher don't have enough knowledge and schools are not inclusive due to lack of knowledge.

4.3.2.10.1.1 Sub-theme: Knowledge of the Constitution and SASA

A few participants responded that they have knowledge of the Constitution and SASA. This is evidenced in the following quotes:

FGP2: "Umm, the Bill of Rights and the Constitution of South Africa is one major thing, especially in the Constitution of South Africa but that is directed towards diminishing inequality. So I, that's a resource that, and that is a legislation that, that I stand with and umm, also umm, the South Africans Schools Act does it so well, umm, it, it describes it so well that at the end of the day we have classes and schools that are, that are not discriminatory, although certain level of discrimination is allowed but not, not one that, that, that compromises umm, the value of the next person. So yeah, umm, for me. it's, I know for sure, the Bill of Rights and also the South, the South Africans Schools Act."

FGP3: "Ek onthou ons het die reg, ons regte vak gehad umm, as ek reg kan onthou sou dit die Suid-Afrikaanse Skolewet gewees het wat sekere goed uit umm, uiteensit wat diskriminasie teenoor umm, in leerders en ek sou gesê die Grondwet definitief stel ook sekere goed uit om ongelykheid en so in skole te kan umm, uitskakel." [Eng. Translation: "I remember we had the right, our right subject, if I remember correctly, it would have been the South African Schools Act that sets out certain things out of um, that expresses discrimination towards um, in learners and I would say that the Constitution definitely also sets out certain things to address inequality and eliminate it in schools."]

4.3.2.10.1.2 Sub-theme: Lack of knowledge about EWP6 and SIAS

A few participants indicated that they do not have comprehensive knowledge of EWP6 when they were asked: *Have you heard about or did something about education White Papers 6 or the SIAS document in one of your generic modules?*

FGP1: "I don't remember doing something like that in my education years and it's a very new thing to me.

FGP2: "Umm, not to my knowledge, but it's the name sounds familiar. Yeah, I think we did but we didn't dive much deeper into it."

FGP5: "Well, I am aware of the South African Schools Act policy it allows, it provides that the learners should be, learners of different disabilities, abilities, from different backgrounds should be provided with education, quality education without being discriminated... Oh, the White Paper 6. Yes, I am not sure about the first one, but I'm sure I have heard about the White Paper 6."

The participants indicated that they are aware of the SIAS document, but that they became aware of it through WIL when a mentor teacher exposed them to the document. None of the participants indicated that they have in-depth knowledge about the SIAS document (DA10).

FGP3: "Ek weet ons het so vaagweg een keer daaraan geraak en een van die modules maar, ek weet ook my ma het al baie daarvan gepraat is, umm, ek dink dit is die SIAS dokumente en ek onthou ons, sy het my eenkeer gewys want ek het vir haar gevra daarvoor want ons het vinnig in 'n vak gepraat en umm, dan het sy my gewys dat jy hierdie dokument moet invul, maar dit is 'n groot pak en ek verbeel my sy het gesê voordat hulle dit kan invul dan moet die leerder eers gestuur word na die skool se sielkundige om te toets of hy wel die umm, umm, moet dalk in 'n inklusiewe klaskamer gesit word." [Eng. Translation: "I know we've touched on it so vaguely once, and, one of the modules but, I also know my mother has been talking about it a lot, um, I think these are the SIAS documents and I remember, we, she showed me once because I asked her about it, because we quickly spoke in a subject and um, then she showed me that you have to fill out this document, but it's a big pack and I imagine she said before they can fill it in then the learner must first be sent to the school's psychologist to test if he does have the um, um, maybe should be put in an inclusive classroom."]

FGP5: "I knew the document [the SIAS document] that you're talking about. I know that, I just forgot the name of the document. I learned about the document while I was, during the practical's when I was on my first year practical that's when my mentor taught me about the document. In our will project, we were given to find the document and ask about the document and the, the, our mentor should help us to fill the document and know what is used for, Now I remember the document."

4.3.2.10.1.3 Sub-theme: The need for one policy

One of the participants suggested that a single policy should be written and implemented in all schools;

FGP1: "I think this is the point where we match policies, where different schools have to come and have one policy act or one law that governs how the school is run as far as diversity is concerned as far as inclusivity is concerned. So we would have one specific, something like a Constitution but it governs all the other schools, it governs all the schools and it's very stringent, it's very umm, just very hard, everyone at has to adhere to it. So if all the schools, we have one specific, one type of a Constitution where they would have to derive their own code of conducts from, then it was going to be easy for them to, to govern and control umm, how everything is running the school systems."

4.3.2.10.1.4 Sub-theme: Policies not practically applied

In the focus group interviews a few of the participants indicated that there seems to be poor application and implementation of policies relating to inclusive education in the school system. The one participant commented that such policies already exist, schools should only take the time to acquaint themselves with what is written in these policies and implement them.

FGP2: "...I hold on the view that there is already documents like that, and that is the Constitution of South Africa, umm, there is the South Africans Schools Act, there is Employment Act, you know, umm, I think that there are acts, there are policies, there are legislations that are put in place for that. So for me the challenge with that it is not that there are no policies the challenges that umm, the, the codes in those ethnics umm, the code in those policies sorry, umm the codes in those policies are what is written in those policies is not applied to some extent, it is not practically applied in some extent by the school. So for me, I think the thing about it if schools can then take seriously

umm, the South African Schools Act, take time to go through it all as a school. Like, how fun would it, umm, no not fun, but how important would it be if the principal was to organize workshops around that. We know that most teachers know about that but it doesn't help to go through it umm, because vision lacks and when things aren't repeated then they are not grasp. So for me, it's just now and then the principle is to, the principal or the leadership or whatever that looks like whatever the structure looks like, has to then come back and, and umm, take teachers and say here's what we are faced with and learn. Let us create educate ourselves on what the Constitution says, what the various acts say on that.”

4.3.2.10.1.5 Sub-theme: Reinforce policies

Another participant proposed that a teacher should be appointed to make sure the policies, like the SIAS document, is fully implemented and that all teachers are aware of these policies, but not only that, they should constantly be reminded of such policies.

FGP6: “I can see umm, principle [principal] appointed educator should reinforce SIAS document to every educator. In other words, ensure that eeh, the, the site they know and they pass such claws, which are evident in the SIAS documents to the learners. Eeh, rehearse those claws on the assembly on a daily basis or on meetings, on school meetings.”

4.3.2.10.1.6 Sub-theme: Teachers don't have enough knowledge

A few of the participants indicated that schools and teachers do not have enough knowledge about learners with disabilities that they might be facing. Consequently, these learners are often falling behind that may lead to their potential exclusion from proper education.

OQP20: “Many schools have not acquired knowledge about the learners with learning disabilities most of time these learners are falling behind and they cannot get skills because they are not in an appropriate schools and they cannot further their studies because they also drop out of school or repeat grades because of schools that does not understand the knowledge of inclusive education”

OQP32: *“Teachers don’t have enough knowledge as to how to handle these learners and most of the time this leads to neglecting the learners rather than helping them.”*

4.3.2.10.1.7 Sub-theme: Schools not inclusive due to lack of knowledge

Another participant indicated that he/she did not experience fully inclusive schools yet because school are not inclusive due to a lack of knowledge:

OQP30: *“Classes I have taught are not inclusive. Because the schools are not totally inclusive”*

4.3.2.11 Category 11: Reinforce inequality

The themes identified within this category are presented in Table 4.18.

Table 4.18: Themes and sub-themes within category 11

Themes
Unequal resource distribution
Many learners in the class
Top achieving learners
Science learners are held in high regard
Gr 10F known as delinquents
The curriculum
Physical structures of schools
Teachers
Not considering all
Separate institutions

Some of the participants emphasised barriers in the South African school system that reinforce inequality.

4.3.2.11.1 Theme: Unequal resource distribution

A few of the participants highlighted the unequal distribution of resources. These participants highlighted that in township schools there are not enough resources while in private schools they have resources. This is reflected in the following statements:

FGP2: "... I believe that most of the Township Schools students are umm learners who are at risk of being marginalised simply because umm when we observe the whole covid-19 situation it is that we found that a lot of things had to move online and most of the learners were stuck behind the content and couldn't catch up because number one the whole technological system was new to them. Number two. They didn't have enough resources to actually catch up to the content. So I will then concur with my colleague that students who are from umm previous disadvantaged background are facing the risk of being marginalised excluded simply because they don't have sufficient resources to actually make it in there the educational, South African educational system."

FGP5: "...But in private schools, in private schools, they have the privilege and the resources to amend their curriculum and all of that..."

4.3.2.11.2 Theme: Many learners in the class

In order for teachers to accommodate diverse learners in the inclusive classroom it is vital that teachers can identify the needs and abilities of the learners in the class (cf. 2.4.5.1.1.1). The participants were asked, in the focus group interview: *To what extent is it possible for a teacher to know a learners' needs and abilities? Do you feel that It is possible for a teacher to know the needs and abilities of the learners in her classroom or his classroom and why?* A few of the participants indicated that they do not believe it is fully possible for a teacher to know all learners' needs and abilities due to too many learners in a class.

FGP1: "...I do feel like to a very low extend they can, a teacher know all the learners needs and abilities. Well, this question is derived from a certain worldview from a certain context, right? I teach in a very... in a township school. So the learners in the classroom are a lot, you understand. So it's very difficult for a teacher to actually be very close to all the learners at once... the size of the classes as external determinant is a determining

factor because teach – learner relationship, or teacher - learner ratio rather, plays a very important role as far as knowing what Learners want, what Learners need for the teacher because now if the class is big it's going to be quite difficult for the teacher to umm get the hang of all the Learners and be able to be very close with all learners, yeah.”

FGP2: “I think it depends. It depends on the number of learners in the class. I think it would pose a great challenge if, me as a teacher umm or I as a teacher I have I have like 40 students in a class and then with that in mind have various other groups of learners I have to teach. I think it was a great challenge to know every learners needs umm, because then the group is just too large and I'm only one person against 40 to 50. But if the group is less than or if the number of learners that I teach are way less like under 30 umm or 25, then it is possible for me giving some time that I can know their needs umm and then again that depends on whether are they willing to open up to that and just so for me it kind of depends on the situation umm their level of trust between a teacher and learner umm and it also depends on the size of the class umm.”

FGP3: “as umm, jy 'n kleiner klasse het, want ek weet umm, dis privaatskole het mos maar 'n kleiner klassie, soos met 16 kinders in, ek dink dan is dit baie maklik om te weet dat daai meisie kind skryf dalk moeilik of daai seuntjie hy sukkel nie, hy sukkel dalk om hierdie tipe sommetjies te doen, so ek glo dat as jy met 'n kleiner klas sit dan is dit definitief makliker om elkeen se behoeftes te voldoen... maar, ek voel dat as jy met 'n klas sit van 36 kinders dan is dit nie moontlik om 'n brein profiel op almal van hulle te doen en hulle dan op die plekkies te sit wat hulle behoort te sit nie want, daar is nie, ek glo nie daar is genoeg tyd om 36 kinders 'n hele dag uit te sit om 36 kinders se brein profiel uit te werk, en dan uit te werk waar elkeen moet sit sodat dit tot die beste, tot sy voordeel gaan wees nie, as jy wel, 'n kleiner klassie het dan gaan dit definitief moontlik wees, dink ek, maar soos ek sê ek dink nie dit sal moontlik wees om so iets te doen in 'n groot klas nie.” [Eng. Translation: “If you have a smaller class because I know um, it's private schools have a smaller class, as with 16 kids in it, I think it's very easy to know that that girl child might be writing difficult or that little boy he's struggling, he might struggle to do these types of sums, so I believe that if you're sitting with a smaller class then it's definitely easier to meet everyone's needs... But I feel that if you're sitting with a class of 36 kids then it's not possible to do a brain profile on all of them and then put them on the spots they should be sitting because, there isn't, I don't believe there's enough time to put 36 kids out an entire day to work out 36 children's brain profile, and

then work out where each one should sit so that it will be to the best, to his advantage, if you do, a smaller class then it's definitely going to be possible, I think, but as I say I don't think it would be possible to do something like that in a big class."]

4.3.2.11.3 Theme: Top achieving learners

A participant indicated that he/she still experienced inequality with top achieving learners sitting in front of the classroom. The participant responded in the following manner:

FGP1: "...So inequality, I'm going to predicate my answer on this part of the inequality or umm, yes, umm, if learners, if we have like top achieving learners in the classroom or in the school..."

FGP1: "So those are the things I can maybe that's not a physical factor, but yeah, the, the, way in which the classrooms are structured that actually normally reinforces inequality and the way learners normally sit in a classroom, umm, top achieving learners normally go to the front, normally goes to the front and the teacher will be talking with them, will be focusing on them and normally they would say, you know, those the ones are the back you are the most noisiest people I have ever met, all those nasty words. Yeah."

4.3.2.11.4 Theme: Science learners are held in high regard

The same participant felt that science learners are regarded as the cream of the crop:

FGP1: "...Science learners! Science learners in the school are the cream of the crop, you know, they are literally taking in high regard they normally take the first classes..."

4.3.2.11.5 Theme: Gr 10 F known as delinquents

One participant indicated in his/her response that when learners are placed in certain classes based on their performance, learners in the lower performing class may be known as delinquents. The above mentioned is supported by the following statement of the participant:

FGP1: "... class Gr 10 A, Gr 10 B, Gr 10 C, and then the Gr 10 F normally those classes are collectively known as delinquents, you know, so that part on its own umm, reinforce inequality and the other reason the other thing that it does have, that forces or that reinforces inequality in the school is the way teachers actually communicate with these

learners, you know, there are learners and teachers, who normally speak with in a very fluently in a very clear way in a very nice way, you know, they're very clean the very nice, sophisticated and all that. But now when they have to go to other learners now they are harsh they just say this word and you could literally even see their eyes, the face, is gone for, you understand..."

4.3.2.11.6 Theme: The curriculum

One of the participants indicated that on paper the CAPS curriculum is a good curriculum, that is very progressive from one grade to the other. Teachers can clearly see what a learner should be able to do in each grade. The problem that arises is that when a learner falls behind in certain areas they may be promoted to the next grade without mastering important content knowledge and skills. This is reflected in the following response:

FGP3: "Wel, as mens dit op papier sit en jy kyk na jou "CAPS" dan, soos die graad, soos ek weet van graad twee en drie, dan doen hulle moes nou seker goedjies en begin hulle net met breuke en so, dan in graad 4, 5, 6, dan vul hulle daarop aan...ek dink jy op papier lyk dit baie goed ... dan jy weet volgens jou kurrikulum dat die kind of die leerdere behoort nou al hierdie goed te weet, maar wat dit moeilik maak is, is dat ja, soms word die kinders tog deur gesit maar jy, jy weet nie regtig, hulle het dalk 'n twee gekry vir dit maar hulle word in elk geval deur sit en nou in graad 3. Maar, nou ja ek dink ons kurrikulum op papier lyk baie goed..." [Eng. Translation: "Well, if you put it on paper and you look at your "CAPS" then, as the grade, as I know, from grade two and three, then they probably had to do certain things and just start them with fractions and so, then in grades 4, 5, 6, then they complement that...I think you on paper it looks very good... then you know according to your curriculum that the child or the learners should know all this stuff now, but what makes it difficult is that yes, sometimes the kids are put through but you, you don't really know, they may have gotten a two for it but they are put through anyway and now in grade 3... I think our curriculum on paper looks very good..."]

Another participant indicated that teachers are sometimes forced to teach the CAPS curriculum as it is written on paper and they are not granted the opportunity to adapt the curriculum to fit the needs of the learners in their class. This can possibly lead to learners falling behind. The same participant compared the implementation of the curriculum

between private schools and rural schools in South Africa.

FGP5: "...the curriculum is not accommodated for everyone because it's gives, it provides teachers with one teaching strategy, which is to pass the information to the learners which does not accommodate each and every learner. So if within the school there are no creative teachers who can be creative with how they deliver the content from the curriculum, the learners will suffer because they will face inequality to learning because not, not umm, each and every learner will receive the content in the same way. Not each and every learner will be able to achieve in their academic work."

FGP5: "... But they are given the curriculum as it is, and they have to teach it as it is the way they are taught grade by grade. But if we check from private schools, they're able to change their curriculum in some ways because we find that mostly in private schools a grade three learner is already learning about the eye, the anatomy of the eye and all of that. But we find that in rural areas there is nothing like that. Learners are of still a bit I would say a bit behind because they have no choice of, you know ma'am, having a say or controlling anything about the curriculum..."

4.3.2.11.7 Theme: Physical structures of schools

A few participants identified that due to the fact that school infrastructure are not adapted to accommodate learners with physical disabilities, these learners might still be excluded from certain schools. This is evidenced in the following responses:

FGP6: "So now I can say that the schools' physical structures, they do reinforce inequality in a way that when you go to any school or the township schools, the public schools specifically they don't have eeh, structures which will support those learners who while using wheelchairs, then also uum, using eeh, how can, eeh, the crutches. Now that develops inequality because now these learners are excluded certain, certain, umm, structures they cannot go to, to specific buildings because now they are using wheelchairs. They have to, to be excused in a way, they don't have their specific pathways to move from building A or to, building B."

OQP30: "...For example, there were no physically disabled learners as the school's structure and building was not friendly for them..."

4.3.2.11.8 Theme: Teachers

A participant highlighted that teachers, especially teachers near retirement, might not be motivated to teach anymore, especially those learners who experiences barriers to learning in the classroom:

FGP3: “Wel ek sou definitief sê van hulle is dalk soos die onderwysers, een onderwyser is dalk naby aan aftree want, ek het gesien dat umm, self dat, wanneer die onderwysers naby is hulle aftrede dan is hulle nie noodwendig meer so lus om klas te gee nie en ek glo dit is 'n vorm van ongelykheid want die onderwyser gee nie meer so baie aandag aan die werk nie, hulle staan net daar, hulle wil nie meer regtig daar wees nie en dit is umm, 'n nadeel vir die leerders wat in hulle klas is teenoor 'n ander 'n onderwyser wat passievol is oor hul klas gee, en sy doen soveel moeite vir hulle. So ek glo definitief daai is 'n vorm van ongelykheid wat ons in ons skool sien as gevolg van die sisteem, sou ek sê, want ek weet daar is nou vroeë aftrede so meer onderwysers sal dit vat en dan wil hulle net af gaan en dan wil hulle nie meer regtig by die skool wees nie.” [Eng. Translation: “Well I would definitely say some of them might be like the teachers, one teacher might be close to retiring because, I've seen that um, even that, when the teachers are close to their retirement then they're not necessarily as keen to teach anymore and I believe it's a form of inequality because the teacher doesn't pay so much attention to the job anymore, they just stand there, they don't really want to be there anymore and that's um, a disadvantage for the learners who are in their class versus giving another a teacher who is passionate about their class, and she makes so much effort for them. So I definitely believe that's a form of inequality that we see in our school because of the system, I would say, because I know there are now early retirement so more teachers will take it and then they just want to go down and then they don't really want to be at school anymore.”]

