Coventry University

DOCTOR OF PHILOSOPHY

The wholistic experiences of knowing as Black South African women at university the untold stories from the margins in STEM

Solomons, Zaira

Award date:
2024

Awarding institution:
Coventry University

Link to publication

The wholistic experiences of knowing as Black South African women at university: the untold stories from the margins in STEM

By

Zaira Solomons

PhD

September 2023

The wholistic experiences of knowing as Black South African women at university: the untold stories from the margins in STEM

A thesis submitted in partial fulfilment of the University's requirements for the Degree of Doctor of Philosophy

September 2023

Coventry University

Coventry
University

Certificate of Ethical Approval

Applicant: Zaira Solomons

Project Title: The wholistic experiences of knowing as Black South African
                                    women at university: the untold stories from the margins in
                                    STEM.

This is to certify that the above named applicant has completed the Coventry University Ethical
Approval process and their project has been confirmed and approved as High Risk

Date of approval: 25 Feb 2021

Project Reference Number: P107416

Abstract

This thesis sets out to provide a wholistic understanding of Black South African women's access into and participation through STEM (Science, Technology, Engineering and Maths) higher education and beyond. My argument employs critical theory, in particular, Fraser's (1997, 2007, 2008) participatory framework, as well as elements of decolonial and decolonial feminist insights as analytical lenses, accompanied by both Western and African storytelling. Data were collected from a sample of 21 Black South African women who were at any stage of the STEM journey (undergraduate, postgraduate, employment), through an iterative data collection process, taking place over a 10-month period.

The findings of this thesis suggests that Black female STEM access into, through, and beyond higher education, remain nuanced against the backdrop of a highly stratified South African society, whilst juxtaposing how minority female bodies are situated on the social hierarchy. Moreover, the findings suggest that as much as race, class and gender are complexly intertwined with Black South African women's exclusionary encounters of pursuing STEM, the case for township and rural women presented additional challenges, since coloniality, but also geo-spatiality, in the latter case, remained further articulated in their experiences. In addition, this thesis further demonstrates how critical theory, as well as decolonial and decolonial feminist thought, accompanied by both an African and Western storytelling paradigm, can be employed in tandem in seeking out novel ways to untangle the salient nuances, complexities and tensions in the wholistic South African female STEM journey. Such utilisation involves not only interrogating how inequality manifest in the daily realities of marginalised women in their quest for a role in the STEM field, but further seeks to ascertain how historical injustices remain embedded in such experiences in further intensifying their marginalisation and oppression. Furthermore, the study fills a very important gap in the literature, in that it provides insight into various aspects of Black women's endeavours in pursuing STEM, taking into consideration how the colonial imbrication of gender at home and at school shape the South African girl child's encounters in preparing for tertiary studies, how they traverse the neo-liberal and Western higher education terrain as outliers, including how further studies

and STEM masculine workplaces have become highly contested spaces, in the midst of a growing increase of minority bodies occupying it's confines.

Acknowledgements

List of Abbreviations

Adult Basic Education and Training (ABET)

Black Economic Empowerment (BEE)

Bachelor of Science (B.Sc)

Department of Basic Education (DBE)

Department of Higher Education (DHE)

Focus Group Discussions (FGD's)

Higher Education (HE)

Language of Instruction (LOI)

Language of Learning and Teaching (LOLT)

National School Nutrition Programme (NSNP)

National Student Financial Aid Scheme (NSFAS)

Non-government Organisation (NGO)

Postgraduate Certificate in Education (P.G.C.E)

School Management Team (SMT)

Socio-economic Status (SES)

Science Technology Engineering Maths and Science (STEM)

Society for Women in Engineering (SWiET)

Table of Contents

Conference Presentations and Forthcoming Publications

Poster Presentation at Doctoral Capability and Development Conference (Coventry University) – 2019 'A Synthesis of the South African educational landscape and a critical analysis of student attainment'.

Paper Presented to the Decoloniality, Gender Equity and Diversity International Conference (University of Johannesburg – South Africa) – 1-2 December 2022 'Drawing on Insights from Decolonial Thought and Critical Theory in Framing the Black Female Experience in, Through and Out of STEM Higher Education, and Beyond'.

Co-wrote a successful grant application - Doctoral Capability Programme between South Africa (Stellenbosch and Walter Sisulu Universities) and the UK (Coventry University)

Conference Organiser of Decoloniality, Gender Equity and Diversity International Conference: 1-2 December 2022 (University of Johannesburg: South Africa)

Solomons, Z. (2023) Forthcoming: Drawing on Insights from Decolonial Thought and Critical Theory in Framing the Black Female Experience in STEM (Chapter in Special Edition)

Solomons, Z. 2023 'How Western and African Storytelling can be used to decolonise research methods'

Solomons, Z. and Clisby S. (2023) Forthcoming: 'Using Embodied Infrastructures to Navigate the South African higher Education terrain as outliers in STEM'

Chapter One: An Orientation to the Study

1.1 Introduction

In this introductory chapter, I provide an overview of the thesis. First, I explain my motivations for undertaking this study. In this, I provide relevant information about my position as a woman of colour emanating from the South African context, as well as my role in working with disadvantaged youth. I show how both these positions have shaped my decision to conduct a study of this nature. Second, I demonstrate how this thesis adds to the existing body of knowledge in terms of the contribution it makes, as well as point out its unique features. I argue that the findings of this study could support efforts to enhance gender equity and transformation in STEM (Science, Technology, Engineering and Mathematics) within schools, universities, as well as the world of work in the South African context. Third, I provide information on the research purpose, analytical paradigm, as well as the research design that I use in this study. I show how this study is significant and how it can be beneficial for the South African government, schools, universities, as well as other stake holders, such as STEM workplaces. Fourth, I address the Research Questions and Study Aims. Lastly, I provide an overview of the structure of the thesis, as well as provide succinct detail on each chapter.

1.2 Motivation for the Research

This research is driven by the fact that I am a woman of colour from the Global South[1] and have experience of working in a disenfranchised South African school for 7 years, with a focus on supporting the career needs of young Black[2] women in particular. 'Black' in the South African context, refers to African, Indian and Coloured, in relation to how society was historically racially and hierarchically structured, as engineered by the apartheid regime.

---

[1] This expression remains highly contested politically and it is even problematic, alongside terms such as 'Majority World', both of which I use interchangeably in Chapter 2 of this thesis. However, I employ both Global South and 'Majority World' to denote how broader global social, political and structural processes have resulted in unequal confines for non-dominate bodies and remain deeply vexed with ongoing legacies of colonisation (see Ndlovu-Gatsheni 2015).

[2] By 'Black', I rely on decolonial feminist interpretation to refer to those bodies who have been historically disadvantaged, due to race, class, disability, sexual orientation, gender, including geo-spatiality, as well as how the intersection of such non-dominant identities have operated and continue to do so in tandem to entrench and sustain their silencing and exclusion, especially for those at the lower echelons of the hierarchy, such as non-dominant female bodies who continue to be dehumanised (see Hill-Collins and Bilge 2020).

Distinct social divisions remain visible, particularly along intersections of class, race, gender and age.

1.2.1 My situatedness as a woman of colour from the global South

I identify as a Black South African woman who grew up in South Africa and currently resides in the United Kingdom. I identify as an African woman with a mixed-race heritage, given the geographic African context which shaped my experiences and existence. I grew up during the latter part of Apartheid in a family that is conservatively religious. I realised during my readings on issues pertaining to social justice and equity, that apartheid denied me, as well as many others, the right to fully participate as equals in society, as a result of both racial identity (misrecognition), and because of resources not being fairly distributed amongst white and non-white schools (maldistribution) (Fraser 1997a, 1997b, 2008).

Apartheid was a social and political structure that entrenched racism and inequality, ensuring the racial hierarchical binary, whereby a certain racial group (White-European) dominated every facet of life – socioeconomic and political - by subjugating non-whites to inferior positions in society. A defining characteristic of Apartheid was the classification of the various racial demographics into categories, i.e., White, Black, Coloured (mixed-race) and Indian. This aspect of segregation is key to my existence as it helped me to define my hybridity, my intersecting identities and where I stand in the contemporary social matrix, given my background (Haraway 1988). As a consequence, I constantly found myself occupying in-between spaces (dominant, as well as non-dominant), which ensured that I remained an outlier in society (Anzaldua 1987, Ortega 2020, Clisby 2020), which according to Lugones (2003) necessitates world-travelling.[3]

Hence, the regime I grew up under not only entrenched stratification on a macro-level, but also ensured that individual identities were masked and silenced on a micro-level. Hence, as much as Apartheid was central to diminishing human dignity, the role of patriarchy within the system was needed to further its objectives, with education and religion as instruments in justifying the intellectual nature and the ideology of racial segregation and white male domination. This often negated the experiences of everyone not falling into the male/female, White/Black and rich/poor binary. Also, since remnants of Apartheid have filtered through to

---

[3] I discuss the concept of world-travelling in more detail in chapter 2 and show how it is applied in chapter 8.

the current set up in post-Apartheid South Africa, which still bears intricate features of segregation, particularly on the axis of race, class and gender exclusion, it is imperative to understand how such identities intermesh with other more hidden ones, which have implications for transformation. Moreover, due to my own situatedness, I feel more inclined to give a voice to those identities situated differently on the periphery, in a move to make the core more inclusive and transformative.

1.2.2 My situatedness in working with underprivileged youth

After tertiary studies, I worked for seven years in a semi-rural school in South Africa, attending to the needs of disenfranchised learners from nearby farms. As a result, I have witnessed the issue of schooling inequality and oppression. Moreover, I also realised that many learners were denied the opportunity to start off on an equal footing, compared to their more affluent peers, due to the underlying structural complexities associated with inequality and poverty, and how the historical legacy of oppression remained embedded in their everyday realities. This experience led me to devise more encompassing ways to analyse matters of inequity and transformation, especially in relation to gender and STEM, given my direct experience in dealing with problematics associated with disadvantage. Furthermore, in making visible the plight of marginalised women in STEM, it is possible to also open up opportunities for awareness, as well as develop ideas and strategies in order to mitigate ongoing oppression and suffering.

Also, having been exposed to working with disadvantaged school pupils placed me in a favourable position to speak from a rich, diverse and meaningful context, which I carried with me into this research. Moreover, my years spending time with disadvantaged learners in South Africa allowed me to gain useful insights into the complex and rather challenging lives surrounding the African child in education, especially the less privileged African girl child. I also had the opportunity to listen to their stories of inclusion-exclusion, including oppression which made me realise that many stories still need to be heard and told. These experiences and the children's stories led me to imagine a life quite different to how society is currently structured and organised. I discuss more on my positionality in the methodology (chapter 4) later on. Hence, based on the above, I would like to accomplish the following through my work:

- To use my work as a mechanism to transform and promote a decolonial educational framework, particularly regarding African women in STEM.

- To encourage subaltern women to have a place and a voice in Western patriarchal spaces, particularly in male-dominated study and work spheres.

- To raise awareness on issues of gender, race, class, coloniality, education and social (in)justices.

1.3 Contribution to Knowledge and Uniqueness of the Study

This thesis adds to the existing body of knowledge in various ways. Firstly, it theoretically contributes to knowledge by bringing two distinct concepts together in analysing the experiences of Black women in STEM from a transformative standpoint. Fraser's (1997a, 1997b, 2008) Participatory Parity Framework, which I employ in this thesis, makes visible how social arrangements either impede or enable equitable participation along the Black female STEM journey. Moreover, decolonial (Quijano 2000, Mignolo 2011a, Santos 2018), as well as decolonial feminist thought (Lugones 2007, 2010, Ortega 2020) that I further rely on, expose historical legacies of oppression, which has implications for ongoing equity and transformation. Hence, it contributes theoretically in seeking out transformative angles in addressing the experiences of Black female STEM scholars, in relation to the complexities associated with race, class, age, gender, and geospatial dynamics. Moreover, since the experiences of Black women have not previously been analysed using critical theory, namely Fraser's (1997a, 1997b, 2008) Participatory Parity Framework as well as Decolonial Thought (Quijano 2000, Lugones 2007, 2010, Santos 2018), my analysis makes a unique contribution in this regard, especially in relation to coloniality's influences, including wider structural barriers implicating the wholistic STEM experience.

The study further makes a methodological contribution from a storytelling perspective. I incorporate both Western, as well as African stories in conveying the experiences of minority women in STEM. In doing so, I show how a plurality of methodological perspectives are important in transforming Western research in making it more equitable in studying the experiences of all 'Others'. In addition to this, this study has also taken on a participatory stance, in which I as researcher also weave intricate details of my own situatedness into the analysis and findings. Furthermore, it documents a wholistic understanding of Black women's

journeys and experiences in STEM, by exploring their pre-university contexts, their access into and participation through university, including their transitions out of higher education (HE), and into further study and the world of work. No other study to my knowledge has documented the experiences of Black women in STEM in this manner, neither in the South African context, nor more widely.

Given that the literature pertaining to STEM and gender in South Africa remains scant (Liccardo 2015, Liccardo and Bradbury 2017, Idahosa and Mkhize 2021, Mkhize 2022), this research contributes to the existing body of knowledge in the extant literature, by providing insights into schooling challenges, as well as cultural patriarchy in the home, from the perspective of Black women from different social class backgrounds, but more so by providing insights on the rural female experience. Moreover, it provides a unique understanding in how Black women are positioned against the dominant hegemonic structure and ideals espoused by the institution and how this has implications for their access and participation in STEM HE. In particular, it further sheds light on being misrecognised and situated in a Eurocentric HE system, as well as in male-dominated STEM departments, whereby Black women use the notion of embodied infrastructures (Clisby and Holdsworth 2014) to support others, as well as to receive the same in return. Also, the study further provides insight into Black women's experiences of transitioning out of HE and the challenges and opportunities that are available to them, including how masculine workplaces become enclaves of resistance and tension, including the strategies minority females employ to navigate such contested spaces.

Lastly, this study has policy implications, in that it can be used as a means to provoke change in making schooling conditions more conducive for the scientific development of aspiring female scientists, especially those from impoverished contexts. Also, I argue that by ensuring that resources for different STEM disciplines are more equitably distributed, Black women and minorities would have more choice in terms of study options and career prospects, which would enable widening scientific participation, but also in the interest of the South African government's spending priorities, in ensuring equity and transformation in all STEM fields. Furthermore, research of this nature is useful to companies and organisations, in which workspaces are predominantly male and masculine, in adopting strategies that serves to enhance Black women's participation, as well as acknowledge their contribution.

1.4 Research Purpose, Analytical Paradigm, Research Design

I have a deep interest in this topic, due to my own situatedness as a woman of Colour from the global South, and also because of my lived experiences in working with disadvantaged youth, especially Black women in the South African educational context. In particular, I have advised and counselled many Black disenfranchised students on the complexities associated with transitioning into South African HE, as well as issues of institutional and funding criteria that should be met, in order to successfully access university. Therefore, it remains imperative to gain a wholistic understanding of Black women's access into and through STEM HE, as well as beyond, such as postgraduate studies and work.

The purpose of this research is to probe and understand the experiences of Black women on their respective STEM journeys, and how due to being situated differently, their participation is either enabled or hindered in accessing dominant white and masculine spaces. This study employs both critical theory, as well as decolonial and decolonial feminist thought in making sense of Black South African women's experiences in relation to STEM. Moreover, it is centred on a storytelling approach. My decision to opt for both the conceptual framing, as well as a storytelling approach will be further discussed in chapter 2 (Conceptual Framing) and chapter 4 (Methodology) respectively.

A sample of 21 Black South African women who were engaged at different stages of their STEM journey (undergraduate, postgraduate and employment) took part in the study, during three iterations, over a 10-month data collection period. The first iteration involved open-ended online interviews, with an emphasis on Black women's upbringing, as well as the factors implicated in preparing for STEM HE. The second iteration consisted of semi-structured interviews focused on understanding Black women's access and participation into STEM HE. The third iteration was a combination of a focus group discussion (Mbizi), as well as a creative workshop.

1.5 Significance of the Study

The underrepresentation of Black women in STEM is still a concern despite support measures being put in place to narrow inequalities experienced through the identity intersections of gender, race, and class in South Africa (Liccardo 2015, 2018a, 2018b, Idahosa and Mkhize 2021, Mkhize 2022, Mlambo 2022). The STEM landscape also presents challenges in

accommodating those who do not fit a certain hegemonic mould, in terms of being white, male, heterosexual and able-bodied, further retarding transformational efforts (Liccardo 2018a, 2018b). It is important to understand how schooling inequalities and living arrangements affect Black women from all different positions, which will ensure a level playing field is created, by widening STEM participation, especially for low socio-economic and rural women. This in turn shapes how Black women access HE from different vantage points, due to a misalignment between their own values and that espoused by the institution (Liccardo 2018a, Miles, Brockman, and Naphan-Kingery 2020). Since low socio-economic and rural women lack knowledge and parental guidance in accessing South African HE, as opposed to their middle-class counterparts, this has both financial, as well as epistemological implications when accessing and participating at university, but also in terms of further studies and employment. Given that the issue of Black women in STEM in the South African context is an underexplored area of research (Liccardo 2015, Idahosa and Mkhize 2021, Mkhize 2022), this study seeks to do two things, namely document Black female STEM experiences, as well as make visible how access and participation is implicated in relation to situatedness.

1.6 Research Questions and Study Aims

1.6.1 The research questions

The research questions posed are:

1. What are the differential experiences of Black South African women growing up prior to transitioning into STEM higher education?

2. How do Black South African women in STEM navigate the higher education terrain through access and participation?

3. What are the obstacles and opportunities in transitioning out of STEM higher education and how do Black women perceive themselves?

1.6.2 The study aims

The study aims are as follows:

1. To examine how different social classes of Black South African women prepare for STEM higher education, as well as how cultural patriarchy and schooling inequality either hinder or enable participation.

2. To compare how Black South African women access STEM higher education from different class positionings in society, as well as to explore how their participation is implicated through resources, language, as well as through the support of other Black women.

3. To explore how Black women transition out of STEM higher education, and how their participation is either enabled or restrained in further studies and employment, as well as to examine how they views themselves as Black women in STEM.

1.7 The Thesis Structure

Chapter one provides an orientation and road map to the study. In this, I provide the motivation for the research, the contribution to knowledge and uniqueness of the study, as well as the research purpose, analytical paradigm, as well as research design. In addition, I provide a summary of the significance of the study. Moreover, I outline the Research Questions and corresponding Aims, as well as present an outline of the thesis structure.

Chapter two discusses/illustrates the conceptual framing for the study. In particular, I merge two theoretical paradigms and positions, namely critical theory, as well as decolonial and decolonial feminist thought. Specifically, I employ Fraser's (1997b, 2007b, 2008) participatory parity framework with decolonial, including decolonial feminist thought in providing a more encompassing framework to the issue and challenges of equity and transformation.

Chapter three investigates various strands of the literature, specifically pertaining to patriarchy and schooling inequality, matters of access and participation into, through and out of HE, as well as workplace challenges in relation to STEM from a transformative perspective.

Chapter four deals with the methodological framework, namely narrative research, African storytelling, as well as participatory methods. Moreover, it includes the research paradigm,

the method employed, the analysis, a table pertaining to the demographics of my co-researchers, as well as ethical considerations.

Chapter five provides nuanced information about my co-researchers, such as schooling and family background, parental influences, as well as important encounters along their STEM journeys.

Chapter six is the first data chapter. It looks at the data analysis and findings pertaining to Black women's participation prior to accessing STEM HE. In particular, it shows how both cultural patriarchy, as well as schooling inequality shape the experiences of Black women situated differently whilst growing up in pursuing STEM studies.

Chapter seven is the second data chapter. It deals with the data analysis and findings concerning Black women's access into and participation through STEM HE and the implications this have on class background.

Chapter eight is the third data chapter. It deals with the data analysis and findings associated with Black women's transitions out of STEM HE, and the complexities concerning resources, funding, and geo-spatial location. Moreover, it looks at male dominated STEM workspaces and the implications these have for Black women's participation.

Chapter nine is the concluding chapter. This deals with a summary of the key aims of the research and concluding thoughts on my findings. It provides a synthesis of the key findings and answers the Research Questions. It also looks at the limitations and challenges of the research and provide recommendations for policy, both in terms of schooling and HE. Moreover, it identifies areas for future research.

1.8 Conclusion

This introduction has provided an orientation to the thesis. In this, I provided my personal motivation for conducting a study of this nature. I have outlined the research purpose, analytical paradigm, as well as the research design that is employed, and my own positionality. Furthermore, I outlined the thesis structure, as well as briefly described each chapter.

The next chapter looks at the conceptual framing, namely Participatory Parity and decolonial/decolonial feminist thought that I use to frame my arguments.

Chapter Two: Conceptual Framing
Drawing on Insights from Decolonial Thought and Critical Theory in Framing the Black Female Experience In, Through and Out of STEM Higher Education, and Beyond

2.1 Introduction

In this chapter, I bring together key theories and concepts pertaining to social justice and inequality in South African HE in critically analysing issues of access and participation of marginalised women students within the Science, Technology, Engineering and Mathematics (STEM) related fields. Therefore, this chapter finds itself situated at a juncture between critical theory and a decolonial paradigm in drawing on both strands of thought, specifically Nancy Fraser's (Fraser 1997a, 1997b, 1998, 2007a, 2008, 2010) Participatory Parity Framework and aspects of the coloniality of power, knowledge and gender. In this, I particularly seek to unpack issues surrounding Black women's entry into contested male dominated white spaces, such as university STEM courses in developing contexts. I argue that the lived experiences of Black women from the Majority World or Global South are particularly paramount for this study in general, including how they are uniquely positioned based on race, gender, geo-spatial location and class background in white Eurocentric institutional spaces that primarily cater to the dominant white male and his needs and experiences (Liccardo and Bradbury 2017, Liccardo, Botsis, and Dominguez-Whitehead 2015, Liccardo 2018b). The terms Majority World and Global South will be used interchangeably, to imply the geographic locations situated outside of the developed world[4] (Santos 2012).

---

[4] I use this term in the context of this research study to highlight how the Euro-American framework has exploited and benefitted politically and economically from non-dominant bodies and spaces, in the interest of developing and advancing its respective territories, through processes of slavery and colonisation inside and outside the colony, i.e., Africans, Native Americans, Aborigines (see Quijano 2000). This plundering of natural resources and human labour from the South to the North created an uneven terrain, since the latter 'developed' itself at the expense, misery and suffering of the former (see Quijano 2000). Yet, ironically, the developed North currently views it philanthropic endeavours as noble and righteous, whilst setting out to exclude its underdeveloped counterparts based on race and non-Western democratic values and ideals (see Santos 2012).

As I have outlined in Chapter one, my first Research Question asks: *What are the differential experiences of South African women growing up prior to transitioning into STEM higher education?* For this, I first draw on decolonial thought and related insights by aligning it to Fraser's (1998, 2007a, 2007b, 2008, 2010) *Participatory Parity* Framework, which incorporates three interrelated dimensions – distribution (economic), recognition (cultural) and representation (political). I use Quijano's (2000, 2007) conception of the Coloniality of Power as well as Mignolo's (2007, 2011a) 'Colonial Matrix' to show how the structures of coloniality/modernity, as well as capitalism create unequal opportunities for accessing HE based on class, but also to show it sets out to financially exclude economically-disadvantaged female students. This is what Fraser (2008) calls the distribution or economic element of social justice that needs to be met in order for all students to participate on an equal footing.

Second, I draw on key decolonial and critical thinkers internationally, such as Mignolo (2011a), Quijano (2007), Lugones (2007, 2008), and Mendoza (2016) as well as scholars from within the South African context such as Mbembe (2015, 2016) and Ndlovu-Gatsheni (2013, 2015) for my second Research Question which asks: *How do Black women in STEM navigate the higher education terrain through access and participation?* In addition, I employ Santos' (2018) notion of Cognitive Justice and Fricker's (2003, 2008) concept of Epistemic Injustice that I link with Fraser's cultural domain to social justice. This refers to the types of situated knowledge held by Black women in HE, knowledges that historically have been and may continue to be deemed invalid by Eurocentric male-dominated institutions, as well as how women make sense of this. This approach also interrogates questions such as who are legitimate knowledge producers, whose linguistic identity can be relied upon and why, and how does knowledge intersect with language (race, class, and gender) in matters of legitimacy? This combined theoretical lens facilitates a deeper understanding of the racialised, classed, and gendered experiences that Black women both bring with them into South African HE and that further inform their experiences and meaning making through access and participation.

This brings me to my third Research Question: *What are the obstacles and opportunities in transitioning out of STEM higher education and how they perceive themselves?* For this, I weave in Lugones' (2003) conception of world-travelling, pilgrimages and Anzaldúa's (1987)

Borderlands with Fraser's third domain of representation, as well as the distribution and cultural elements, as a means to give Black women in STEM a voice and a sense of belonging.