4.3.2.11.9 Theme: Not considering all

Another participant voiced his/her opinion that not all learners are valued and different learning styles are not considered. The following statement supports the above mentioned finding:

FGP5: “Well, I do not find all of the learners valued, because not all of the learners are accommodated in the schools. Because we have learners with different learning styles, we have learners, we have different talents and all of that. But not everyone is included and accommodated in the school system and all of that. For example, in the township,

in the township school where I was, we were all different in the classroom and we all had different learning styles and we all had different techniques of how we approach the content in the classroom. But when the teacher comes, when the teacher comes and teaches us, he does not consider that at all, he does not consider the fact that we learn in different ways and all of that. He will just deliver the content as it is and we just have to grasp it and go right with it. Just, it's just it's almost like we have to just gram it, go answer the questions and pass that's all. But then we are not valid in such a way that we are not accommodated to our different learning styles.”

4.3.2.11.10 Theme: Separate institutions

A few participants indicated that that many learners experiencing learning barriers are still placed in separate institutions. This is evidenced in the following responses:

OQP30: “...And all the learners with learning disabilities are transferred to special schools.”

OQP40: “...Learners with disability have their separate institution at a different site...”

In the previous section the analysis of the most prominent research findings from the Document Analysis, Open-Ended Questionnaire and the Focus Group Interviews was concluded. In the section that follows, a detailed interpretation and discussion of the integrated research findings is provided.

4.4 Interpretation and discussion of the integrated research findings

Throughout the data analysis it became evident that teacher education for inclusive education is complex and that it seems even more challenging in subject fields relating to NS. In this section of the interpretation and discussion the goal is to integrate the research findings from the document analysis, open-ended questionnaire and the focus group interviews with that of the literature review in order to create a clear overview of the findings of this research study.

4.4.1 Conceptualisation of inclusive education

The conceptualisation of inclusive education (cf. 4.3.2.1) by the participants may be attributed to the fact that they have been exposed to policies and theory of inclusive education, as well as democratic principles such as human rights, equal opportunities, social justice and participation without exclusion, in generic modules that form part of

their Natural Science B.Ed Programme (cf. 4.3.2.2.2; 4.3.2.2.2.1 & 4.4.2). In the literature review (cf. 2.4.1) a descriptive definition of inclusive education was provided from different sources, which have also influenced- the afore-mentioned modules. In essence inclusive education can be described as a system that aims to construct a more democratic society, with an equitable and quality education system that advocates that all schools should be responsible for accommodating diverse learning needs of all learners (Symeonidou, 2018; Swart & Pettipher, 2016; Nel et al., 2016; Ainscow et al., 2014; Chiner & Cardona, 2013; Booth, 2009; Masalela, 2008).

Furthermore, Dunbar-Krige and Van der Merwe (2010) affirm that inclusivity embodies values that strive to eliminate inequality, injustices and discrimination in the South African society. This supports the statement by Engelbrecht et al. (1998, p. 7) which contends that inclusion aims to create *“a society in which diversity is celebrated and equality of opportunity promoted”*. The participants of this study conceptualised their own understanding of inclusive education as providing all learners an equal chance to learning (cf. 4.3.2.1.1), to be non-discriminatory (cf. 4.3.2.1.2) as well as to include everyone (cf. 4.3.2.1.3) in the classroom.

With reference to an “equal chance to learning” (cf. 4.3.2.1.1) the Constitution of the Republic of South Africa, specifically section 9 of the Constitution, highlight that *“all people are equal”* and thus have *“equal rights”*. (Act 108, Sec 9; 1996) (DA1). This right to equality provides that all South African citizens should enjoy the rights and freedoms found in the Bill of Rights (Act 108, Sec 9; 1996) (DA1). These rights and freedoms are also extended to people from different races, genders, social economic backgrounds and disabilities (Act 108, Sec 9; 1996) (DA1). This is furthermore asserted in the South African Schools Act 1996 (Act No 84 of 1996) (SASA) (DA2) which affirms that: *“no person may unfairly discriminate against a learner and that all learners shall enjoy equal treatment before the law and shall receive equal protection and benefits of the law.”* (Act 84, 1996) (DA2).

The mentioning of being “non-discriminatory” (cf. 4.2.2.1.2) by the participants as integral to inclusive education is also confirmed by the Bill of Rights which states that no person or institution *“may discriminate directly or indirectly against anyone on one or more grounds, including disability.”* (Act 108, Sec 29, 1996) (DA1).

To “include everyone” (cf. 4.3.2.1.3) is confirmed in Section 5 of SASA (Act 84, Sec 5; 1996) (DA2) which assures that there should not be any form of bias and that all learners have the right of admission into public schools. Moreover, Section 12 of SASA emphasises that education for learners with special education needs must be provided at ordinary public schools by offering relevant educational support services for such learners and taking all reasonable measures in ensuring that physical facilities are accessible to disabled persons (Act 84, Sec 12; 1996) (DA2).

The National Education Policy Act (NEPA) of 1996 (cf. DA4), in article 4 (d) advocates that inclusion is key in the provision of equal educational opportunities for all learners in South Africa. This policy states that: *“no person may be denied the opportunity to receive an education to the maximum of his or her ability as a result of a physical disability”* and that *“every person must be protected against unfair discrimination within or by an education department or institution on any grounds and that the right to basic education and equal access to education institutions are guaranteed”* (DA4).

Furthermore, the White Paper on Education and Training (1995) (DA3), in combination with the National Education Policy Act, (1996) (DA4), highlight the following points as part of the mission of the education system in South Africa. These points include:

- *“fundamental human rights”* must be upheld in the South African school system,
- *“equitable education opportunities”* should be provided to all learners’, with the aim to *“redress past inequality”* that lead to the exclusion of many learners,
- ensuring that *“no person is denied the opportunity to receive an education to the maximum of his or her ability as a result of physical disability”*.

EWP6 affirms that the aim of inclusive education in South Africa is *“including human rights and social justice for all learners; participation and social integration in society, equal access to a single, inclusive education system and access to the curriculum, equality and redress and community responsiveness”* (DoE, 2001, p. 5) (DA5). The CAPS document further highlights that *“human rights, inclusivity, environmental and social justice”* should be infused in the inclusive classroom (DBE, 2015, p. 4-5) (DA12).

In a relatively recent project named Teaching for All (2019), it was emphasised that pre-service teachers should be trained to follow a rights-based approach to education where human rights are placed at the centre of all teaching and learning. This requires teachers

to “*model*” and “*practise*” human rights in every interaction they have with learners (Teaching for All, 2019, p. 22). This project was organised by various stakeholders through partnerships between the British Council, the University of South Africa, the Departments of Basic Education and Higher Education and Training, MIET AFRICA and the European Union. The “*Teaching for All*” project was launched with the aim to provide pre-service teachers in South Africa with the skills, knowledge and attitudes to teach inclusively in diverse classrooms within diverse communities. The contributors to this project (for example, Beere et al.) also reiterate that during the use of social and rights-based practises learners are “*free to explore, discover, develop and express their potential, equally, with dignity and without discrimination*” (Teaching for All, 2019, p. 22).

Thus, it is evident that the participants seem to conceptualise inclusive education in line with policy requirements, as well as how it is defined and described in the literature. A good understanding of the concept of inclusive education is essential in order to ensure that appropriate education practices are applied (Haug, 2017) (cf. 2.4).

4.4.2 Policies relevant to teacher education for inclusion

4.4.2.1. DHET teacher education policies and guidelines

Nel et al., (2019) and Lindmeier (2013) assert that the preparation and empowerment of pre-service teachers for inclusive teaching during their initial teacher training is crucially important to ensure a successfully functional inclusive education system. EWP6 (DoB, 2001) (DA5), as well as the SIAS policy (DBE, 2014) (DA10), emphasise the crucial role played by teachers in the successful implementation of inclusive education and thus, it is essential that they are successfully prepared for it on a pre-service level (cf. 4.3.2.2.1.7). The literature review and the empirical study (cf. 2.6 & 4.3.2.2) indicated that a number of national policies are set in place to govern the manner in which pre-service teachers are trained for inclusive education in their ITE programmes (cf. 4.3.2.2.1 & 4.3.2.2.2).

It seems apparent that in all of the national policy documents the Higher Education and Training Department of South Africa (DHET) aim to provide some type of guideline for HEIs to develop and structure their ITE programmes and curriculums to train pre-service teachers on inclusive education. Some of these policies (cf. 2.6.3.2 & 4.3.2.2) describe how the ITE programmes and curriculums should look in terms of the number of credits and the NQF levels while other policies (cf. 2.6.3.2 & 4.3.2.2) articulate the knowledge,

skills and values pre-service teachers need to master in their theoretical, as well as practical modules. The following themes were identified during the document analysis which can be linked to knowledge, skills and values that are deemed to be important, to obtain for teaching in an inclusive classroom (DHET, 2015; DHET, 2006) (DA6 & DA8) (cf. 4.3.2.2.1):

- pedagogical knowledge (cf. 4.3.2.2.1.1),
- study of practice (cf. 4.3.2.2.1.2),
- learn to converse competently in a second official language, ICT's and academic literacy (cf. 4.3.2.2.1.3),
- knowledge of a variety of situations, context and environments (cf. 4.3.2.2.1.4),
- professional development in inclusive education (cf. 4.3.2.2.1.5), and
- the ability to reflect (cf. 4.3.2.2.1.6),

Policies such as EWP6 (DoE, 2001) (DA5), the SIAS policy (DBE, 2014) (DA10) and CAPS (DBE, 2011) (DA12) (cf. 4.3.2.1) also prescribe that pre-service teachers must develop skills, knowledge, and proficiencies with regard to:

- the role of the teacher (cf. 4.3.2.2.1.7),
- identifying and accommodating diverse barriers to learning (cf. 4.3.2.2.1.8); and
- curriculum differentiation (cf. 4.3.2.2.2.9).

In Chapter 2 (cf. 2.6.) it was emphasised that ITE programmes and curriculums should be structured in such a way that it ensures that pre-service teachers acquire different types of knowledge and practices that will enable them to become proficient in their chosen profession (DHET, 2015) (DA8). This means that the Natural Science B.Ed. Programmes must ensure that the pre-service teacher receives theoretical knowledge, as well as practical experience (Khan, 2017; DHET, 2015) (DA8). According to Kelly and McKenzie (2018) as well as Graham and Scott (2016) pre-service teachers can gain the skills, experience and confidence in teaching within an inclusive education system if they are educated in the theory and practice of inclusive education during initial teacher preparation. Furthermore, the theory relating to teaching and learning should provide a

thorough foundation or approach to teaching which includes specific pedagogical content knowledge (DHET, 2015; Kaplan & Lewis, 2013) (DA8) (cf. 4.3.2.2.1.1).

The document analysis found that it is required for Natural Science pre-service teachers to be trained in theory that will equip them with the necessary subject content knowledge, as well as pedagogical knowledge which includes aspects of methodology and didactics, teaching strategies as well as assessment processes (Gravett & De Beer, 2010). The DHET in the MRTEQ (2015) (DA8) (cf. 2.6) provides HEIs with a clear description of what pedagogical content knowledge entails. The MRTEQ policy (DHET, 2015) (DA8) also refers to special pedagogical content knowledge that is emphasised as vitally important for developing an inclusive pedagogy (cf. 2.6 & 4.3.2.2.1.1). Special pedagogical content knowledge requires a pre-service teacher to have comprehensive content knowledge, the skills to teach this content effectively, as well as the ability to identify and address barriers to learning, through the adaptation of the content, applying variety of teaching strategies and assessment methods, and through curriculum differentiation (UNESCO, 2018; DHET, 2015) (DA8) (cf. 2.6 & 4.3.2.2.1.1). The empirical study highlighted the need for proficiency in multi-level classroom instruction and curriculum differentiation (cf. 4.3.2.2.1.9). Key features of inclusive teaching is the ability of teachers to use differentiated instruction, the universal design for learning strategy, as well as scaffolding (cf. 2.4.5.1.1 & 4.3.2.2.1.9). In the literature (cf. 2.4.5.1.1.1) differentiated instruction is regarded as a method that teachers use to accommodate each learner's learning style and instructional preferences. This means that teachers need to be able to employ a variety of different teaching strategies, resources and assessment strategies as well as adapt the curriculum content to ensure all learners achieve the lesson outcomes (Walton, 2016; Thakur, 2014; DBE: 2011) (cf. 2.4.5.1.1.1). Several policy documents (cf. 4.3.2.2.1.9) emphasise that curriculum differentiation is one of the most prominent manners in which teachers can respond to the diverse learning needs of learners. The document analysis showed that curriculum differentiation (cf. 4.3.2.2.1.9) may entail differentiating the content, the learning context, teaching strategies and methods, as well as the type of assessments used. In addition, a finding that was highlighted in the literature and the empirical study (cf. 2.6 & 4.3.2.2.1.6) is the ability for teachers to critically reflect on their teaching practice in order to learn from failures and successes in the classroom (cf. 2.6 & 4.3.2.2.1.6). Teaching requires teachers that can think and reflect as it is essential for teachers "to convert life experience into a learning experience" (Gravett & De Beer, 2010, p. 4). Teachers who

continuously reflect know that they have to make amendments and improvements to their daily teaching practices in order to accommodate diverse learners (Ambady, 2018). Furthermore, being able to reflect can be regarded as an integral skill for applying differentiated instruction (Ambady, 2018) (cf. 2.6.3.2 & 4.3.2.2.2.12).

The findings also asserted that the training of the practical aspect of teaching (i.e. Work Integrated Learning), especially for the implementation of an inclusive education approach is important (cf. 4.3.2.2.1.2). The literature review (cf. 2.6) highlighted essential facts about Work Integrated Learning (WIL) programmes at HEIs. The practical component of ITE programmes in the form of WIL allows pre-service teachers' entry into the schools and classrooms to observe and practice actual teaching and receive practical advice from professional mentor teachers. This will enable pre-service teachers to gain teaching experience and see how the theory and practice fits together, which is essential for a successful inclusive classroom (UNESCO, 2018; Khan, 2017; Kaplan & Lewis, 2013) (cf. 4.3.2.2.1.2). The document analysis revealed that practical teaching can occur in two forms namely, a study of practice and learning in practice (cf. 4.3.2.2.1.2). During a study of practice, pre-service teachers are required to mainly observe and analyse different teaching practices in a variety of contexts, e.g. observing teacher educators, mentor teachers in schools or fellow pre-service teachers doing micro-lessons. Learning in practice entails pre-service teachers to actively take part in teaching by applying the theoretical knowledge they were exposed to in their ITE programmes.

The literature review affirmed that being able to communicate effectively in general with diverse learners, as well as during the teaching of subject content, to effectively mediate learning for diverse learning needs, is critical in an inclusive classroom (cf. 2.6). Linking to this, the empirical research found that pre-service teachers should learn to teach and communicate in a second language (cf. 4.3.2.2.1.3), which is vital in a South African context, where classrooms have learners with different home languages (cf. 2.4.4). In addition, learning how to effectively use ICT's in their classrooms to facilitate lessons (cf. 4.3.2.2.1.3) is increasingly becoming an important skill to acquire in a world where technology is becoming a critical tool in learning.

In getting to know the learners in the classroom and adapt their teaching accordingly, pre-service teachers need to have an understanding of how learners learn and what the learners' needs are (cf. 2.6 & 4.3.2.2.1.4). In order to achieve this and teach inclusively,

the findings indicated that pre-service teachers should understand diversity in the South African context (cf. 2.6 & 4.3.2.2.1.4), while also working collaboratively with stakeholders (such as peer colleagues and parents), to identify learning and social problems that could hinder learning (cf. 4.3.2.2.1.4). However, the DHET (2011) has identified that in many South African school teachers are either not prepared or are under-prepared to deal with the diverse needs of learners (cf. 4.3.2.2.1.5). Consequently, the DHET asserted that teachers need to be trained to work in the diverse South African school context, and have the ability to adapt and respond to different challenges in an inclusive manner (DHET, 2011) (cf. 4.3.2.2). This means that HEIs should ensure that all pre-service teachers have the ability to implement an inclusive pedagogy (Nel et al. 2019; DBE, 2017).

In order to apply an inclusive pedagogy pre-service teachers, need to be trained in the identification and accommodation of barriers to learning (cf. 4.3.2.2.1.8). However, research done by Mapepa and Magano (2018) concluded that there seems to be a lack of appropriate training for teachers to identify barriers to learning. The SIAS policy (2014) (DA10) stipulates that in order to provide appropriate and relevant support to learners in the inclusive classroom teachers need to identify the barriers to learning experienced by the learners, thereafter determine the support needs that arise from the barriers and lastly develop the support programme that needs to be in place to address and accommodate the barriers to learning experienced by the learners in the classroom (DBE, 2014) (cf. 4.3.2.2.1.8).

The findings discussed above show many similarities with the competencies of an inclusive teacher as describe by the European Agency for the Development of Special Needs Education (EADSNE, 2012) and Loreman (2010). In Table 4.19 these competencies are displayed.

Table 4.19: Comparison of different competencies pre-service teacher require for inclusive teaching

Competencies of an inclusive teacher according to Loreman (2010), based on seven outcomes	Competencies of an inclusive teacher according to European Agency for the Development of Special Needs Education (EADSNE, 2012) based on four core values
<ol style="list-style-type: none"> 1. A respect for diversity and an understanding of inclusion 2. Engaging in inclusive instructional planning 3. Instructing in ways conducive to inclusion 4. Engaging in meaningful assessment 5. Fostering a positive social climate 6. Collaboration with stakeholders 7. Engaging in lifelong learning 	<ol style="list-style-type: none"> 1. Valuing Learner Diversity – learner difference is considered as a resource and an asset to education. <ul style="list-style-type: none"> • Conceptions of inclusive education; • The teacher’s view of learner difference. 2. Supporting All Learners – teachers have high expectations for all learners’ achievements. <ul style="list-style-type: none"> • Promoting the academic, practical, social and emotional learning of all learners; • Effective teaching approaches in heterogeneous classes. 3. Working with Others – collaboration and teamwork are essential approaches for all teachers. <ul style="list-style-type: none"> • Working with parents and families;

	<ul style="list-style-type: none"> • Working with a range of other educational professionals. <p>4. Personal Professional Development – teaching is a learning activity and teachers take responsibility for their lifelong learning.</p> <ul style="list-style-type: none"> • Teachers as reflective practitioners; • Initial teacher education as a foundation for ongoing professional learning and development.
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Although literature sources, such as EADSNE (2012) and Loreman (2010), and policy documents (DHET, 2015; DBE, 2014; DBE, 2011; DoE, 2001) give guidance on what to address in a pre-service teacher education programme, it still seems to lack the exact attributes that newly qualified teachers should have in relation to their general pedagogical knowledge and specialised pedagogical content knowledge in relation to inclusive education (Majoko & Phasha, 2018) (cf. 2.7). Consequently, HEIs and ITE programme developers seem to be left to apply their own interpretations on how inclusive education should be addressed in their courses. This could result in pre-service teachers having “fragmented conceptualisations” of: what in inclusive education is and entails; the pre-service teachers’ roles and functions regarding inclusion of all learners; and without the competence to address barriers to learning in an effective manner (Majoko & Phasha, 2018, p. 50).