This research draws on insights from critical and decolonial theory. Namely, Fraser's Participatory Parity Framework assists me to understand the overarching mechanisms that enable or restrain equal participation into, through, and out of STEM HE from an institutional perspective, whereas Decolonial and Decolonial Feminist thinking accommodates for gaining insights into Black women's lived realities from an onto-epistemic angle in a Southern context. Moreover, it aligns well with Mignolo's (2011a: 17) thinking as he suggests that daily structural issues are not particularly endemic but are 'being articulated through the colonial imperial difference'. In the first part of this chapter, I draw on decolonial theories and Fraser's distribution dimension in understanding Black women's lived experiences in preparing for STEM HE and how they make sense of broader structural issues, such as cultural patriarchy and schooling inequality, in accessing and navigating the Western, neo-liberal university terrain. The second part looks at issues of knowledge politics and draws on concepts of Cognitive Justice and Epistemic Injustice in relation to Fraser's recognition dimension. This focuses on the dialectical tension between valid and invalid knowledge in Western educational enclaves, including who has a claim to knowledge and what those claims are dependent on. The third part incorporates Black decolonial feminist political thought, in conjunction with the representational dimension of Fraser's social justice model. This enables the inclusion and representation of women as knowledge producers and not as mere consumers in affording minorities[5] with voice and agency in matters of equity. I discuss each theory in turn and draw links and inferences between each, but first provide a rationale for using both as analytical lenses.

2.2 A Rationale for Critical Theory and Decolonial Thought

Since I seek to merge two distinct schools of thought, one decoloniality and the other social justice, both of which converge on untangling salient aspects of inequality - the former seeks to investigate where social (in)justices originate from, whilst the latter makes visible the

---

[5] This term suggests how non-dominant identities have been dehumanised by dominant hegemonic influences, for example, by conservative Western feminism, which overlooks Black, Brown, queer and trans bodies for not fitting the standard of being White, bourgeoisie and feminine (see Lugones 2007). In this way, minority identities and non-dominant ones are still vilified, regarded as non-equal and inferior (Verges 2020).

repercussions as a result of such inequality (Adam 2020). Pertaining to the former, as Runyan (2018) contends, if we choose to ignore colonialism, it means that we are implicated in remaining complicit in the ongoing violence that has plagued and continues to affect already deprived groups and individuals. Hence, it becomes essential that the role of (de)colonisation is brought to the fore in our analytical interpretation and conceptualisation of rising inequality and oppression (Mignolo 2011a, Ndlovu-Gatsheni 2013, 2016, Shepherd 2018).[6]

Moreover, Fraser's (2008) social justice paradigm omits the processes of coloniality and its implications in her theorisation of inequality and social justice. Santos (2012: 48) further argues that this omission 'takes on a derivative character which allows it to engage in debate, but not to discuss the terms of the debate, let alone explain why it opts for one kind of a debate and not another'. Hence, Adam (2020) brings to our attention the limitations of both coloniality and the concept of Participatory Parity in addressing the social justice phenomenon and how the adoption of both can be used as a novel framework in our theorisation on matters pertaining to inequality. I thus adopt this bifocal approach in ascertaining how historical, as well as current underlying structural mechanisms are at play which are responsible for impacting on the ability of underserved student communities to fully access and participate in HE, and what may come with such implications. Decolonial and Participatory Parity theories have been used widely on their own and in conjunction with other frameworks across sociology, social work, education, and psychology, however, from my understanding, very little work has been done in bringing both frameworks together in developing new ways of theorising social justice and gender equity in HE settings, particularly in the Global South. Given that both phenomena remain pernicious and problematic, particularly in Majority World contexts which display remnants of historical ills against the majority of the society, it becomes imperative for us to explore new ways in articulating our conceptualisation of both (in)equity and social (in)justice (Mutekwe 2014). For example, as Lister (2007) puts it, Fraser's Participatory Approach has been primarily geared to address inequality in developed contexts, and omits the salient features relating to poverty and injustices in the Majority World. Hence, we need additional lenses which will address

---

[6] Although my work is largely intersectional, I have chosen not to employ intersectionality as a theoretical lens in my framing of this thesis, since Fraser's Perspectival Dualism provides me with a more encompassing and robust framework, alongside that espoused by Decolonial and Decolonial feminist thinkers, which thoroughly aids me in addressing my respective research questions.

coloniality, geo-spatiality, as well as rurality affecting the developing world and its people (Mignolo 2011a, Masinire 2020, Omodan 2022, Timmis et al. 2022). Moreover, based on the above, I incorporate this approach in the theorisation of this thesis.

2.3 Coloniality/Modernity Nexus and the Coloniality of Gender

I unpack what various decolonial scholars refer to as the coloniality/modernity entanglement which is responsible for the interrelated systems of oppression of non-Western subjects at the hands of colonialism. Coloniality is distinct from colonialism in that coloniality is an extension and an ongoing process of colonisation (Baker 2012). Maldonado-Torres (2007: 43) argues that it 'refers to long-standing patterns of power that emerged as a result of colonialism, but that define culture, labor, intersubjective relations, and knowledge production well beyond the strict limits of colonial administrations'. For Mignolo (2011a: 17), the process of ongoing coloniality operates within a 'colonial matrix, [that consist] of interconnected heterogenous historico-structural nodes crossed by colonial and imperial differences and by the underlying logic that secures those connections'. As a result, it has been nearly impossible to eradicate coloniality's remnants altogether, hence, as Santos (2018: 109) argues, the post-colonial process has merely been altered in its 'form', but not in its substance. Ndlovu-Gatsheni (2015: 488) branded it as 'an invisible power structure, an epochal condition, and an epistemological design, which lies at the centre of the present Euro-North American-centric modern world'. Other decolonial scholars describe this phenomenon as the coloniality of power (Quijano 2000, Mignolo 2011a), given that it is responsible for sustaining the ongoing 'wicked problems' (Hopwood 2019: 266) particularly plaguing disadvantaged communities. This is Carter (2012) refers to as *Stubborn Roots* in her work on paralleling educational inequalities in both the US and South Africa - two distinctly similar unequal contexts.

To put inequality into perspective from both historical, as well as colonial processes, it is necessary to carefully examine the coloniality/modernity nexus to understand the underpinning mechanisms involved in issues of oppression and social (in)justice (Quijano 2000, 2007, Mignolo 2007, 2011a). Critical decolonial scholars, in particular those from the modernity-coloniality schools of thought, are largely in agreement that coloniality and Western modernity are one and the same phenomenon (Mignolo 2007a, Icaza 2017). Both

remain rooted in Eurocentric agendas (Mignolo 2013), remain deeply intertwined and interconnected and, whilst working in tandem to achieve similar goals in ensuring a mould to structure the entire global world (Escobar 1995, Quijano 2000, 2007, Mignolo 2011a). To illustrate this, Mignolo (2007: 450) avers that the sinister 'rhetoric that naturalizes "modernity" as a universal global process and point of arrival hides its darker side, the constant reproduction of "coloniality"'. This is evident in the case of racial identity and the exploitation of labour which gives rise to processes of capitalism and the constant need for the accumulation of wealth (Quijano 2000). Moreover, for coloniality to be successful, it was also thus heavily reliant on the establishment of boundaries and the creation of binaries, i.e. North-South, Black-White, Male-Female etc. (Amin 2009, Ndlovu-Gatsheni 2013), as a means of subjugation and enslavement in crafting out a utopian West (Quijano 2000, 2007). This provided a lens through which the entire world can be viewed (Quijano 2000, Tlostanova 2010, Santos 2018) and a 'mirror in which Europe, as an identity and culture, could recognise itself as modern' (Aman 2016: 101). According to Mignolo (2011a, 2013) it is such a standard that can be regarded as Western modernity. This standard of the West not only pertains to how the terms are set out, but more so the content of relations between coloniser v colonised and North v South (Mignolo 2011a). It is suggestive of the fact that Western modernity is unable to provide solutions for the problems it has created (Escobar 2004). Hence, for Aman (2016: 101) there lies a sinister motive beneath reasonings from the West such as, '"salvation", "development" and "progress," or, to put it differently, coloniality'.

The hierarchisation and categorisation of various identity markers are also essential in our analysis of the hegemony of wealth accumulation (Quijano 2000, 2007) and the processes of the coloniality of gender (Lugones 2007, 2008, 2010). In the case of the former, the hegemony of wealth accumulation can be seen as a structure that occurred with the colonisation and expansion of the imperial world by exploiting Black labour and physical power in the colonies in the interest of the colony (Quijano 2007, Grosfoguel 2011, 2020). Quijano (2000) notes that the processes of Western modernity are prevalent throughout the globe in which the standard is set for cheap labour, taking businesses offshore to save on costs and whereby it remains morally acceptable to want something from someone for next to nothing in return (capitalism). Hence, as Santos (2018: 109) notes 'capitalism cannot exert its domination except in articulation with colonialism'.

Santos (2018) then takes this one step further in locating the way in which gender as a construct has been shaped and influenced by the structures of colonisation (see also Lugones 2007, Tlostanova 2010, Mendoza 2016), in articulating heteronormativity amongst both colonised men and women, as well as to further complement the hierarchical colonial system (Lugones 2008, 2010). Here, enslaved and colonised women were not able to have any stakes in economic matters and were particularly vulnerable to sexual abuse and exploitation by both coloniser and colonised men (Mendoza 2016, Vergès 2021). Moreover, in this classification, gender was further inscribed into neat categories of those who possess a gender and those who are non-gendered (Lugones 2003, 2007). Similarly, Fraser (2007) draws a similar comparison in that she untangles the nexus between work and gender, as we shall see later in her framing. In this she argues that women are the most at risk of exploitation, with class and race as defining categories in its intensity. Her argument stems from the 'labour of love' or unpaid work that Black women are usually subjected to, by not only caring for their own offspring, but for those of her white master.

Subaltern women (Spivak 2010), particularly from disadvantaged backgrounds are not afforded an opportunity to economically participate on par with their male counterparts, due to gender organising principles set out through the processes of colonisation that would invalidate and dehumanise Black femininity in general. Hence, decolonial feminist theorists conclude that subaltern women are often regarded as 'genderless', not only because their situatedness and social experiences (ontologies) are invalidated by colonial systems of oppression (Segalo 2015, Hlabangane 2018, Segalo and Fine 2020, Bhambra 2020) but also because their humanity is called into question (Lugones 2007, 2008, Segalo and Fine 2020). Various scholars have shed light on the human/non-human binary which lies at the heart of the colonial system in its inscription of race, class and gender (Lugones 2008, Wynter and McKittrick 2015).

In HE, institutions still subscribe to the colonial order in their subjugation of anyone who does not fit into the mould of the dominant group (Santos 2020b) and even more so in White masculine spaces (Liccardo and Bradbury 2017). The liberal individual, Neo-liberal system (Luckett and Naicker 2016) and the "plastic university" (Keet 2014, 2018) as remnants of coloniality (Bell 2018) should be critically interrogated, whereby markets, profits and merits determine who is supposed to be included and who is not (Ndlovu-Gatsheni 2013, 2016,

Liccardo 2018b), in remaining reflexive (Ndlovu 2017), self-aware (Hlabangane 2018, see also, Ndlovu-Gatsheni 2016), historical, as well as political (Keet 2018). Keet (2018: 20) argues that,

> the 'origin' of the university, from which it has detached itself, is plastic: flexible, with an inscribed transformative ability rooted in the 'nature' of the knowledge and the disciplines with which it works. The university's essence is transformability. As our ways of disciplining the university have concealed this essence, the decolonial turn, with its circulations, in my reading, is a call to excavate the plasticity of the university…a kind of unburdening of epistemic freedom as a key notion in any definition on the decolonisation of knowledge.

Hence the 'delinking' from the shackles of colonialism and its properties that Mignolo (2007, 2011b) advocates for remains pivotal in assessing the inequalities created by a Western view of education. He adds that in counteracting the dominant Western/Eurocentric ways of being and becoming in institutions, subaltern knowledge can be centred and thereby the subaltern subject is able to evade the Western gaze it is constantly subjected to. In this regard, Davies (2016: 42) suggests that knowledge is 'multi-dimensional' in essence – operating in different ways and manners; emerging in relation to varying experiences and 'does not necessarily imply the need to be explicit'. Knowledge is both epistemic, political and always situated from a gendered (Haraway 1988), as well as from a colonial 'Other' perspective (Santos 2012, see also, Escobar 2004, 2007), created through prisms of identity and experience, informed by our intersectional bodies, ethnicity, age, disability and habitus.

2.4 Cognitive Justice and Epistemic Injustice

Visvanathan (2005, 2006) introduced and developed the concept of cognitive justice and later Santos (2007a, 2007b, 2008, 2009, 2018) in his body of work and gave it further relevance in the context of struggle for ongoing decolonisation and knowledge equity. Cognitive justice calls for a transformation in how diverse knowledges can be regarded as legitimate (Santos 2018, Boni and Velasco 2020, Ndlovu-Gatsheni 2015) and equal to the extent that 'subaltern' or non-dominant knowledges are not merely tolerated or even dismissed, but whereby they stand to be substantively recognised (Visvanathan 2005, 2021). Visvanathan, (2006) notes that this will only be possible through co-operative principles, whereby we should seek to disrupt dominant forms of knowledge imperialism (ibid.). Thus, through seeking to unravel the various layers embedded in both dominant and non-dominant forms of knowledge can

bring us one step closer to what Oyedemi (2020) calls a polycentric decolonial framework. Oyedemi (2020) notes that polycentricism calls for all voices and knowledge to be made visible in order to advance the efforts of a decolonised university.

Moreover, such frameworks include Afrocentric epistemologies, including notions of 'Ubuntu'[7] (Letseka 2012, Ramose 2020). For Letseka (2012: 48) Ubuntu 'translates as humanness, personhood and morality.' In other words, it espouses that 'the flourishing of one human being is not separate from the flourishing of all other', making it particularly 'transformative' (Cornell and van Marle 2015: 5). Chilisa (2020: 25) reminds us that as Africans:

> Ubuntu offers an example of how the researcher's ethical and moral obligation undergirded by his/her obligation towards his fellow men are often interlocked with subjective reality and ways of knowing. This also underscores the connectedness and relatedness in the I/we relationship, where 'hierarchy is discouraged.

Yet, there still remains tension between various schools of thought as to the applicability of *Ubuntu* as a moral philosophy of care in resuscitating and overcoming current challenges pertaining to structural and gendered inequalities (Letseka 2012, Chisale 2018). Kubow and Min (2016) for example, in their findings conclude that African female teachers feel more connected with Westernised ideals of being sovereign in schooling than with inclinations of communalism and Africanism. However, on a closer reading of Western modernity and what it means to be a liberal, Letseka (2016) problematises the above arguments as narrow and superficial. He further points out that 'mainly due to the unintended consequences of [past] colonialism and imperialism, liberalism has mutated into new forms such that there is no single view that can be said to define what it means to be a liberal' (Letseka 2012: 2, see also Fricker 2013). Nevertheless, various intellectuals have opined on the value of alternative epistemologies, such as Ubuntu as an antidote against a plethora of historically based injustices and ongoing neo-colonial and neo-liberal ideals becoming more ingrained in African societies (Nicolaides 2015, Gouws and van Zyl 2015, Higgs 2016, Ramose 2020). This

---

[7] This refers to an African way of being in the world with others, as well as with self (Chilisa 2020), and has key tenets rooted in communalism, forgiveness, sharing and reciprocity. It remains epistemic and can be regarded as a buffer against the social, political and economic oppression as a result of individualism, neoliberalism and capitalism, all which have called into question the humanity of those on the fringes of society (see Letseka 2012).

transformative potential further involves an ethics of care, which can be used with more liberal principles, as a means to ameliorate against past injustices, which not only illuminates on its philosophical orientation, but exposes its ideological and political ideals (Gouws and van Zyl 2015).

Nevertheless, the idea of different knowledge systems, such as Ubuntu should be regarded as dynamic, co-existing with other epistemologies and ways of being, and not be viewed in isolation (Visvanthan 2021). Santos (2007a, 2018) has coined this as the 'ecologies of knowledge', whereby if one particular system fails to adequately address an issue, an alternative framework can be relied upon (Santos 2007b, 2008, 2018, Escobar 2020, Ramose 2020, Santos 2020b). For example, if Western medicine cannot provide the solution to the problem, we turn to traditional medicine or even a combination of the two. Escobar (2020: 43) and Santos (2018) refer to multiple ways of knowing in the cosmos of knowledges as the 'pluriverse'. Moreover, drawing on a plurality of perspectives will bring us a step closer to realising true transformation in the era of the decolonisation agenda (Santos 2018, 2020a, Bhambra 2020)

To reach the point of knowledge equity, Leibowitz (2017a in relation to Rowan 2017b in congruence to Morrow 2009), advocates for a relational understanding to various epistemological practices existing amongst groups depending on the amount of power and influence that is being wielded, i.e. how do those from lower socio-economic backgrounds generate knowledge and what would such knowledge mean for them, compared to their upper class counterparts? Moreover, who has access to dominant knowledge at their disposal in contributing to the global structure and power in play and at who's cost? (Leibowitz 2017a).

Santos (2007a, 2012, 2018, 2020a, 2020b) asks us to critically examine the influence of coloniality in the subversion of other forms of knowledges, stating that it is important to understand 'the intimate connection between the epistemic project and the imperial political project that construct the other as a non-human being, devoid of either knowledge or aesthetic sentiment' (Santos 2020: 119). In this way, he claims that an 'Abyssal line' is enacted whereby Western colonial knowledge, culture and understanding on the one side are regarded as human and to be relied on as valid, and on the other non-human epistemologies exist which should be disregarded and rejected (Santos 2007a, 2020b, Bhambra 2020, see also Escobar 1995 and Tlostanova 2010). The Abyssal line that was created between so called

'true knowledge' (scientific and Western understanding) and false knowledge (those espoused by marginalised communities on daily basis becomes erased in the process of knowledge subversion and silencing (Leibowitz 2017a, 2017b, Waghid and Hibbert 2018a, Bhambra 2020). Hence, imperial 'sociability is the mode of operation of modern domination between unequal human beings, i.e., between fully fledged human beings and sub-human beings' (Santos 2020: 119).

Similarly, Fanon (1986) situates the experiences of individuals into categories, such as the zone of being and the zone of non-being. Those who do not fit a Western understanding and outlook to life are relegated to the zone of non-being, which brings into question their humanity, and the opposite hold true for those who neatly fit this mould, as they occupy space in the zone of being and are deemed fully human. This also further implies that the ultimate goal would be to attain the zone of being, whereby experiences and sentiments are humanised, even if it means denying core aspects of one's own identity in emulating another, i.e., Black bodies adopting whiteness, Eurocentrism, and Westernisation as a means to validate their humanity (Gordon 2005).

Others implicate the establishment of Western institutional values in 'enclosing knowledge, limiting access to knowledge, exerting a form of control over knowledge and providing the means for a small elite to acquire this knowledge for the purposes of leadership of a spiritual, governance or cultural nature' (Hall and Tandon 2017: 8), through the means of the enlightenment agenda that has prominently spread to every part of the globe today (Mignolo 2011a, Small 2012), initially by 'Christian theology [standards, and later by] secular Reason' (Mignolo 2011a: 16) through a conduit of Western philosophers and thinkers in shaping our understanding of the world (Ndlovu-Gatsheni 2021). Nevertheless, Western knowledge also poses its own limitations despite its elaborate universalism it has created. As Leibowitz (2017a: 101) puts it:

> The hegemony of Western knowledge is problematic in five respects: it is embedded in relations of violence and imposition; it is embedded in relations of social inequality; it is interwoven with dynamics of alienation; it lacks a foil to counter its own excesses and show up its weaknesses; and it is inadequate on its own to solve questions that require attention.

Fricker (2003, 2008) bestowed upon us the concept of Epistemic Injustice in rethinking issues pertaining to whose knowledge can be considered valid in the interest of epistemic and knowledge diversity. Epistemic injustice relates to non-dominant ways of knowing that have been decentred as a result of Western biases and prejudices (Fricker 2008). According to Fricker (Fricker 2013: 1320), this pertains to one being treated unfairly as a 'knower' or rather what she calls an 'epistemic subject', due to an 'unjust deficit or credibility' afforded to them. Fraser (2001, 2007) regards the invalidation of non-dominant forms of knowing as an injustice of misrecognition based on the interrelation of both class and culture. Dominant groups, regardless of race, enter institutions by sustaining and reinforcing the prevailing status quo, at the expense of their lower socio-economic counterparts, commonly referred to as an institutional habitus as espoused by Bourdieu (1984, 1987), as well as Bourdieu and Wacquant (1992) and more recent research by Carter (2003, 2012). Moreover, Fricker (2013) divides testimonial injustice and hermeneutical injustice into two categories.

Testimonial injustice invalidates the knowledge bearer's credibility based on external characteristics which deems his word or understanding thereof marginal or inferior, thus he is not in a position to reliably convey facts and truths (Fricker 2008). Fricker (2013: 1319) notes that this usually occurs 'when a speaker receives a deficit of credibility owing to the operation of prejudice'. This suggests that a subaltern person is deemed less equal, and their word more than likely may be taken as a misrepresentation, as a consequence, merely because of who and what he or she stands to represent, i.e., race, gender, class, sexual orientation, etc.

Moreover, hermeneutical injustice refers to 'when a subject who is already hermeneutically marginalized (that is, they belong to a group which does not have access to equal participation in the generation of social meanings) is thereby put at an unfair disadvantage when it comes to making sense of a significant area of their social experience' (Fricker 2013: 1319). Here, the idea is that when a marginalised person (e.g. non-white, non-hegemonic) is surrounded by a dominant group (e.g. white hegemonic), his/her ability is inhibited in making sense or constructing meaning around their own unique social experiences, due to the domination effect (Fricker 2008, 2013). Fricker (2013: 1319) points out that varying degrees of hermeneutical injustices, including its 'severity' and seriousness, often occur in instances whereby the status-quo and norms of a group usually determine which members wield the power, and who are subjected to such power, which in turn can inadvertently produce and

reinforce the dominant hegemony. She also suggests that there remains a 'hermeneutical gap' in place, in which the victim of such injustice is not in a position to make sense of his/her injuries, or he/she may be able to comprehend the injustice and relay such experiences to others but may struggle to put it in words to institutions of authority. Moreover, for Fricker (2013), both forms of epistemic injustices are often responsible for the discrimination and ultimate prevention of equal participation by actors who are bearers to their unique epistemic reasoning. She further coins this 'distributive epistemic injustice' which is the lack of education or information for all, relating to injuries pertaining to equity and social (in)justice in society.

2.5 World-travelling, Pilgrimages and Borderlands

Given that differences amongst women were established with the coming of the colonial period (Grosfoguel 2011), marked by the inception of the Coloniality of Power (Quijano 2000), non-dominant women were not seen as equal to their dominant counterparts (Grosfoguel 2011, see also Davis, 2019). Moreover, Ortega (2006) argues that this is due to White women sustaining the patriarchal hegemonical structure created by White middle-class men. In this modern-day colonial structure of power, White women are even deemed as more privileged than men of colour (Collins and Bilge 2020, see also Ortega 2006). Hence, Lugones (1987, 2003) came up with a concept in which women can identify with each other's struggles in working towards acceptance and tolerance, across boundaries and differences. This she coins as the phenomenon of 'world-travelling' and being playful at the same time in the various worlds we find ourselves inhabiting across interstices of difference, whether we identity as White/Angla feminist or whether we see ourselves as Black, Brown, hybrid, decolonial, Mestiza, Dalit, queer or trans (Lugones 1987, Velez 2019, see also Tlostanova 2010). Moreover, her theorisation incorporates 'crossing lines of gender, race, and class difference, as well as ability, where those lines mark social hierarchy' (Price 2019: 220). This is what scholars such as Chávez (2019: 179) notes would encompass a 'decolonial ethics' in which those higher up on the social hierarchy should look past structural differences embedded within societal confines, in order to dismantle identity differences associated with oppression and dominance. This is particularly imperative for men of colour in Southern contexts, as it can mitigate against gender-based violence, whereby race and heteropatriachy still bear a

colonial nature and character (Orton 2016, Gouws 2017, 2018, Chávez 2019, Vergès 2021, Gouws 2022). In this, Chávez (2019: 179) contends that:

> Building solidarity with nonheterosexual people and women of color, rather than inhabiting the abstraction of modern moral autonomy, offers an opening for antiracist men of color to resist internalised oppression and cultivate a new way towards self-love (personal and communal) delinked from the logic of domination.

In building solidarity, we open ourselves up to a world inhabited by another's onto-epistemological understanding of what it means to be and to become the 'Other' in a multi-faceted world in which subaltern women are forced to travel to other worlds due to the socio-historical legacy they are associated with (Lugones 2003, Lugones and Price 2003). Acts of travelling to the other side should transcend purposes associated with voyeurism or 'academic' research and should bear the hallmarks of genuine self-discovery and a yearning to see through the lens of the 'Other' and not merely be driven by curiosity (Price 2019: 233). This is because non-dominant groups usually find themselves entrapped under the Western gaze, either through coercion or co-option into adopting a Western heteronormative embodiment through which to make sense of their world (Lugones 1987, 2003, DiPietro 2019, Carastathis 2019, see also Gouws 2017). This relates to Fraser's (2007, 2008) representation politics that sets out to shed light on matters of voice, agency and a sense of belonging for groups and individuals in in-between spaces in which they remain constantly influx. As Anzaldua (1987) refers to the *mestiza's* non-recognition of being unable to fit the dominant Western paradigm of the United States, as well as her non-Western, but the dominant heteropatriarchal space of her native Mexico, leaving her on the *borderlands.*

A 'world' should be something real, concrete and not imagined, according to (Lugones 2003, see also Ortega 2020). Thus, the act of 'world travelling' includes spaces of HE or workplaces, and in particular – the case of women in STEM - spaces previously dominated by white and Black upper to middle-class men (Liccardo 2018b). This is deemed as an act of pilgrimage in which privileged groups are neither subjected to, nor are they able to fully relate to Black women's situated knowledges that are constructed in different worlds on a daily basis in the Global South (Lugones 2003, Lorde 2017, Carastathis 2019). Santos (2012: 51) points out that the Majority World is 'rather a metaphor of human suffering caused by capitalism and colonialism at the global level, and a metaphor as well of the resistance to overcome or

minimise such suffering'. Hence, in this regard dominant groups take on mere roles of spectator and remain detached from the embodied realities encompassing the subaltern experience on a daily basis. Tlostanova (2010: 6) eloquently summarises this point by suggesting that: 'White feminism as well as other European post-enlightenment liberatory discourses suffered a missionary syndrome, without stopping to think of a possible subjectivity and agency of the other'. The next section will discuss Fraser's Participatory Framework.

2.6 Participatory Parity

Fraser (2007, 2008) developed her Participatory Parity model as an all-encompassing approach to enable social justice amongst individuals and groups, as well as to illustrate how persons are able to fully participate in society as equals. She articulates her framework through three areas - namely distribution, recognition and representation. Her model provides key insights into aspects pertaining to why certain individuals are allowed access and full participation and why others are left out in society and its implications for equity of participation (Hölscher and Bozalek 2020). Although her model has relevance for society in general, various scholars have employed her work in the South African educational context (see Bozalek and Carolissen 2012, Clowes, Shefer, and Ngabaza 2017, Garraway 2017, Dykes 2018, Khan 2019) and further afield (Keddie 2012, Cazden 2012, Vincent, Rowe, and Johnson 2021) including many others calling for it to be used more widely in educational contexts that are starkly unequal (Leibowitz and Bozalek 2016, Hlengwa, McKennna, and Njovane 2018, Sobuwa and McKenna 2019, Hölscher and Bozalek 2020).

The South African context is just one such example of egregious inequality. Luckett and Naicker (2016) argue that due to the 'vast inequalities [in places like South Africa], it is important to recognise the constrained agency of universities as institutions of civil society – they are not able to completely compensate for society, nor can they fully interpret the social reproduction of inequalities – nor will their internal public spheres ever be perfectly just and democratic'. Hence, Fraser's (2008) model provides us with a platform to understand the inherent inequalities that restrict, impede or even enable certain individuals in their participation as full members in HE. She developed her theoretical model on social justice by initially accounting for economic (distribution) and cultural (recognition) dimensions (Fraser,

1997a, 1997b, 1998). It was only much later that she decided to introduce the political dimension (representation) in order to provide a more robust framework to guide our understanding of social justice (Zurn 2003, Fraser 2007b). Hence, the Participatory Parity model is particularly useful in understanding the plight of underrepresented groups' access and participation in dominant institutional contexts, including race, class and gender in STEM.

As such, Fraser's (2007b, 2008, 2010) participatory parity model centres on three dimensions, which includes access to resources (distribution), the consideration for diversity and acknowledging various worldviews and outlooks (recognition) and inclusion in decision making which affects the individual (representation). This trivalent aspect 'either mitigates against or contributes to social justice' (Leibowitz and Bozalek 2016: 112). Moreover, Fraser (1998) sees this tripartite of dimensions as separated from each other, as well as interdependent, but not irreducible to one another. Hence, she maintains that there can be no distribution or recognition without representation (Fraser 2007b). This suggests that one cannot be substituted for the other and each analytic account needs to be accounted for social justice to be fully realised (Fraser 2008).

2.6.1 Distribution

In order for us to equally participate in society, Fraser (1998) argues that economic resources need to be equally and fairly distributed. This concerns the differentiating disparity between the developed world and that of its less affluent counterparts, with intersectional identities as central to this divide (Fraser 1995, 2010). Within schools and institutions, students from less privileged backgrounds will not be equipped to participate as full agents in the learning and teaching processes alongside their elite counterparts due to a lack of economic or material resources which results in a maldistribution of resources (Bozalek and Carolissen 2012, Leibowitz and Bozalek 2016). Hence, to mitigate against maldistribution, the distributive element seeks to ascertain whether someone has unrestricted access to finances that will enable their full participation (Fraser 2007a). In doing so, it looks for structures and processes that hinders a person's ability to acquire economic resources, such as 'exploitative work or lack of access to income generating work and disparities in work, leisure time and responsibilities' (Bozalek and Hochfeld 2016: 201). All these factors are taken into account to ensure the redistribution of material resources in the creation of a level playing field (Fraser 1998).

The stark reminder of neo-liberalism masquerading in the form of equity in which a level playing field is created in education in general, is nothing but a myth (Fraser et al. 2004). As a matter of fact, neo-liberal thinking and ideas pertaining to service delivery, like for example education, are being turned into private issues which concerns the individual as opposed to a moral public good (Hölscher and Bozalek 2020). It preaches that everyone should start on the same footing without regard for historical and structural elements at play which are responsible for the marginalisation of certain groups (Cross 2009, Bozalek and Boughey 2012, Badat and Sayed 2014, see also Fraser 1995). This is particularly relevant to the South African context, given the vestiges of both colonialism and apartheid in the construction of a largely fragmented society, not only based on race, but more so on social class. In particular, educational finance during apartheid was egregiously unjust due to the segregated nature of White versus non-White spaces of teaching and learning (Badat and Sayed 2014). This suggests that Black educational establishments during the new democratic dispensation were unable to catch up and remain on par with their former White counterparts due to generations of underfunding, as well as not possessing the skills and knowledge to manage their own financial affairs (Bozalek and Boughey 2012).

Moreover, during the current dispensation, universities are positioned at a disjuncture between redress and social transformation on the one side and their own economic interests on the other, which leaves many marginalised groups in precarious situations when accessing and entering university (Cross 2009, Botsis, Dominguez-Whitehead, and Liccardo 2013). This often affects whether students from resource-deprived contexts have the available resources to aid their learning, especially during the current Covid-19 pandemic of 2020-1, as the need for technological learning and teaching have exacerbated and intensified such realties (Mpungose 2020, Le Grange 2020, Czerniewicz et al. 2020). Also, due to vast disparity in educational opportunities available for various groupings, Cross (2009) argues that it further entrenches a hierarchised society, one which endorses and values a distinctive group and class structure in wielding power differentials (Botsis, Dominguez-Whitehead, and Liccardo 2013, Matsehela 2018). Hence, Fraser's (1998, 2007) insights bears semblance on how socio-economically challenged student experiences of access to resources and equal participation in HE can be affected. In other words, the distribution dimension calls for a decrease in the gap between the 'haves' and the 'have nots' to eradicate the issue of class status in order for

everyone to reap the rewards of a democracy and participate equally (Fraser and Bedford 2008). Furthermore, what complicates matters even more for South Africa is that social class also bears a racial element (Naidoo 2004, van Zyl 2016, Ngoasheng and Gachago 2017). These issues will be fleshed out in the following paragraphs.

To place the above into context, the 2015/16 student uprisings, namely the 'Feesmustfall' and later 'Rhodesmustfall' movements have become critical moments in exposing racialised and classed disparities in South African HE, as well as internationally. The former called for free education against the exorbitant costs of university education which limits access to HE. Matsehela (2018) argues that institutions were unable to relate to the lived experiences of impoverished students, hence were unable to enact provision, leading to student unrests. As I show in the following chapter (Chapter 3), students from lower socio-economic backgrounds often have to travel long distances to university to initiate the application process, whether for attending interviews or submitting portfolios in support of applications (Khan, 2019; Matsehela, 2018). Moreover, a lack of technological resources makes it difficult for marginalised students to submit online university funding and residence applications. In many instances, indigent students are left to their own devices in terms of making ends meet in residential enclaves (Khan, 2019; Le Grange, 2020; Matsehela, 2018), which can lead to them taking on exploitative part-time work (Leibowitz and Bozalek 2016), seeking temporary accommodation before settling into university accommodation (Khan, 2019; Walker, 2018a), and even attending to younger siblings, as well as elderly parents at home (Pather and Chetty 2015, Khan 2019).

Some students are burdened to act as de facto parents for their younger siblings due to the loss of a parent or for other reasons, which suggests that they are not able to engage in activities that would enrich their academic endeavours in their free time (Lareau 2011, 2015, Pather and Chetty 2015). Moreover, van Zyl (2016) argues that there are higher chances of attrition impacting students with lower socio-economic backgrounds along their university journey. He further notes that 'many talented students in South Africa find themselves constrained by finances and, as a result, unable to translate their potential into actual performance' (van Zyl 2016: 3). These factors were evident in the student unrests in 2021, whereby students demanded access to university for all those who have fallen short financially, especially at the time as a result of the Covid-19 pandemic. As part of their demand

at the onset of the 2021 academic year, students threatened to boycott and shut down all public universities in South Africa should their calls fall onto deaf ears. HE institutions then decided to work with student leaders and Student Representative Council (SRC) to forge a path ahead in financially supporting resource-poor students.

In addition, the case for gender in the presence of race and socio-economic status (SES) takes on a distinct, yet subjective dimension (Mama 1995, Tlostanova 2010, Davis 2019, Chilisa 2020). Fraser (1998) argues that the situation may be more intensified with women expected to take on additional responsibilities, like caring and household duties, without any form of economic redistribution. She states:

> From the distributive perspective, gender is a basic organizing principle of the economic structure of society. On the one hand, it structures the fundamental division between paid "productive" labor and unpaid "reproductive" and domestic labor, assigning women primary responsibility for the latter. On the other hand, gender also structures the division within paid labor between higher-paid, male dominated, manufacturing and professional occupations and lower-paid, female dominated "pink collar" and domestic service occupations. The result is an economic structure that generates gender-specific forms of distributive injustice (Fraser 1998: 2).

Extending Fraser's gender analysis to female students more specifically, as Helman and Ratele (2016) note, they are also more likely to be expected to engage in domestic and caring duties at home, in relation to their male counterparts, which impacts on academic progress, the need for extra murals and socialisation benefits. Shefer, Clowes, and Vergnani (2012) have also found that female students from impoverished backgrounds are often most vulnerable to being sexually exploited in return for financial and other rewards. As a consequence, the overburdening of responsibilities without financial gain produce a rippled effect and escalates to other broader psycho-social issues, such as feeling demoralised or the inability to focus on their studies (Bozalek and Leibowitz 2012, Clowes, Shefer, and Ngabaza 2017). The plight of marginalised women in HE, especially in male-dominated Western spheres, deserves an analytical analysis through the lenses of both distribution and recognition (Fraser 2007a, Fraser and Bedford 2008). Hence, Black Women's oppression in the Global South context is often two-fold -the one concerns economic (maldistribution), and the other cultural (misrecognition) exploitation in terms of, for example, how women are viewed and perceived

by society, including the normalisation of men as breadwinners (Fraser 1998, Khan 2019, Czerniewicz et al. 2020).

Another example of how the effects of maldistribution interact with misrecognition in the case of Black women from less affluent backgrounds pertains to the student unrests in 2015/16 (Davids 2016, Xaba 2017). Findings suggest that as much as Black female students were advocating on the front lines alongside their male counterparts for the right to free education and curriculum reform in order to fully participate as equals, they were also subjected to sexual abuse, whereby their feminine identity and what they stood for were regarded as inferior, thus misrecognised and sexually exploitable (Xaba 2017, Khan 2017).

2.6.2 Recognition

Recognition refers to how difference in terms of outward appearance or visible characteristics such as cultural affinities in institutional spaces are dealt with in ways that would either impede or promote participatory parity for all (Fraser 1997a, 2000, 2001, 2007b, 2007a, 2008, 2016). This is based on various markers of an individual's identity, such as race, class, sexual orientation/identity, etc., taking on various forms in the valuation (recognition) or devaluation (misrecognition) of such characteristics. In other words, recognition, in Fraser's framework, considers how different sets of epistemologies and even ontologies are viewed and regarded by institutions and critically examines institutional responses to such perceived difference. Within this, Fraser (2008: 405) points out that 'people can be prevented from interacting on terms of parity by institutionalized hierarchies of cultural value that deny them the requisite standing; in that case they suffer from status inequality or misrecognition'. Basic examples of recognition in institutional spaces would include whether student linguistic identities are valued and promoted or not (Clowes, Shefer, and Ngabaza 2017) and how prevailing structures influence the dominant cultural landscape that only reflect the views of a small minority. Recognising linguistic identity exclusions could in turn highlight the importance of promoting the practice of multilingualism in the South African HE context and how such a step could contribute positively to enhancing student identity formation and yield better academic results, thereby narrowing the achievement gap between different groups and ethnicities (Carter, 2012). Moreover, the wider structural frameworks and normative institutional policies are framed around the hetero-cis-gendered white, Christian male and his experiences (Leibowitz and Bozalek 2016). Indeed, it is through such patriarchal structural

frameworks that heteronormativity and masculinity as social constructs are reproduced by universities (Shefer, Clowes, and Vergnani 2012, Shefer 2016, Ngabaza, Shefer, and Clowes 2018).

Fraser (2000, 2001) though makes a clear distinction between identity politics and the manner in which identity theorists frame the issue of recognition. She provides her take on the conceptualisation of recognition. In this she argues that identity politics tend to be more concerned with group dynamics and how such collectives are perceived, including its psychological impact on members and the group as a whole (Fraser 2000). This traditional framework on the one hand often relies heavily on 'a single, drastically simplified group identity, which denies the complexity of people's lives, the multiplicity of their identifications and the cross-pulls of their various affiliations' (Fraser 2001: 24). However, Fraser's (2000, 2007) recognition model on the other hand is more concerned with what she refers to as status subordination, instead of identity, in the sense of scrutinising the impact that institutional cultural patterns have on an individual's marked characteristics which would either enable or constrain equal participation. She notes that the act of misrecognition:

> is not simply to be thought ill of, looked down upon or devalued in others' attitudes, beliefs or representations. It is rather to be denied the status of a full partner in social interaction, as a consequence of institutionalised patterns of cultural value that constitute one as comparatively unworthy of respect or esteem. (Fraser 2000: 113-114, see also Fraser 1997)

Thus, to be misrecognised is concerned more about the dynamics involved in social interactions that are shaped by overarching patterns that are responsible for excluding and occluding identities that are perceived to 'misfit', as opposed to the psychological harm to such identities by institutions (Fraser 1997a, Fraser et al. 2004). Misrecognition also operates in a distinct manner from maldistribution, in that it requires its own lens and, thus should not be reduced, but may be analysed in connection to it, (ibid.). Fraser (1998, 2007) contends that there is often an intersection, an overlapping and even an influencing in the analytical aspect of the dimensions, though each dimension stands in its own right and should not be substituted for the other, ensuring that the one does not become reduced at the expense of the other. She cautions heavily against this and even went so far as to critique feminist

ideologies, 'since it is no longer clear that feminist struggles for recognition are serving to deepen and enrich struggles for egalitarian redistribution' (Fraser 2007: 24).

Moreover, we can see how aspects of misrecognition play out in the South African educational context through a gendered lens, for example when Black impoverished women in male-dominated subject areas may feel at a disjuncture or conflicted by the Western, heteropatriarchal cultural terrain they feel that they need to fit into, which can be at odds with their own lower socio-economic African backgrounds and their prior knowledge that they carry with them (Liccardo and Bradbury 2017, Liccardo 2018b). This brings into sharp focus what Fraser et al. (2004) and later Fraser (2007, 2016) refer to as misrecognition based on where someone is positioned on the hierarchy which society has set up and how institutional values are positioned to exclude, rather than include non-hegemonic identities. Thus, Western hegemony in existence in institutions based on competitiveness and metrics informed by neo-liberal ideals are often a struggle for the indigenous Black student from resource-deprived backgrounds to relate to and connect with. This form of exclusion is compounded by the lack of consideration given to mitigate against such obstacles, leading to already disadvantaged groups becoming further marginalised (Morrow 2007, Bozalek and Boughey 2012).

Forms of exclusion become particularly problematic given the backdrop of a stratified South African schooling system which has been inherited from both the colonial and later the apartheid eras. Various studies have shown that students from impoverished township schools face issues of epistemological access when entering HE, compared to their more affluent counterparts emerging from former Model C and private schools (see, Morrow 2009, Bozalek and Boughey 2012, 2020, Clowes, Shefer, and Ngabaza 2017, Garraway 2017, Sobuwa & McKenna 2019). Liccardo, Botsis, and Dominguez-Whitehead (2015) and later (Liccardo 2018b), demonstrate how a group of Black female STEM students in a South African university experienced the imposter syndrome, as a result of its prevailing white masculine hegemony, with colonial settler undertones and the euro-centric course content that they were subjected to. I discuss the issue of epistemological access further in Chapter 3.

Correspondingly, the current dominant institutional framework goes against the grain of communalism, sharing and reciprocity based on the tenets underpinned by Ubuntu as a moral compass and a value system embedded in the African understanding of being (Venter 2004,

Higgs 2010, Letseka 2012). Hence, a non-dominant framework stands to mitigate against the misrecognition of women (culture) and its concomitant effects of maldistribution (economics) in the Global South in rethinking Western values (liberalism) and centring our attention to alternative perspectives (Ubuntu), as I allude to prior in this chapter.

Another critical concern that sets the status subordination model apart from conforming theories on recognition and identity is that it refrains from 'essentialising' a specific identity marker over another or other pertinent issues, which would narrow our scope but may also lead to further issues of inequality and social justice (Keddie 2012: 264). In other words, if we only focus on Black and White and their experiences, it may lead to misrecognising 'Other' in between groups, simply because they do not fall into such binary categories. Furthermore, if we focus only on specific identities within marginalised groups, we risk silencing those embodied identities which may have suffered the most from oppression within such confines, i.e., same sex, trans identities, disabled bodies, etc. Hence, Fraser (2000) sees the issue of being misrecognised as a moral contention over an ethical one, contrary to the manner in which mainstream recognition theorists, such as the likes of (Honneth 1995) have purported it to be. By thinking of misrecognition in a radical sense, she maintains that the 'struggles for recognition can aid the distribution of power and wealth and can promote interaction and cooperation across gulfs of difference' (Fraser 2000: 109). However, luminaries such as Honneth (1995), Lister (2007), and later work by Hochfeld (2022) have problematised Fraser's notions for not taking into account how marginalised groups stand to be affected psychologically due to the effects of being misrecognised.

2.6.3 Representation

Representation pertains to how and where individuals are situated politically and whether they have leverage in decision making that concerns them. This dimension of social justice concerns voice and political agency which are meant to ameliorate the effects of injustices. Thus, when this is taken away or someone is denied this right, it can be regarded as an instance of misrepresentation (Fraser 2007b, 2010). Fraser (2008: 403) suggests that 'through the lens of democratization struggles, justice includes a political dimension, rooted in the political constitutions of society, whose associated injustice is misrepresentation or political voice'. In HE or even the workplace, this would pertain to whether students and workers are able to participate in student and work unions, vote and elect representatives, as well as take

part in political rallies on campus or in workspaces without being persecuted or victimised (Bozalek and Boughey 2012, 2020).

With that said, she draws our attention to the importance of distancing ourselves from a post-Westphalian vantage point, which only accounts for the nation state, but neglects to focus on the significance of the global (Fraser 2007b, 2008). Fraser (2007a: 23) goes on to state that, 'the Keynesian Westphalian frame is now considered by many to be a major vehicle of injustice, as it partitions political space in ways that block many who are poor and despised from challenging the forces that oppress them'. Here the central argument is that transnational policies set by global entities are largely responsible for the reproduction of inequality by further exacerbating the oppression and marginalisation experienced on the ground of national states by those already on the periphery of a society (Clowes, Shefer, and Ngabaza 2017). Moreover, such global entities are self-insulating against scrutiny and critique and as a result of their might and influence are able to operate outside the parameters of a democracy (Bozalek and Boughey 2012, 2020). An example of this would be the issue of internationalisation of HE and its differential impact in setting out neo-liberal agendas, particularly for institutions in the Global South, who have to contend with the extra burdens of colonialism and, in the case of South Africa, segregation. This poignant reminder should serve as a message to the global academic fraternity that the construction and introduction of metric league tables and ranking of institutions are not developmental, particularly for underserved communities within the system. This is due to the fact that not all players have access to the same level playing field from the inception, given the historical, socio-cultural, economic and political structural frameworks within which they are located (Fraser 2007b, 2007a, Mathebula 2018, Bozalek and Boughey 2020). Hence, student groups on the periphery, such as women of colour, are not afforded a say in the ongoing ranking system which hierarchises universities, sets elite apart from non-elite and further determines the value of a qualification that is conferred by an institution, and which is then used as a form of cultural capital to leverage further opportunities depending on which side of the fence one stands (Bourdieu 1984, 1986, Bourdieu and Passeron 1990).

Moreover, within this dimension, Fraser (2007a, 2008) adds another deeper level to political representation, which she terms 'boundary-setting'. For Fraser, boundary-setting is a way of exploring how the mis-framing of less privileged groups and individuals within institutional

realms leads to differential participation in political matters. In this lies the issue of who should be regarded as a legitimate student or worker in accessing and participating in HE or workspaces, and who is not (Fraser 2007a, 2007b, 2008). This usually occurs when institutions and workplaces start everyone off at the same point without being mindful of socio-cultural, economic and historical contexts that may have given some people more advantages over others, and in so doing, this can serve to, even inadvertently, exclude non-dominant groups (Carter, 2012; Fraser, 2007a). Here the understanding is that it is not only about the 'what', in terms of resources (distribution) and culture (recognition) that has a stake in social justice claims, but also the who, as to the person (political) and what they represent that deserves greater attention (Fraser 2007a). An example of who (political) are often *misframed* and not seen as 'real' or legitimate students and workers from the perspective of HE institutions and organisations, are those from lower socio-economic backgrounds as well as non-dominant women, and those who do not fit the dominant description of being White, heteronormative, able-bodied and Christian (Bozalek and Boughey 2012).

2.7 Conclusion

In conclusion, this chapter demonstrated how two conceptual paradigms can be situated along side each other, from both a social and institutional perspective, as well as from an epistemic one, to provide a nuanced understanding of issues of equity and social justice concerning Black Southern women in STEM HE. This is particularly evident in the South African context, whereby its neo-liberal policies dictate that all entrants into the university system are equal, white, upper-middle class, as well as men (Bozalek and Boughey 2020). I firstly provided a rationale for using both philosophical strands in complementing the strengths and weakness of the other, as well as to provide insights in terms of how both can be incorporated into HE research, dealing with issues of gender, access, and participation. Secondly, I discussed each concept in turn and demonstrated how they can be employed interrelatedly. Moreover, I have drawn on insights from useful concepts pertaining to the colonial/modernity nexus, in understanding how 'historico-structural nodes' (Mignolo 2011: 17) of capitalism and neo-liberalism are still implicated in the subjugation of subaltern women through ongoing neo-colonial processes that shape the current status quo. Also, I engaged with concepts pertaining to Cognitive Justice and Epistemic Injustice in ascertaining how non-dominant forms of knowledge are invalidated, which consequentially impacts on equal access and

participation in STEM HE. This further pertains to the racialised, classed, and gendered aspects of knowing in which non-dominant women travel between worlds, named as World-travelling and Border thinking. Hence, I decided to turn to Maria Lugones for answers in understanding how the transition from dominant to non-dominant spaces present epistemic and cultural consequences for women taking up space in white male-dominated Western settings and how this can be overcome. Thirdly, I incorporated Fraser's Participatory Parity framework by drawing on her three dimensions distribution (economic), recognition (cultural) and representation (political) in understanding how Black women's participation is impeded or enabled in STEM HE.

This chapter plays a pivotal role in this thesis as it provides a conceptual lens in understanding the lived experiences of socio-economically disadvantaged Black women as they navigate their access and participation in historically white male-dominated disciplines, such as STEM. I now turn to the literature chapter, in which I present different strands of literature pertaining to the tension, obstacles, as well as opportunities that Black women are confronted with from the time, they decide to pursue STEM at school, through to postgraduate studies, as well beyond, such as the employment context.

<p style="text-align:center">Chapter Three: Literature Review
Journeying In, Through and Out of STEM Higher Education
and Into the Professional Context</p>

3.1 Introduction

The aim of this chapter is to explore, as well as critique the extant literature to provide a comprehensive understanding of Black women's access into, through, and out of HE, particularly in relation to STEM. In other words, this chapter looks at Black women's experiences growing up prior to entering HE, how they prepare to access and participate at university, as well as how their experiences in furthering their studies, including working in male-dominated spaces, pose challenges and constraints for those who do not fit the hegemonic mould associated with STEM. Moreover, the chapter is divided into themes that speak to issues of schooling and gender inequality, the intricacies concerning access of minorities into HE, linguistic equity, and decoloniality, with an emphasis on the Black female experience. First, I present debates and arguments on schooling inequality in South Africa, as well as its implications for different learner populations in relation to class, geospatiality, and coloniality at school. Moreover, I engage with debates and arguments on patriarchy in the South African context and explore the implications it has for Black women situated differently on the periphery, particularly how it shapes issues of class and gender equity in relation to schooling. Second, I critically explore how various forms of both dominant Western and alternative capital have implications for Black women's access into and participation through HE. In this section, I show how alternative capital serves the interests of Black women in STEM being positioned as both insiders and outsiders, but also how they support each other and receive in the same in return through embodied infrastructures. Third, I explore aspects of transitioning out of HE, employment opportunities, and workplace problems associated with gender and transformation. Finally, I provide concluding thoughts on Black women's STEM experiences.