To address the abovementioned lack of specific attributes that must be developed in pre-service teachers to be effective inclusive teachers, the DHET (2017) (DA14) has tasked a number of researchers to develop a set of teaching standards for inclusive education. According to Nel et al. (2019) these standards are yet to be integrated into B.Ed Programmes. These teaching standards (cf. 2.6.3.2) include a number of dimensions and sub-dimensions and can be seen in Figure 4.3.

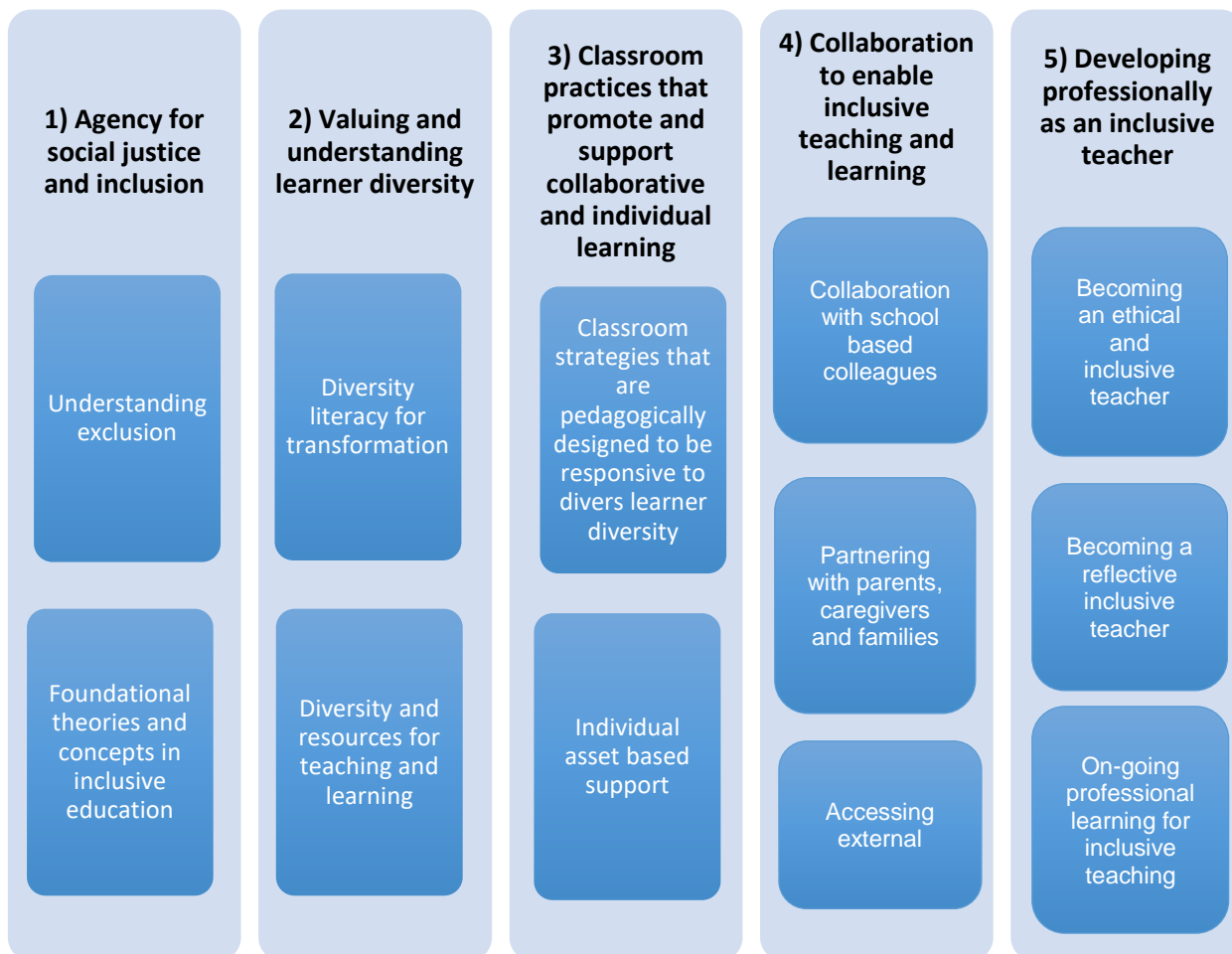


Figure 4.3: Visual summary of the dimensions and sub-dimensions of inclusive teaching (DHET, 2017) (DA 14) (cf. 2.6.3.2)

4.4.2.2. B.Ed curriculum for NS

The findings demonstrated that in the NS B.Ed Programme the modules relating to inclusive education forms part of a set of fundamental modules or generic modules while the major subject of the participants' forms part of their specialisation subjects (Anon, 2021) (DA9) (cf. 4.2 & 4.3.2.2.2). This means that the participants have a total of six stand-alone modules where certain content relating to inclusive education was dealt with.

The specific content relating to inclusive education that received attention in these modules include (Anon, 2021) (DA9):

- Inclusive education in South Africa (cf. 4.3.2.2.2.1) with a specific focus on different theories and models explaining learner development, understanding the concept of inclusive education, the national and international movements towards

inclusive education, national policies relating to the implementation of inclusive education in South Africa, the principles and guidelines for inclusive schools and classrooms and a critical evaluation of the implications of the implementation of inclusive education in South African schools and classrooms.

- Professional ethical conduct towards learners and their diverse needs (cf. 4.3.2.2.2.2) with a focus on understanding the social context of the classroom, identifying and understanding the fundamental aspects for developing a positive and inclusive classroom context, reflecting on the pre-service teachers own personal characteristics and how these may influence the classroom negatively or positively as well as reflecting on the pre-service teachers professional and ethical conduct towards learners and their diverse needs.
- Social-educational barriers (cf. 4.3.2.2.2.3) with the focus on explaining the influences of society on educational barriers, identifying various types of social and educational barriers to learning and demonstrating skills to support learners who experience a number of social and educational barriers as well as understanding social justice in the South-African context.
- Physical and behavioural barrier (cf. 4.3.2.2.2.4) focusing on the pre-service teachers elaborated understanding of physical and behavioural barriers in the classroom, identifying different physical and behavioural barriers, demonstrating skills to support physical and behavioural barriers in the South African classroom.
- The learning support process (cf. 4.3.2.2.2.5) with a specific focus on the analysis of the learning support process for learners who experience barriers to learning and the process to develop and learning support plan.

The other six generic modules (Anon, 2021) (DA9) dealt with basic knowledge and skills focused on teaching approaches, strategies and methods in the general classroom, basic lesson planning, understanding the structure of curriculum design, the history and development of education in Africa and South Africa, educational law, educational management and basic principles of assessment in the classroom.

The analysis of the five Natural Science specialisation subjects revealed that inclusive education is not addressed in the didactics or the methodology sections of these subjects. The specific content relating to didactics and methodology that received

attention in these modules include (Anon, 2021) (DA9):

- Lesson planning (cf. 4.3.2.2.2.6) that centres around the ability of pre-service teachers to plan and facilitate lessons and micro-lessons according to the prescriptions of the CAPS document for the specific subject relating to the field of NS.
- Teaching theories (cf. 4.3.2.2.2.7) focusing more on the constructivist learning theory and the behaviouristic learning theory.
- Teaching and learning strategies (cf. 4.3.2.2.2.8) concentrating around the use of teacher-centred and learners centred teaching and learning strategies in the field of NS.
- Teaching methods (cf. 4.3.2.2.2.9) including the use of case studies, inquiry-based learning, practical investigation, the use of simulation, cooperative group work, the use of fieldwork and excursions, problem-based learning, the jigsaw method, De Bono's' six thinking hats, role play and classroom debates.
- Assessment strategies (cf. 4.3.2.2.2.10) focusing specifically on the ability to plan a practical assessment, design worksheets and assessment tasks, designing suitable learner activities according to the levels of Bloom's taxonomy, develop suitable assessment tools and instruments', plan and implement different assessment strategies as well as methods according to the prescribed policy documents.
- Learning and teaching support material (cf. 4.3.2.2.2.11) including the development of infographics, designing and building of models, using the overhead projector, transparencies, data projector, posters and other visual aids etc.
- Reflective practice (cf. 4.3.2.2.2.12) centring around good reflective practices and the different types of reflection.
- Indigenous knowledge (cf. 4.3.2.2.2.13) focusing specifically on defining indigenous knowledge, comparing indigenous knowledge with western knowledge systems and incorporating indigenous knowledge on various topic in the field of NS.

A few of the participants indicated in the open - ended questionnaires and focus group interviews that the knowledge and skills that they obtained with regards to teaching in an inclusive classroom was acquired through their stand alone, generic modules and not through their major subjects in the field of Natural Science (cf. 4.3.2.2.2). One of the participants (FGP3) who took part in the focus group interviews indicated that he/she cannot recall learning about inclusive education specifically in his/her Natural Science modules. This participant said he/she can only remember learning about the subject content and a few didactical aspects. He/she acknowledges that the lecturer might briefly mentioned something about inclusive education and how to help a learner that struggles but no in-depth knowledge about inclusive education was shared in the modules relating to NS (cf. 4.3.2.3.2.1). In contrast to the response of the previous participant, another participant (FGP5), that participated in the focus group interview stated that in both his/her generic modules and his/her Natural Science content modules he/she was exposed to inclusive education. He/she expressed that he/she was taught how to include all learners, became aware of different teaching styles, how to deal with specific content related topics, how to teach and elaborate on topics, how to have an inclusive classroom and how to deliver theory (cf. 4.3.2.3.2.1). The responses of the participants might be influenced by their perceptions and conceptualisation of inclusive education and also what competencies they regard as knowledge, skills and values that will enable them to teach inclusively. It might also be that although inclusive education is not explicitly or directly expressed in the module outcomes of NS, that the teacher educator indirectly or directly refer to inclusive teaching methods and strategies during lectures.

In research done by Nel et al, (2019) they emphasised that within a B.Ed Programme that is structured like the Natural Science B.Ed. Programme at this specific HEI it is a common feature that the conception and consequence of inclusion are not always comprehended by pre-service teacher and their teacher educators. Nel et al, (2019), Majoko and Phasha, (2018), as well as Walton and Rusznyak, (2017) (cf. 2.7) are of meaning that when pre-service teachers are taught about inclusive education and inclusive practices in stand-alone modules they tend to develop the perception that inclusive education is something that also stand apart from their normal daily teaching practices, which is consequently viewed as an add-on and not compulsory.

Nel et al, (2019), Walton and Rusznyak, (2017) as well as Arthur-Kelly et al., (2013), (cf. 2.6.3.1), suggest a “hybrid” model. The above mentioned researchers assert that ITE programmes should offer modules that include and integrate aspects of inclusive and special needs education, as well as practical field experience with learners who experience barriers to learning in major subjects such as NS. Consequently, research evidence has shown that inclusive education should be addressed in B.Ed Programmes in one or two stand-alone module or course, but should essentially be infused into the whole curriculum including in the methodology and didactics of major subjects like NS (Nel et al, 2019; Walton & Rusznyak, 2017; Arthur-Kelly et al., 2013; Kim, 2011). However, this requires that ITE programme developers and teacher educators will have to strengthen and improve their own conceptualisation of inclusive education in order to effectively implement a hybrid model (Nel et al, 2019; Walton & Rusznyak, 2017).

Furthermore, the content and outcomes of all subjects will need to include the knowledge, skills and values relating to inclusive education (Nel et al, 2019, p. 12). Many researches (for example Hopkins et al., 2018; Sharma & Sokal 2015; Forlin & Chambers, 2011) suggested that the following topics should be included in a B Ed curriculum which aims to prepare an effective inclusive teachers: understanding and gaining knowledge on the most relevant policies and legislation; identifying and addressing various barriers to learning; comparing the advantages and disadvantages of the medical model and the need to move to a social model of identification and providing support; being able to understand and implement the universal design of learning, differentiated instruction and scaffolding, curriculum and assessment adaptations, various forms of cooperative teaching and learning strategies, and effective collaboration and support strategies (Nel et al, 2019). The data analysis of the Natural Science B.Ed Programme showed elements of the aforementioned (cf. 4.3.2.2.2.1 - 4.3.2.2.2.13). It is however difficult to determine the depth in which these topics are dealt with in the Natural Science pre-service teachers B.Ed Programme to ensure if pre-service teachers are prepared for inclusive and diverse classrooms.

4.4.3 Knowledge and skills obtained to teach in an inclusive classroom

In relation to the abovementioned section that dealt with the DHETs’ policy requirements for ITE programmes and the structure and content relating to inclusive education in a Natural Science B.Ed Programme, the participants were asked to respond to a question in the open-ended questionnaire namely; what knowledge and skills have you obtained

in your B.Ed that will enable you to teach in an inclusive classroom? The findings indicated that the participants felt that there are a variety of knowledge and skills that they have obtained that will enable them to teach in an inclusive classroom. These knowledge and skills the participants identified seem to be mainly centred around knowing learners' needs and abilities, theory learned in their Natural Science B.Ed. Programme and different forms of pedagogy (cf. 4.3.2.3).

An important aspect of inclusive education is the ability of teachers to know the needs and abilities of learners (cf. 4.3.2.3.1). The participants mentioned that they have some comprehension of what a learners' potential and ability (cf. 4.3.2.3.1.1) might be and seem to think that a learners' potential is what the learner will be able to do and achieve with continuous support and accommodation from the teachers. They also added that a learners' ability is what the learner can do and achieve at the moment (cf. 4.3.2.3.1.1). These views of the participants correspond with that of the online dictionary *CampareWords* (2021) which describes ability as a state of being able; having the power to perform or being skill or competent in doing. Potential is described as currently unrealized ability (Wikidiff, 2021). Being able to understand and identify learners' potential and their ability could help pre-service teachers to plan and conduct lessons that will cater for the different ability levels amongst learners, as well as accommodate and support them in achieving their potential (Minderhout, 2007) (cf. 4.3.2.3.1.1) The findings reveal that pre-service teachers appear to be aware that learners have different levels of abilities and potential in their future classrooms (cf. 4.3.2.3.1.1). This is an important aspect of inclusive education, since it could determine how the pre-service teacher will plan and conduct lessons, and assess learners in an inclusive manner (Minderhout, 2007).

The participants also indicated that they have learned to group learners with different abilities together in the classroom (cf. 4.3.2.3.1.2) and it seems that they believe that grouping learners in this way will help learners to learn from each other. In addition, participants emphasised that disadvantaged learners will feel equal and included in a merged group [heterogeneous group] (cf. 4.3.2.3.1.2). One participant (OQP26) mentioned that he/she will "merge learners with special needs with learners who are not struggling with the content anyhow, this will lead them to learn from each other and the disadvantaged ones will feel equal...". Lewis (2019) explains that heterogeneous groups in the classroom refer to the practice of assigning learners with different learning abilities

to share and take part in various classrooms activities. The aim of using heterogeneous group activities is to develop a positive interdependence when learners from varying abilities and achievement work together and help each other to achieve learning outcomes (Lewis, 2019). Homogeneous groups on the other hand is where all learners have more or less the same abilities and perform approximately on the same level (Lewis, 2019; Sapon-Shevin, 2003). According to Sapon-Shevin (2003) research have suggested that homogeneous grouping does not consistently help learners learn more or better in the classroom. Inclusive education thus favours grouping of learners with different abilities (Sapon-Shevin, 2003). Thus, the fact that pre-service teachers feel that grouping learners with different abilities is good practice shows that they could already have a basic understanding of an important principle of inclusion, namely no segregation.

An important focal point in addressing learner needs is the ability of a teacher to understand the teaching context, as well as getting to know the learners. This could help teachers to predict and react quickly to a learner who needs educational support (Vestermark, 2020). The participants asserted that they obtained the ability to address learner needs (cf. 4.3.2.3.1.3). However, the participants did not elaborate on how they will address learner needs in the inclusive classroom. Thus, this could be an important aspect to address in ITE programmes, namely the practical skills to apply flexible and adaptable teaching and learning activities.

Petersen, (2017), Gravett and De Beer (2010), as well as Allen, (2009) (cf. 2.7) stated that many educationists, including pre-service teachers, are accusing HEIs that they are making ITE programmes too theoretical. This could imply that there is a disconnect between the theory (or known as “formal book knowledge”) and practice (or known as “real-world knowledge that is based on experience”) (Gravett and De Beer, 2010, p. 5). Moreover, research done both internationally and nationally has shown that many pre-service teachers feel that their training relating to inclusive education did not sufficiently prepare them for the practice (for example Walton & Rusznyak; 2019, Walton, 2017: Kurniawati et al., 2014: Florian & Spratt, 2013; Forlin, 2010; Jordan et al, 2008) (cf. 2.7). This is also evidenced in this research (cf. 4.3.2.7.2.1) where some of the participants emphasised that they have book knowledge about inclusive education, but need more practical experience with teaching in an inclusive classroom.

Nel et al, (2019), Majoko and Phasha, (2018), Walton, (2017), DHET, (2015) (DA8) and Forlin, (2010) (cf. 2.7) assert that ITE programmes should include theoretical knowledge and practical experience in terms of inclusive education. In the focus group interviews and open-ended questionnaire, the participants revealed that they are satisfied with the theory they were taught with regard to inclusive education and they seem to feel that the theory they learned about inclusive education helped them to accommodate diverse learning needs (cf. 4.3.2.3.2.1; 4.3.2.3.2.2). This may be attributed to the fact that inclusive education and various aspects thereof are addressed in some of the generic modules presented to pre-service teachers in the Natural Science B.Ed Programme (cf. 4.3.2.2.2.1 & 4.4.2.2). The issue of needing more practical experience will be addressed in paragraph 4.4.7.