3.2 Schooling Inequality in South Africa

According to available data, the South African population currently stands at approximately 60 million, of which Black/Africans account for roughly 80 per cent, Coloureds 9 per cent, Whites 8 per cent and Indians/Asians 3 per cent (Statistics South Africa 2022). Moreover, what

is also apparent is that more than two decades into a democracy, the South African education system remains extremely uneven and complex (Spaull 2019, Motala and Carel 2019, see also Motala, Vally, and Maharajh 2016). Scholars argue that this is due to a lack of expertise and capacity building (Okeke et al. 2017, Omodan 2022), including mismanagement in the transition into democracy, which upheld the status quo and allowed the ongoing segregated nature of schooling (Spaull 2013a, Pretorius and Spaull 2016, Broekhuizen and Spaull 2017, Roberts 2021).

To elaborate on the above, various scholars have pointed out that that two-types of schools are prevalent; the well-resourced and previously advantaged former Model C School[8] or private schools which cater to the financially elite minority to provide a decent education, and also the resource-deprived and 'dysfunctional' township and rural schools, which are meant to serve approximately 80 per cent of the population and does not produce the best educational outcomes (Badat and Sayed 2014, Spaull 2019, Motala and Carel 2019). Teeger (2015) notes that former Model C schools were formerly designated for whites and still carries this legacy of privilege and advantage. However, Timmis et al. (2022) argue that although township and rural schools share similar educational characteristics, they remain unique in their own right, given that they do not share the same historical, geographical, and social contexts. Nevertheless, such educational contexts pose challenges for learners, and there continues to be a racial connotation in these contexts, as they primarily cater to the Black/African populace.

There have been various debates concerning rurality and the extent to which the rural context is often shaped by social, political, economic, and ideological factor (Cross and Atinde 2015). For example, rurality in South Africa is deeply associated with the political landscape pertaining to the forced removal of Black people under apartheid, which has roots in colonialism (Hlalele 2014, Masinire 2020). In contrast, societies with no resemblance to colonial and apartheid oppression see rurality differently. In the international context, especially in developed countries, rurality is often deemed differently in relation to how

---

[8] Model C schools were reserved during Apartheid for the White minority South African populace. Such schools were also on par with international educational standards, both infrastructurally and academically. They have since retained this status quo into the new dispensation and currently caters predominantly to the middle-class from all racial groupings. This dynamic has further exacerbated the ongoing inequality in South African society by widening the gap between the 'haves' and the 'have nots'.

broader systems are geared and may not be associated with poverty (Echazarra and Radinger 2019). The fundamental distinction with the South African context is the exacerbation of the impediment of historical colonialism (Masinire 2020). To show what this means for rural South Africa, Hlalele (2014: 463) attests that it is primarily marked by:

> long distances to towns; the poor conditions of roads and bridges to schools; a lack of or limited access to Information Communications Technologies (ICTs); a lack of services such as running water, electricity, sanitation, health and educational facilities; low economic status and little access to lifelong learning opportunities.

Moreover, to reaffirm Timmis et al.'s (2022) earlier point regarding rural and township educational contexts resembling each other, scholars such as (Maringe, Masinire, and Nkambule 2015: 366) see it as 'schools facing multiple deprivation'. Thus, Maringe and Moletsane (2015: 348) suggest multiple deprivation concerns:

> a confluence of factors that conspire to undermine the educational benefits intended and anticipated for groups of learners. These factors, which are prevalent in environments and communities facing socioeconomic hardships and disadvantages, include poverty, a lack of educationally stimulating environments, and cultural and social dissonance. Communities that face multiple deprivation are exposed to all or most of such factors simultaneously, not in isolation.

Furthermore, for rural and township women, education takes on a gendered dimension, pertaining to family pressures that come with cultural expectations, in addition to schooling inequality, which further disenfranchises the girl child and has implications for her life chances. I now explore relevant literature on patriarchy in relation to schooling and consider the structural factors, such as resources and availability of skilled teachers, in determining the experiences of social and class groupings in the South African context.

3.3 Patriarchy

3.3.1 Patriarchy and its influences on education

As noted by numerous scholars in the field of education and sociology, the root of most inequities is relegated to prior systems of apartheid and colonialism embedded into a system

of patriarchy (see for example Yuval-Davis 2015; Mtshiselwa 2015; Akala and Divala 2016; Liccardo and Bradbury 2017; Cameron and Drennan 2017). A basic definition of patriarchy developed by Walby (1989: 214) concerns 'a system of social structures, and practices in which men dominate, oppress and exploit women'. It concerns itself with a 'culture [which is used] to represent human experience, even when it is women who most often live it.' (Johnson 2014: 10). Hence, Akala (2018: 232) asserts that women in general are still educated and cultured into a society which demands obedience and subservience to their husbands. She notes that patriarchy further 'conceptualises women as inferior, intellectually and physically' (Akala 2018: 235). This leads Clisby and Holdsworth (2014: 22) to allude on patriarchy's pervasive nature in manifesting 'in multiple arenas including through family life, state institutions, through cultural transmission, and embedded in constructions of femininities, masculinities and sexualities.'.

Moreover, the Apartheid government's monolithic ideology of binaries (Lugones 2010, Walker 2018b, Segalo and Fine 2020) have systematically entrenched male domination and reinforced a gender imbalance in society (Du Preez, Simmonds, and Chetty 2017, Khan 2017, Ndlovu, 2017). This is further associated with South Africa's hegemonic influences derived from a strict orthodox religion (Nicolaides 2015; Akala and Divala 2016; Akala 2018; Wood 2018; Maponya 2021), as well as colonialism and Apartheid's entrenchment of gender subordination into the racial status quo (Unterhalter 1990, Mama 1995, Martineau 1997, Akala 2018, Verges 2021). This is also a consequence of imperialism's failure of having either ignored, or denied, their former colonies from constructively dealing with the gender debacle (Gill and Pires 2019). As much as colonialism have been implicated in the subjugation of racialised women in the colonies (Lugones 2007, 2010, see also Segalo and Fine 2020), scholars such as Oyewumi (2002) affirms this by suggesting that gendered binaries never existed in her Nigerian tribe prior to colonisation and emphasis was placed on age and seniority instead. To provide more context, concerning how colonisation shaped Apartheid's ideology in relation to race, gender, as well as economically (MSU n.d.), scholars such as Orton (2016), including Gqola (2015) demonstrate how Black women were dehumanised, as opposed to their Black male counterparts, through violent racialised and gendered practices and processes meant to exploit and violate the non-dominant female body.

In addition, rural women's experiences in South Africa remain deleteriously conditioned through a complex interplay of poverty and patriarchy, which exacerbates gender inequality, particularly in traditional African villages (Madiba and Ngwenya 2017: 56, Zuze 2020). This is further due to how gender was constructed, as part of the colonial imbrication in inculcating norms, values and customs reinforcing female subjugation (Akala 2018: 231, Verges 2022). As Akala (2019: 3) notes, Black men were socialised into 'leadership and entrepreneurial roles through training in farming, fighting, blacksmith, masonry and hunting'. Whereas Black women were conditioned into household duties and caring for their families and offspring. This colonial legacy had persisted into the apartheid era, whereby it was common for Black women to take up employment as housemaids and servants for upper-and middle-class white families, given their subjugated roles pre-apartheid (Nicolaides 2015: 205 and Maisela and Ross 2018: 42).

The few Black women who managed to get an education during the period of apartheid were forced into careers based on stereotypical notions about normative expectations of their gender and race. As Akala and Divala (2016: 8) state, Black women were educated in the past to take on careers that would complement their 'caring' and nurturing abilities. These specifically comprised of careers such as 'teaching and nursing' (Walker 2018b: 133). Thus, education for the Black disenfranchised female was very 'traditional', highly gendered (Akala 2018: 232) and designed to stifle her ability to make a meaningful contribution to the workforce (Akala 2019).

White women on the other hand also had limited options available to them, but held careers supporting White men, like 'clerical and secretarial jobs' (Akala 2018: 232, see also Jansen 2009),thus, retaining their privilege from the 'intersection of white, gender and middle-class' (Chapman and Bhopal 2013: 569, Ortega 2020, Hill-Collins and Bohrer 2022). This is in contrast to the precarious forms of employment set out for the less educated Black women from a subjugation standpoint (Nicolaides 2015, see also Bohrer 2019), implicating the constructed notion of gender, race and class in relation to a mediocre education set out for Africans (Mutekwe 2015: 1295), in propelling low socio-economic and deprived women to accept the situation and take their space in the informal economy (see van Klaveren et al. 2009: 27-29).

Scholar have opined that the above dynamic is in relation to the ongoing interface between capitalism and patriarchy, positioning men as providers in further entrenching gender

inequality, whilst manifesting into broader issues associated with power imbalances between the genders (Einestein 1999, Bohrer 2019, Vergès 2021). In addition to capitalism, others have interrogated the post-Apartheid era's set up of colonial modernity, in relation to the various intersectional identities, such as trans, queer, disabled, in intensifying the oppression of less privileged women of colour as espoused by various scholars (Yuval-Davis 2006; Lugones 2010; see also Fine 2012). Hence, Orton (2016) is of the view that despite attempts to rectify Apartheid's injustices against women, particularly for Black disenfranchised bodies, such endeavours have not amounted to anything tangible into the new dispensation.

However, Mutekwe, Modiba, and Maphosa (2011: 133) blame African societies for promoting 'stereotypical' notions of gender-related careers, which inadvertently disempowers the already disadvantaged girl child in thriving educationally. To further expound on this, de Lange, Mitchell, and Bhana (2012: 507) found in a rural South African village, girls who excelled academically experienced hostilities by their communities, since the women's duty was to cook, clean and care for her family. Moreover, Zuze (2020) found that girls from resource-poor socio-economic backgrounds were less likely to perform well at school compared to their middle-class peers, due to both the endemic poverty in their surroundings, and as a result of a patriarchal system they live under, which prioritises household chores for women over education. Neither middle-class women nor Black resource poor men were subjected to the same levels of oppression. This is due to resource-poor women's work being considered inferior, less important, and undervalued within a normative patriarchal socio-cultural framework (Maseno and Kilonzo 2011, Johnson 2014). As a result, there is deemed little reason to place much emphasis on the girl child's education, given that her role has already been set out by cultural expectations (Maseno and Kilonzo 2011, Akala 2019, see also Msibi 2011).

This situation is of course not limited to the South African context, rather this is a global issue. However, there is evidence that mothers can play an important role in supporting the girl child's education. By way of one example, Levison and Moe (1998) found in a Peruvian study that the mother-daughter relationship at home influenced the educational opportunities for girls. The researchers found that the more educated the mother was, the more likely they were to ensure that fewer household responsibilities were placed on the girl child, in the interest of her education. Conversely, the less educated the mother was, the less importance

was placed on her daughter's educational endeavours. This reinforces Nicolaides' (2015: 203) study of Black women from poorer socio-economic backgrounds in the South African context, whereby the researcher found that women themselves reinforced patriarchal ideals.

Furthermore, (Maseno and Kilonzo 2011) reported in their study of two villages in rural Kenya, on how patriarchal relations manifest between men and women. The researchers found that patriarchy was pervasive throughout the villages, through the enforcement of traditional patriarchal gender roles, for example in that women had to gather food as well as prepare it, and that the patriarchal dynamic also further manifested into gender-based violence. Hence, patriarchy in the private sphere is reflected in the disempowerment of women in the public sphere, both socially and educationally, making them reliant upon men for financial support, and providing a breeding ground for gender-based violence (Orton 2016, Walker 2018b).

3.4 Resources

3.4.1 Funding allocations

According to Walker (2019) public schools fall under five quintiles, depending on various socio-economic factors. Quintiles 1, 2 and 3 schools are those which were reserved for non-Whites during apartheid and currently do not charge fees (van Zyl-Schalekamp and Mthombeni 2017), whereas 4 and 5 are for former White schools and parents are expected to pay school fees (Walker 2018a, 2019). A quintile system has been set up by the democratic government to 'allocate government subsidies' to schools (McKay 2015: 103).

Moreover, other supportive structures to assist needy schools, such as the National School Nutrition Programme (NSNP) are put in place to mitigate against the inequity gap (Department of Basic Education 2021). The NSNP is a programme set up by the government to mitigate against school hunger. However, Motala and Carel (2019) suggest that the system of funding remains inequitable, as their research found that poorer rural provinces received less funding to purchase resources and employ more teaching staff, compared to wealthier provinces. In addition, Quintile 4 and 5 schools have wealthier School Governing Bodies (SGB's) that can financially subside the school to further complement government funding.

The above dilemma also puts these wealthier schools in a favourable position to employ more teaching and specialised staff and to diagnose learners with learning difficulties as compared

to township and rural schools (Motala and Carel 2019). Similarly, Abdoll and Barberton (2014) found that government spending in rural educational contexts remains rather opaque, as there lacks accountability in their expenditure reports. In McKay's (2015: 103) study, the researcher found that in spite of learners not expecting to pay school fees, particularly in impoverished contexts, gaining an education was not entirely free. She found that parents were still expected to give a donation to the school annually, as well as pay for miscellaneous costs associated with books, uniforms, extra-curricular activities, and transport.

Martinez-Vargas, Walker, and Mkwananzi (2019) found that students have to travel far distances to access good quality schools in urban suburbs. This is in line with what Teeger (2015: 228) notes as the influx of Black students into White schools at the dawn of apartheid, though the reverse was not observed. McKay (2015: 104) notes that parents sometimes had to inconvenience the family to finance transportation costs and contends that 'such "hidden" costs of schooling may be further impoverishing households'. Therefore, it remains imperative that both forms of equity, social, as well as educational need to be tackled to dismantle the effects of a maldistribution of resources, in order to ensure the most vulnerable in society do not continually remain excluded.

3.4.2 Material resources

Issues of access to and availability of material resources in the South African context have largely determined the experiences of learners, depending on which side of the schooling spectrum they find themselves on. To shed light on this, Liccardo and Bradbury (2017: 378), as well as earlier work by Spaull (2013: 18) point to the nature and context in which impoverished schools operate in South Africa. They allude to a paucity of well-resourced schools being responsible for not adequately preparing scholars to undertake STEM related courses at university. This is despite calls from government for students to specialise in maths and science subjects (McKay 2015: 104). This can further be in addition to a variety of factors, such as how inequitable funding perpetuates further disadvantage, as outlined above, as well as deeper and wider structural challenges confronting impoverished contexts.

McKay (2015), for example, conducted research in various township schools in Alexandra, a township outside of Johannesburg in South Africa, plagued by poverty and unemployment. Her research reveals that of the 18 primary and secondary schools in the area, none had

science laboratories, besides for two, which were either locked or non-functional. This is similar to what Maringe, Masinire, and Nkambule (2015: 380) found in 3 separate rural schooling contexts, whereby scientific and computer laboratories were present, though rural schools did not make use of these, as they lacked the resources that would facilitate teaching and learning, such as instruments and equipment. Instead, they utilised such buildings as storage facilities for 'broken furniture'. However, they further concluded that the situation in rural schools was made more difficult compared to their urban township counterparts, due to electrical scientific equipment and instruments not always being able to be used in 'non-electrified' rural spaces. This suggests that rural learners can be excluded from conducting science experiments at school and become locked out of the STEM 'curriculum', as a result. It further corroborates later research conducted by Nesthivhumbe and Mudua (2021) which indicated that a lack of science labs and equipment were the main obstacle for science-related practical tasks to be delivered in rural schools. Hence, being deprived of science laboratories in young people's formative years bear repercussions for their tertiary experiences (Liccardo, Botsis, and Dominguez-Whitehead 2015: 387).

3.4.3 Skilled teachers

There is a relative consensus amongst researchers in the field who argue that little meaningful teaching and learning takes place in impoverished settings due to a fragmented educational system engineered by past segregation policies (Young and Campbell 2014: 360; McKay 2015: 102; Pather and Chetty 2015: 1). This is due to a number of reasons, such as class sizes, teacher morale, workload, a lack of resources, less conducive working environments and insufficient resources (Leibowitz and Bozalek 2014; Teeger 2015; McKeever 2017). du Plessis and Mestry (2019), in their research concerning the experiences of 8 teachers and 4 principals from different primary and secondary schools in the rural Mpumulanga region of South Africa found that rural classrooms are often confronted with double grade teaching leading to very large class sizes, which eroded the teacher's ability to teach effectively and divide their attention amongst all pupils. Teachers in rural schools having to contend with overcrowding and large class sizes often led to negative attitudes, which affected positive learning outcomes (West and Meier 2020, see also Marais 2016). Moreover, in a different study, Matsepe, Maluleke, and Cross (2019) found that due to large class sizes in rural Limpopo schools, teachers were unable to produce critical scholars. This suggests that the academic learning

and teaching of rural children are often compromised, as opposed to those who learn in smaller class sizes, resulting in more individual attention from teachers.

However, in Walker's (2019: 54) study it was found that impoverished female students reported that teachers in township schools only supported the students who were the 'clever' ones at school. This implies that only those who are perceived to be competent in class are given enough attention by teachers, which could also be due to the structural factors at play in schools facing multiple deprivation. In contrast, Martinez-Vargas, Walker, and Mkwananzi (2019) report that teachers in former Model C schools supported all students with career advice and assisted them in selecting subjects in line with their interests and personality. Walker (2019) also suggests that advantaged schools' facilities allowed for such provision. Also, teachers in well-resourced schools do not have to often navigate the complex schooling terrain associated with multiple deprivation which means better support measures in place for its learners. These are some of the key factors that put former Model C schools on par with international teaching and learning standards (Pienaar and McKay 2014).

To further illuminate on this dialectical tension, Swartz et al.'s (2017) study found that disenfranchised students made mention of not having enough Maths and Science teachers to support their learning whilst at township schools. This is due to the fact that teachers are often reluctant to teach in resource-deprived contexts, which further erodes on the quality of education being offered in such learning enclaves (du Plessis and Mestry 2019). Moreover, students were also not in a position to specialise in Maths and science from grade 10 onwards, since township schools did not have teaching capacity to teach these subjects (McKay 2015). Hence, the school never offered such. This reflects Walker's (2019) findings on resource-poor students at university being unable to pursue their dream careers at university, due to a lack of subject choices during their schooling. Moreover, where teachers were available, township and rural schools discouraged girls to do non-STEM related courses, since a patriarchal normative gendered perception persists that women are not capable of being scientifically minded (Mkhize 2022). This was further reflected in Liccardo and Bradbury's (2017) study in STEM at university. The researchers found that Black female students were encouraged in their impoverished schooling context to do art and not technical drawing, as the latter was for boys.

Apart from resources in relation to teaching and learning, the attitudes of teachers in general are paramount in fostering an effective learning environment. In their study, Maringe, Masinire, and Nkambule (2015) compared the attitudes of teachers in three schools facing multiple deprivation in implementing their duties. The researchers found that in one school, teachers' qualification levels, as well as showing a respect for learners, including engaging parents, were key factors in ensuring a successful school, despite adversity. However, in the other two schools, the researchers found that teachers only possessed the bare minimum qualifications and often displayed negative attitudes towards both learners and parents, as well as facing redeployment, which resulted in a dysfunctionality of the institution and went on to hinder learning opportunities for pupils. Hence, Venkat and Spaull (2015) found that teachers in multiple deprived schooling contexts were unable to solve grade four maths problems. Moreover, others such as Nel and Müller (2018) have shed light on the limited English language proficiency teachers in impoverished schooling contexts possess, which hinders the educational development of its pupils. Thus, the majority of learners transitioning into South African HE, access it with this background, leaving them epistemologically excluded (Morrow 2009, Fataar 2019), which I further address in the following sections dealing with the interface between schooling and HE and the implication for access and participation, including the role of different forms of capital (Western and alternative).

3.5 Transitioning Into, Through and Out of Higher Education

3.5.1 Accessing university

Accessing HE in South Africa has always been contentious for minority student populations, especially given how the institution remains juxtaposed against their subaltern identities (Liccardo 2015, 2018a, 2018b, Fataar 2018, 2019). This is due to a gap in knowledge between their home and school background and that espoused by the institution (Timmis et al. 2019, Mgqwashu et al. 2020, Timmis et al. 2022, see also Cross and Atinde 2015). This incongruence is what Morrow (2009) refers to as epistemological access. In this, the university omits its part in aligning itself to a diverse student populace in widening access, especially for those at the bottom of the social hierarchy. Thus, Calitz (2018) argues that the university faces an identity crisis, whereby it is situated on African soil with a Western structure, influence, essence and

substance. This remains problematic, since the institution may not be in a position to respond to the needs of minorities intending to access HE (Waghid and Hibbert 2018b, Fataar 2019).

Walker (2018a) for example, noted that students from impoverished backgrounds did not possess a robust foundation in accessing HE. They were hindered by a lack of material resources, including practical but essential minutia such as having money for taxi-fare to university to make their applications in the first place, and when getting to the institution, lacking the knowledge of how to complete the application forms. Moreover, in the case of rural students accessing HE, their exclusion remain more entrenched, due to a geo-spatial element (Timmis and Muhuro 2019, Timmis et al. 2022), further amplified by the remnants of colonisation (Masinire 2020).

In their study on rural students' access into university, Timmis et al. (2022), as well as earlier work by Timmis and Muhuro (2019) found that rural students faced more challenges in accessing university, given that they are situated far away from institutions, making it difficult for them to personally enquire. The fact that university applications are now mostly digital also poses a barrier for resource-poor applicants with limited access to computers and a lack of digital literacy. Consequently, they learned that rural students accessing university remained technologically excluded, due to lacking technological equipment and little or no access to internet services in rural enclaves. Thus, Black female students from resource-poor backgrounds face many obstacles when making the transition into HE, and trying to access male-dominated fields, like science and engineering, poses even greater barriers to successful participation (Walker 2018b).

Another issue that can pose further barriers to the access of disadvantaged students' access into university concern the lack of guidance and support from a parent, guardian, or someone in their immediate surroundings (Walker 2018a, see also McKay 2015). Parents in resource-poor contexts may have had limited educational access and opportunities themselves and as a result are not fully able to support and aid their children's educational endeavours (Martinez-Vargas, Walker, and Mkwananzi 2019, see also Li and Qiu 2018). This can be further seen to be a symptom of the Apartheid governments' role in separating Black families, in which men were forced to take up employment in cities, spending long periods of time without seeing their wives and children (Nicolaides 2015; Gradín 2019). Morrell, Jewkes, and Lindegger (2012) ascribe this to the creation of complex family systems in South Africa, which

continue to be non-nuclear and whereby single mothers raise their offspring. In many socio-economically deprived Black families, children are reared by either the granny, aunt or uncle, because their parents are deceased or due to parental separation or because parents have had to travel away for work (Swartz et al. 2017, 2018, Martinez-Vargas, Walker, and Mkwananzi 2019, see also Daniels, Davids, and Roman 2018). This makes it even harder for parents to play a significant role in the child's life, let alone her education.

3.5.2 Participation at university

The participation of Black women at university is influenced by various factors, such as prior schooling experiences (Monica Mawoyo and Ursula Hoadley 2009, Dukhan, Cameron, and Brenner 2012, Lewin and Mawoyo 2014, Liccardo, Botsis, and Dominguez-Whitehead 2015, Timmis et al. 2022), their home backgrounds (Lareau 2011, 2015), and cultural, as well as epistemic disjunctures (Santos 2018, see also Le Grange 2007) in relating to the Eurocentric set up upon arrival, as well as in applying themselves at university. Thus a '(mis)recognition' of their identity may come into sharp focus which may hinder their academic potential (Fataar 2018: 596, see also Calitz 2018). This leads scholars to conclude that a bridge between what students know and what they are offered at university should be narrowed (Jansen and Walters 2018, see also Leibowitz 2017a).

3.5.3 Habitus and dominant forms of capital

Bourdieu (1984) theorised the notion of habitus, which suggests that a persons' 'dispositions', behaviour and attitudes bequeathed upon him/her from their family are responsible for influencing his/her decisions and guiding the individual's interpretation of the world. Thus, such practices and rituals, often practiced by the elite and wealthy is what gives middle class children the upper hand in educational institutions. In addition, what works to the advantage of elite practices and customs is that schools often endorse and reward such practices, while penalising lower socio-economic groups (Bourdieu and Wacqaunt 1992). In other words, former Model C schooling contexts in South Africa are geared for preparing its learners for HE, given that it conforms to the underlying habitus that's condoned in elite spaces, such as universities. This leads Pather and Chetty (2015: 62) to argue that, 'if a student habitus is closely matched to the institutional habitus, a student would be more likely to successfully integrate academically and socially into his/her new environment'. Conversely, where there

is a disjuncture between the schooling habitus and that of the institution, this serves to exclude and 'other' often reinforcing inequality (Bourdieu and Wacquant 1992).

The above is sharply reflected in a study of low socio-economic first-generation Black female STEM students at a historically advantaged institution in South Africa, Liccardo, Botsis, and Dominguez-Whitehead (2015) found that despite having received financial, academic and psychosocial support, through means of scholarships, students were still unable to forge ahead in their engineering programmes. This they attributed to a lack of being adequately prepared in township schools, which hindered their equal participation at university. The researchers instead found that the type of knowledge held by students who attended former Model C schools differed significantly to those emanating from township schooling backgrounds, in that the former could execute complex applications and operate certain resources with ease, whilst the latter had little or no experience in carrying out such.

Similarly, Timmis et al. (2022) found that rural students lacked the institutional habitus upon arrival at university, which positioned them as outsiders, due to a lack of exposure to resources and habits that form part of HE's teaching and learning approach, thereby affecting their progress. Moreover, in the absence of resources, township and rural learners are also more likely to be confronted with rote learning and memorization of textbook information at school, which make them less competent in applying themselves effectively in utilising learning equipment, but also in becoming critical scholars at university (Dukhan, Cameron, and Brenner 2012, Liccardo, Botsis and Dominguez 2015). Another obstacle to equal participation at university for socio-economically challenged students is the unavailability of certain subjects on offer in impoverished schools.

In addition to habitus, Bourdieu and Passeron (1990: 87) further note that impoverished youth do not possess significant forms of cultural, as well as symbolic capital endowed upon them by their parents, as well as communities to aid their academic mobility. The above statement, underpins Lareau's (2015: 2-3) finding that lower-class parenting styles in the American context often hinder educational potential. Socio-economic poorer or working-class children with limited cultural and educational capital are more likely to be socialised to obey instructions without questioning orders, as opposed to middle class children with greater cultural capital who are socialised to be opiniated and to express themselves freely, further shaping their participation, and even success at university. Similarly, Makunga et al. (2018)

found that that the influence of parents and caregivers are more complex in the South African context, given the lower literacy levels amongst the older generation, due to segregation of education, inhibiting low socio-economic students' potential. His was especially evident in rural and severely impoverished enclaves where parents and caregivers were unable to foster a learning environment at home to the children in their care with the academic capabilities to succeed at school. Moreover, Piketty (2014) further observed that excelling in academia, as well as becoming successful in employment are primarily aligned to the different capitals (social, economic, cultural, symbolic) bequeathed on students by their parents.

Lareau (2015) further explored the complexities shaping parenting in terms of class backgrounds. In this American study, socio-economically impoverished parents were forced to contend with survival strategies in making a living, which afforded them less time to spend with children in enhancing their educational development. However, middle-class parents had the resources, including the knowledge, which allowed them to facilitate extra-mural activities, and endeavours outside of schooling, to uplift them educationally. This is reflected in Walker's (2018b) South African study whereby three impoverished Black female students reported that they lacked academic support from their parents, which made their academic entries and journeys into HE more challenging.

Furthermore, Liccardo (2018a) reported on the trajectories of low socio-economic Black women on an engineering scholarship at a South African university, who lacked both the habitus of the institutions, as well as the cultural and symbolic capital, given that they were first generation students. The researcher found that these Black women were insiders, due to the physical access that was granted to them, through admission, however, they also situated as outsiders for not being able to align to the traditions, rituals and practices set out by the institution, which, since parents were unable to pass certain cultural and symbolic capital onto them, affecting their engagement and progress.

3.5.4 Alternative capital and embodied infrastructures

There has been various debates in calling for the acknowledgement of alternative standpoints and ways of knowing and being, especially in the era of obscuring different philosophies and ideals from the modern day science curricula (Okeke et al. 2017, see also Carter 2011), including institutional failure to promote epistemic plurality (Connell 1993, 2014, 2017, Carter

2003, 2011, Mbembe 2016). Dutta (2016) carefully examines the knowledge terrain and questions why certain epistemic standpoints are often regarded as the pinnacle of success. The findings from various scholars though reinforces her point, as they assert that alternative vantage points, such as that held by non-heteronormative and non-middle-class white men are constructed and often viewed from a deficit lens (Jayakumar, Vue, and Allen 2013, Yosso and Burciaga 2016). One example of how this non-dominant cultural capital could be seen and valued is provided in the work of Mgqwashu et al. (2020), in which they found that rural students at various South African universities engaging in STEM were more advanced scientifically, compared to their non-rural counterparts, given their prior exposure in terms of knowledge of soil, plants and in working with animals in their rural contexts.

Hence, Yosso (2005) argues that marginalised groups possess their own 'community cultural wealth' and knowledge systems bestowed upon them by their respective communities. In her argument, she critiques Bourdieu's (1984, 1986) notion of capital in only giving relevance to the white and middle-class experience. Cross and Atinde (2015: 308) refer to this as the 'pedagogy of the marginalized' in which non-dominant and disadvantaged communities can use their own resources to support and sustain one another. Hence, various scholars have argued that is micro-embodied forms of knowledge that non-dominant bodies experience in general that are missing from the knowledge canon (Liccardo and Bradbury 2017, Bell 2018, Hlabangane 2018, Kiguwa and Segalo 2019, Chilisa 2020). An example of how community cultural wealth serves the interest of non-dominant groups, such as Black women on a STEM programme in the South African context, concerns the work of Liccardo (2018a). The researcher found that Black female bodies resisted the heteronormative and Western patriarchal culture embedded in their departments being responsible for their exclusion, and as a result went on to support each other through poetry and song in documenting their experiences in defiance of the ongoing racialised and gendered status quo. However, her research does not show how Black women supported each other both materially and non-materially as outsiders to the dominant institutional values and to the heteronormative nature of STEM as a study field. Moreover, in a different study, Cross and Atinde (2015: 322) found that South African rural students from poor socio-economic backgrounds used the 'learning resources' inherent within them to succeed at university in the midst of adversity in facing

epistemological exclusion. These ranged from goals setting, as well as managing time and material resources wisely.

In addition, low socio-economic female students also possessed their own forms of social capital, which they often drew on, as reported by Walker (2018b). The researcher found that despite impoverished female students not receiving the needed support from their parents, they managed to do well academically as time went by, due to the guidance and direction they received from lecturers and academic staff. Similarly, Johnstonbaugh (2018: 602) found that socio-economically challenged female students strategically navigated university enclaves by setting out to forge networks with mentors, peers and others who were able to assists their academic advancement. Hence, socio-economically disadvantaged students were often found to form pockets of communities, as it provided them with a sense of belonging at university, as well as being able to relate to one another's pain and suffering (Walker 2018a). This is also further affirmed in a later study by Khan (2020) on disenfranchised students at a different South African university, suggesting that a lack of resources resulted in self-exclusion, whereby lower socio-economic students kept to themselves, as they did not wish to expose their economic status to their more affluent counterparts.

Similarly, in the American context, Ong, Smith, and Ko (2018) found that women in STEM created counterpaces outside of the university to buffer against the loneliness and isolation of a hostile male dominated STEM culture within their respective departments. Within this, they found that female faculty even went to the extent of setting up monthly meetings whereby women in STEM can gather to interact and support each other. Also, in recent work undertaken by Lane and Id-Deen (2023) in the US context found that Black women on a summer STEM programme were eager to forge networks with other women to support their scientific endeavours, as they felt that they were accepted for who they were and what they stood to contribute, no matter how small that was.

Furthermore, this brings into sharp focus Clisby and Holdsworth's (2014) work on the gendered experiences of women's lives and how the actions of the female labour are often implicated through infrastructural care in a two-phase research project in the English context. They learned that women used their bodies as infrastructures to physically, emotionally and mentally support other women, and receive the same in return. This phenomenon they understand to be highly gendered in highly implicated in the work and initiatives of women,

that often go unnoticed and unrewarded, and thus went on to term it as 'embodied infrastructures' (Clisby and Holdsworth 2014: 11). They suggest these to be:

visits made and support offered to elderly or otherwise vulnerable neighbours, developing community-based groups to provide services for young or elderly people in the area, establishing and maintaining friendship networks with neighbours, maintaining family networks with biological and non-biological kin through social care networks, for example, sending gifts and cards at birthdays and religious festivals or hosting friends and family in one's home to celebrate significant events. All this work that goes into the creation and maintenance of these embodied infrastructures, is expensive in terms of time and emotional labour as well as more directly financial costs (Clisby and Holdsworth 2014: 11).

3.5.5 Linguistic participation

Language in the South African context has always been closely aligned with scholastic success (Msila 2019; Madiba 2012; Nkosi 2014; Seabi et al. 2014; Desai 2016; Potgieter 2016; van Deventer, van der Westhuizen, and Potgieter 2015, Mutasa 2015, Lombard 2017). As a matter of fact, one of the main reasons that non-English speaking students underperform is a result of a language barrier (Mutekwe 2014, Makalela 2015, Desai 2016). As argued by Lafon (2009), the South African linguistic identity is riddled with politics reflecting injustices of colonialism and Apartheid leading to two primary languages hegemonising the linguistic terrain. This linguistic hegemony had a more sinister and brutal effect in 1976, whereby South African Black school pupils revolted against the Apartheid regime for their refusal to be educated through the medium of the Afrikaans language. Black pupils clashed with police, which led to bloodshed, whereby numerous were injured and even killed, most notably, Hector Peterson, who have to date become iconic in the struggle for South African liberation. This further marked one of the defining moments, highlighting the plight of a non-racialised education system, and a step towards democracy and freedom.

Hence, language was used as a tool of control to assert power and to hegemonise the coloniser's existence, linguistic identities and culture (Spaull 2016), to 'civilise' and educate the natives, as well as to further drive the colonial agendas back at the colony (Lafon 2009: 3). Moreover, there has been much speculation in academic discourse surrounding the legitimacy of Afrikaans and whether it can be considered a Dutch Creole (Aexander 2011) or

a mixture of Dutch, Malay and Khoe as Hurst and Mona (2017: 129) put it. Nevertheless, despite its validity and origins, Aexander (2011: 12) contends that although English and Afrikaans stood in opposition to each other, Afrikaans was still developed academically through the aid of English (Aexander 2011: 12)**.**

To date, South Africa has made great strides at ensuring linguistic pluralism by legislating eleven official languages into its constitution, whereby nine are native indigenous languages (Department of Arts and Culture 2003; Lombard 2017; Nkosi 2014 and Madiba 2012) with all holding equal status in order to address prior imbalances, to ensure equal and fair representation for everyone and to enable cultural and linguistic integration to serve the needs of a dichotomous society (Department of Arts and Culture 2003). In addition, the government introduced the Language Policy for Higher Education (2002) for higher learning institutions and the Language in Education Policy (1997) which applies to primary and secondary schooling at the beginning of democracy.

The aforementioned policies made provision for all South African universities to individually and retrospectively set in motion an outline of how to embed and allow indigenous African languages as the central emphasis in respective curricula design and planning and as part of their mandate to pursue institutional 'transformation' (Mutasa 2015: 46-47; Drummond 2016: 72). However, the step towards crafting overarching language policies by the democratic regime of South Africa set out to challenge existing inequalities, allowing recourse for past injustices by ensuring that the language of instruction (LOI) and language of learning and teaching (LOLT) will be representational to serve the needs of the wider demographic nature of the South African student populace.

Various scholars have called for the development of African languages alongside English for academic purposes, the same way Afrikaans was developed to ensure that all students benefit from being instructed in their native language (Mutekwe 2015, Makalela 2018, Msila 2019). Failure on the part of South African institutions to act suggests that South African HE is continuously feeding into Western notions of eurocentrism under the guise of transformation agendas, impacting student access and participation. For example, Drummond (2016) conducted research on two South African HE institutions, in which the researcher found that as much these institutional policies suggest African language instruction as part of its transformational agendas, there were no implementation of such. This further shows the

inaction of certain key players, such as universities in retarding transformational efforts, and in the process disempowering non-native English-speaking students in South Africa.

Matters concerning Eurocentric knowledge canons and paradigms in academia sparked protests by students across South African institutions, calling for a decolonisation of the South African academe by revisiting its LOLT policies and by overhauling its curricula by Africanising it to reflect the linguistic and cultural heritage of its students (Desai 2016: 343; Mayaba, Ralarala, and Angu 2018). Nonetheless, criticisms have also been levelled against the move to adopt an African language for teaching and learning purposes, and many believe that it would undermine the standard of South African education in the global arena (Swartz et al. 2017).

Opponents propose various critiques, by arguing that race, class and gender identity plays an important role in differentiating HE structures in South Africa, as mentioned above, which Phillipson (1997: 238) terms 'linguistic imperialism', referring to the 'hierachisation of languages' in general. This pertains to how certain languages have gained prominence through its usage and validation, as is the case for both English and Afrikaans (ibid.). Phillipson (1997: 238) alludes to a term 'linguicism' which was further developed by Schutnabb-Kangas, a linguistic scholar, equating the notion of 'hierarchisation' on principles of race and ethnic background '(racism-ethnicism), gender (sexism) and language (linguicism)'.

Tove Skutnabb-Kangas (2000) suggests that linguicism essentially refers to the authority of one language over another based-on factors like racial backgrounds of its subscribers. Denying students the right to make use of their own language for educational purposes sets out to deny their epistemic freedom (Schutnab-Kangas and Phillipson 1988: 33). Makalela (2016: 187) refers to this as a 'monolingual bias' perpetrated in institutions which works against the access grain of equity and Prinsloo, Rogers, and Harvey (2018) see it as a discordance between linguistic background and academic background, while Claussen and Osborne (2013: 60) believe that subjecting non-native speakers to English in educational settings equates to 'symbolic violence' in the case of women of colour engaged in a science related courses. Swartz et al. (2017: 24) refers to symbolic violence as 'the process of internalising identity-based oppression associated with poverty and such repressive regimes and take the existing social order to be just'.

To place the issue of language into perspective and to demonstrate its profound impact on Black impoverished female student access and participation, Drummond (2016) argues that students whose native languages are neither Afrikaans nor English are often voiceless in matters pertaining to language freedom and equity, such as in the case of deprived and marginalised women of colour. No wonder, (Mutekwe 2014) found that non-English speaking students, and particularly those from resource-deprived backgrounds, at university developed poorer self-esteem, as a result of not being able to fit in, whilst Kalenga and Samukelisiwe (2015) observed the use of dictionaries in classes to enhance understanding for those students whose township education had poorly equipped them to effectively master the English language.

This above findings was further reflected in work done by Shefer, Clowes, and Ngabaza (2020) on the participation of low socio-economic students at university. The researchers found that students from township schooling backgrounds refrained from interacting in class, hence remained excluded, as they were unable to articulate themselves in the same way they perceived their English speaking and former Model C schooling counterparts would. Hence, Bourdieu (1991) asserts, learning institutions often create unequal opportunities through filtering various different languages to different groups of students, perpetuating an uneven playing field. He argues that 'speakers have the same recognition of authorised usage, but very unequal knowledge of this usage' (Bourdieu 1991: 62). Bourdieu also alludes to how language intersects with race, class and gender to shape individual life chances.

In township schools, Spaull (2016) found that impoverished students in Grade 3 were unable to write a simple sentence in English, due to a language barrier. Nonetheless, Makalela (2016) contends that by the age six years old, many African children are already proficient in three languages. Moreover, many have alluded to the advantages of being able to communicate in various different languages and associates this with the individual possessing higher symbolic cultural capital than monolinguists (Potgieter 2016).

However, the English language still presents the most cultural capital, as Swartz et al. (2018) demonstrated in their work on students from eight universities in South Africa, whereby students felt that holding a high command in the English language would enhance international opportunities. Similarly, Liccardo and Bradbury (2017) found that Black female students on a science-related course felt that they would be perceived to be incompetent,

since they were less able to interpret scientific terms and jargon. Hence, they refrained from enquiring from lecturers and tutors, which posed negative implications for their grades. The researchers went on to further note:

> In addition to the absence of particular background knowledge and skills, the medium of instruction at university is English, which is not the mother tongue of the majority of students, and several women allude to this as a big learning hurdle. Although secondary school education is officially conducted in the medium of English, in the racially and linguistically homogenous schools from which many of these students come, code-switching is standard practice (Liccardo and Bradbury 2017: 288).

This is part of the research Msila (2019) argues, that advancing African languages in academia, would allow students to gain better confidence in class and enable deeper participation levels. Moreover, Hurst and Mona (2017) call for English to be taught through other African languages and not in isolation. This is also similar to what Makalela (2016: 190) is advocating for as 'translanguaging' or multilingualism in classrooms whereby non-native English-speaking students are at liberty to draw on their entire linguistic repertoire and thereby use several languages in one instance to draw upon.

The following section will document the experiences of Black students entering the job market, as well as postgraduate studies, including workplace complexities in masculine spaces for Black female bodies.

3.5.6 Transitioning out of higher education and complexities associated with STEM postgraduate studies and work

The transitions out of HE for South African students are always stressful, due to the uncertainty of job prospects, given the country's high unemployment rate (Flanagan 2021), especially for graduate students from lower socio-economic backgrounds, such as those who are dislocated, as being, Black, female and low SES (Harry and Chinyamurindi 2020). With the advent of the Covid 19 pandemic, jobs losses were further accelerated, leading more younger Black people into unemployment and poverty (Habiyaremye, Habanabakize, and Nwosu 2022). Moreover, various factors are associated with the high unemployment rate in South Africa, where as some believe that the problem may be due to a mismatch of skills and that

young graduates are not adequately prepared for the job market (Mncayi and Meyer 2022, see also Chinyamurindi 2016). Moreover, apart from possessing the right skill sets, scholars such as Baldry (2016), as well as Mncayi and Dunga (2016) also believe that race is implicated in the high unemployment rate amongst Black graduates, as more companies and employers prefer hiring whites over Blacks.

Harry and Chinyamurindi (2020) found that due to a lack of opportunities available after undergraduate studies, Black commerce graduates from low socio-economic backgrounds resorted to enrolling for postgraduate teaching qualifications, as it offered them employment prospects afterwards, but more so to alleviate pressure from families to earn an income. In other words, poverty, and the pressure from back home motivated graduates to take up teaching, to earn an income, but also due to a lack of job opportunities. In addition, low socio-economic Black women in the STEM field may use teaching bursaries as a means to occupy themselves, in the absence of postgraduate funding for courses in line with their career prospects.

Moreover, the situation seems bleak for Black female STEM graduates who are unsuccessful in securing employment, as Liccardo's (2018a) study suggest. The researcher found that all her Black female participants on a STEM scholarship programme, were unable to secure employment in penetrating the white male-dominated STEM job market, upon completion of their studies. This resulted in anxiety and depression for these young female graduates, as not only were they affected, but their communities and families that looked up to them too.

Also, when Black women do secure employment or venture into further studies in STEM, they are often confronted with constantly being under the colonial gaze, by being positioned as outliers (Liccardo 2015, Liccardo and Bradbury 2017) in often White middle-class masculinised spaces. In other words, due to the colonial constructions of race and gender, STEM workplaces and postgraduate study entities are still embedded with a culture and mentality of favouring the male gender and his abilities over that of his non-dominant female counterpart (Lugones 2008, 2010). A good example of this concerns the research conducted by Wilkins-Yel, Hyman, and Zounlome (2019) in an American study found that Black women were often ignored in STEM postgraduate studies and their sense of belongingness to STEM questioned by their White male peers and professors. Another example was uncovered by

Idahosa and Mkhize (2021) on the experiences of 19 Black female STEM doctoral researchers from two South African universities through an intersectional lens. They found that Black women in STEM were often found to be excluded, due to the assumptions that they were incapable and as a consequence more serious and complex tasks were often afforded to men (both Black and white). Similarly, Alexander and Hermann (2015) found in an American study, that Black women in STEM were undermined and belittled by White professors which had implications on their ability to conduct research.

Similar findings were also reflected by Mcgee and Bentley (2017) in an American study on 3 Black female students engaged in both undergraduate and postgraduate studies. The researchers looked at the experiences of women of colour in STEM through a structural racism perspective and found that Black women were perceived to be hypersexual and not deemed fit to make an academic contribution. This resulted in men (both Black and white) requesting sexual favours. Also, Black women in STEM were given duties that were stereotypical to their gender, and it was often assumed that as non-dominant bodies, they were more inclined to be practical, than analytical.

Moreover, apart from being excluded to make a contribution in work and study contexts, the STEM space presented hostilities for women and their ideas, when they were expected to produce outputs. This was highlighted in Mkhize (2022) research on the experiences of 73 Black women pursuing PhD courses in STEM, through an intersectional lens. She found that Black women's ideas were harshly critiqued by Black men and that white women, as well as Indian women further oppressed their Black female counterparts. Moreover, she found that Black women were deemed intellectually inferior and their ideas overly scrutinised. This is also similar to what Miles, Brockman, and Naphan-Kingery (2020) found in an earlier study, whereby Black doctoral students in engineering had to prove their intellect to be included in group work at an American university. They also felt isolated by foreign Chinese students who formed tight knitted bonds to often excluding them.

Apart from Black women being 'othered', due to their race, gender and age, Black women were also side-lined for employment, such as tutorial roles, which were afforded to Black men instead, giving them more time to finish their PhD's, as reported by Mkhize (2022) in a follow-up study. Her findings reflect that of Mlambo (2022) which bears credence to the fact that

Black women found STEM academic spaces stifling for their career advancement, hence the need to move into industry and not pursue roles in academia. The researcher investigated the experiences of 18 Black female engineering students through a racialised and gendered perspective at a South African HE institution. She found that Black women felt excluded by the white masculine hegemony in their department, which remained pervasive and made them feel less safe, leading to their decision not to pursue a career in HE their decision in not pursuing a career in HE. In addition, her findings reveal that Black women also witnessed white women struggling to fit into masculine spaces.

Since academia's hostility of being Western and heteronormative propelled the actions of Black women to look to industry for opportunities in terms of career growth, studies have found that in non-academic working contexts relating to STEM, similar dynamics have been observed in shaping the non-dominant female in applying and asserting herself (Mcgee and Bentley 2017, Idahosa and Mkhize 2021). In their study, Balalola, du Plessis, and Babalola (2023) conducted a study on 42 Black female leaders in the STEM industry from 12 African countries from a leadership theoretical perspective in the workplace. The researchers found that Black women were negatively assessed over their leadership abilities compared to both Black men and white women. Their findings also revealed that Black female leaders received more pushback from both junior and senior men and were often treated with disrespect. This was further shaped by cultural attitudes held by Black men, which created barriers to Black women exerting their leadership influence.

The issue of heteronormative cultural bearings on women's professional lives in STEM were found to pervade boundaries in not only being confined to the African context, but further afield. In an Australian study, (Male et al. 2018) looked at how the underlying masculine culture primarily constrains the development of female students on a work placement at an engineering company. The researchers looked at the experiences of 13 engineering students (4 male) engaged in work placement, through a gendered workplace culture framework. The findings revealed that female interns were given admin work and expected to comply with it, instead of benefitting from experiential learning that will contribute to their skills and development as upcoming and competent engineers, whereas their male counterparts were expected to gain experience from observing other male engineers in the workplace. Moreover, the researchers found that workplaces posed extra challenges for women, as they

had to adapt to accommodating masculine talk, and anything that characterised the feminine gender was looked down upon. The researchers concluded that workplaces became hostile spaces, in which vulgar and sexual remarks were often instituted against women, and even at times more serious direct forms of sexual harassment. Similarly, in a British study of female engineers, Fernando, Cohen, and Duberley (2019: 13) learnt that female engineers were still subjected to patriarchal standards at work by their more senior male counterparts. The researchers contended that:

> Patriarchal relations at work thus potentially constrained women from making decisions, taking leadership and showing creativity. For instance, when awarding challenging assignments, "daughters" and "sisters" who need frequent assistance, guidance and care, might not be seen as the most promising candidates.

Furthermore, based on the above complexities associated with masculine workplace cultures, as well as heteropatriarchal practices negatively affecting the experiences of Black women in such confines, BEE policies geared to protect and emancipate minorities, such as non-dominant females, have rather worked against the interest of such groups (Naidoo and Kongolo 2004). BEE legislation has been introduced by the new dispensation to redress and transform workplace inequality, as well as to ensure the even representation of minority groups, such as Black women, especially in senior positions. However, Makgoba (2019) have found that highly masculinised spaces, such as the mining industry often identify and use loopholes to undermine transformative policies, in working against the interest of Black women. Hence, BEE did not always serve to empower minorities such as Black women. This was further remonstrated in a study conducted by (Klasen and Minasyan 2021) in how the different demographic groups faired prior to BEE's inception until recently. The researchers found that despite more Black women occupying leadership positions with the advent of BEE, as well as having increased qualifications, there still remain disparities in terms of financial reward for work undertaken, between Black and White men, but with the latter in particular, taking home a considerable amount of income, compared to that of their Black female counterpart.

Fouad et al. (2017) found in an American study that the leading cause of workplace attrition in the engineering industry were as a result of uneven compensation for the same amount of work carries out by the genders. This further confirms Sendze (2023) findings that Black

women are motivated to stay in STEM if they are well compensated with company benefits. Hence, issues such as wage disparities amongst the genders, as well as senior managerial roles in highly dominated workspaces which garnered less respect, often lead to workplace dissatisfaction and further motivated Black female attrition rates in STEM fields (Cardador and Hill 2018). Others also found that where workplaces that did not provide opportunities for growth and creativity Black women were further driven to leave their STEM posts (Sendze 2023). Moreover, Singh et al. (2018) ascribed the attrition levels of women in STEM to be associated to factors at work, such as overtime and work-life balance, to further motivate female departure from the field.