The participants furthermore reported that they believe that theoretically they obtained essential knowledge and skills in the modules to identify different barriers to learning. The literature review explained that barriers to learning can refer to all the variables that make learning different or causes learning breakdown to occur for particular learners (Nel et al., 2016; Hays, 2010) (cf. 2.3 & 2.4.4). According to Dunbar-Krige and Van der Merwe (2010) these barriers to learning can be grouped into two categories, namely intrinsic and extrinsic. (cf. 2.3 & 2.4.4). In the document analysis EWP6 (DoE, 2001) (DA5) describe barriers to learning as physical, mental, sensory, neurological and developmental impairments, psycho-social disturbances, differences in intellectual ability, particular life experiences or socio-economic deprivation and systemic barriers (DoE, 2001).

The document analysis showed that the policy documents also support the fact that pre-service teachers need to be trained in identifying and accommodating barriers to learning (DBE, 2014; DoE, 2001) (DA5 & DA12) (cf. 4.3.2.2.1.8). Some of these barriers to learning are addressed in the Natural Science B.Ed Programme. In the participants' generic modules, they are presented with theoretical content relating to social-educational barriers (cf. 4.3.2.2.2.3) as well as physical and behavioural barriers (cf. 4.3.2.2.2.4). The module outcomes require that the participants should know the different barriers included in socio-educational barriers, as well as physical and behavioural barriers, understand the influences thereof and demonstrate skills to support and manage learners who experience these barriers to learning. The findings indicated that many of the participants specified that they generally feel capable of

identifying different barriers to learning in the classroom and understand that in an inclusive classroom they will be confronted with learners who experience different barriers to learning (cf. 4.3.2.3.2.3).

With regard to accommodating learners the participants seem to believe that they obtained the knowledge and skills to accommodate a diversity of learners who for example are in wheelchairs, have learning disabilities, and have different learning styles (cf. 4.3.2.3.2.4). They mentioned that innovative strategies need to be used to accommodate educational needs of all learners and that “merging” learners with special needs with learners who are not struggling will lead to learning from each other. It was also asserted that teaching on the level of the learner, at their pace will allow them not to feel excluded (cf. 4.3.2.3.2.4). Participants also maintained that they have obtained knowledge and skills relating to language, meaning that they can code switch to aid learners who are struggling with the language they are being taught in and thus make sure that all learners understand. One participant mentioned that teachers have to make learners familiar with the teaching and learning language so that they can understand better (cf. 4.3.2.3.2.5).

The findings indicated that the participants seem to feel comfortable applying learner-centred teaching and learning strategies by facilitating and enabling learners to find answers for themselves (cf. 4.3.2.3.3.1). In the literature review (cf. 2.4.5.1.1) it was mentioned that learner-centred teaching and learning strategies forms part of an inclusive pedagogy (Fiksl et al., 2017; Lake, 2016). In the document analysis EWP6 (DoE, 2001) (DA5) also acknowledges that the best approach to addressing barriers to learning and exclusion is to make use of a learner-centred approach to learning and teaching. Contrary to this finding research done by Bantwini (2017) and Beni et al. (2012) (cf. 2.4.5.2) found that teachers in most NS classrooms, make use of pedagogical approaches that promote exclusion instead of inclusion. Lombard (2015) (cf. 2.4.5.2) affirm that Natural Science teachers seem to mainly use teacher-centred teaching strategies like teaching from the textbook and do not often implement learner centred teaching and learning strategies that accommodate diverse learning needs in the classroom.

Participants also mentioned that they have learned about making use of different teaching strategies (cf. 4.3.2.3.3.2). The document analysis confirmed that different teaching strategies are addressed in the Natural Science B.Ed curriculum as part of the

subject didactics and methodology modules (cf. 4.3.2.2.2.8 & 4.4.2.2). These different teaching strategies will be used to encourage learners to actively participate in the classroom and to provide support to learners with learning difficulties (Lindsay, 2021) (cf. 4.3.2.3.3.2).

Participants asserted that they have obtained knowledge and skills in offering content to diverse learners regardless of their backgrounds while teaching them fairly according to their capabilities (cf. 4.3.2.3.3.4). Linking to the aforementioned finding the participants also emphasised that they have obtained knowledge and skills in providing assessment that is fair and equal (cf. 4.3.2.3.3.5). Although not specifically mentioned by the participants these findings can confirm that the participants seem to know how to apply differentiated instruction by accommodating diverse backgrounds and capabilities in a fair and equal manner (cf. 2.4.5.1.1.1; Walton, 2016; Thakur, 2014; DBE: 2011). Researchers such as Fiksl et al., (2017) as well as Van Rooyen and De Beer (2010) mentioned that in order to provide adequate inclusive teaching and learning experiences in a classroom, NS teachers should create a warm and inviting classroom climate, as well as include all learners in the teaching and learning process (cf. 2.4.5.2). In the participants' responses they confirmed that they have obtained the knowledge and skills that will enable them to create a warm and friendly classroom atmosphere (cf. 4.3.2.3.3.6) while also nurturing learners (cf. 4.3.2.3.3.7).

4.4.4 Knowledge and skills needed to teach in an inclusive classroom

The participants were also asked to respond to a question: *What knowledge and skills do you still need, that will enable you to teach in an inclusive classroom?* (cf. 4.3.2.4). What is interesting in the findings are that some of the same knowledge and skills many participants indicated they already obtained (cf. 4.3.2.3 & 4.4.3) are also mentioned as knowledge skills they still need to gain to teach in an inclusive classroom. This could be a positive indication in that the participants realise that what they have learned is not optimal yet and they still need to develop more knowledge and skills. The knowledge and skills the participants mentioned they still need include; planning and conducting inclusive lessons (cf. 4.3.2.4.1); accommodating learning barriers (cf. 4.3.2.4.2); to use more effective teaching strategies (cf. 4.3.2.4.3); identifying learners' weaknesses and strong points (cf. 4.3.2.4.4); knowledge of the context (assuming this means learners' contexts) and study material (cf. 4.3.2.4.5); using flexible curriculum implementations and adaptations (cf. 4.3.2.4.6); and learning more languages (cf. 4.3.2.4.7).

Furthermore, participants asserted that they need additional training (cf. 4.3.2.4.8) by having for example, having courses (cf. 4.3.2.8.1) on first aid to help learners with physical disabilities and how to handle learners with problems. Workshops on how to infuse inclusive education were also mentioned (cf. 4.3.2.8.2). Being life-long learners was acknowledged by the participants as important (cf. 4.3.2.4.8.3) and is perfectly encompassed in the following quote: OQP33: *“No one knows everything. The term life long learner should and needs to be a common phrase used amongst teachers and learners. There is still plenty knowledge I could learn to better aid my learners in the classroom and make them feel even more welcome and included.”* (OQP33). Dhaliwal (2015) affirms that teachers should make sure that they continuously acquire new knowledge and skills that they can apply in their teaching to become more effective (Dhaliwal, 2015). A role that has been attributed by policy (DHET, 2000) to teachers is the role of being a lifelong learner. This implies that teachers must attend to professional development through research, reading, participating in professional development courses (cf. 4.3.2.4.8.1) and attending workshops (cf. 4.3.2.4.8.2).

Participants also seem to still need to obtain knowledge and skills in management (cf. 4.3.2.4.9), such as time management (cf. 4.3.2.4.9.1) and classroom management (cf. 4.3.2.4.9.2). Other skills the participants referred to that they still need to develop included patience (cf. 4.3.2.4.10) and communication skills (cf. 4.3.2.4.11). According to Zambas (2021) patience and communication can be regarded as essential skills for being an inclusive teacher, especially when working with learners who experience different barriers to learning. This implies that when learners struggle and do not comprehend the content immediately, the teacher will be required to reflect and find alternative ways to deliver the content (Zambas, 2021). Moreover, the skill to communicate effectively with fellow colleagues, parents and other educational stakeholders (cf. 4.3.2.9) to ensure effective collaboration, as well as being able to effectively communicate content in a way that learners will comprehend it, is critical (Zambas, 2021).

4.4.5 Responding to diversity of learning needs

Responding to a diversity of learning needs was affirmed as an essential feature of inclusive education (Singh, 2004) (cf. 4.3.2.5). The participants stated that they will respond to diverse learning needs in the classroom by using cooperative learning (cf. 4.3.2.5.1), group work (cf. 4.3.2.5.2), class discussions (cf. 4.3.2.5.3), experiential

learning (cf. 4.3.2.5.4), play (4.3.2.5.5), including different learning styles (cf. 4.3.2.5.6), use simple language (cf. 4.3.2.5.7), using resources to promote inclusion (cf. 4.3.2.5.8), achievement (cf. 4.3.2.5.9) and assessment (cf. 4.3.2.5.10).

The participants seem to believe that co-operative learning (cf. 4.3.2.5.1) should be promoted because learners learn best from each other and learners with learning disabilities are able to interact and engage with those who have a better understanding of the subject content. Group work (cf. 4.3.2.5.2) are also seen as strategy where learners can work together and share ideas. Linked to working in groups the participants mentioned problem-based learning (cf. 4.3.2.5.2.1) where learners can work together in groups to find solutions for problems. The Jig-saw method (cf. 4.3.2.5.2.2) was also referred to as learner-centred strategy to do group work. Class discussions (cf. 4.3.2.5.3) to share ideas and opinions, as well as experiential learning (cf. 4.3.2.5.4) for a hands-on experience were cited as strategies. Play (cf. 4.3.2.5.5) was seen by the participants as something learners enjoy and therefore a strategy to use. In order to accommodate learning styles (cf. 4.3.2.5.6) audio, visuals and tactile activities were mentioned. To address diverse learning needs in a NS class using simple language (cf. 4.3.2.5.7) and translating into learners' home language so that all learners can understand seem to be an important strategy for the participants. The aforementioned strategies are all regarded as effective in teaching Natural Science, as well as in inclusive classrooms (Candrasekaran, 2014; Van Rooyen & De Beer, 2011; Magano, 2009) (cf. 2.4.5.2).

An important part of responding to diverse learning needs is the effective use of resources in the classroom (Killen, 2010) (cf. 4.3.2.5.8). Learning material and resources that is used by the teacher within a specific teaching strategy should be chosen carefully in order to assist in accommodating diverse learning needs and provide all learners with the opportunity to equally participate during the learning process (Booyesen, 2017). The participants indicated that they can use a wide variety of resources like: charts and posters, videos, PowerPoint presentations, textbooks, recycle material, material out of nature, fieldtrips and excursions as well as smartboards and the internet, that they currently have, both inside (cf. 4.3.2.5.8.2) and outside (cf. 4.3.2.5.8.3) of the classroom, to respond diverse learning needs. A few participants' also mentioned that sharing resources of resources may promote inclusion in the classroom (cf. 4.3.2.5.8.1).

In addressing diverse learning needs assessment is a crucial aspect to handle appropriately (Bourke & Mentis, 2013). Assessments used in the classrooms should be structured in a way that learners with various levels of abilities and potential can achieve as well as address their individual needs (Lubbe, 2020; Bourke & Mentis, 2013). However, assessment is a complex of aspect teaching (Lubbe, 2020). The participants appear to be aware of the complexity of assessment (cf. 4.3.2.5.10), by the manner in which they responded to various aspects and factors that can relate to assessment practices, like distinguishing between the ability and potential of learners (cf. 4.3.2.3.1.1), identifying needs and abilities of learners (cf. 4.3.2.11.2), measuring achievement (cf. 4.3.2.5.9), providing different types of assessment as well as feedback in the classroom (cf. 4.3.2.5.10) and offering fair assessment (cf. 4.3.2.3.3.5). The participants affirmed that they think to a certain extent it will be difficult for a teacher to determine exactly what the needs and abilities are of all the learners in the classroom (cf. 4.3.2.11.2). One of the reasons that the majority of the participants emphasised is that classroom sizes, in terms of the number of learners (cf. 4.3.2.11.2) in each class, are too big. Teachers are teaching in classes that are overcrowded and that hinders their ability to know the needs and abilities of all the learners in their class (cf. 4.3.2.11.2). The participants also mentioned various types of assessment that can be used in the classroom (cf. 4.3.2.5.10) ranging from non-written activities, written activities, practical activities, group work and discussions (cf. 4.3.2.5.10). The participants also highlighted the importance of feedback to learners (cf. 4.3.2.5.10). Thus, it seems that the participants understand that assessment should not be only formal paper and pen tests, but using a variety in order to accommodate different learning needs which is also a feature of an inclusive pedagogy (cf. 2.4.5.1; 4.3.2.2.2.10 & 4.3.2.5.10).

Linking to assessment the participants appear to comprehend that the way in which achievement is measured in schools can influence how learners will experience learning success in the inclusive classroom (cf. 4.3.2.5.5). Crick (2007) stated that it is important that assessment practices in the classroom are not are not mainly focused on standards of achievement, the product of learning or pass rates, but that assessment should also focus on the process of learning to determine whether learners understand and apply what they have learned and not only recall factual knowledge. Supporting this statement by Crick (2007) one participant asserted that in many South African schools' achievement is seen linked to good pass rates and whether learners obtain distinctions.

The participant further stated that he/she believes achievement should not be implemented like that, but should rather reflect whether learners understand and can apply the knowledge (cf. 4.3.2.5.5).

4.4.6 Forms of learning support

Providing adequate and appropriate support to learners who experience barriers to learning are supported by inclusive education policies (Nsinisa, 2016; DBE, 2014; DoE, 2001) (cf. 4.3.2.2.). The participants referred to observing different forms of learning support (cf. 4.3.2.6) being provided to learners in schools. These types of support include one-on-one support (cf. 4.3.2.6.1), extra classes (cf. 4.3.2.6.2), counselling (cf. 4.3.2.6.3) and LSEN classes (cf. 4.3.2.6.4).

It was declared by the participants that one-on-one support should be provided to learners who need additional support. However, they acknowledged that in many classrooms there are too many learners who might need individual support from the teachers which might require teachers to be creative. Supportive activities that will help learners with their specific area they are struggling with in the classroom were also mentioned (cf. 4.3.2.6.1). Extra classes in the afternoons or in the mornings were identified as regular forms of support being provided to learners who are struggling (cf. 4.3.2.6.2). A few of the participants have indicated that they, themselves, have been approached by learners who struggle to provide extra classes in the afternoon (cf. 4.3.2.6.2).

Participants referred to counselling services which are available at some of schools (cf. 4.3.2.6.3). These counselling services are provided by specific designated teachers, counsellors and therapists, community counsellors and NGO's like Lifeline (cf. 4.3.2.6.3). Participants also mentioned that many schools have LSEN classes (cf. 4.3.2.6.4). LSEN classes can be regarded as special support classes located in some mainstream schools that are available for learners with low to moderate special educational needs if these learners struggle in mainstream classes (NSW, 2020).

4.4.7 Practical experience

Participants indicated that they have experienced the diversity of learners in the classrooms during their WIL practical's (cf. 4.3.2.7.1). One participant specifically mentioned that the WIL experience he/she gained, enabled him/her to be able to apply and incorporate inclusive education (cf. 4.3.2.7.1.1). It was also mentioned that they have seen and experience different barriers to learning including: language barriers (cf. 4.3.2.7.1.2), ADHD and concentration barriers (cf. 4.3.2.7.1.3), learners struggling to read and write (cf. 4.3.2.7.1.4), and under privileged learners or learners from disadvantaged backgrounds (cf. 4.3.2.7.1.5).

What was notable from the responses is that many participants identified barriers to learning that are more extrinsic in nature. For example, the participants seem to believe that exclusion in South African schools affects learners from disadvantaged backgrounds more (cf. 4.3.2.8.1 & 4.3.2.7.1.5). Furthermore, language barriers in the classrooms were noted by many participants (cf. 4.3.2.7.1.2). A few participants mentioned that they have come across learners who experience learning difficulties, like learners diagnosed with ADHD and general concentration problems (cf. 4.3.2.7.1.3), as well as learners who struggle to read and write (cf. 4.3.2.7.1.4).

The majority of the participants indicated that they completed their grade 12 in township or rural schools (cf. 4.2). Modisaotsile (2014) postulates that extrinsic barriers to learning are more predominantly seen in disadvantaged communities surrounding township or rural schools. Many of the participants could also have completed their WIL practical teaching at township or rural schools, which can account for the reason why they identified learners from mostly disadvantaged backgrounds as experiencing barriers to learning (cf. 4.3.2.1.2.4). Language barriers (cf. 4.3.2.7.1.2) are also very often seen in South African schools due to the LOLT being predominately English or Afrikaans, and many learners having home languages different from the LOLT (Friedman, 2020). ADHD and concentration problems have been reported by teachers as becoming more prevalent barriers to learning which result in many learners being unfairly labelled as naughty or lazy due to certain types of behaviours they exhibit in the classroom (Dednam, 2016). The participants seem to have experienced the same as one identified “a lot” of learners having ADHD and concentration problems (cf. 4.3.2.7.1.3).

Furthermore, participants asserted that they have been given the theory but need more practical experience (cf. 4.3.2.7.2.1) in the inclusive classrooms to enable them to accommodate and respond to diversity amongst learners, especially with regard to handling different disabilities (cf. 4.3.2.7.2.1). Many of the participants stated that they rarely or have never seen learners with physical disabilities in South African classroom and therefore have never taught learners with physical disabilities before (cf. 4.3.2.7.2.2). However, some of the participants seem to understand that the responsibility also rest on them to develop practical experience in teaching inclusively by putting into practice what they have learned in their theoretical modules: “*The practical part is for me I need to be told something and then I put it in practice right*” (FGP1) (cf. 4.3.2.7.2.1). It was similarly acknowledged by the participants that although they have the book knowledge enforcing it on a practical level might be more difficult because they have not dealt with it on an emotional level (4.3.2.7.2.1). These responses seem contrary to the findings of similar research like that of Nel et al. (2019, p. 46) where they found that “*pre-service teachers expect their university education to provide them with practical skills to support diverse learners in the classroom*”. One participant indicated that he/she is not fully satisfied with the theory they were taught, because it did not prepare him/her to accommodate diversity in a practical manner (cf. 4.3.2.2.5.1). This could be because the Natural Science B.Ed. Programme are structured in a way that separates the theoretical knowledge from practical knowledge (Gravett & De Beer, 2010) (cf. 2.7). This response corroborates the finding of Nel et al, (2019) where participants felt that they have not been given practical tips and that the theory did not readily translate into classroom practice. From these responses it can be determined that practical experience is regarded as essential to fully prepare pre-service teachers to address and accommodate diversity in the classroom to fully implement inclusive education.