3.6 Conclusion

In conclusion, this chapter has drawn together various strands of cogent literature, organising it into themes pertaining to how Black South African women transition into, through and out of STEM HE and into the world of work. In so doing, this chapter has provided an understanding of the South African schooling system and how its feeds the educational interest and needs of different strata of its learner population. Moreover, I have also critically analysed the debates pertaining to schooling inequality, relating to material (i.e., equipment and facilities) and non-material (skilled teachers) resources, and influences in the home environment (patriarchy) in shaping educational opportunities for the girl-child, especially those from impoverished backgrounds. I argue that since African communities continue to be largely patriarchal, and women still have to live up to normatively gendered societal and community expectations, career and educational choices become constrained for the most vulnerable of women. In addition, I critically engaged with the secondary data pertaining to the complexities surrounding Black women's access and participation into HE. This pertains to how women from different class backgrounds experience the higher education terrain and the role played by different forms of capital (social, cultural, linguistic, symbolic) available to non-dominant females positioned differently in society, in accessing and participating equitably in the HE STEM terrain. Also, I further examined how alternative forms of capital Black women utilise whilst at university, as well as the support structures and initiatives they set up and undertake to support each other. Furthermore, I presented debates on accessing further studies, as well as the world of work, including the complexities associated with working in male dominated contexts. I now turn to the methodology chapter to discuss how this research

was carried out, including the underpinning methodological theorical framework, as well as the methods I applied.

Chapter Four: Methodology
Engagements with Black South African Women in STEM – Co-constructing Stories in the Field

4.1. Introduction

The aim of this chapter is to provide an in-depth discussion of how I carried out the research, including the practicalities of conducting the fieldwork, and the time I spent forging relationships with my co-researchers during the data collection phase. I refer to the women who took part in my study as co-researchers, in line with Chilisa's (2020) notion of decolonising research methods in ensuring equity between researcher and those that are being 'researched'. First, I provide an overview of my own stance and position as a researcher of colour and a Southern woman having experience in working with disenfranchised youth, as well as how my own subjectivities and biases may have potentially influenced this research in a particular manner (both positive and negative). In addition, I provide a rationale for my choice in aligning myself to a transformative research tradition. Second, I discuss my methodological frameworks, namely narrative inquiry and African storytelling and demonstrate how through the means of a conversational and storied approach, I was able to generate rich and meaningful data which assisted me in weaving together the co-constructed narratives of Black women along their STEM journeys. Moreover, I discuss the various analytical lenses that I employed and provide more substance on each. Third, I introduce the method sections by discussing the three iterative processes, as well as the complementary approaches. I elaborate on issues of recruitment and selection of the sample, means of accessing the site, and consider the reliability of the data. Lastly, I discuss the ethical considerations for this study, particularly in relation to my focus groups (talking circles).

As stated above, this research focuses on storytelling of a group of 21 Black South African women, at all stages of their STEM journeys (undergraduate, postgraduate, employment). These women co-researchers come from rural, as well as non-rural homes, and encompass both first and second-generation students. I conducted my research in three main iterations, with complementary approaches to enrich the storied approach.

4.2. Reflexivity and Positionality

As I point out in the introductory chapter of this thesis, I identify as a Black South African woman and remain aware of the fact that my own experiences, perceptions and understanding of the world shaped the outcome of my study. As I embarked on my data collection endeavour, I was mostly interested in understanding the stories of African women, since I position myself as a Black woman, with both Indian and African heritage, but particularly the latter, which I drew on for this research. Morrow (2005) suggests that it is important for the researcher to be astutely reflexive, since it will influence the way in which he/she positions himself/herself.

I believe that my insider knowledge was particularly beneficial for this research, as it was able to assist in the conveying of accounts insightfully as a Black woman from the Global South. Thus, my own embodied experience of growing up in the so-called Majority World, being schooled under the Apartheid segregation system, as well as my multiple intersecting identities as an African woman, situate me on the margins of society and as such in a more favourable position to share and recount similar stories with my co-researchers from the periphery. This is particularly important as it facilitated knowledge construction and development from a non-Western, decolonial feminist standpoint.

In addition, my position as a woman of colour allowed for greater awareness, insight and understanding to the plight of Black female students on both a philosophical and intellectual level, as well as on an experiential one (Leibowitz 2017a). Also, in line with work in liminal spaces, Smith (2012: 205) attests that: 'If one is interested in society then it is often in the margins that aspects of a society are revealed as microcosms of the larger picture or as examples of a society's underbelly'. As Haraway (1988: 586) asserts that 'knowing self is partial in all its guises, never finished, whole, simply there and original; it is always constructed and stitched together imperfectly, and therefore able to join with another, to see together without claiming to be another.'

As a situated knower, in Haraway's (1988) terms, my own subjectivities have undoubtedly influenced the manner in which I approached this research, including how I articulated the collective stories of my co-researchers by having brought into sharp focus matters concerning my own positionality. Positionality refers to how and where a researcher is situated, based

on nuances pertaining to identities, worldviews, affinities, which will have a bearing on issues of power; politics of knowledge construction and representation in the research process (Merriam et al. 2001).

Thus, my own embodied experience of growing up in the so-called Majority World, being schooled under the Apartheid segregation system, as well as my multiple intersecting identities as an African woman, situate me on the margins of society and as such in a more favourable position to share and recount similar stories with my co-researchers from the periphery.

England (1994: 243) further teaches us that, 'the world is an intersubjective creation and, as such, we cannot put our common-sense knowledge of social structures to one side'. Fine (2018) further contends that when undertaking research, the personal is always in some ways political. Hence, it can be agreed that research can never be apolitical (Mohanty 1984, Harraway 1988). This implies, what knowledge is produced, how it is produced, by whom, on whose terms and under what circumstances are all central questions that need to be accounted for when dealing with matters of women and their specificities (Rose 1997).

Another issue is that I am situated in a rather unique category in South African society, which may have implications, or so I thought, about whether my co-researchers would perceive me as a so called 'real' African and whether they may even be receptive or accommodating to storying their lived-experiences with me. As it turned out, I need not have worried, because I found that my co-researchers could relate to me regardless of my mixed identity and were keen on sharing their stories with me, given that my work was focused on giving them a voice, encouraging them to speak about their experiences of traversing the margins of a still segregated and divided society, and discuss with me the study and career-related fields they chose to pursue. I remained conscious of the fact that since I am residing and studying in the West, my co-researchers may have their own pre-conceived notions of me and my social status, questioning whether or not I am aligned to their social class in trusting me with their stories and experiences. Again, I found that my co-researchers were readily comfortable in opening up to me, feeling that they could relate to me as a Black woman, given their keen awareness of how inequality and oppression have manifested into their daily live, as well as the fact that my work was intended to further shed light on their liminality, and as a result bring this to the fore. This I feel, together with my understanding and knowledge of the

African culture, values, norms, traditions, and ways of life paved the way for my acceptance into their worlds.

Issues of identity construction are complex and deeply held beliefs that are embedded in the social, political, cultural and historic fabric of society are still particularly reminiscent of Apartheid South Africa. Prinsloo (2012) contends that the classification of being African through a racial lens alone provides a rather rudimentary understanding, which includes various critical factors that needs to be considered beforehand, such as the embodied experiences the person holds with them, the affinity they attach to Africa and being African, including how they see themselves in identifying as African.

I draw on Anzaldua's (1987) insights of being a queer mestiza on traversing the margins between her native Mexico and the United States in demonstrating her appreciation for being culturally attuned to the multitude of identities displayed by both the oppressor and the oppressed. Moreover, marginalised women are constantly navigating the borders between both forms of white and black privilege (Smith 2012). For example, Kiguwa and Segalo (2019) critically interrogate the western HE system, as Black female academic outliers, both socially and epistemologically, yet at the same time their scholarly contributions are capitalised on by the very system entrenching their exclusion. Thus, Clisby (2020: 2) sees this liminality as pivotal in being favourably situated to 'expose systems of oppression in global contexts and destabilise identity politics'.

I further understand that traditional research dictates that a clear boundary be maintained when dealing with 'participants', though Chilisa (2020) reminds us that a transformative and participatory approach to research requires a democratised and a non-hierarchical set up between researcher and co-researcher.(as I further point out later on in this chapter). This goes against the grain of much traditional dominant Western scholarship, that sets the precedence of an uneven power hierarchy between researcher and researched. To provide substance to the aforementioned statement, I draw on Smith's (2012: 184) work who affirms that: 'Research is implicated in the production of Western knowledge, in the nature of academic work, in the production of theories that have dehumanised' underserved communities in the interest of fostering Eurocentric ontologies. Similarly, it can be argued that Western ways of knowing are not socially, culturally, or intellectually aligned to the subaltern experience and ways of knowing. This is a field that Santos (2007a, 2012, 2017,

2018, 2020a) has spent most of his academic life pioneering, and has specifically termed, The Epistemologies of the South. His philosophical and theoretical insights give greater clarity, meaning and expression to the marginalised experience and draws down against that which is produced by the North for the consumption of South.

With the above in mind, I aimed to adopt a more equitable approach in my research endeavours with my co-researchers, as I previously mentioned, to refrain from making my participants 'the object of the gaze, to be studied, objectified, measured, evaluated, mapped', according to (Visvanathan 2006).

Also, since academic scholarship require researchers to be critically astute, I evaded the 'knowledge transaction' relationship prevalent in Western scholarship (Jansen 2019: 62). In other words, I endeavoured at all times to maintain a high level of regard for my co-researchers and their ways of ascribing meaning to their world through dialogue and stories.

Western science creates a knowledge hierarchy, which according to Leibowitz (2017) objectifies the underserved. No wonder Jansen (2019) contends in his critique of the Western university and its paradigms, that the pinnacle of Eurocentric scholarship is to study the 'Othered' experience through a Western/colonial gaze and to feed it back to them as objective knowledge. Such knowledge then gets canonised and ratified to be taught in our so called 'progressive' centres of higher learning (Santos 2017). In spite of the above points, Smith (2012) further notes that great strides are being made by many indigenous and non-Western communities in researching themselves, including in taking on agency in articulating their struggles from a non-dominant vantage point.

Hence, I actively engaged in finding out more about them and their preferences, like which restaurant and food places to visit after our interviews, focus groups/creative workshops. Also, at times, I had to book Uber rides for my co-researchers to meet up with me on campus or at an agreed place, and at other times gave them a ride back home, since I was driving a rented car. In addition, I also drove a few times to meet up with my co-researchers at their residences to conduct interviews and creative workshops, as they were unable to travel and meet up with me. I also continued to maintain contact with my co-researchers and have communicated with them on Whatsapp during and after the data collection process, as I always viewed them as co-researchers than passive participants (Chilisa 2020). This was

pivotal, as it placed me in a favourable position to represent their stories as accurately as possible in terms of their respective journeys along the STEM trajectory, by giving emphasis to their situatedness as Black women in dominant hegemonic spaces. Furthermore, my aim is to maintain an ongoing relationship with my co-researchers long after my PhD and well into my career, as I would like to build onto this research by turning it into a longitudinal and collaborative study in learning more about their career and further study endeavours over the years.

4.3. The Research Paradigm

4.3.1 A brief historical overview of critical theory

I align myself to the transformative paradigm. The transformative paradigm forms part of the postpositivist tradition and is informed by critical theory. In this section, I provide a brief overview of the critical paradigm as its underlying philosophical foundation. Historically, critical theory has its roots in the German Frankfurt school and can be traced back to critical philosophers and feminist thought (Kincheloe and McLaren 2011).

Critical theory endorses an underlying social justice agenda, exposes oppression and sets out to challenge the hegemonic status quo that seeks to maintain the power differentials between those in privileged positions and the underclass. More so, it unpicks critical issues, though not exclusive to race, gender, and class that deals with 'Othering' and all processes and structures that are responsible for perpetuating privilege. The proponents of this tradition seek to conscientize and illuminate awareness through advocacy and activism as a means to radically transform and shape an unequal society (Morrow 2005). In addition, Critical Theory, sets out to understand the condition of the subaltern and 'Othered' communities. It is further instrumental in seeking action, strategies, and interventions through collaboration, in the interest of change.

4.3.2 The transformative paradigm

The transformative paradigm has been introduced by Mertens (1999) as the need for inclusion and diversity in society. She elucidates that 'we live in a symbiotic relationship with each other on this planet' (1999: 3) and further notes that the problems plaguing marginalised communities are everyone's concern, for turning a blind eye can become deleterious for all,

even for the most affluent in society. A good example of this concerns the recent George Floyd murder, which resulted in various violent uprisings, looting of shops and businesses and the killing of ordinary civilians across the globe. Another example concerns the chaos that erupted across South Africa in 2021, over the imprisonment of former President Jacob Zuma, whereby rampant looting of businesses resulted in an economic shutdown of the entire country.

Also, the transformative paradigm stresses the importance of socio-culturally and historically situating all forms of inequality, for example, situating into context forms of discrimination affecting non-cis, black, brown, minority, trans, queer and (dis)abled bodies, including acknowledging the intergenerational spaces of poverty, stigma, silences and exclusion faced by many as a result of centuries of colonialism and later apartheid. Hence, it becomes obligatory in our assessment, as researchers, to cater for all voices and experiences which have been previously negated due to asymmetrical power differentials between and within groups (Mertens 1999, Haraway 1988). Interwoven within this, Mignolo's (2011a) work on The Darker Side of Western Modernity, draws a link between colonialism's influence on modernity and capitalism's role in promoting the North's (Western civilisation) socio-political, economic and ideological influence and power over that of the South (indigenous and all 'Othered'). He poignantly makes reference to the fact that capitalism is a by-product of the Western constructions of capitalism and modernity.

Fine (2018) calls on the researcher to possess awareness when researching minority groups, through a critical bifocality lens. Critical bifocality teaches us to critically reflect on the 'evil woven into the shadowed underbelly of our public and private institutions' and reflect on how structures and processes of oppressions have been designed and organised to entrench social (in)justices and in perpetuating privilege (2018: 26). When we uncritically view the problems facing many underserved communities, it becomes convenient to laden them with blame for the obstacles that they face on a daily basis. We need to be cognisant, however, of how oppression operates in both multi-faceted and multi-layered guises under the auspices of neo-liberalism, free marketisation and meritocracy (Giroux 2017). In so doing, we equipped to understand differing versions of reality and how they are synergistically related to power issues (Mertens 2012: 807).

Fine (2018: 27) further contends that to negate the basis of how oppression manifests itself in neo-liberal and so called 'democratic' societies or to gloss over it in an attempt to silence dissenting voices, makes us complicit in squeezing tighter the colonial knot smothering so many marginalised communities, resulting in acts of 'epistemological violence'.

Hence, the above issues lead the transformative paradigm to challenge and critique both constructionist and interpretivist traditions. These traditions should be confronted for upholding and perpetuating social injustices and many forms of inequalities in society (Mertens, 2012). Chilisa (2020) notes that all theories and worldviews that refrain from challenging oppression are inadvertently responsible for perpetuating social injustices. Mertens (1999) argues that both the constructionist and interpretivist worldviews offer us the potential 'of multiple socially construed realities and are thus subject to the criticism of being mire in absolute relativism such that no one perspective is any "truer" than any other perspective'. Hence, Chilisa (2020) responds to this by suggesting that all philosophical traditions which maintain that neutrality are responsible for inadvertently also reproducing power, hegemony, legitimacy and privilege, and should be exposed and discredited.

The transformative paradigm thus seeks to transform complex issues relating to culture, hegemony, racial and gender discrimination, and sets out to assist marginalised communities in finding solutions to their problems (Mertens 2012). It also factors in the need to give indigenous bodies a place in society and to restore their humanity against centuries of colonialism and oppression (Romm 2015). Apart from advocating for oppressed communities, a key focus of the transformative paradigm is to give marginalised women voice, agency and to further their empowerment in driving change in their respective communities (Chilisa 2020).

Various feminist decolonial scholars argue that women's and gender issues are still seen in 'binaries', the roots of which are deeply entrenched in colonialism (Lugones 2010, Gouws 2017, Vergès 2021, Gouws 2022). Critiques of certain perceptually white feminist discourse sets out to caricature and reduce minority women into a singular category of being poor, victims of femicide and in need of intervention (Mohanty 1984, Escobar 1995). For example, decolonial feminist scholar and activist Maria Lugones (2007, 2010) questions the Western conception of placing beings into categories based on their gender. She suggests that male

Western notions of gender depict women as inferior, weaker and the invisible sex, as a consequence of such oppositions, which influences traditional Western scholarship.

A further example of this can be found in Small's (2012) research, in which he found minority women's experiences were silenced, suppressed and muted in a white male-dominated academy. From both a race and a gendered angle, the transformative paradigm seeks to further untangle the 'micro-embodiments' encapsulating the lives of Black (African) women from the global South, how these women know what they know and how they ascribe meaning to such experiences, in spite of being positioned against a backdrop of a capitalist and neo-liberal university system (Kiguwa and Segalo 2019, Cornell and van Marle 2015, see also Dutta 2016). Moreover, various hegemonic ways of knowing that run in opposition to Western theories, conceptions and interpretations are critical in understanding the experiential and lived realities of African women but remain largely silenced in Western canons (Segalo 2015, Kiguwa and Segalo 2019, Chilisa 2020, Ndlovu-Gatsheni 2016). Hence, I find it important to acknowledge such micro-embodied nuances in the form of stories that women from the margins convey through counter-hegemonic discourses, such as transformative approaches, namely decolonial feminism and African Ubuntu.

4.4 The Methodological Approaches

4.4.1 The case for African Storytelling

The focus of this study is on an exploration of the stories of African women in STEM and the ways they ascribe meaning to their experiences, specifically their micro-embodiments, ways of knowing, and their being and becoming in and through a Western HE system and beyond into a patriarchal and often hostile masculine workforce. In addition, the data gathered is idiographic and emic, based on the stories of a group of 21 Black female aspiring scientists who are differently positioned in society. I carefully consider African Ubuntu Storytelling as my overarching methodological approach, complemented by a participatory approach, as it not only allows me to engage with stories from an African 'Othered' perspective, but more so to become an active participant in the research process (Mucina 2011, Chilisa 2020). In other words, Ubuntu storytelling facilitates Black women to tell their stories from resistant and defiant standpoints in matters where they feel oppressed due to race, class and gender (Mucina 2011, Chilisa 2020).

4.4.2 A brief orientation to storied (western narrative) research

Various scholars offer their unique insights and understanding in terms of what dominant modes of narrative entail, however no consensus has been established towards such definitions (Chase 2018, Smith 2017, Riessman 2005). Riessman (2005:1) sees narrative as 'sequence and consequence' whereby encounters are carefully considered for close and detailed examination, often problematised in order to make sense of reality for its intended audience. She further notes that narrators 'interpret the world and their experiences in it' and often times they even propose their own philosophical interpretation of how the world should be (2005:1).

Squire, Andrews, and Tamboukou (2014) point out that emphasis should not only be placed on the stories and their underlying meanings, but also on what processes have enabled/hindered their narration and how we can make sense of how narrators view the world. Polkinghorne (1995) suggests that narratives can be deemed as events and encounters selectively arranged by what he refers to as 'plots'. Connelly and Clandinin (1990: 2) remind us that that we are all central in our stories and, in addition that 'teachers and learners are storytellers and characters in their own and other's stories'. Also, narrative research in general can be conducted and analysed through various approaches (Mishler 1995, Connelly and Clandinin 2006, Chase 2018), and that it can and should be used in tandem with other methods, which Michie (2013) calls for methodological pluralism.

4.4.3 African storytelling and its potential to drive change

Since I set out to explore how African women articulate their unique stories and narratives across their STEM journeys, based on what is important and significant to them, I refer to Maria Lugones' (2010) assessment of how indigenous and non-dominant group experiences and stories are often suppressed at the expense of the powerful and elite in society. In particular, Lugones (2010) questions the role of Western modernity's epistemological ignorance in alienating voice and agency of underrepresented populations. Other scholars note similar accounts (see Morrow 2005, and also Haker 2019). Thus, Chilisa (2020: 193-194) affirms that certain rhetoric and stories emerging as 'androcentric, anthropentric, racist, heterosexual-centred, or ethnically biased and stigmatizing stories that build on communities' foundations of exclusion, silencing, exploitation and oppression' should be exposed. This

understanding is important as it will provide an opportunity in not only providing a catalyst for change, but also to reimagine how dominant Western ways of storytelling can be uncentred, in order to recentre 'Othered' methodological frameworks.

African storytelling presents its own purpose, structure and unique ways of positioning both the storyteller and the recipient of such stories (Mucina 2011). Tuwe (2016) notes that indigenous African stories in general do not follow any specific order and the substance behind conveying African stories is to share wisdom and insight on historical, as well as contemporary issues through mythical representations. Such representations are often portrayed through legendary folktales, poetry, sayings and riddles (Tuwe 2016, Mucina 2011, Chilisa 2020). For Chilisa (2020), it is more about what is pertinent about the African story and how society is often projected and portrayed from the vantage point of the knower. Chilisa (2020: 194) further posits that such non-dominant stories 'fill the gaps and provide the missing literature, theories, conceptual frameworks, and research methods in [both a] postcolonial', as well as a decolonial discourse setting.

The way in which Africans experience reality, which informs their African ways of knowing, is through their interconnected reality, through living with others and with nature in a communal sense (Chilisa 2020: 310). Mucina (2011) notes that African wisdom often dictates that nature, the universe and all living things are part of us, and we respect and nurture it through co-existence. The mantra for an African is: 'One cannot have a sense of "me" without a sense of "we" (Chilisa 2020: 310), meaning that I am unable to thrive and succeed in life at the expense of my fellow brother/sister, and the success of one should be relational to that of the others (Cornell and van Marle 2015). Stories often take place in the evening around an open fire where elders may use stories as a means of passing on intergenerational knowledge (Mucina 2011, Tuwe 2016). An elder, a respected person in the community or even a Shaman would be responsible for conveying stories of African wisdom.

Apart from the specificities of traditional Africans stories, more contemporary ones take on an oppositional stance or it can be in the form of resistance (Chilisa 2020). Steve Biko and Kwame Nkuruma told stories through their writings about liberation and freedom, which was meant to educate the masses and shed light on colonial and apartheid oppression. Similar to Western storied approaches, Riessman (2001, p.x) alludes to its relevance in mobilising 'social movement, political change and macro-level phenomena'. In addition, there is no structure

to African stories, akin to how Western stories are told and the relational aspects for both are used in different ways. Furthermore, I align myself to Ubuntu Storytelling as my guiding lens in making sense of my co-researchers stories (Mucina 2011). According to Mucina (2011) Ubuntu storytelling encompasses the following:

- Allows people of colour agency to proudly talk about their 'Blackness'.
- It occurs both through written and verbal forms.
- It is relational not only with others, but with the self too.
- It can be carried over to other contexts and presented to a wider global audience.
- It acts as a means of bringing awareness, insight and understanding to issues of Africans.
- The storyteller does not provide an analysis of his/her story.
- The storytellers allow each listener to analyse for themselves as each one will gain something different from it.
- Each listener will analyse the story based on their own contextual position, age, gender, values, sexuality, political knowledge and social position.

4.4.4 Positioning the researcher: critical and reflexive co-creation of knowledge

This inquiry took on a collaborative or participatory research stance. Chilisa (2020) highlights in her work with indigenous communities and 'Othered' bodies that collaboration not only provides a platform for equal partnership, but it also validates all experiences. Hence, 'participatory research involves a joint process of knowledge-production that leads to new insights' (Bergold and Thomas 2012: 195) and further understanding. Similarly, narrative inquiry calls for a deliberation of all storied experiences to be negotiated and renegotiated to enable an accurate representation of co-researchers' lived realities, which evolve into stories of transformation (Connelly and Clandinin 1990).

Hence, I actively engaged in the research process, which allowed me to formulate my own understanding and interpretation of events in the field, as well as draw on my own prior experiences. In doing so, I reflexively engaged in note taking, which at times left me with more questions than answers and which also allowed me the opportunity to pose follow-up questions to my co-researchers as and when we met, and even once the data collection

process was concluded through Whatsapp chats and calls. At times we even found ourselves challenging one another's assumptions and beliefs through this process of reflection and collaboration. This allowed us to think together and share views on how systems of oppression impeding transformation and equity, particularly in dominant spaces, can and should be approached, in our attempts to co-create knowledge. Other times we agreed on the processes hidden beneath the veil of 'transformation' which should be brought to the surface and interrogated in the interest of substantive transformation. In addition, I, as the researcher, still provided a platform for each co-researcher to convey their unique stories and experiences without the influence from other co-researchers. Boylorn (2008) highlights, participatory research affords agentic potential for often voiceless and marginalised groups to allow the world to see them as they see themselves.