In Chapter 2 (cf. 2.7) it was mentioned that pre-service teachers experience what is called the “*so-called theory-practice divide*” (also referred to as a theory-practice gap) as soon as they enter the practice (Nel et al, 2019; Walton & Rusznyak, 2019; Majoko & Phasha, 2018; McGarr et al., 2017; Kinyaduka, 2017; Kwenda et al., 2017; Gravett & De Beer, 2010). This theory-practice gap may stem from the disproportionate view amongst many pre-service teachers that educational theories are factual and true in every learning context, and that these theories can be applied directly into the classroom situation and produce the desired results (Gravett & De Beer, 2010). However, teaching

is a very complex activity and therefore theoretical knowledge cannot be applied as a one size fit all in the practical teaching context (Bezanson, 2003). Gravett and De Beer (2010) are of meaning that pre-service teachers should continuously build their own theories of teaching when standing in the practical classroom, by acknowledging that in some contexts a combination or integration of different theories might be applicable. With that being said, it is still the responsibility of HEIs through their ITE programmes to ensure that pre-service teaches receives sufficient training, that includes both theory and practical experience (cf. 2.6; 2.7: 4.3.2.2.1.2 & 4.3.2.2.1.3).

4.4.8 Learners at risk of marginalisation

The participants identified that learners from disadvantaged backgrounds (cf. 4.3.2.8.1) and learners who struggle (cf. 4.3.2.8.2) are often marginalised in the South African classroom. As a result of marginalisation, learners could be less likely to attend school or to complete their education and will therefore be more prone to leave school with lower levels of achievement (Mathur, 2017). Mathur (2017) affirms that marginalisation of learners in any education system can lead to discrimination and exclusion. EWP6 (DoE, 2001) (DA5) asserts that the learners who are most vulnerable to barriers to learning and exclusion in South Africa are those who have historically been termed learners with special education needs which include learners experiencing intrinsic (i.e. disabilities) and extrinsic barriers to learning. The literature review also emphasise that extrinsic barriers to learning as a result of socio-economic factors, poverty, lack of basic amenities and resources can lead to marginalisation (Nel et al., 2016; Swart & Pettipher, 2016) (cf. 2.4.3. & 2.4.4).

4.4.9 Working together

As noted in the literature review (cf. 2.4.5.2) a collaborative approach (i.e. working together) between learners, parents, teachers, and community members can strengthen participation in an inclusive classroom (Van Rooyen & De Beer, 2011). The participants indicated that they acknowledge working with others will provide them with support and can assist them in an inclusive classroom (cf. 4.3.2.9). The benefits of working together with stakeholders were also affirmed by the participants as they believe it could have an impact on the development of the learner, because if the learner sees strong support and unity between teachers it tends to motivate them and build them up. However, the participants also reported no cooperation from parents or fellow teachers as a challenge

(4.3.2.9.2 & 4.3.2.9.3). It was mentioned by the participants that no cooperation from the parents' side "can be a challenge to know how to help the learner in their learning environment..." (FGP5). Dash (2018) and Schrader (2011) confirm that a lack of parent engagement and support in schools contribute to non-effective support and accommodation of learners. The one participant stated that working with other teachers can sometimes lead to conflict between the two parties especially if they do not agree on certain matters like the type of support that needs to be provided to a learner (cf. 4.3.2.9.3). Belapurkar and Phatak, (2012) found that a lack of collaboration between teachers can cause several problems and challenges for the implementation of inclusive education as well as support provision in the classroom. In addition, cooperation with community members, including counsellors, doctors, therapists, churches, local organisations and even lecturers at the HEIs where they were trained were also identified as stakeholders to work with (4.3.2.9.1.3). Van Rooyen and De Beer (2011) affirm that collaboration between parents, teachers, and community members can strengthen participation and support in an inclusive classroom.

4.4.10 Elimination of discrimination

One of the findings from the document analysis and the participants' responses were that for inclusive education to be implemented successfully teachers need to be accustomed to the policy content. The document analysis revealed that policies are "*binding in terms of decision-making around any form of support-provisioning to learners, schools and teachers*" (DBE, 2014) (DA10). The main purpose of these policy documents can be regarded as to eliminate discrimination, which is especially emphasised in the Constitution of South Africa and the South African Schools Act (cf. 4.3.2.10.1). Participants seem to be aware that these policies were developed to ensure the elimination of discrimination and promote equality and equity in South African schools. The fact that the participants recognize that the different principles' and values (cf. 4.3.2.1 & 4.4.4.1) contained in the Constitution and the SASA forms the foundation of inclusive education may be attributed to a strong emphasis that is placed on these two policies in the curriculum content of the generic modules that relate specifically to inclusive education (cf. 4.3.2.10.1; 4.3.2.2.2.1 & 4.4.4.2).

However, the participants who took part in the focus group interviews revealed that they have a lack of knowledge about the EWP6 (2001) and the SIAS (2014) (cf. 4.3.2.10.1.1). The participants either did not recall being exposed to these policies or they indicated

that they did briefly touch on these policies in some of the generic modules. Some stated that they became aware of these policies through a mentor teacher during their WIL practical teaching experience. None of the participants indicated that they have in-depth knowledge about the content or processes contained in these policy documents (cf. 4.3.2.10.1.1). Since EWP6 and the SIAS policy are two of the most guiding documents with regard to the implementation of inclusive education this finding should be noted as a concern for teacher educators and in the case of the study specifically for the Natural Science B.Ed Programme. EWP 6 (DoE, 2001) provides a framework for establishing an inclusive education system. This policy document asserts that classroom educators are the primary resource for accomplishing an inclusive education and training system. This means that teachers “*will need to improve their skills and knowledge, and develop new ones*” (DoE, 2001, p. 18) (DA5), which implies that they need be informed about policy requirements. The SIAS document (DBE, 2014) (DA10) provides a standardised procedure that teachers and schools should follow to identify, assess and support learners who experience barriers to learning. In both these policy documents training and mentoring of teachers to implement inclusive education and provide support to learners who experience barriers to learning are outlined and consequently important to know. If pre-service teacher lack knowledge about these policies, it can influence their preparation and readiness to teach in inclusive classrooms. This lack of knowledge may be attributed to the fact that although the generic modules make mention of these policies in their outcomes, they are most probably not dealt with in detail and how it links to subject specific fields such as Natural Science (cf. 4.3.2.2.2.1 & 4.4.4.2).

One of the participants suggested that a single policy should be written and implemented in all schools (cf. 4.3.2.10.1.3). Another participant commented that, schools should the time to acquaint themselves with what is written in these policies and implement them (cf. 4.3.2.10.1.4). It was also proposed that a special teacher should be appointed to make sure the policies, like the SIAS document, is reinforced and fully implemented and that all teachers should be constantly made aware of these policies (cf. 4.3.2.10.1.5). These suggestions that the participants made is also supported by Donohue and Bornman, (2014) who asserted that the gap between inclusive education policies and the practical implementation thereof can be closed through the application and enforcement by the DBE (Donohue & Bornman, 2014).

Besides the participants seemingly not adequately informed of policies they also believe that teachers at schools do not have enough knowledge and that schools are not inclusive enough which leads to neglecting learners who experience barriers to learning (cf. 4.3.2.10.1.6). Dash (2018), Nel (2018), Belapurkar and Phatak (2012) as well as Ladbrook (2009) affirm that the lack and knowledge and skills and consequent neglecting of learners result in the weakening of the implementation of inclusive education in South African schools which could exacerbate discrimination and exclusion.

4.4.11 Reinforce inequality

The participants identified a number of barriers that they observe in the South African education system, that they believe reinforce inequality. These barriers can be categorised as systemic barriers and include, unequal resource distribution (cf. 4.3.2.11.1), many learners in the classroom (cf. 4.3.2.11.2), top achieving learners (cf. 4.3.2.11.3), Science learners are held in high regard (cf. cf. 4.3.2.11.4), Gr 10 F known as delinquents (cf. 4.3.2.11.5), the curriculum (cf. 4.3.2.11.6), physical structures of the school (cf. 4.3.2.11.7), teacher (cf. 4.3.2.11.8), not considering all (cf. 4.3.2.11.9) and separate institutions (cf. 4.3.2.11.10).

The participants seem to believe that most of the township school learners are still at risk of being marginalised because they don't have enough resources. An example that was given is in the current Covid-19 pandemic situation which moved learning online. As technology is not available to all these learners it resulted in learners being behind in learning the content. Modisaotsile (2012) also emphasises that many classrooms are still ill-equipped with severely limited resources. The literature review also affirmed that a lack of resources is still one of the remaining systemic barriers that can be seen in the South African school system (cf. 2.4.4.). This includes a shortage in learning materials (Modisaotsile, 2012). Furthermore, according to Modisaotsile, (2012) most teachers prefer not to teach at schools with few or old resources, as they believe it hinders their performance and that of the learners that they teach. Thus, it can be deduced that a lack of resources negatively impacts on teachers being able to fully implement inclusive education and apply differentiated teaching in the classrooms (cf. 2.4.4.). A suggestion made by Modisaotsile (2012) is to involve communities and NGO's that are able meet

the resource needs of schools or to repurpose local resources to fill gaps when government response to provide needed resources are not adequate. In the field of Natural Science teachers can mediate a lack of resources in the classroom by implementing methods like “Science on a Shoestring” (De Beer & Nduna, 2010). These methods suggest looking for and using cost effective, recyclable materials that can be found in the average household or communities as resources during teaching and learning (De Beer & Nduna, 2010).

The literature review has identified overcrowded classrooms as a major systemic barrier that hinders the successful implementation of inclusive education in many classrooms (cf. 2.4.4.). The participants indicated that having too many learners in the classroom can limit a teacher’s ability to know the needs and abilities of all the learners in the classrooms (cf. 4.3.2.11.2). When a teacher is faced with an overcrowded classroom it could limit them to provide individual support to learners who experience barriers to learning as well as the time to implement support strategies (cf. 2.4.4). West and Meier (2018) found in their research that many challenges experienced in the classroom can be related to over-crowdedness. These challenges include aspects like didactical neglect, discipline issues and negative teacher attitudes towards teaching in conjunction with the inability of the teacher to successfully implement inclusive education and providing individual support to learners (West & Meier, 2018).

A particular systemic issue that was mentioned by participants, which they believe reinforce inequality, is the way that classrooms are structured where top achievers sit in front of the classroom and teachers focusing mostly on them while labelling learners sitting in the back of the classroom (cf. 4.3.2.11.3). Linking to this finding is where the participants report that science learners are held in higher regard (cf. 4.3.2.11.4) and learners in lower classes such as Grade 10 F are seen as delinquents (cf. 4.3.2.11.5). One participant stated that teachers use harsh words with these learners in the F class, for example: “... *you could literally even see their eyes, the face, is gone for, you understand...*” (FGP1). The practice of grouping learners by their different abilities still occurs regularly in school systems around the world and can take on various forms (Tereshchenko et al., 2019). One such form includes the grouping of learners in schools where higher achieving learners are placed in one class and lower achieving learners are placed in a separate class (Tereshchenko et al., 2019). According to Samkange, (2015, p. 1419) this can result in labelling, due to the separation of learners based on

achievements or ability. These learners are given “name tags” that present them as “social misfits” in their communities. Arguments in the literature suggest that as a result of separation and labelling the schooling of many learners may be impacted negatively (Samkange, 2015).

Furthermore, the curriculum has been identified by the participants as an aspect that could reinforce inequality. One of the participants asserted that on paper the CAPS curriculum is a good curriculum, and that is very progressive from one grade to the other. Thus, teachers can clearly see what a learner should be able to do in each grade (cf. 4.3.2.11.6). However, the participants feel that a problem arises when a learner falls behind in certain areas but still being promoted to the next grade without mastering important content knowledge and skills. Another participant indicated that teachers are sometimes forced to teach the CAPS curriculum as it is written on paper and they are not granted the opportunity to adapt the curriculum to fit the needs of the learners in their class, which can possibly lead to learners falling behind (cf. 4.3.2.11.6). Various research studies done by Nel (2018), Booysen (2018), Hodgson and Khumalo (2016), Coetze (2016), Wium and Louw (2015), Payne-van Staden (2015), as well as Mlambo (2014) has emphasised that teachers report that the current curriculum cannot be implemented in a flexible way and this can negative impact the successful implementation of inclusive education in the classroom (cf. 2.4.5.1.2 & 4.3.2.11.6). Moreover, Dash (2018, p. 159) asserts that the school curriculum is centrally designed and rigid, leaving little room for flexibility and adaptations for teachers to experiment and implement new methodologies, which does not support an inclusive, flexible curriculum addressing diverse learning needs.

Physical structures which do not allow access to learners with physical disabilities have been identified by participants as a factor reinforcing inequality (cf. 4.3.2.11.7). In an article published by Gilili (2020) he interviewed an education researcher named Sibabalwe Gcilitshana who stated that “*poor school infrastructure is a barrier to schooling*”. This proclamation support the statements made by some of the participants. According to Dash (2018) many schools are “*physically inaccessible*” to various learners, particularly to many learners who experiences physical barriers to learning. Furthermore, this researcher also mentions that in socio-economically deprived rural areas, schools are frequently inaccessible due to infrastructure that are neglected and unmaintained (Dash, 2018).

The participants also mentioned that teachers can reinforce inequality (cf. 4.3.2.11.8). An example that was given is teachers near retirement who seem not to so keen to teach anymore (cf. 4.3.2.11.8). According to Bansal (2016) negative attitude of teachers towards inclusion creates barriers in the inclusive classroom as it negatively affects the teaching abilities of the teachers. In this case, of teachers near retirement, it may be possible that these teachers feel overwhelmed by the challenges of teaching in an inclusive classroom or that they may not be able to plan lessons and use effective strategies to accommodate diversity amongst learners. In the same trend one of the participants asserted that teachers are not considering all (cf. 4.3.2.11.9) learners' values, different talents and learning styles, i.e. different ways of learning. They tend to deliver the content as it is and expect learners to grasp it and move on (cf. 4.3.2.11.9). This kind of teaching action emphasise a teacher-centred approach where teachers only focus on completing the curriculum and not giving attention to learner needs and development (Manuel, 2021). The aforementioned finding may also be fuelled by many teachers' negative attitudes towards inclusive education (Dash, 2018, p. 159).

Lastly, the participants believe that inequality in the school system is reinforced due to the notion that learners with disabilities are placed in separate institutions, namely special schools (cf. 4.3.2.11.10). This reflects the continued implementation of the medical model (cf. 2.4.3), which suggests that learners who are experiencing barriers to learning should be placed in separate institutions (Swart & Pettipher, 2016). This contradicts the principles of inclusive education (cf. 2.4; 4.3.2.1 & 4.4.4.1) which supports the use of the socio-ecological model (cf. 2.4.3) where learners who experiences barriers to learning should be accommodated in mainstream schools as well (Nel, 2013).

4.5 Conclusion

In this chapter the most important findings of the document analysis, open ended questionnaire and the focus group interviews were presented followed by an integrated discussion of the findings. Chapter 5 will discuss the implications of these findings and how they answered the primary and secondary research questions. A summary will also be provided which will highlight the limitations of this research and the recommendations prescribed by the researcher that can be considered for further research

CHAPTER 5: SUMMARY OF THE FINDINGS, CONCLUSION, RECOMMENDATIONS AND LIMITATIONS OF THE STUDY

5.1 Introduction

According to the EADSNE (2012) the success of inclusive education will depend on teachers' attitude towards inclusion and diversity, their commitment, the extent to which they develop appropriate knowledge and skills and ways of relating to the greater levels of diversity amongst learners in their classroom. Researchers such as EADSNE, (2012), Sharma et al, (2008) and Booth et al, (2003) have shown that the challenges for ITE institutions to adequately prepare pre-service teachers for inclusive education, responding to diversity and the appropriate identification and accommodation of barriers to learning is of international concern. Therefore, the purpose of this research study was to explore the perceptions of fourth year NS pre-service teachers in a BEd Programme regarding their training for inclusive education (cf. 1.3; 1.4 & 3.3). To achieve the previous mentioned purpose, a literature review and empirical study were conducted. The empirical research consisted out of a qualitative study where in-depth data were collected by making use of an extensive document analysis, open-ended questionnaire and focus group interviews (cf. 3.7.3 & 3.7.5.3)

In Chapter 1 (cf. 1.3 ;1.5; 3.3 & 3.5) the primary research question, as well as the secondary research questions were outlined. In this chapter answers to the primary research question and the secondary research questions will be provided according to the findings of the literature review and empirical study. Based on these answers, recommendations, possible contributions and the limitations of the study are provided. Recommendations for further research are also indicated in this chapter.

5.2 Overview of the study

In Chapter 1, an outline and rationale for the study were provided. This included a summary of the problem statement, secondary research questions and the research objectives. The primary research question is: *What are the perceptions of fourth year NS pre-service teachers in a B.Ed Programme regarding their training for inclusive*

education? Together with this, an overview of the research design, strategy of inquiry and other methodological aspects were provided.

Chapter 2, included an elaborated literature review where NS pre-service teachers, inclusive education, inclusive pedagogy and teaching NS inclusively were contextualised. Teacher education for inclusive education and its challenges were also explored.

In Chapter 3 detailed discussions of the research methodology, design and research paradigm that were used in this study were included.

Chapter 4 provided the analysis of the data collected from the document analysis, online open-ended questionnaire and online focus group interviews. This was followed by an integrated interpretation and discussion of the most prominent findings.

5.3 An integrated summary of the findings from the literature review and the empirical research

The primary and secondary researcher questions will be answered by providing and integrated summary of the findings from the literature review and the empirical research.

5.3.1. Primary research question: What are the perceptions of fourth year NS pre-service teachers in a B.Ed Programme regarding their training for inclusive education?

The participants have shown in the responses to various questions in the online open-ended questionnaires and the online focus group interviews that they seem to have a positive perception of their training for inclusive education. The findings suggest that the participants appear to feel that they have obtained sufficient theoretical knowledge through their B.Ed Programme to enable them theoretically for teaching in an inclusive classroom (cf. 4.4.3). As part of the successes regarding their training for inclusive education the participants affirmed that they were exposed to and obtained knowledge and skills through the B.Ed Programme that they feel will enable them to teach diverse

learners in an inclusive classroom (cf. 4.4.3).

In the document analysis of the DHET teacher education policies and guidelines (cf. 4.3.2.2.1 & 4.4.2.1) as well as the B.Ed curriculum for NS (cf. 4.3.2.2.2 & 4.4.2.2), it showed that many of the knowledge, skills and values that are prescribed by these documents are addressed in the B.Ed curriculum for NS (cf. 4.4.2.2). This finding seems to support the abovementioned perceptions of the participants. However, it was found that the B.Ed curriculum for NS does comprise knowledge and skills relating to inclusive education mainly in stand-alone generic modules and seem not to be infused in NS specialisation subjects, including the didactics and methodology areas (cf. 4.4.2.2).

The primary research question will be answered in more detail in the secondary research questions.

5.3.2. Secondary research question 1: What is inclusive education?

The objective of this question was to describe what inclusive education is according to literature.

Findings from previous research indicated that inclusive education seem to be defined in a variety of ways internationally (cf. 2.4 & 2.4.1; Majoko & Phasha, 2018). However, when looking at the different definitions of inclusive education in a broader sense, there seems to be common threads running through each one of them. Key guiding elements that appear to be central in many of the definitions of inclusive education include addressing diverse learner needs, identifying and accommodating barriers to learning that adversely affect learning, supporting the elimination of barriers to learning and ensuring that all learners experience equal and quality education that is non-discriminative (Majoko & Phasha, 2018; Dalton et al., 2012; DoE, 2001) (cf. 2.4.1).

A strong emphasis is also placed on the principles of human rights and social justice (Nel et al., 2019; Symeonidou, 2018). The aforementioned principles are captured in the South African definition of inclusive education as described by Swart and Pettiphzer (2016, p. 4); *“inclusive education is about building a more democratic society, a more*

equitable and quality education system and a belief that extend the responsibility of regular schools to accommodate the diverse learning needs of all learners.” This definition emphasises that the responsibility to identify, address and accommodate diverse learning needs of all learners are not only placed on special schools but also on regular mainstream schools.

This means that all teachers should be trained for teaching in an inclusive classroom (cf. 2.4.2). An inclusive classroom can be described as a classroom where a diverse group of learners (cf. 2.4.4) are provided the opportunity to learn and participate together. Principles that should be infused into an inclusive classroom is that of respect for each other's differences as well as equality (cf. 2.4.2 & 2.4.4). An inclusive pedagogy is strongly supported in the literature to accommodate diverse learning needs in an inclusive classroom (cf. 2.4.5.1). Florian and Beaton (2018) describe an inclusive pedagogy as an approach to teaching and learning that aims to address and accommodate individual differences between learners in the classroom but eludes the marginalisation and exclusion that may occur when pedagogical approaches are designed only to attend to some specific learners. An inclusive pedagogy does not only require the teacher to have general pedagogical content knowledge but also special pedagogical content knowledge (cf. 2.4.5.1.1). Special pedagogical content knowledge encompasses that the teacher should have knowledge and skills in implementing differentiated instruction (cf. 2.4.5.1.1.1), the universal design for learning (UDL) (cf. 2.4.5.1.1.2) and scaffolding (cf. 2.4.5.1.1.3).

The literature also revealed that there are still many challenges that exist within the South African school system that inhibits the ability of teachers to provided quality inclusive education for all (Donohue & Bornman, 2014). Some of these challenges identified include an inflexible curriculum (cf. 2.4.5.1.2), prevailing negative attitudes and discrimination towards learners who experience barriers to learning, limited resources and school infrastructure, inadequate teacher training programmes and teachers lacking knowledge and skills to enact policies and implement inclusive education (cf. 2.4.4 & 2.4.5.1.2).

5.3.3 Secondary research question 2: What are policy requirements with regard to the training of pre-service teachers in inclusive education?

The aim of this secondary question was to determine what the policy requirements with regard to the training of pre-service teachers in inclusive education entails.

The introduction of EWP6 (DoE, 2001) emphasised the official adoption of inclusive education in the South African school system. A prominent plan of EWP6 (DoE, 2001) was to provide training and workshops that would enable all teachers to obtain skills and knowledge in identifying, addressing and accommodating diverse learner needs in the inclusive classroom (Nel et al., 2019) (cf. 2.6.3.2). The aforementioned required that interventions should have been implemented by the Department of Education for in-service teachers and by HEIs in their ITE programmes.

In Chapter 2 (cf. 2.6.3.2) it was mentioned that the Norms and Standards for Educators (NSE) (DoE, 2000) was the policy that guided ITE programmes around that time. Unfortunately, the NSE (DoE, 2000) was introduced before EWP6 (DoE, 2001) was released, which meant it was not specifically required of ITE programmes at that time to address inclusive education. In a response to the gap identified in the NSE (DoE, 2000) the National Policy Framework for Teacher Education Development (DoE, 2006) was developed. This framework stipulates that the identification and addressing of barriers to learning as well as collaboration should be key components in ITE programmes in preparing pre-service teachers for inclusive education (Majoko & Phasha, 2018; DoE, 2006). The National Policy Framework for Teacher Education Development (DoE, 2006) together with the Minimum Requirements for Teacher Education Qualifications (MRTEQ) (DHET, 2015) emphasises the need for pre-service teachers to be acquainted with the requirements for implementing inclusive practices in the education system.

Certain knowledge and skills were identified in the literature and the empirical data (cf. 2.6.3.2; 4.3.2.2.1 & 4.4.2.1) that should be addressed in an ITE programme. This includes the development of pedagogical knowledge by specifying that inclusive education needs to be an important feature in general pedagogical knowledge (GPK) and specialised pedagogical content knowledge (SPCK) (cf. 4.3.2.2.1.1). Furthermore,

pre-service teachers need to:

- learn and gain experience through the study of practice in an inclusive environment (cf. 4.3.2.2.1.2);
- learn to converse competently in a second official language, using ICT's and gain academic literacy (cf. 4.3.2.2.1.3);
- develop knowledge of a variety of situations, context and environments to understand diversity in the South African context to enable them to teach in a way that will include all learners (cf. 4.3.2.2.1.4);
- to continue with professional development in inclusive education, i.e. life-long learning (cf. 4.3.2.2.1.5); and
- develop the ability to reflect on the practices of other teachers, as well as their own, in order to learn from mistakes and improve their own inclusive teaching practices (cf. 4.3.2.2.1.6).

Policies such as EWP6 (DoE, 2001) (DA5), the SIAS document (DBE, 2014) (DA10) and CAPS (DBE, 2011) (DA12) (cf. 4.3.2.1) also necessitate that pre-service teachers need to develop knowledge and skills to understand the crucial role of the teacher in inclusive education (cf. 4.3.2.2.1.7). In addition, certain competencies also need to be fostered to enable pre-service teachers to identify and accommodate diverse barriers to learning (cf. 4.3.2.2.1.8) as well as cultivate proficiencies in multi-level classroom instruction and curriculum differentiation (cf. 4.3.2.2.2.9).

It seems evident from the literature and empirical data that inclusive education should be integrated in all B.Ed Programmes, as stipulated in the national policies. However, evidence also show that there are a few limitations within the existing policies (cf. 4.4.2.1). It is notable from the policies that there is no clear identification of the exact attributes that newly qualified teachers should have about general pedagogical knowledge and specialised pedagogical content knowledge in relation to inclusive education. Therefore, HEI and ITE programmes developers are left to apply their own interpretations on how inclusive education should be addressed in their B.Ed Programmes (Majoko and Phasha, 2018) (cf. 2.6 & 4.4.2.1).

According to Majoko and Phasha, (2018) the abovementioned limitations can create misconceptions amongst pre-service teachers about various aspects of inclusive education as identified in the data analysis (cf. 4.4.2.1). In an attempt to address the limitations various researchers have worked together to develop teaching standards for inclusive teaching that pre-service teachers need to be exposed to in ITE programmes (DHET, 2017; Beere et al., 2017). These teaching standards together with the sub-dimensions was presented in detail in Figure 2.5 (cf. 2.6) and later briefly summarised again in Figure 4.3 (cf. 4.4.2.1).

5.3.4 Secondary research question 3: How does the B.Ed Programme for Natural Science pre-service teachers at a specific campus of a Higher Education Institution address inclusive education?

This question explored the depth in which the B.Ed Programme for Natural Science pre-service teachers (referred to as participants) at a specific campus of a Higher Education Institution address inclusive education.

The empirical study has indicated that the knowledge and skills as prescribed in the policy documents relating to inclusive education (cf. 2.6; 4.4.2.1 & 5.3.2) are addressed in some of the outcomes within the B.Ed Programme for NS pre-service teachers at the specific HEI. However, it seems that these knowledge and skills are mainly addressed in the form of stand-alone generic modules and not infused in NS subject specialisation modules, as well as the didactics and methodology (cf. 4.4.2.2). The literature review (cf. 2.7 & 2.5.3.1) revealed that one of the major challenges teacher education for inclusive education is facing is the fact that many HEIs cannot reach consensus as to how inclusive education should be facilitated for pre-service teachers. Research done by many researchers (for example, Nel et al., 2019; Majoko & Phasha, 2018; Walton & Rusznyak, 2017; Engelbrecht et al., 2015; Malak, 2013; Hemmings & Woodcock, 2011) have revealed that most South African HEI's address inclusive education in stand alone modules. This means that inclusive education as such and an inclusive pedagogy are not infused in subject specialisation modules, as well as the didactics and methodology aspects of these subjects, including lesson planning, and assessment and other elements that shapes pre-service teachers pedagogical content knowledge (Majoko &

Phasha, 2018). Due to this pre-service teachers can develop the notion that inclusive education is an add-on or something separate from their usual teaching and learning practices in the classroom (cf. 2.7).

Specific content relating to inclusive education that is addressed in the generic modules include; inclusive education in South Africa (cf. 4.3.2.2.2.1), professional ethical conduct towards learners and their diverse needs (cf. 4.3.2.2.2.2), social-educational barriers (cf. 4.3.2.2.2.3), physical and behavioural barriers (cf. 4.3.2.2.2.4), as well as the learning support process (cf. 4.3.2.2.2.5). Other content that is addressed in NS specialisation subjects relating to didactics and methodology include: lesson planning (cf. 4.3.2.2.2.6), teaching theories (cf. 4.3.2.2.2.7), teaching and learning strategies (cf. 4.3.2.2.2.8) teaching methods (cf. 4.3.2.2.2.9), assessment strategies (cf. 4.3.2.2.2.10) using and designing learning and teaching support material (cf. 4.3.2.2.2.11), reflective practice (cf. 4.3.2.2.2.12) and indigenous knowledge (cf. 4.3.2.2.2.13).

A few of the participants who took part in the open-ended questionnaires and the focus group interviews revealed that the knowledge and skills they obtained with regard to inclusive education were acquired through their generic modules (cf. 4.3.2.2.2 & 4.4.2.2). This finding corresponds with what was identified during the document analysis of the B.Ed Programme for NS pre-service teachers at the specific HEI. Another participant that participated in the focus group interview stated that in both the generic modules and the NS content modules he/she was exposed to inclusive education (cf. 4.3.2.3.2.1.). This reason for this could be that although inclusive education is not explicitly or directly expressed in the module outcomes of NS specialisation subjects, the teacher educator indirectly or directly referred to inclusive education during lectures. Nel et al., (2019) emphasise that pre-service teachers want to understand how the principles of inclusive education translate into practice in their teaching context within their subject specialisation. The aforementioned requires that inclusive education and inclusive practices (such as an inclusive pedagogy, assessment and classroom management) should be modelled by subject specialists. The participants also expressed their need for more practical exposure and experience in the inclusive environment (cf. 4.3.2.7.2 & 4.4.7).

Alternative forms of structuring a B.Ed Programme have been suggested by many researchers (for example Nel et al., 2019; Walton & Rusznyak, 2017; Arthur-Kelly et al., 2013) (cf. 2.7). These researchers assert that HEI's and ITE programmes should offer modules that include and integrate aspects of inclusive and special need education, as well as practical field experience with learners who experience barriers to learning in major subjects like NS. It is also suggested that in the B.Ed Programmes inclusive education should essentially be infused into the whole curriculum including in the methodology and didactics of major subjects like NS and not only in one or two stand-alone module or course (Nel et al., 2019; Walton & Rusznyak, 2017; Arthur-Kelly et al., 2013; Kim, 2011). Nel et al., (2019) and Walton & Rusznyak, (2017) describe the aforementioned as a hybrid model towards preparing pre-service teacher for inclusive education (cf. 2.7 & 4.4.2.2).

5.3.5 Secondary research question 4: What is the understanding of Natural Science pre-service teachers at a specific campus of a Higher Education Institution regarding inclusive education?

The objective of this question was to explore the understanding of Natural Science pre-service teachers (referred to as participants) at a specific campus of a Higher Education Institution regarding inclusive education.

The participants conceptualised inclusive education as providing all learners an equal chance to learning (cf. 4.3.2.1.1), to be non-discriminatory (cf. 4.3.2.1.2) as well as to include everyone (cf. 4.3.2.1.3) in the classroom. From the literature review, as well as empirical study (cf. 2.4. & 4.4.1) and as described earlier in this chapter (cf. 5.3.1.) it seems that the NS pre-service teacher have some understanding of the basic principles and values that underpins inclusive education, namely human rights and social justice (cf. 2.4). Inclusivity is a fundamental principle contained within the Constitution of the Republic of South Africa, Act No. 108 of 1996 and the South African Schools Act 1996 (Act No 84 of 1996) as well as many other prominent policies and legislation (cf. 4.4.1).

The empirical study revealed that the participants believe that the learner who are most at risk of marginalisation (cf. 4.4.8) include learners from disadvantaged backgrounds (cf. 4.3.2.8.1) and learners who struggle (cf. 4.3.2.8.2). The literature review also emphasised that some intrinsic and extrinsic barriers to learning can also lead to marginalisation (Nel et al., 2016) (cf. 2.4.3. & 2.4.4). Intrinsic barriers to learning (cf. 2.4.3. & 2.4.4) are described as barriers located within the individual learners themselves. Learners with intrinsic barriers are usually born with a specific characteristic that makes it difficult for them to learn or some learners may later acquire an intrinsic barrier to learning causing them to struggle (Swart & Pettipher, 2016). Nel et al., (2016) and Swart & Pettipher, (2016) (cf. 2.4.3. & 2.4.4) specified that extrinsic barriers to learners include, but are not limited to, socio-economic factors, poverty, lack of basic amenities and resources that can be seen as common occurrences in disadvantage communities.

The participants also stated that they understand an important requirement of inclusive education is to respond to diversity in the classroom (cf. 4.4.5). Diversity amongst learners is defined in Chapter 2 (cf. 2.4.4) as recognising that learners are unique, thus, in a classroom one will observe that there are learners from different socio-economic backgrounds, languages, cultures, religions, ethnicities, races, genders, sexual orientations, ability groups, as well as learners who experience intrinsic barrier to learning and/or extrinsic barrier to learning (Mudzingwa, 2019, Lebona, 2013 & DBE, 2011). The participants emphasised in the empirical study that they will respond to diversity in the classroom through the use of cooperative learning strategies (cf. 4.3.2.5.1), groupwork (cf. 4.3.2.5.2), class discussions (cf. 4.3.2.5.3), experiential learning (cf. 4.3.2.5.4), play (cf. 4.3.2.5.5), including different learning styles (cf. 4.3.2.5.6), using simple language (cf. 4.3.2.5.7), using resources to promote inclusion (cf. 4.3.2.5.8), through promoting learner achievement (cf. 4.3.2.5.9) and by using various forms of assessment (cf. 4.3.2.5.10) during the teaching and learning process. Many of these aspects mentioned by the participants are also highlighted in the literature (cf. 2.4.5.2) as strategies and methods that should be used to teach NS inclusively. Furthermore, the participants made mention of different forms of learning support they are aware of and have observed during their WIL practical teaching periods (cf. 4.4.6) These types of support include one-on-one support (cf. 4.3.2.6.1), extra classes (cf.

4.3.2.6.2), counselling (cf. 4.3.2.6.3) and LSEN classes (cf. 4.3.2.6.4).

Working together (cf. 4.4.9) is also regarded by the participants as an important component of inclusive education. The participants recognised that working with other adults like fellow colleagues and teachers (cf. 4.3.2.9.1.1), parents (cf. 4.3.2.9.1.2) as well as other community members (cf. 4.3.2.9.1.3) are important in ensuring the success of inclusive education. In addition, mention was made of a few benefits working together can have in the inclusive classroom, such as providing support, identifying learner strengths and weakness as well as motivate the learners (cf. 4.3.2.9.2) The participants asserted that when there is no cooperation between fellow teachers and parents it can hinder the implementation of inclusive education (cf. 4.3.2.9.3). Swart and Pettipher (2016), as well as Nel (2013) (cf. 2.4.5.2) describe collaboration (i.e. working together) in inclusive education as a sharing community where, teachers, parents, SBSTs, DBSTs and other community stakeholders work together constantly to share and discuss best inclusive practices and decide on the best possible support to implement in order to accommodate learners who are experiencing barriers to learning as well as respond to learner diversity in the inclusive classroom.

5.3.6 Secondary research question 5: How do Natural Science pre-service teachers at a specific campus of a Higher Education Institution perceive their training with regard to the successes, shortcomings or vulnerabilities of inclusive education?

This question investigated how Natural Science pre-service teachers (referred to as participants) at a specific campus of a Higher Education Institution perceive their training with regard to the successes, shortcomings or vulnerabilities of inclusive education.

- **Successes**

Based on the perceptions of the participants they have gained knowledge and skills in their B.Ed Programme that will enable them to teach in an inclusive classroom (cf. 4.3.2.3 & 4.4.3). The knowledge and skills they highlighted included knowing learners' needs and abilities (cf. 4.3.2.3.1), theory learned in their NS B.Ed Programme (cf. 4.3.2.3.2) and forms of pedagogy (cf. 4.3.2.3.3).

The participants further indicated that as part of knowing learners' needs and abilities they are confident in their ability to distinguish between a learner's potential and ability (cf. 4.3.2.3.1.1). They also affirmed that in an inclusive classroom they will group learners with different abilities together (cf. 4.3.2.3.1.2). According to the participants grouping learners with different abilities together will help them to learn from each other, and a stronger learner can provide support and peer teach a learner that might be struggling. Moreover, the participants mentioned that they have obtained knowledge and skills in addressing learner needs and understanding the learner's situation (cf. 4.3.2.3.1.3).

With regard to the theory the participants learned in their NS B.Ed Programme, they affirmed that they are satisfied with what they have learned and that the theory has helped (cf. 4.3.2.3.2.1) to enable them in teaching diverse learners in the inclusive classroom. The participants specifically emphasised that the theory they have learned included the theory of inclusive education (cf. 4.3.2.3.2.2), identifying different learning barriers (cf. 4.3.2.3.2.3), accommodating learners (cf. 4.3.2.3.2.4.), using different languages (cf. 4.3.2.3.2.5) and content knowledge (cf. 4.3.2.3.2.6).

It appears from the findings that the participants also gained some experience during their WIL practical (cf. 4.3.2.7.1). The participants specified that the experience they gained through their WIL practicals enabled them to incorporate inclusive education in their classroom. They further highlighted that they have seen some learners with barriers to learning in the classroom while they were at schools during their WIL practicals. The major barriers to learning the participants identified and experienced included: language barriers (cf. 4.3.2.7.1.2), learners experiencing ADHD and concentration barriers (cf. 4.3.2.7.1.3); learners struggling to read and write (cf. 4.3.2.7.1.4) and under privileged learners (cf. 4.3.2.7.1.5).