Kemmis and McTaggart (2003) see participatory research as dynamic and transformative, since underserved communities are supported to construct their own knowledge and understanding of their experiences, structures and processes affecting their lives. They further conclude that certain criteria need to be in place before it can be deemed 'participatory' over traditional forms of research, namely: 'shared ownership of research projects, community-based analysis of social problems, and an orientation toward community action' (337). Bergold and Thomas (2012) remind us that when the above elements are not taken into consideration, it cannot be regarded as true participatory research in nature. Thus, the stories that were co-created belong to all of us. It is the understanding that we all have a responsibility in protecting it, though it will be primarily used for research outputs such as the researcher's thesis and publications arising there from. Co-researchers may also co-publish at a later stage or have their names included onto publications that arise from the data, if they so wish.

Moreover, Kent's (2000) view alludes to the importance of setting up a good match between researcher and co-researchers on experiences to prevent 'alienation'. Hence, my choice for recruiting those possessing a similar trajectory to mine, allows for deeper exploration of Black female experiences in STEM HE, as well as to create an alliance in order to advocate for a common purpose as agentic and willing subjects and not as mere passive objects. The similarities that the researcher shares with her co-researchers are that they are all Black women from the Global South, they all have experienced the South African educational

system, including a Western male-dominated educational terrain, and they all come into this research with their own situatedness as Black women.

4.5 The Analysis

All interviews were recorded using a Dictaphone and thereafter the data were transcribed. I transcribed most of the first round of interview transcripts and sought the services of a professional transcriber to transcribe the second round, as well as the focus group discussion and the creative workshop transcripts. I used an online software programme to assist me in transcribing my portion of the transcripts. Moreover, during the data collection phase, and after having conducted the interviews, focus group discussion, as well as the creative workshop with my co-researchers, I would listen to the recording once again and make rough notes of what stood out to me, as well as any discrepancies or follow-up questions that I may have had, including local words, phrases and dialects that were used, in order to familiarise myself with the data, get clarity and to start searching for relevant themes. This also allowed me to reflect and capture my own experiences, in order to construct a narrative. Furthermore, I also spent time reading and re-reading through each transcript.

Once I had familiarised myself with the data, I imported it into Nvivo and Atlas t.i to start the coding process. I used a deductive coding (theory-driven) approach, given my understanding and familiarisation with the concepts I engaged in, as well as how I am positioned, as a woman of colour, including my own unique biases and subjectivities, in line with Braun and Clarke (2022: 55) who suggest that, at times, 'existing theory and concepts might provide a lens through which a researcher interprets and make sense of the data.' After having coded the data, I derived categories and from these went on to develop themes. I employed thematic analysis for analysing the stories. Braun and Clarke (2022: 55) note that thematic analysis involves searching for and 'identifying patterns of meaning' within your data. Moreover, after having devised themes that addressed my research questions, I found myself constantly navigating between the constructed themes, the raw data (transcripts and audio-recordings), as well as doing follow-up Whatsapp calls and messages in confirming the underlying complexities in my co-researchers' narratives and whether my own interpretation of their stories served me correctly (Madden 2010).

Thus, it amounted to an iterative process of negotiation and renegotiation with my co-researchers, as it was imperative in assisting us to attain common ground. This reflexive process could also be deemed as a learning experience for both researcher and co-researchers alike (Chilisa 2020). Both the researcher and co-researchers are actively involved in analysing the data, including how the data is to be analysed, as well as how the stories are to be positioned. In addition, as Bergold and Thomas (2012) advocate, I further incorporated the values of the African philosophy of Ubuntu into my work as it yield a relational lens, as well as the potential to transform and emancipate, as I have discussed in chapter 2.

Moreover, I adopted Carspecken's (2019) notion of analysing metaphor in a critical sense in stories. Carspecken (2019) notes that in order to understand metaphor, it is important to look at it in the African context that it is being used in and how people assign meaning to it from the vantage point of how people organise their lives. He further suggests that to generalise it to other contexts, it is bound to lose its nuance and true meaning. Hence, in the analysis, I have included words, phrases and sentences that are in the African Nguni languages, and translated to English, as a means to dislodge Western Anglo-Saxon centric viewpoints.

4.6 Participant Recruitment

4.6.1 Obtaining access and access to the elite

This study has received ethical clearance from Coventry University, as well as from the institution where the research was conducted. Moreover, steps were taken to obtain permission from the Science faculty to recruit co-researchers to the study and to make the study known to the wider STEM student population. Gatekeeper permission was requested from the Dean of the institution where the study was conducted, in the form of a written letter requesting permission to recruit co-researchers, as well as informing her about myself and my study, and detailing what I wished to accomplish during my fieldwork. The Vice-Chancellor of the university at the time had already granted me semi-formal permission to carry out fieldwork and had put in me in contact with the relevant people to facilitate my stay in South Africa.

Looking back, I realise that accessing the right people in high up spaces is never a straightforward and easy process. Upon commencement of my PhD, I had set my sights on conducting fieldwork at another 'highly ranked' university, as I had a contact there, but soon

realised that the institution catered to primarily rich and middle-class students and I had to reconsider, as these experiences were not the primary focus on this research. I thus had to rethink my plans and while struggling to develop my ideas and explore other avenues, an opportunity presented shortly after that for me to co-write a bid with two South African institutions, one being a former advantaged and the other a former disadvantaged institution, catering to primarily working-class and disenfranchised students. I found this to be a valuable opportunity, as I formed ties with the institution, discussed my fieldwork endeavours and obtained feedback. At this point, I had already set my sights on this institution and planned my fieldwork journey accordingly. However, Covid-19 struck, with countries going into strict lockdown and accessing the field was delayed for more than a year. As a result, I decided to reconsider my fieldwork plans, and opted to engage in fieldwork in a province in South Africa I was familiar with.

4.6.2 Sampling

Given the situation around Covid and the significant disruptions and delays it had caused to my fieldwork endeavours, I decided to start recruiting my co-researchers online and went on to conduct virtual interviews as the first part of my iterative data collection process. STEM lecturers reached out to me and assisted in posting details of my study, including my contact information on their online teaching portals to inform their female students of my research. I also relied on a snowball technique or a 'word of mouth' approach to locate other co-researchers. Bryman (2012) advises that snowballing is a particular useful strategy when the researcher finds it challenging to locate co-researchers in difficult to reach places. Also, since my aim was not to seek out a 'representative' sample of the entire university population, snowballing worked well in my case, given that my aim was to draw on a small qualitative cohort (Bryman 2012). Furthermore, I have initially recruited 26 co-researchers to the study, whereby I lost five co-researchers along the way, which leaves me with 21 in total.

4.6.3 Selection criteria

Selection of co-researchers to the study was based on the following:

- Co-researchers should identify as Black South African and female.
- They should identify as either low socio-economic, working, or middle-class.

- They should be or have been enrolled for any type of STEM qualification at tertiary level.
- They should be at any stage of their STEM journey (undergraduate, postgraduate, employment).

In terms of assessing SES, I relied on whether my co-researchers were entitled to the National Student Financial Aid Scheme (NSFAS) or whether they made use of such at any opportunity. The NSFAS was set up by the South African government to assist resource poorer and academically deserving students to obtain a qualification, where otherwise they would not have had the economic resources to do so. It is means tested and rests on a strict criterion, which is assessed based on a student's entire household income, as well as the situation of the family. Moreover, I also considered factors, such as parental occupation and qualification levels, including type of school: township v former Model C. As a historical legacy of apartheid and due to the continuing inequality facing the South African populace at large, schools are classified into five tiered systems, tiers 1, 2, 3 schools cater to the impoverished and working class and 4 and 5 cater primarily to the educational upliftment of the elite and middle class, as I have outlined previously in Chapter 3 (see Badat and Sayed 2014).

4.6.4 Table of demographic profile of co-researchers

Pseudonym/ Study Areas	Age	Family SES Status	Parental Occupation	Funding/Self-funded	School Type Attended	First or Second Generation
Annicca Urban Studies	28	Low SES - Township	Mother – paramedic Father - unemployed (grade 11)	Bursary	Township	First generation
Ayanda Urban and Regional Planning	22	Low SES - Rural	Mother -farm worker Father - deceased	Self-funded/ NSFAS	Rural School	First generation
Anna-Marie Zoology	25	Low SES - Rural	Mother - unemployed	Self-funded/ NSFAS	Rural School	First generation

Buhle Chemistry	24	Low SES - Rural	Mother – Nurse Father – supervisor at a grocery store	NGO Bursary/ NSFAS	Rural School	First generation
Constance Civil Engineering	31	Missing middle - rural	Mother – Foundation phase educator Father - deceased	Private Bursary	Township/ Rural School	First generation
Esther Operations Management	25	Low SES - Township	Mother– unemployed Father - Deceased	Municipality Bursary	Model C	First generation
Grace Physiology and Psychology	19	Low SES - Rural	Mother – Street vendor Father - Welder	NSFAS	Rural School	Second generation
Hope Chemistry	28	Low SES - Rural	Mother – deceased Father – Factory worker	NSFAS	Rural School	First generation
Karabo Construction management		Middle- Class - Township				
Kgosigadi Life and Environmental Sciences	25	Low SES - Rural	Mother – unemployed Father - Absent	NSFAS	Township School	First generation
Lebohang Life and Environmental Sciences	24	Missing Middle/Lo w SES - Rural	Mother – unemployed Father - absent	Self-funded/ NSFAS	Township School	First generation

Lerato Civil Engineering	32 years	Low SES - Rural/ Township	Mother – unemployed Father - deceased	Private Bursary	Township/independent Schools	First generation
Millicent Civil Engineering	26 years	Missing Middle – Township/ Rural	Mother – pensioner Father – retired teacher	Self-funded/Private Bursary	Township School	Second generation
Neo Mechanical Engineering	30 years	Low SES - Township	Mother – Dress maker Father – factory operator	Self-funded/NSFAS	Model C School	First generation
Patricia Metallurgical Engineering	31 years	Missing Middle - Rural	Mother – Teacher Father - Retired	Private Bursary	Model C	Second generation
Philisiwe Mechanical Engineering	30 years	Missing Middle – Township/ Rural	Mother – teacher Father - Absent	Private Bursary	Model C School	Second generation
Precious Analytical Chemistry	29	Missing Middle - Rural	Mother – Teacher Father - Teacher	Self-funded/Part-Bursary	Township	First generation
Prudence Chemical Engineering	28	Missing Middle - Township	Mother – Nurse Father - unemployed	Self-funded/Bursary	Model C School	First generation
Sibongile Chemistry	38	Low SES - Township	Mother – Teacher Father - unemployed	NSFAS	Township/Model C Schools	First generation
Sophia Physiology and Psychology	24	Low SES - Rural	Mother – Security Guard	NSFAS	Rural School	First generation

			Father - Absent			
Sunny Physiology	33	Missing Middle – Rural/ Township	Mother _ housewife Father – HR manager	Self-funded	Rural/ Model C Schools	First generation
Zandile Life and Environmental Sciences	23	Low SES – Township	Mother – Unemployed – Receives a State pension Father - Absent	NSFAS	Township	First generation

4.7 The Method: An Iterative Process

Seidman (2006) discusses the importance of a three-step process of collecting data, by establishing context, probing for detail and setting out to seek for underlying 'meaning' surrounding co-researcher stories. This iterative process allows co-researchers time to get their thoughts in order, in the event that they forgot or did not feel comfortable discussing it during previous iterations. It allows co-researchers to carefully contemplate and reflect on the type of knowledge they produce and the manner in which it is being produced. This suggests that during the data process, co-researchers may even reach out to the researcher to amend the responses and frame it in a different light. Hence, my rationale for embedding an iterative approach to aid with the above aspects. Moreover, data collection occurred in three main iterations over a twelve-month period.

4.7.1. Iteration one – establishing rapport and virtual interviews

During this iteration, I took time to introduce myself and my research study to my co-researchers. This allowed us to get to know each other and to establish a researcher relationship. I also took time to debrief my co-researchers and clarified any questions they had. Moreover, I shared important documents pertaining to this study, such as, consent forms (Appendix A), Participants Information Sheets (PIS) (Appendix B), as well as requesting my co-researchers' biographical details, such as age, field of study, parental occupation, etc. Furthermore, I conducted online virtual open-ended interviews (Appendix C) on TEAMS with

all co-researchers, and enquired on their upbringing, what their experiences were growing up as a Black woman in South Africa, as well as information concerning their schooling realities and how these had shaped their endeavours to pursue STEM until they reached university. This back-and-forth movement is what Connelly and Clandinin (1990) see as taking your co-researchers on a journey back in time and bringing them forward in connecting their stories to significant life events. I also took time to gauge what the major concerns Black South African women pursuing STEM faced. However, at times, my co-researchers wanted to first discuss issues that were bothering them at that time, which I allowed, as I wished to refrain from the power dynamics associated with traditional notions of interviewing. Moreover, this worked well as I knew that what I was unable to gather and retain during the first iteration, I could always fill in the blanks, as I was planning on meeting face-to-face with my co-researchers in follow-up iterations, as well as maintain contact with them throughout, which did happen for most. Most interviews lasted approximately 60-90 minutes; however, a few went beyond this time. During this phase, questions were loosely structured, and I ensured that I listen attentively for cues. Also, the interviewing took on more of a conversational approach, as co-researchers narrated their respective stories of growing up as Black middle-class, township and rural women in South Africa on their respective journeys into STEM HE.

4.7.2 Iteration two-semi-structured interviews

For the second iteration, I conducted face-to-face semi-structured interviews (Appendix D) with most co-researchers. These were based on a combination of open-ended questions, and explored what it means to be Black South African women in STEM and how their own situatedness have played a role in shaping their experiences of accessing HE. The rationale for semi-structured interviews were to probe co-researcher stories on a much deeper level, compared to their narration in the first iteration. For this iteration, I also focused primarily on aspects of accessing, participating, and transitioning into HE. Moreover, I asked questions such as, *'how did you experience higher education for the first time?', 'Do you feel you were prepared for it?' as well as 'what were your encounters with English at university?'.* In addition, I employed prompts and probes, like *please elaborate more on that, what did you do next? How does that make you feel? Tell me more about that,* and *please give me an example, etc.* I ensured that I keep my questions open-ended to allow co-researchers to talk freely, which will allow for prompts and probes, but also to ascertain for novel issues surfacing during our

interaction, which I may have not considered (Madden 2010). Hence, for Merriam and Tisdell (2016), *'good* interview questions are those that are "open-ended" and yield descriptive data, and even stories about the phenomenon'. I also balanced this out with a semi-structured approach to interviewing since I wished to have some level of control over the direction of the interviews.

All interviews lasted approximately 60-90 minutes, and two or three of these went beyond this time frame. Interviews took place on, as well as off campus at a safe location that had been arranged by both co-researchers and researcher. I conducted follow-up interviews online, to seek further clarity on issues that were not clear to me, including having WhatsApp conversations to seek greater insight and understanding in certain instances. Moreover, I encouraged my co-researchers to express themselves freely during our conversations and ensured that they remain on topic, when they steered off track, by gently diverting the discussion back to its original focus.

4.7.3 Iteration three – focus groups and visual narratives

The last iteration consisted of 4 focus group discussions (FGD's) (Appendix E), with 2-6 co-researchers per group, which opened up a platform for issues to be discussed collectively, as well as embedding a creative workshop in each one of them. The focus of the FGD's centred around Black women's transitions into and through STEM HE and outward into further study or/and the world of employment. Questions related to aspects, such as parental and family influences in further studies, as well as the challenges and setbacks experienced by Black women in venturing out of HE in pursuing STEM.

Further to the FGD, I ran creative and visual stories workshops during this iteration. The idea was that it would equip and enable my co-researchers to create and construct their stories through the form of visual and artistic (re)presentation, i.e., design of a visual artefact, drawing or painting. This step is pivotal as it makes room for co-researchers to articulate their experiences through an alternative means, which goes beyond the spoken word, as well as seen as a form of activism in highlighting their experiences (Chilisa 2020). This approach to gathering data is similar to what Segalo (2015, 2018) adopted in which Black women in South Africa were unable to convey their experiences verbally, pertaining to their encounters during

apartheid. The researcher found that her Black female participants relied on the creation of embroidery to express painful sentiments that they were unable to verbally articulate.

Co-researchers were requested to construct an artistic representation of themselves as Black minority women in contrast to the male-dominated Western terrain associated with STEM, to think about how they saw themselves, and their contribution to the field. Cigdem (2017) notes the importance of visualised storytelling making room to accommodate 'visual imagination' in opposing the assumptions we hold in relation to student life stories. Once my co-researchers had constructed their visual representations of themselves, they were all afforded an opportunity to each discuss their painting without any interruption from the group. I also requested that my co-researchers briefly note down in written form their own assessment of their visual creation. For this, I adhered to the principle of placing the focus on each co-researcher to give voice to their own lived experience, at their own discretion (Chilisa 2020). Moreover, in discussing their paintings, as well as (re)presentation of themselves as Black women in STEM, co-researchers were also found to have reflected on the barriers and obstacles they faced as a minority, including how they were positioned in the greater scheme of things, as well as sharing sentiments of remaining hopeful for a better and brighter future in the coming years. I have taken aspects from both Western understanding of focus groups, which allow for anyone to freely interact and comment on an issue and combined it with an African approach to focus groups which places importance on the individual and her story.

As I stated prior, I conducted 4 creative workshops, with groups of 2-6 co-researchers. These co-researchers were interviewed previously. Three of the four workshops took place on campus in an arranged venue, whilst one took place off campus at a place of residence of one of my co-researchers. It should also be noted that the co-researcher who decided to host us was on the verge of giving birth and was unable to travel but wished to be part of this endeavour. She then requested for the workshop to take place at her home, where she hosted myself and the rest of the others. Ethical guidelines were adhered to, and co-researchers were debriefed, and questions were clarified prior to each workshop. Moreover, I have reproduced the images, pictures, paintings and writings that my co-researchers constructed as representations of themselves in the analysis of chapters 7 and 8. In addition, these images and written constructions were used to support quotes from interviews and FGD's, as well as excerpts from interview vignettes.

Furthermore, all visual images were photographed after each session. All supplies and equipment (colouring pens and markers, decorative equipment) to create the artefact/creative work were supplied by the researcher. The workshop lasted approximately 90-180 minutes in length. During and after the workshop, we had a conversation about the story behind each artefact and the multi-layered and multifaceted meanings underlying each. These discussions assisted me as researcher to express in words the meaning behind each visual representation.

Refreshments were provided for my co-researchers after each iteration of data collection. This allowed me to further connect with my co-researchers and gain a deeper understanding into their realities in terms of what they attempted to share with me during the various iterations. We went for lunch to a nearby restaurant and I had lunch with almost every co-researcher who attended both the in-person interviews, as well as the creative workshop. Not all co-researchers attended the creative workshop, 6 did not, as 3 cited other commitments, and 3 were located in other provinces at the time. Also, due to being situated in faraway provinces outside of the research site, two of the three co-researchers provided data (both interviews) virtually, whilst a third could only take part in one interview, citing other commitments. Hence, only 15 co-researchers took part in all three iterations (interviews, focus groups and creative workshop). Moreover, 19 co-researchers engaged in both interviews, though some could only engage virtually as I pointed out. In addition, all co-researchers were provided with a small token of appreciation consisting of an Exclusive Books gift voucher to the value of R500 (£25) at the end of my fieldwork journey. Bryman (2012) suggests that offering your co-researchers small tokens as a gesture of good will can help to cement the researcher relationship and make it more likely for co-researchers to follow through with all research activities. It also amounts to showing respect and valuing the time, expertise, and knowledge contribution of co-researchers.

4.8 Trustworthiness of the Data

I endeavoured to fully answer the following questions posed by Bassey (1999) in ensuring that all the criteria he asks for are met, as a means of maintaining trustworthiness and rigour. In addition, I provide ways on establishing plausibility of the data. Bassey (1999: 76) asks:

- Has there been a prolonged engagement with data sources?

- Has there been persistent observation of emergent issues?

- Have raw data been adequately checked with their sources?

- Has there been sufficient triangulation of raw data leading to analytical statements?

- Has the working hypothesis, evaluation or emergent story been systematically tested against the analytical statements?

- Has a critical friend thoroughly tried to challenge the findings?

- Is the account of research sufficiently detailed to give the reader confidence in the findings?

4.8.1 Plausibility

Another issue that may have implications for credibility in narrative research is that of verisimilitude. Calame (2012: 83) suggests that 'verisimilitude brings together in a single concept the internal logic (the "plausible") of a discourse'. This implies that the findings should be real or a semblance of realness. In other words, others may have to relate to it, in order for it to be deemed plausible. Thus, I robustly followed the above process of member checking, as well as audience checking, to aid the authenticity and plausibility of my analysis, by scholars in the field, mentors and supervisors who are knowledgeable about my study (Loh 2013).

An additional litmus test that needs to hold up for stories to seem plausible is that of 'utility' (Loh 2013: 10). This suggests that the study should be of use to my group of co-researchers, as well as to the broader society in general. Moreover, I acquired rich sets of data, accompanied by thick descriptions in providing me depth and context in answering my research questions. (Loh 2013). This further enabled the illumination of related issues in assisting other researchers with insights and understanding in the interest of transformation.

4.9 Data Collection Timeframe

Timeline for data collection: Aug 2021-May 2022	
Aug 2021 – Oct 2021	Establishing a researcher relationship Virtual Interviews (21 in total)
Jan 2022 – May 2022	Face-to-face Interviews **(19 in total)**

	(4 provided data virtually)
	Focus groups and
	Creative workshops **(4 workshops with 15 co-researchers in total)**

4. 10 Ethical Considerations

This research followed aspects of ethical considerations to Narrative Research espoused by Smythe and Murray (2000), whilst having embedded insights from Sim and Waterfield (2019) regarding focus group ethics into the discussion, tailored specifically to my study. Smythe and Murray (2000: 312) acknowledge that contemporary qualitative methods offer rather limited scope in terms of ethical considerations and do not accommodate for group discussions, where co-researchers converge to discuss their experiences collectively. Of particular concern for the narrative researcher is the question of who bears custodianship of the stories emerging from the data (Lowndes 2016). I turned to Chilisa's (2020) work to gain insight into the notion of conducting research with marginalised groups and data ownership. She avers that all data emerging from the study should belong to both researcher and co-researchers. Hence, I came to an understanding with all co-researchers that there will be co-ownership of data, but that its' focus remained on it being used in the form of academic discourse (researcher's thesis and publications) to transform the STEM terrain in the interest of all Black women, including all groups deemed 'Othered'.

Informed consent: After having successfully recruited my co-researchers, I forwarded consent forms to all interviewees, informing them of the objective of the study, including their rights and responsibilities. Sim and Waterfield (2019: 3007) suggest that focus groups differ in a distinct manner from one-on-one interviews, as 'analytical insights that emerge are co-constructed by all participants and indeed by the moderator also'. This is often the basis of analysis, whereby input of the collective is given consideration over that of the individual, making it difficult for an individual to withdraw their data. I made this aspect explicit in both my participant information sheet as well as in my consent form. Co-researchers were afforded the right to withdraw all their data though, prior to taking part in the focus groups and this

detail was conveyed to them in the Participant Information Sheet. In addition to this, co-researchers were also informed of their rights at the beginning of data collection.

Privacy and Anonymity: I went to great lengths in order to ensure that co-researcher stories were protected, anonymised and their data concealed through the means of pseudonyms. Co-researchers were afforded the opportunity to choose their own pseudonym and in cases where they found it difficult, I put suggestions forward to them, which was agreed upon. In addition, I also refrained from mentioning the institution's names, as well as places and other entities that are associated to my co-researchers in an attempt to ensure that they are not easily identifiable. Hence, I also employed the use of pseudonyms to further mask the identities of people and entities directly linked to my co-researchers. Raw data was stored on an encrypted memory device where only I, as the researcher, as well as my supervisory team have access to it.

I did not have direct control over what my co-researchers said during our focus group discussions, as well as while we were engaged in the creative workshop. Neither did I have control over whether my co-researcher's discussed issues that others have shared with their friends. However, to mitigate for these, I outlined in both my participant information sheet, as well as in my consent forms that information discussed as a group should be treated with the utmost confidentiality, in order to respect the privacy of others. Sim and Waterfield (2019) is of the view that a heterogenous focus group should be sought, whereby its less likely for co-researchers to know one another, as a means to ensure that no one runs the risk of being 'outed' in the end.

Protection from harm: I foresaw no real harm to my co-researchers as a result of participating in this study. I was aware though that my co-researchers may experience distress and anxiety from talking about potentially difficult life experiences, and which did occur, as I further expound and reflect upon in the conclusion chapter of this thesis. In such cases, I signposted the affected ones to the relevant support services within the university. All universities in South Africa are equipped to offer some sort of student mental wellbeing service, including the one where my co-researchers are situated at. Moreover, when it occurred to me during our conversations that my co-researchers felt uneasy, I deflected the conversation, but gradually brought it back on point. This is particularly pertinent in focus groups as co-researchers may talk about uncomfortable situations in front of others, some may even

withdraw to themselves due to shame or stigma; hence researchers need to ensure they maintain a good balance over the flow of the conversation, steering away from uncomfortable issues, as well as ensuring that all voices are projected during discussions, according to Sim and Waterfield (2019). Moreover, I always checked on my co-researchers from time to time, during my fieldwork journey to ensure that everyone was doing well.