Other knowledge and skills that the participants mentioned they obtained that can assist them in teaching diverse learners within an inclusive classroom included using different forms of pedagogy. Some of the major components of different forms of pedagogy that the participants referred to include making use of learner-centred teaching and learning

(cf. 4.3.2.3.3.1), using different teaching strategies (cf. 4.3.2.3.3.2), using different material (cf. 4.3.2.3.3.3), offering content to diverse learners (cf. 4.3.2.3.3.4) and creating fair assessments that can be done by all learners in the classroom (cf. 4.3.2.3.3.5). The participants also affirmed that they have learned to create a warm and friendly atmosphere in the classroom (cf. 4.3.2.3.3.6) and develop nurturing skills (4.3.2.3.3.7) that can promote inclusive education in their classrooms.

- **Shortcomings**

The participants confirmed that there are still knowledge and skills that they need to obtain to enable them to teach in an inclusive classroom (cf. 4.3.2.4 & 4.4.4). The knowledge and skills that they identified, that they still need to acquire include: planning and conducting inclusive lessons (cf. 4.3.2.4.1), accommodating learning barriers (cf. 4.3.2.4.2), more effective teaching strategies to use in the inclusive classroom, (cf. 4.3.2.4.3) and identifying learners' weaknesses and strong points (cf. 4.3.2.4.4). In addition, they mentioned knowledge and skills relating to knowledge of the context and study material (cf. 4.3.2.4.5), flexible curriculum implementation (cf. 4.3.2.4.6) as well as learning more languages to accommodate language barriers in the inclusive classroom (cf. 4.3.2.4.7).

Moreover, the participants voiced their need for additional training with regard to inclusive education (cf. 4.3.2.4.8). They also recognised their role as lifelong learners (cf. 4.3.2.4.8.3) and indicated that they need to attend additional courses (cf. 4.3.2.4.8.1) and workshops (cf. 4.3.2.4.8.2) to assist them to effectively infuse inclusive education in their classrooms. The participants also referred to their need to develop skills in management (cf. 4.3.2.4.9), both time management skills (cf. 4.3.2.4.9.1) and classroom management skills (cf. 4.3.2.4.9.2), being patient (cf. 4.3.2.4.10) while teaching diverse learners, especially learners experiencing barriers to learning and they need to develop good communication skills (cf. 4.3.2.4.11).

Apart from the abovementioned knowledge and skills the participants mentioned they still need to obtain, they also emphasised that they need more practical experience in inclusive teaching (cf. 4.3.2.7.2). The participants affirmed that their training for inclusive education prepared them theoretically for inclusive teaching but they feel that they still

need more practical experience within inclusive classrooms (cf. 4.3.2.7.2.1). This aspect is described by the following responses some of the participants made: *“I believe that we have the book knowledge on how to tackle these issues, but enforcing it on a practical level might be a bit more difficult. The reason why I say this is because we haven't had to emotionally deal with situations like this...”* (OQP35) and *“...We don't really learn how to handle a variety of disabilities in one classroom...I think teachers need more experience in the field where they can learn how to handle situations where these students with barriers gets "difficult...”*(OQP32).

The participants also pointed out that although they gained some experience during their WIL practical and identified various barriers to learning in the classrooms (cf. 4.3.2.7.1.1; 4.3.2.7.1.2; 4.3.2.7.1.3; 4.3.2.7.1.4 & 4.3.2.7.1.5) many of them have never experienced or taught learners with physical disabilities before (cf. 4.3.2.7.2.2)

- **Vulnerabilities**

The participants emphasised that knowledge about legislation (cf. 4.3.2.10.1 & 4.4.10) can assist with the elimination of discrimination in the South African school system. However, the findings showed that the participants have knowledge about South Africa legislations like the Constitution of South Africa and the South Africa Schools Act (SASA) (cf. 4.3.2.10.1.1 & 4.4.10), but that they lack in-depth knowledge about policies that directly influence the practical implementation of inclusive education in the classroom such as EWP6 and the SIAS policy (cf. 4.3.2.10.1.2 & 4.4.10).

Furthermore, it seems evident from the findings that the participants recognise inadequate implementation of existing policies relating to inclusive education (cf. 4.4.10). This is mentioned in the responses by the mentioning the need for one policy (cf. 4.3.2.10.1.3), that apolicies are not practically applied (cf. 4.3.2.10.1.4) and the need to reinforce policies (cf. 4.3.2.10.1.5). The participants also responded that teachers do not have enough knowledge about inclusive education (cf. 4.3.2.10.1.6) and that schools are not inclusive due to a lack of this knowledge (cf. 4.3.2.10.1.7).

The findings also showed that the participants acknowledge that there are still many remaining barriers that reinforces inequality (cf. 4.3.2.11 & 4.4.11) in the South African school system and consequently hinder the implementation of inclusive education. These barriers identified by the participants include; unequal resource distribution (cf. 4.3.11.1), to many learners in the class (cf. 4.3.2.11.4), the top achieving learners sitting in front and the teacher focusing on them (cf. 4.3.2.11.3), the Science learners that are in high regard, (cf. 4.3.2.11.4) and the Gr 10 F known as delinquents (cf. 4.3.2.11.5). The participants also made mention of the curriculum that is not accommodative for everyone (cf. 4.3.2.11.6), the physical structures of the school that do not accommodate children with physical disabilities (cf. 4.3.2.11.7), the teachers themselves, especilay teacher close to retirement (cf. 4.3.2.11.8), not considering all (cf. 4.3.2.11.9) as well as the remaining belief that learners who experiences barriers to learning should be placed in separate institutions (cf. 4.3.2.11.10) apart from learners who do not experience barriers to learning.

5.4 Recommendations

Findings from this study support the following recommendations:

- The knowledge and skills pertaining to inclusive education in ITE programmes, especially in the field of NS, need to be deepened and extended in order to strengthen inclusive education in the Science classrooms.
- ITE programme developers need to critically review their NS B.Ed curriculum to ensure that pre-service teachers learn both theoretical and practical pedagogical practices appropriate for inclusive classrooms.
- The NS B.Ed Programme should embed inclusive ways of teaching in all subjects as part of the methodology and didactics modules. This could enhance the pre-service teachers' knowledge, skills, practices and understanding of inclusive education.
- A stronger focus should be placed on NS pre-service teachers' in-depth knowledge and understanding of existing policies such as EWP6 and the SIAS document.

- HEIs must acknowledge their contribution towards enabling or constraining the development of competence in inclusive teaching in pre-service teachers. By acknowledging their role in adequately training pre-service teachers for inclusive education it will require specific actions. These actions may include re-examining courses and WIL opportunities to expose pre-service teachers to different teaching contexts beyond regular ordinary schools.
- NS teacher educators should make sure that they become competent in inclusive education through taking part in continuous professional development opportunities so that they can model good inclusive practices to the pre-service teachers they train.
- Schools and mentor teachers need to make sure that they adhere to the principles of inclusive education and create an inclusive environment where pre-service teachers can observe and be exposed to the implementation of an inclusive pedagogy during their WIL practical experiences.
- Pre-service teachers should be given the opportunity to critically evaluate their perceptions about diversity and barriers to learning as well as how certain practices in the South African education system and schools can contribute to the continuation of exclusion.

5.5 Possible contribution

Exploring this topic may enable and guide future research with regard to developing interventions aimed at improving ITE programmes at HEIs in having inclusive education infused in the whole curriculum, including specialisation subjects like those linked to NS. This study could be beneficial for understanding exactly what is needed in NS teacher education programmes for successful implementation of inclusive education in the South African context. The intention of the overall project was to ensure that current and future pre-service teacher education programmes prepare pre-service teachers adequately for the practice of teaching in an inclusive classroom. The goal of this study was to provide research findings that could inform B.Ed Programme developers and teacher educators to determine what factors inhibit inclusive education in Natural Science and consequently make general recommendations that might be taken into consideration when improving module and courses.

5.6 Limitations of the study

The ethical approval process took longer than anticipated due to administrative delays and the new demands that the Covid19 pandemic placed on research. Originally, I would have made use of paper-based open-ended questionnaires and face to face focus group interviews, but because of the “lockdown” restrictions and the call for social distancing as well as the risk of transmission in a face to face environment, I had to revert to conducting online open-ended questionnaires and online focus group interviews.

The paper-based open-ended questionnaire and the informed consent form had to be transferred on a Google-form document that the participants could complete. The informed consent form that accompanied the focus group interview was also transferred to a Google-form document while the focus group interviews took place online via WhatsApp. This was a profound revision of the implementation of the data collection methods. There was also no opportunity to physically engage with the students, which could have added subtler data, such as facial and body language. Furthermore, problems with limited available data and connection problems interrupted many of the data collection interactions. Although, rich data was collected I believe that these challenges placed limitations on the depth of the research.

In addition, the fourth year Natural Science pre-service teachers have very full programmes as they are teaching and studying and in the current education environment had to adapt to remote online teaching and learning for their studies and their practice. Thus, due to a lack of time and limited online data many of the participants were not able to take part in this research study. This resulted in a small sample group. It also took approximately 6 months to gather the data for this research study.

5.7 Recommendations for further research

Based on the results of this study, the following topics are recommended for further study:

- The application and implementation by HEIs on the policy recommendations for inclusive education in their whole ITE programme.

- The readiness of teacher educators to adequately train pre-service teachers for inclusive education.
- The infusion of a practical WIL component that will specifically provide pre-service teachers with practical experience in terms of inclusive education.
- The construction of a model that can be used to assist with the infusion of inclusive education in subject specific methodologies and didactics.

5.8 Conclusion

The purpose of this research study was to explore the perceptions of fourth year NS pre-service teachers in a B.Ed. Programme regarding their training for inclusive education. In this chapter the primary research question and the secondary research questions that were outlined in Chapter 1 (cf. 1.5 & 1.6) were answered by integrating the findings of the literature review and the empirical data, which included a document analysis, an online open-ended questionnaire and online focus group interviews.

The findings of this research show that most fourth year Natural Science pre-service teachers seem to generally have a positive perception of inclusive education and their training for inclusive education. These pre-service teachers recognise and appreciate the theoretical knowledge that they receive in their NS B.Ed Programme regarding inclusive education and feel that this theory helped them and was sufficient in preparing them for inclusive education. With that being said the participants asserted that they still need more practical experience in the implementation of inclusive education in the classroom.

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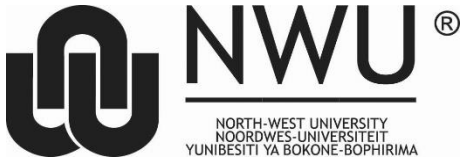
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ADDENDUM A1: INFORMED CONCENT FORM FOR OPEN-ENDED QUESTIONNAIRE



PO Box 1174, Vanderbijlpark
South Africa, 1900

Tel: +2716 910-3111

Web: <http://www.nwu.ac.za>

Faculty of Education

(OPTENTIA - www.optentia.co.za)

Tel: 0169103095

Email: Mirna.Nel@nwu.ac.za

Date: 5 October 2019

PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM: OPEN ENDED QUESTIONNAIRE

ETHICS APPROVAL NUMBER: NWU-01618-19-A2

TITLE OF THE RESEARCH PROJECT: Towards inclusive education: Exploring perceptions of natural science pre-service teachers in a B.Ed Programme

PRINCIPAL INVESTIGATORS: Ms Anne-Marie De Nysschen 23081597

CONTACT NUMBERS: 082 061 1993

EMAIL: 23081597@nwu.ac.za

* Required

Dear 4th year Natural Science Student

You are invited to take part in a research project conducted by Ms A De Nysschen to be submitted in fulfilment of the requirements for the degree MEd in Special Needs Education. Please take time to read the information presented here, which will explain the details of this project. Please ask the researchers regarding any part of the project you do not fully understand. It is very important that you are fully satisfied and that you clearly understand what this research is about and how you could be involved. Also, your participation is entirely voluntary and you are free to decline to participate. If you say no, it will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

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This study has been accepted and approved by the Optentia Research Committee and will be conducted according to the ethical guidelines and principles of the North-West University (NWU). It might be necessary for the supervisor, Prof M Nel (Optentia Researcher) to make sure that the researcher is conducting the research in an ethical manner

and therefore, she will have access to all the data gathered.

What is this research study all about?

The Departments of Basic Education (DBE) and Higher Education and Training (DHET) have requested several South African universities to focus on determining how inclusive education can be infused into the B.Ed Programme of Higher Education Institutions and to enable teacher educators to model and impart an inclusive pedagogy. The aim of this research is ensuring that current and future pre-service teacher education programmes prepare undergraduate students adequately for the practice of teaching in an inclusive classroom. This research will form part of a European Union funded project that aim to do research relating to Teacher Education for Inclusive Education.

The purpose of this study is to explore the perceptions of Natural Science pre-service teachers in a B.Ed Programme regarding their training for inclusive education.

This study will be conducted at a place and time convenient to you and will involve a questionnaire which will be administered to you for the purpose of the research.

Why have you been invited to participate?

You have been invited to participate because as a final year student registered for a course in one of our focus areas, Natural Science, you are ideally positioned to provide information about your perceptions of your training of inclusive education in a B.Ed Programme.

- The 4th year and Final year Natural Science pre-service teachers was selected to complete the open- questionnaire because they have already completed three years in the B.Ed Programme and have more practical experience in teaching Natural Science.
- The identified participants will most probably be able to provide a more informed opinion than all the other year groups.

What will your responsibilities be?

You will be expected to complete an online open-ended questionnaire (Link to the online questionnaire can be found at the bottom of this consent form). The questionnaire will consist of biographical questions relating to general biographical information and various open-ended questions relating to your training on inclusive education in a B.Ed programme. You will be given approximately 30 minutes to complete the questionnaire after which you can submit your responses.

Please take note that we need to make you aware that this research includes the completion of the online questionnaires as well as an online Google-meet focus group interviews. This consent form only pertains to the online questionnaire, but you could be requested to take part in the online interviews on a voluntary basis, for which a separate informed consent form will also be signed.

Will you benefit from taking part in the research?

Participation in the study holds no direct benefit for you. The indirect benefit of participating in the research will be the contribution you make towards enabling future research with regard to developing interventions aimed at improving teacher education programmes at tertiary institutions in having inclusive education infused in the whole programme. The knowledge obtained from this study will enable training institutions to adapt training opportunities towards the improvement of pre-service teachers' training for inclusive classroom.

Are there any risks involved?

There are no risks involved when taking part in this research. No negative consequences will reflect on you should you choose not to participate. Choosing to participate or not in this research study will have no effect on your number of credits or marks whatsoever. If you do choose to participate, we will respect your right to privacy, safety from harm and confidentiality.

Who will have access to the data?

Anonymity and confidentiality will be ensured by providing each participant with a number at the start of the questionnaire. This number will be used throughout the study. The researchers will not make reference to your identity and answers will not be linked to your identity. When referring to the data obtained from your questionnaire only the number allocated to you will be used. The researcher, the supervisor Prof M Nel and an independent researcher/ co-coder will be the only ones who have access to your personal information, answers and findings of the research. The data will be kept safe and secure by locking hard copies in a cupboard and electronic copies will be password protected.

What will happen to the data?

The questionnaire data will be analysed and reported in the research project. The data may be included in academic articles or presented at conferences. Just to reassure you, your name and personal details will not be used. After 5 years the data will be destroyed.

Will you be compensated to take part in this study and are there any costs involved?

You will not be compensated to partake in this study.

Is there anything else that you should know or do?

You can contact the researcher: Ms A De Nysschen by cell phone at 082 061 1993 or by email at 23081597@nwu.ac.za if you have any further queries or encounter any problems. Alternatively, the supervisor, Prof M Nel may also be contacted at 016 910 3095 or by email at Mirna.Nel@nwu.ac.za. The chairperson of the EduREC committee may also be contacted in case of any ethical concerns: Prof Jaco Olivier at 018 285 2078 or by email at Jako.Olivier@nwu.ac.za.

Affirmation by participant:

By signing below (choosing the yes option), you agree to take part in the research study entitled: Towards inclusive education: Exploring perceptions of Natural Science pre-service teachers in a B.Ed Programme.

I affirm that:

I have read and understood the information in the consent form which is written in a language which I comprehend and am comfortable using.

I was offered the opportunity to ask questions to the researcher and my questions have been answered adequately.

I understand that my participation in the study is voluntary and I have not been pressured to take part in any way.

I understand that what I contribute to the research will be used in the research report, but that my identity will not be disclosed.

I acknowledge the fact that I may choose to withdraw from the research at any stage and will not be penalized or discriminated against in any way.

1. I agree to take part in this research study *

Mark only one oval.

Yes

No

2. I would like a summary of the research findings:

Mark only one oval.

Yes

No

3. I would be willing to take part in the online focus group interview:

Mark only one oval.

- Yes
- No
- Maybe

4. The best way to reach me for taking part in the focus group interview or sending research findings: (Email and Phone Number)

Assertion by the researchers:

I, Me A De Nysschen assert that:

I explained the information provided in this document to the participant.

I encouraged him/her to ask questions and took the time to answer the questions adequately.

I am satisfied that he/she adequately comprehend all the aspects of the research as mentioned in the document.

I did not use an interpreter during the information session.

Signed at (place) Vanderbilpark on (date) 14/07/ 2020

A. De Nysschen

Signature of researcher

Link to Questionnaire

https://docs.google.com/forms/d/e/1FAIpQLScwSSo3O3jPgNucjGkXoEcJH5H5Tlz3jaG7cNBcLww4qaH1Ng/viewform?usp=pp_ur

ADDENDUM A2: OPEN-ENDED QUESTIONNAIRE

Thank you for your willingness to take part in this research: Towards inclusive education: Exploring perceptions of natural science pre-service teachers in a B.Ed Programme.

If you have any queries or concerns regarding this questionnaire, please contact:

- 1) Ms Anne-Marie De Nysschen (North-West University; Faculty of Education)
 - 082 061 1993
 - 23081597@nwu.ac.za
- 2) Prof M Nel (North-West University; Optentia Research Focus Area)
 - 016 910 3095
 - Mirna.Nel@nwu.ac.za

Please note, no names or identification information is requested.

1) Biographical detail

1.1) Please choose the type of school that best describes the school where you did Grade 12:

Former model C	Township school	Rural School	Independent School	Special/remedial school
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1.2) Please choose the phase that you are specializing in (mark as many as applicable)

Early Childhood education (ECD)	Foundation Phase	Intermediate Phase	Senior Phase	Further Education and Training Phase (FET)	Vocational Education and Training (VET)
--	---------------------	-----------------------	-----------------	--	---

1.3: Please give details of your major subject/s (if applicable)

2) Questions on the following pages ask you to respond to the following scenario:

Imagine that you have completed your B.Ed and have been successful in obtaining a teaching post in the grade/subject you have qualified in. In the week prior to taking your post, you have been advised that you would be responsible for teaching in an inclusive classroom that would include learners with diverse learning needs, including a few with identified disabilities. This diversity is represented by.

- Learners whose home language is different from the language of teaching and learning, including some recent immigrant learners (up to 80% of the class).
- Learners who, for reasons including concentration difficulties, deprived backgrounds and previous educational neglect, experience severe learning difficulties (5% of the class).
- Learners who are at risk of not meeting the grade level outcomes but who will make adequate progress with some additional help (about 15% of the class).
- One learner who has Spina Bifida and uses a wheelchair for mobility.

2.1) Please use the scenario given on the previous page to answer the following questions

What knowledge and skills have you obtained in your B.Ed that will enable you to teach in the class described in the scenario?

What knowledge and skills do you still need, that will enable you to teach in the class described in the scenario?

A) Name some resources that you think would be available *within* the school to assist you to teach in the class described in the scenario.

B) Please explain how you might make use of these resources to teach these learners effectively.

A) Name some resources that you think would be available *outside* the school to assist you to teach in the class described in the scenario.

B) Please also explain how you might make use of these resources to teach these learners effectively.

In what ways is the class depicted in the scenario *similar* or *different* from the classes you have taught during your teaching practical experience during your degree?

2.2) Referring back to the same scenario, explain how you would ensure the effective learning of all with one lesson on a grade appropriate topic in mind, using the table below:

Lesson topic:	Grade:
<p>How would you respond to the diversity of learner needs as you teach this topic (i.e. the teaching strategies used)? (Please provide as much detail here as possible, including use of resources and learning activities)</p>	
<p>Keeping the same scenario in mind, how would you assess that learning had taken place? provide examples of assessment activities that you would use.</p>	

Thank you for taking time to complete this questionnaire!

Kind Regards

Ms Anne-Marie De Nysschen (Faculty of Education)

ADDENDUM B1: ADDITIONAL INFORMATION LEAFLET FOR THE FOCUS GROUP INTERVIEWS

Focus group interview with Natural Science Pre-service teachers - Additional Information Required

Good day Students

I want to thank you for completing the open-ended questionnaire and providing me with valuable information.

In the informed consent form you completed, you indicated that you might be willing to take part in a focus group interview.

What will be expected of you?

You will be expected to take part in an online focus group interview via Google- Meet, Zoom or WhatsApp with two to three of your peers to answer questions relevant to the study. This interview would take about 30-45 min of your time and would be held on a date and time convenient to you and your peers. With your permission, the researcher would like to record the interview for accurate capture of your responses.

If you are willing to participate in the focus group interviews, please complete the following form.

* Required

1. I am willing to participate in the Focus Group Interview *

Mark only one oval.

Yes

No

2. If you answered yes in the previous question, please provide your contact details and email address for any further arrangements and communication regarding the Focus Group Interview.

3. I would prefer that the Focus Group Interview be conducted via ... *

Mark only one oval.

Google meet

Zoom

WhatsApp

4. I would need additional internet data to take part in the Focus Group Interviews via an online platform *

Mark only one oval.

Yes

No

5. I would like a copy of the questions that will be asked during the Focus Group Interview before hand *

Mark only one oval.

Yes

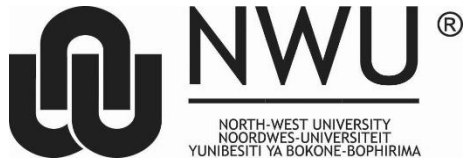
No

Thank you for your response!

Important information regarding the Focus Group Interviews will be communicated to you soon.

Kind Regards
Me A De Nysschen

ADDENDUM B2: INFORMED CONSENT FORM FOR THE FOCUS GROUP INTERVIEWS



PO Box 1174, Vanderbijlpark
South Africa, 1900

Tel: +2716 910-3111

Web: <http://www.nwu.ac.za>

Faculty of Education

(OPTENTIA - www.optentia.co.za)

Tel: 0169103095

Email: Mirna.Nel@nwu.ac.za

5 October 2019

PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM: FOCUS GROUP INTERVIEWS

ETHICS APPROVAL NUMBER: NWU-01618-19-A2

TITLE OF THE RESEARCH PROJECT: Towards inclusive education: exploring perceptions of natural science pre-service teachers in a B.Ed Programme

PRINCIPAL INVESTIGATORS: Ms Anne-Marie De Nysschen 23081597

CONTACT NUMBERS: 082 061 1993

EMAIL: 23081597@nwu.ac.za

* Required

Dear 4th year Natural Science B.Ed student

You are invited to take part in a research project conducted by Ms A De Nysschen to be submitted in fulfillment of the requirements for the degree MEd in Special Needs Education. Please take time to read the information presented here, which will explain the details of this project. Please ask the researchers regarding any part of the project you do not fully understand. It is very important that you are fully satisfied and that you clearly understand what this research is about and how you could be involved. Also, your participation is entirely voluntary and you are free to decline participation. If you say no, it will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

This study has been accepted and approved by the Optentia Research Committee and will be conducted according to the ethical guidelines and principles of the North-West University (NWU). It might be necessary for the supervisor, Prof M Nel (Optentia Researcher) to make sure that the researcher is conducting the research in an ethical manner and therefore, she will have access to all the data gathered.

What is this research study all about?

The Departments of Basic Education (DBE) and Higher Education and Training (DHET) have requested several South African universities to focus on determining how inclusive education can be infused into the B.Ed Programme of Higher Education Institutions and to enable teacher educators to model and impart an inclusive pedagogy. The aim of this research is ensuring that current and future pre-service teacher education programmes prepare undergraduate students adequately for the practice of teaching in an inclusive classroom. This research will form part of a European Union funded project that aim to do research relating to Teacher Education for Inclusive Education.

The purpose of this study is to explore the perceptions of Natural Science pre-service teachers in a B.Ed Programme regarding their training for inclusive education.

This study will be conducted on a date and time convenient to you and will involve an online questionnaire and online focus group interview which will be administered to you for the purpose of the research.

Why have you been invited to participate?

You have been invited to participate because as a final year student registered for a course in one of our focus areas, Natural Science, you are ideally positioned to provide information about your perceptions of your training of inclusive education in a B.Ed programme

- The 4th year Natural Science pre-service teachers was selected to complete the open-questionnaire because they have already completed three years in the B.Ed Programme and have more practical experience in teaching Natural Science.
- The identified participants will most probably be able to provide a more informed opinion than all the other year groups.

What will your responsibilities be?

After completing the online open ended questionnaire, you will be expected to take part in an online focus group interview via Google- meet, Zoom or WhatsApp with two to three of your peers to answer questions relevant to the study. This interview would take about 45 min of your time and would be held on a date and time convenient to you and your peers. With your permission, the researcher would like to audio record the interview for accurate capture of your responses.

Will you benefit from taking part in the research?

Participation in the study holds no direct benefit for you. The indirect benefit of participating in the research will be the contribution you make towards enabling future research with regard to developing interventions aimed at improving teacher education programmes at tertiary institutions in having inclusive education infused in the whole programme. The knowledge obtained from this study will enable training institutions to adapt training opportunities towards the improvement of pre-service teachers' training for inclusive classroom.

Are there any risks involved?

There are no risks involved when taking part in this research. No negative consequences will reflect on you should you choose not to participate. Choosing to participate or not in this research study will have no effect on your number of credits or marks whatsoever. If you do choose to participate, we will respect your right to privacy, safety from harm and confidentiality as far as possible. It is important that you note we are unable to guarantee total confidentiality and anonymity in a focus group interview. Members included in your focus group will be asked to sign a confidentiality agreement in which all participants undertake neither to share the names of fellow focus group members, nor share information from the focus group with any other person.

Who will have access to the data?

Anonymity and confidentiality will be ensured by providing each participant with a pseudonym. This pseudonym will be used throughout the study. The researchers will not make reference to your identity and answers will not be linked to your identity. When referring to the data obtained from your focus group interview only the pseudonym allocated to you will be used. We will also ensure that all transcripts of the focus group interviews are used anonymously, with pseudonyms being given to all participants. Confidentiality will be maintained in the recorded interviews and any detail that might identify you as a participant or your institution

will be omitted in any published and written data. All participants will also be requested to disable their video function during the interview.

The researcher, the supervisor Prof M Nel and an independent researcher/co-coder will be the only ones who have access to your personal information, answers and findings of the research. The data will be kept safe and secure by locking hard copies in a cupboard and electronic copies will be password protected.

What will happen to the data?

The interview data will be audiotaped and transcribed verbatim then analysed and reported in the research project. The data may be included in academic articles or presented at conferences. Just to reassure you, your name and personal details will not be used. After 5 years the data will be destroyed.

Will you be compensated to take part in this study and are there any costs involved?

You will not be compensated to partake in this study.

Is there anything else that you should know or do?

You can contact the researcher: Ms A De Nysschen by cell phone at 082 061 1993 or by email at 23081597@nwu.ac.za if you have any further queries or encounter any problems. Alternatively, the supervisor, Prof M Nel may also be contacted at 016 910 3095 or by email at Mirna.Nel@nwu.ac.za. The chairperson of the EduREC committee may also be contacted in case of any ethical concerns: Prof Jaco Olivier at 018 285 2078 or by email at Jako.Olivier@nwu.ac.za.

Affirmation by participant:

Affirmation by participant:

By choosing YES below, I agree to take part in the research study entitled: Towards inclusive education: Exploring perceptions of Natural Science pre-service teachers in a B.Ed Programme.

1. I indicate my willingness to participate in the research project by being interviewed for this study in an hour long focus group interview at a time and place convenient to me: *

Mark only one oval.

Yes

No

Permission to be audiotaped

2. I agree to be audiotaped during the interview *

Mark only one oval.

Yes

No

3. I know that the audiotapes will be used for this project only *

Mark only one oval.

Yes

No

I affirm that:

4. I understand that my participation is voluntary and that there are no negative consequences or institutional sanctions for choosing not to participate in this research: *

Mark only one oval.

Yes

No

5. I know that the researchers will keep my information confidential and safe and that my name and the name of my organisation or institution will not be revealed.*

Mark only one oval.

Yes

No

6. I know that I do not have to answer every question and can withdraw from the study at any time without negative consequences. *

Mark only one oval.

Yes

No

7. I know that I can ask not to be audiotaped *

Mark only one oval.

Yes

No

8. I know that all the data collected during this study will be kept in a secure place will be destroyed within 3-5 years after completion of the project *

Mark only one oval.

Yes

No

9. I know that the results of the research will be used for academic purposes (journals and conference proceedings). *

Mark only one oval.

Yes

No

Maybe

Confidentiality agreement – focus group participants

Maintaining the confidentiality of the identity and contribution of each member of the focus group is vital to us. As we, as researchers, have undertaken not to reveal anything that could identify you in any report on the findings of this research, we would ask that you sign the following confidentiality agreement in which you undertake not to share the names of fellow focus group members, or share information from the focus group with any other person.

10. Please complete the form below before the commencement of the focus group interview. I hereby agree that: *

Check all that apply.

I will not share the names of the other participants in the focus groups with any other person.

I will not share any information given in the focus group by other participants with any other person.

11. I would like a summary of the research findings:

Mark only one oval.

Yes

No

12. The best way to reach me: (Email and Phone Number)

Assertion by the researchers

I assert that:

- I explained the information provided in this document to the participant.
- I encouraged him/her to ask questions and took the time to answer the questions adequately.
- I am satisfied that he/she adequately comprehend all the aspects of the research as mentioned in the document.
- I did not use an interpreter during the information session.

Signed at (place) Vanderbilpark on (date) 14/07/ 2020

A. De Nysschen

Signature of researcher

Link to Focus Group Interview/ Schedule

https://docs.google.com/forms/d/e/1FAIpQLSfrKPeyQ_afgQLQ-uFeoXgCsZ5yYr87-kvKZuxbwxqK5XblwA/viewform?usp=pp_url

ADDENDUM C: ETHICAL APPROVAL FROM EDU-REC



6 March 2020

To Whom It May Concern

I hereby confirm that the ethics application, as stated below, was approved at the Ethics Committee meeting of the Faculty of Education on 27 February 2020.

Ethics number: NWU-01618-19-A2

Project head: Prof M Nel

Project team: A-M de Nysschen (MEd student – 23081597)

Title: Towards inclusive education: Exploring perceptions of Natural Sciences pre-service teachers in a B. Ed Programme

Period: 27 February 2020 – 27 February 2021

Clearance given for only one year. Extension can be requested after a year.

Risk level: Low

Should you have further enquiries in this regard, you are welcome to contact Prof Jako Olivier at 018 285 2078 or by email at Jako.Olivier@nwu.ac.za or Ms Erna Greyling at 018 299 4656 or by email at Erna.Greyling@nwu.ac.za .

Yours sincerely



Prof J Olivier
Chair Edu-REC

ADDENDUM D: APPROVAL FROM THE RDGC GATEKEEPING COMMITTEE



Private Bag X6001, Potchefstroom
South Africa 2520

Tel: +2718 299-1111/2222

Web: <http://www.nwu.ac.za>

Research Data Gatekeeper Committee

NWU RDGC PERMISSION GRANTED / DENIED LETTER

Based on the documentation provided by the researcher specified below, on 24/08/2020 the NWU Research Data Gatekeeper Committee (NWU-RDGC) hereby grants permission for the specific project (as indicated below) to be conducted at the North-West University (NWU):

<p><u>Project title:</u> Towards inclusive education: Exploring perceptions of Natural Sciences pre-service teachers in a B. Ed Programme.</p> <p><u>Project leader:</u> Prof M Nel <u>Researcher/Project Team:</u> A-M de Nysschen</p> <p><u>Ethics reference no:</u> NWU-01618-19-S2 <u>NWU RDGC reference no:</u> NWU-GK-2020-023</p> <p><u>Specific Conditions:</u></p> <ul style="list-style-type: none">• Due the COVID-19 pandemics the Committee would like to advise the researcher to practice the necessary caution and adhere to the National Covid-19 Guidelines when conducting research with participants. <p><u>Approval date:</u> 24/08/2020 <u>Expiry date:</u> 23/08/2021</p>

General Conditions of Approval:

- The NWU-RDGC will not take the responsibility to recruit research participants or to gather data on behalf of the researcher. This committee can therefore not guarantee the participation of our relevant stakeholders.
- Any changes to the research protocol within the permission period (for a maximum of 1 year) must be communicated to the NWU-RDGC. Failure to do so will lead to withdrawal of the permission.
- The NWU-RDGC should be provided with a report or document in which the results of said project are disseminated.

Please note that under no circumstances will any personal information of possible research subjects be provided to the researcher by the NWU RDGC. The NWU complies with the Promotion of Access to Information Act 2 of 2000 (PAIA) as well as the Protection of Personal Information Act 4 of 2013 (POPI). For an application to access such information please contact Ms Annamarie De Kock (018 285 2771) for the relevant enquiry form or more information on how the NWU complies with PAIA and POPI.

The NWU RDGC would like to remain at your service as scientist and researcher, and wishes you well with your project. Please do not hesitate to contact the NWU RDGC for any further enquiries or requests for assistance

Yours sincerely

Prof Marlene Verhoef
Chairperson NWU Research Data Gatekeeper Committee

Original details: (22351930) C:\Users\22351930\Desktop\test 2.docm
13 November 2018

ADDENDUM E: ADVERTISEMENT

Invitation to take part in research

You are invited to take part in a research project conducted by Ms. A De Nysschen to be submitted in fulfilment of the requirements for the degree MEd in Special Needs Education. This study has been accepted and approved by the Optentia Research Committee and will be conducted according to the ethical guidelines and principles of the North-West University.

Background of the Research

The Departments of Basic Education (DBE) and Higher Education and Training (DHET) have requested several South African universities to focus on determining how inclusive education can be infused into the B. Ed. Programme of Higher Education Institutions and to enable teacher educators to model and impart an inclusive pedagogy. The aim of this research is ensuring that current and future pre-service teacher education programmes prepare undergraduate students adequately for the practice of teaching in an inclusive classroom. This research will form part of a European Union funded project that aim to do research relating to Teacher Education for Inclusive Education.

The purpose of this study is to explore the perceptions of Natural Science pre-service teachers in a B.Ed. Programme regarding their training for inclusive education.

Why have you been invited to participate?

You have been invited to participate because as a final year student registered for a course in one of our focus areas, Natural Science, you are ideally positioned to provide information about your perceptions of your training of inclusive education in a B.Ed. programme.

- The 4th year Natural Science pre-service teachers was selected to complete the open-questionnaire because they have already completed three years in the B.Ed. Programme and have more practical experience in teaching Natural Science.
- The identified participants will most probably be able to provide a more informed opinion than all the other year groups.

What will your responsibilities be?

You will be expected to complete an open-ended questionnaire. The questionnaire will consist of biographical questions relating to general biographical information and various open-ended questions relating to your training on inclusive education in a B.Ed. programme. You will be given approximately 30-40 minutes to complete the questionnaire after which the researchers will collect the questionnaire for analysis

You may also be approached to take part in a focus group interview with three to four of your peers to answer questions relevant to the study. This interview would take about 45 min of your time and would be held at a place and time convenient to you and your peers. With your permission, the researcher would like to audio record the interview for accurate capture of your responses.

Contact Details:

For any further information and enquiries, you are welcome to contact Ms. A De Nysschen by cell phone at 082 061 1993 or by email at 23081597@nwu.ac.za. Alternatively, the supervisor, Prof. M Nel may also be contacted at 016 910 3095 or by email at Mirna.Nel@nwu.ac.za.

ADDENDUM F: EXAMPLE OF DATA ANALYSIS

Category	Theme	Sub-theme	Participant	Participants quote
Knowledge and skills obtained to teach in an inclusive classroom	Theory learned	Theory helped	FGP5	<p>“Theory has helped me to learn how to be able to have an inclusive classroom and how to be able to use the resources that I have in the classroom to include each and every learner and most of the different learning styles so that all of them can learn. So the theory has helped with, has helped me with creating a more inclusive classroom and know how to deliver content to their learners and know how to check if the learners understand the content delivered and also check the learners progress and be able to identify where the learners need help with their schoolwork....</p>
			FGP3	<p>“Ek sou sê die teorie wat ons leer het, het definitief gehelp. Ek onthou in ons tweede jaar het ons 'n klas gehad wat ons geleer het hoe om umm, 'n</p>

				<p>“multigrade classroom” vir jou te hanteer en hoe om 'n les plan op te stel vir 'n “multigrade classroom”, en dan het ons ook die sielkundige, of die sielkundige vakke gehad...”</p>
			OQP35	<p>“...We have had a few...modules that helped us in this regard pertaining to helping learners from an inclusive education background...”</p>