Deception and Debriefing: At the onset of collecting data, my co-researchers were debriefed about my research, its objectives and what was asked of them, including all aspects relating to taking part in the FGD. At the time, face coverings and Covid restrictions, such as social distancing, were not mandatory according to the South African government, hence there were no requirement for these. Co-researchers were offered a R500 (£25) book voucher in acknowledgement of their time and expertise and refreshments and travelling costs were all covered or reimbursed in relation to expenses incurred to taking part in the study, which was covered by my funder, The Leverhulme Trust.

Narrative ownership: The researcher and co-researcher will be co-sharing custodianship of the data. An agreement was reached that aspects of the stories will be used for the write up of a PhD dissertation and various publications that arises out of this process.

4.11 Conclusion

In conclusion, I have provided a detailed account of my methodology and methods employed in this study. I began by alluding to my stance in approaching this research and what implications may arise due to my positionality in the field. I reflexively engage in instances that may enhance, as well as hinder my research when engaging with co-researchers. In addition, I discussed the research tradition that this research fits into and my reasons for its selection based on my ontological and epistemological outlook. I provided a rationale for using African storytelling as means to enrich Western narrative. I further discuss my analytical lenses and demonstrate how stories will be analysed. Lastly, my method section is discussed, in terms of the three iterative processes, including issues of selection and recruitment, accessing the site, trustworthiness of the data, and ethical considerations. The next chapter, which is chapter 5 will be providing a brief overview of each co-researcher's profile.

Chapter Five:
Co-researcher Profiles

I have recruited 21 co-researchers to my study and all of them are different stages of their STEM journeys (undergraduate, postgraduate, internships, working, unemployed), as I had previously alluded to. Moreover, due to the stratified landscape of South African society, associated with the historical legacy of an uneven educational terrain, as I have demonstrated in both Chapters 2 and 3, my co-researchers are positioned differently in terms of schooling opportunities, family background, available resources, etc., afforded to them. Also, all my co-researchers' transitory passages into and out of HE have been fraught with challenges, as all of them had to rely on some sort of financial aid, such as private bursaries or the NSFAS to support their studies whilst at university, including those who emanate from better resourced middle-class backgrounds. NSFAS has been set up by the South African government to fund financially needy students who would otherwise not be able to attend university but possess the academic abilities to succeed in HE. The funding scheme was means tested in the past, however, after the student protests in 2015/6 calling for a transformative and equitable HE system to include more disenfranchised students, this is no longer the case. Their profiles read as follows:

1. Annicca is a 28-year-old gender non-conforming Ph.D. student and part-time lecturer. They grew up in a township near Johannesburg and identify as coming from a low SES background. They were raised as female, but later on in life acknowledged their gender fluidity, which posed challenges, given the culturally conservative context of South African society dictating gender binaries and the expectations thereof. They currently still live at home and are the main breadwinner, given that their parents were not afforded the same educational and employment opportunities as them. They worked in industry after their undergraduate studies but felt compelled to pursue academia, because of, as they explained to me, the unscrupulous nature of euro-capitalist initiatives in serving the interests of profits, as opposed to being ethical and moral in developing African cities. They are a first-generation student and has relied on the support of educational bursaries and scholarships to study at university, due to their outstanding marks and grades. Since identifying as non-binary, they experienced

how society, but also the ways that academia and the system sustaining it, have sought to further non-recognise their identity, as being both non-confirming, as well as Black and from a lower socio-economic background. During the onset of data collection, they were busy developing their PhD proposal and during my time in South Africa, upon meeting up with them again, they were in their first year of doctoral studies.

2. Ayanda is a 22-year-old honours graduate in Urban and Regional Town Planning. She identifies as a Black South African woman from an impoverished rural background. Her mother is a general farm worker, with a rudimentary level of formal education and her father is deceased. She is a first-generation student and hails from a rural background. Her upbringing and schooling through primary and high school were within a rural context and she later pursued her HE studies in a big cosmopolitan city in South Africa. When first arriving in the big city, she became overwhelmed with the fast pace of life that she initially struggled to adapt to. This ultimately affected her university transition during the first year with matters of funding and the 'know-how' of the university funding process, which led to her being self-funded during her first year but thereafter was fortunate to have secured NSFAS funding. She is currently doing an internship and is also working on ideas for her Masters proposal. During the data collection phase of this research, she was struggling to find employment or funding opportunities for further studies, due to not being in possession of her undergraduate academic transcripts, because of outstanding debt on her university account which she is unable to pay. She is currently doing an internship as part of a project organised by the university.

3. Anne-Marie is a 26-year-old Honours graduate in Botany and Zoology. She identifies as a Black South African woman from an impoverished rural background. She is a first-generation student and hails from a rural village on the outskirts of South Africa. Her mom was a domestic worker with a grade 6-7 schooling education but is now unemployed. Her father is absent from her life and her grandparents took responsibility for her whilst growing up with their government grant. Her upbringing and schooling through primary and high school were within a rural context, but she first attended a HE institution in an urban context, but dropped out and later resumed

her studies at a different urban university. Her journey into university has been rather challenging, she had to drop out and restart an entire programme at a different institution due to a lack of funding, as well as having not received relevant guidance in transitioning into university. She only received NSFAS support the second time around. Her dream was to become a medical doctor, but was unfortunately not accepted at medical school, due to not meeting the entry criteria. She is currently doing a Postgraduate Certificate in Education (PGCE) with an emphasis on Physical Science but is also hoping to pursue her Masters degree in the near future.

4. Buhle is a 24-year-old Honours student in Chemistry. She identifies as a Black South African woman from a working-class background. She initially wanted to pursue a career in either Forensic Science or Toxicology after matric but was advised to pursue a BSc degree in Chemistry and afterwards branch into either of the former two. She is a first-generation student and emanates from a rural/township setting in South Africa, where she grew up and completed her schooling career. Her mother is an auxiliary nurse, with a nursing diploma and her father is a supervisor at a grocery store. As the eldest child, and during her primary and secondary schooling years, she had to assist her parents in raising her younger siblings. She received support with her university application, including career guidance from a Non-government Organisation (NGO) that visited her high school. Also, since she was one of the outstanding students in her school, she received a merit bursary, which partly covered the costs of her tertiary studies. The rest of her university costs were covered by NSFAS. She has a passion for Chemistry and decided to change from Biochemistry to pure Chemistry since the Chemistry component in her course was diluted and not what she had expected to study. She is currently looking to pursue her Masters studies when she completes her Bachelor of Science (B.Sc.).

5. Constance is a 32-year-old Bachelor of Civil Engineering graduate. She identifies as a Black South African woman from a middle-class background. Her mother is a Foundation Phase Educator, with a teacher's diploma, and her father is now deceased but was a skills Instructor with a trade certificate. She is a first-generation student and hails from a rural location on the outskirts of South Africa. She grew up in a semi-rural township location, attended both her primary and high school in the same setting, and

completed her HE studies at a university in the city. Her university transitions and overall journey have been challenging since it took her eight years to complete her undergraduate degree. This further resulted in her funding provider withholding funds, due to her non-satisfactory progress in her studies, which presented new challenges for her. When I first met her, she was not in employment, as she was still grieving her father's death and experienced ongoing personal issues. However, during the course of this research, she managed to secure employment and is currently working towards her professional registration as a Civil Engineer. She has a partner with whom she is in a steady relationship and also has a young child with him.

6. Esther is a 26-year-old Masters graduate in Sustainable Urban Planning and Development. She identifies as a Black South African woman from a lower socio-economic background. She is a first-generation student and grew up in a township but attended a former Model C school in a big urban city. Her mother is unemployed with very little formal education and her father is deceased. She is planning to pursue PhD studies and is currently running a charitable NGO with her husband in an urban city, assisting and supporting homeless people. During the course of this research, she was a class representative and assisted in student affairs, including liaising with the department in the interest of students. Her journey into university was very precarious, since she struggled to obtain funding, but was eventually successful. She is married, with a young child, and is presently seeking funding opportunities for her NGO, as well as for her future study ambitions. She was also developing ideas during the course of this research for her PhD study in the future.

7. Grace is a 20-year-old second-year B.Sc. student, specializing in Physiology and Psychology. She identifies as a Black South African woman from a rural background. She is a second-generation student since her brother was the first in her family to attend university. Her mother is a street vendor, selling sweets and crisps, and her father is a welder. She grew up in a rural town in South Africa but attended a township school for both primary, as well as secondary schooling. She initially wanted to pursue a course in paramedics, as she aspired to be a paramedic, but was unsuccessful in securing a place on the program as it was full. She was instead offered a place in the B.Sc. program, which she accepted. Once in her B.Sc. program, she wanted to change

her course to Radiography but was not successful. She relied on NSFAS for funding during her first and second years and used a portion of her stipend to assist her mother back home financially. A church member from her local church assisted her with her university application.

8. Hope is 28 years old and in the final year of her Masters in Chemistry, as she is passionate about the subject. She identifies as a Black South African woman from a rural impoverished background. She is a first-generation student and attended both a rural, as well as a township school during her schooling career. Her mother is deceased, and her father is a poultry worker, with an Adult Basic Education and Training Certificate (ABET). Both her parents had very little formal education. Her transitory passage into university was fraught with challenges, which resulted in her taking a two-year gap, before starting undergraduate studies. During this time, she also upgraded her Maths results, which would allow her to enter a B.Sc degree and not a National Diploma (N.Dip.). She said that her transition from her rural hometown to a bigger urban city, where she currently studies, further overwhelmed her overall experience. She received financial assistance during her first year of undergraduate studies from her aunt, as her father was unable to provide for her. Thereafter, she relied on NSFAS for funding for the remainder of her undergraduate course. She is planning on pursuing PhD studies upon completion of her Masters.

9. Karabo had just submitted her PhD dissertation at the start of data collection. She identifies as a Black South African woman and is also a full-time lecturer. In addition, she had the opportunity to go on a few months' sabbatical abroad. during the course of her PhD studies. She worked in industry prior to joining academia but left due to a highly masculine work environment, which, she explained, sets out to exclude those who do not fit the mould of being men of a certain class background. Moreover, as a Black South African woman in a highly male-dominated workspace, she also felt that there was not enough room for growth and opportunity, as men would support fellow men in climbing the career ladder. Hence, the motivation to join academia, given its somewhat more equitable representation of women, including minority females. She emanates from a middle-class background and had attended Model C schools during her formative years. She is married and had recently given birth prior to the research

taking place. Her husband also holds a PhD too and is a lecturer in the same department. She noted that both her husband and her male supervisor gave her encouragement, thrust, and strength to complete her doctoral thesis.

10. Kgosigadi is 25 years old and currently in her final year of Masters studies in Botany and Zoology. She initially wanted to do pharmacology but was unsuccessful in securing a place at university. This resulted in her pursuing the Environmental Sciences. She identifies as a Black South African woman from a lower socio-economic background. She is also a first-generation student and emanates from a rural area in South Africa where she attended a township school for both primary and secondary schooling. Her mother is formally unemployed but works in the informal economy making curtains and duvets to sell, and her father has been absent from her life, until recently. She was self-reliant during her first year of undergraduate studies, but thereafter received NSFAS support, but struggled for postgraduate funding as she had to rely on various funding pots to cover part of her study costs. Initially, she was not planning on pursuing postgraduate studies, due to financial constraints, but her supervisor was successful in persuading her. She still has outstanding debt, which was carried over from her first year, and which she is still struggling to cover. She also started an environmental internship during her Masters course, which relates to her study field and assists with accommodation and basic expenses. She plans on pursuing PhD studies upon the completion of her Masters.

11. Lebohang is 24 years old and currently in her final year of Masters studies in Botany and Zoology. She initially wanted to pursue Chemical Engineering as a career, based on a distant female relative being a Chemical Engineer but opted for Environmental Sciences. She identifies as a Black South African woman from a working-class background. She is a second-generation student, emanates from a rural background in Limpopo Province, and is also the first in her family to pursue STEM. She attended a township school for her schooling career. Her mother is unemployed, and her father is a retired teacher. Her father was the only breadwinner and her mother, though unemployed, works in the informal economy selling sweets and crisps to support the family. Since her brother was the first to go to university, he somehow supported her financially during her undergraduate studies, given that her parents could not see to

all her financial needs. She was self-funded during her first year of undergraduate studies and thereafter received NSFAS from her second year onwards, but still owes the university outstanding debt for the year NSFAS did not support her undergraduate degree. At the time of data collection, she was experiencing emotional distress due to a lack of funding for her Masters course, despite having pursued various funding options, which were unsuccessful. She has also secured employment and plans on pursuing Ph.D. studies upon the completion of her Masters.

12. Lerato is a 32-year-old Civil Engineer and holds a Masters in Civil Engineering. She identifies as a Black South African woman from a lower SES background. Her mother was unemployed whilst growing up and her father was absent from her life. She wished to take up various career paths, depending on the stage of life she was at, whilst growing up. She is also a first-generation student and comes from a rural background, but attended a township school during her primary schooling days and thereafter received a scholarship to go to a private school to complete her secondary schooling, since her family moved to the city. She received funding from an Engineering company to pursue undergraduate studies, specializing in Engineering, though her wish at the time was to do accounting. As a result, she was obliged to take up Engineering to fulfil her bursars' requirements. Prior to embarking on undergraduate studies, she took a gap year and decided to take on part-time employment, due to a lack of finances to pursue tertiary studies. During the course of this study, she obtained her professional registration as a civil engineer. She currently works for a civil engineering company in a metropolitan city in South Africa. She is married and at the time of data collection was pregnant and subsequently gave birth.

13. Millicent is a 27-year-old trainee Civil Engineer. She holds a Bachelors in Civil Engineering. She also identifies as a Black South African woman from a working-class background. She is a second-generation student and attended a township school for primary and secondary schooling. Her mother is an admin officer, and her father is a retired schoolteacher. She received support in transitioning into university and learning more about the Civil Engineering profession from her brother-in-law. Whilst at university, she served as a board member of an organization founded by Black female STEM students, with the aim of supporting and aiding the journeys of more

women of colour into and through STEM. She always aspired to be a Civil Engineer since her primary school days and is currently training/working in a Civil Engineering company, to gain professional registration. Upon entering university, she obtained a merit bursary, which covered part of her study costs and for the rest, she relied on the assistance of her parents. She only received a full bursary in her third year of study from a power plant in South Africa. Her mission and goals are to dismantle stereotypes surrounding gender and work and to set an example for Black women occupying male-dominated work industries and spaces.

14. Neo is 31 years old. She identifies as a Black South African woman from a working-class background. She holds a National Diploma in Mechanical Engineering from a university in an urban city and is currently a Group Leader at an Engineering company in a coastal region. Moreover, she attended a Model C school throughout her schooling career, despite having grown up in a township environment. She is a first-generation student and grew up with both parents. Her mother is a dressmaker with a matric certificate and her dad is a factory operator with a trade certificate. Since her mother and father were both working parents, she had to step into a caregiver role as the eldest child to look after and support her younger siblings, whilst at the same time balancing this out with her schooling responsibilities. Her dream was always to be a pilot, but due to obstacles beyond her control, she pursued a career in engineering. She completed her tertiary education at a HE institution in an urban city, but later changed provinces for better work opportunities. She holds a leadership position at her place of employment and is studying for a degree in Electrical Engineering as she plans on venturing into the compliance side of engineering.

15. Patricia is 31 years old. She identifies as a Black South African woman from a middle-class rural background. Her mother is a high school teacher, and her father is retired. She is a second-generation student since her mother studied teaching at university. Her undergraduate degree in Metallurgy Engineering was obtained from a university in an urban city and she attended a government inner city school (former Model C) for both her primary and secondary schooling. Moreover, her parents relocated from a neighbouring African country to South Africa when she was about to start high school. Her interest initially after matric was to pursue film and the creative arts, but was also

considering accounting, and she applied to study that. However, she found herself obliged to undertake an engineering degree since it was the only bursary that was prepared to fully cover her university costs, which her parents were unable to meet. Hence, she was fully funded throughout her undergraduate degree by a mining company in South Africa. She was also expected to conduct her Engineering practicals with the same mine, whilst at university and was employed with them for some time after her undergraduate course. She has since left the technical side of engineering and currently works as a Reliability and Improvement Specialist in the same sector. Moreover, she is also studying for an MBA degree at an institution in a big urban city.

16. Philisiwe is a 31-year-old Bachelor of Mechanical Engineering graduate. She identifies as a Black South African woman from a middle-class background, but also sees herself as both advantaged, as well as disadvantaged, depending on the context and situation she finds herself in. However, she also acknowledges the fact that through the historical mechanisms of oppression of marginalized people, such as Black women, her life, that of her family and those that she surrounds herself with have been negatively tainted. She emanates from a Township background but was fortunate enough to attend a former Model C school and is also a second-generation student. Her mother is a teacher and her father is absent from her life. She received a bursary to study at the undergraduate level, as her family could not financially afford to support her HE journey. At the start of this research, she was a Managing Director for an Engineering company in a coastal region of South Africa, but later moved abroad, as she found a better opportunity. During her undergraduate studies, she started an organization with other Black female STEM students to support and develop more marginalized women for career and study opportunities in STEM. Also, since she is accomplished in what she does, she is expected to financially support her younger siblings, as well as nieces, nephews, and other extended family members. She is planning on pursuing a Masters degree in the near future.

17. Precious is a 30-year-old Masters graduate in Chemistry. She holds a National Diploma and a BTech in Analytical Chemistry and identifies as a Black South African woman from a rural background. Her upbringing was in a rural province and lived most of her childhood with her grandmother since her mother gave birth to her at a school-going

age. Hence, her grandmother had to step in and see to all her needs. Her mother is currently a teacher, with a teacher's diploma and her father is absent from her life. Although Precious stems from a middle-class background, she still experienced rural poverty, as her mom was never part of her life. She attended a rural school and went on to do an undergraduate degree at a HE institution in the same Province. After matric, her dream was to be a medical doctor, but was unsuccessful in securing a place at medical school. She is also a first-generation student and was not eligible for NSFAS funding, since both her mother and stepfather were teachers, and this resulted in her often struggling financially throughout her undergraduate journey, as she fell into the 'missing-middle' category. She is also not in possession of her undergraduate certificate and academic record since she is still financially indebted to her former institution. After the completion of her undergraduate degree, she enrolled for Honours and Masters qualifications at different institutions in an urban region. During the course of this research, she completed her Masters degree and secured funding to pursue a PhD Her dream is to someday be a business owner, manufacturing her own unique line of cosmetics.

18. Sibongile is a 39-year-old PhD graduate in Chemistry. She identifies as a Black South African woman from a working-class background. She grew up in a township and attended a township school during her primary years and thereafter went to a Model C high school. She completed her undergraduate and Masters degrees in the area of Analytical Chemistry. After her undergraduate degree, she found employment at a lab as an in-service trainee and went on to work for the company for eight years. She decided to quit her role as she wanted to pursue a PhD, as her company was not supportive of further study endeavours. She is also a first-generation student and was funded for undergraduate studies through NSFAS. Her mother is a teacher, with a teacher's diploma, and her father is unemployed with a standard three schooling education. During the course of this research, she submitted her PhD for examination and passed successfully. Throughout her studies, she faced financial obstacles but also went on to accomplish various milestones, like winning a poster competition at a conference she participated in during her PhD. She is currently pursuing avenues to undertake postdoctoral research and is a single mother with a son of school-going age.

19. Sophia is a 24-year-old final-year BSc student, specialising in Physiology and Psychology. She identifies as a Black South African woman from a lower socio-economic background. She was raised by her grandmother in a rural province and attended a rural school in the region until grade 11. Thereafter, she relocated to an urban city to live with her mother and attended a township school to complete her matric. Her mother is a security guard with a matric certificate and her father is absent from her life. She experienced challenges with adapting to lifestyle changes and issues of language when she first arrived in the urban city. She endured financial obstacles, especially during her first year of study, since she had to rely on her mother for registration fees and money for necessities, whilst waiting for her NSFAS allowance to be approved. She eventually received support from NASFAS and enrolled for undergraduate studies. She is also the first in her family to attend university. Whilst transitioning into university, she felt left on her own, as her mother was unable to support and guide her university journey. After completing high school, she took a gap year and pursued a computer course, as she was not accustomed to using computers in her rural school. She plans on pursuing Honours studies upon the completion of her undergraduate degree.

20. Sunny is a 33-year-old PhD candidate in Physiology. She identifies as a Black South African woman from a middle-class background. She was raised by both parents and emanates from a rural context in South Africa, where she attended a township primary school and later went on to complete her high school at a former Model C school. Her mother is a housewife, and her father is a Human Resources manager. Initially, her aspirations were to pursue medicine, but she was not accepted into medical school. She is also, in her view, a first-generation student, despite her father holding an honours qualification, as he studied part-time whilst working later in his adult life. During her undergraduate degree, her father financed her studies but stopped when she became pregnant. Hence, she still finds herself struggling financially, as she lacked funding to study further, which in the past also caused her mental strain during her time at university. Initially, she was unaware of the university application process and had to request the assistance of others. She first enrolled for her undergraduate degree in a rural province, but later dropped out and enrolled at an urban university

to complete her degree. She is currently reading for her PhD and lecturing at the same time. She is in a steady relationship and is parenting one child with her partner.

21. Zandile is a 24-year-old final-year Masters student in Botany and Zoology. She holds a B.Sc. in Life and Environmental Sciences with a specialization in Biochemistry and Botany. Moreover, she identifies as a Black South African woman from a lower socio-economic background. She grew up in a township in South Africa with a single parent and is the first to attend university. Her mother is unemployed and receives a disability grant and her father is deceased. She attended a township school, where she completed her schooling career and later enrolled to study at an urban university. She struggled with funding, including remaining unaware of university processes and procedures upon entering the HE terrain. She received NSFAS support during her undergraduate degree but faced numerous challenges during her postgraduate studies, which were fraught with both financial and supervisory-related obstacles in delaying her research project. She aspires to pursue doctoral studies after the completion of her Masters.

Chapter Six
The Messiness of Patriarchy and Schooling Complexities: Comparing the Participation of
Rural, Township and Middle-Class Women in preparing for STEM higher Education

6.1 Introduction

As I have demonstrated from my co-researchers' profiles in the previous chapter that they have all been disenfranchised somehow as Black minority females along their STEM endeavours. Moreover, I have also shown from their profiles how they remain differently positioned, which this chapter further demonstrates in how such differences influence their participation in preparing for STEM HE. It compares the lived experiences of middle-class, township and rural women whilst growing up, in relation to both cultural patriarchy at home and matters of schooling inequality. Here, I focus on unravelling the underlying mechanisms and systems of oppression and subjugation that have set out to impede and prevent the equal participation of Black South African women intending to pursue STEM HE. I am interested in exploring the systemic issues at play affecting those occupying the lower echelons of society, such as women growing up in rural impoverished backgrounds. Thus, I argue that rural South African women's experiences are affected by a complex interplay of social justice issues such as disenfranchised rurality, historical legacies of coloniality, and persistent normative patriarchal gender codes. I frame this chapter within a social justice as well as a decolonial framework. Specifically, I draw on Fraser (1998, 2008) distribution element to social justice, accompanied by Mignolo's (2011a) colonial matrix, Quijano's (2000) coloniality of power, as well as Lugones's (2008) coloniality of gender (2008) to centre my arguments. I note where I see interrelated aspects of recognition, and I first show how patterns of inequality play out in the home context, amongst South African women growing up, in ways which reinforce gender inequality and oppression. I then draw a parallel between rural and township women's experiences and compare it with that of their middle-class counterparts. In so doing, I go on to show how socio-cultural and economic disadvantage remains embedded in the

experiences of township and rural women, with the latter facing more severe oppression due to deeper levels of poverty, accompanied by cultural patriarchy.

Second, I explore the complexities surrounding the issue of schooling inequality and show how structural issues in the South African schooling context perpetuate inequality and sustain unequal participation, especially for rural learners. In this, I compare the schooling of both rural and former Model C learners and go on to show how issues pertaining to access to resources, skilled teachers, and broader structures concerning metrics and performance indicators, shape the experiences of Black aspiring female scientists, and have implications for participation, depending on the type of school the girl child is exposed to.

6.2 Household Chores

My data shows how Black women make sense of the cultural expectations placed on them by family systems and how heteronormativity and aspects of socialisation for females are normalised, including how extra burdens are placed on the shoulders of the girl child whilst growing up.

Millicent who emanates from a semi-rural, but middle-class, background had this to say about gender and cultural teachings in her family:

> *So, growing up, our culture teaches us that a woman should mostly do house chores, cook and clean, like just domestic work only...*

> *(Millicent)*

Moreover, Zandile whose background is from a lower socio-economic township, suggested something similar, but further added how her family constructed gender roles in terms of socialising the girl child to be caring and nurturing, which is expected from a good wife to her husband and children:

> *...I was expected to learn how to cook and clean mainly because one day I'll become a wife. During family events, my male cousins would get to just play outside while I would be in the kitchen with the older ladies. I was also taught that as a girl child I cannot be lazy, I have to do house chores, or I won't get married.*

> *(Zandile)*

The above narratives, which resonated throughout my co-researcher narratives, suggest that families still subscribe to traditional gender normative roles in socialising girls to take on caring and nurturing responsibilities in the South African context. This echoes Idahosa and Mkhize's (2021) sentiments, that by design the girl child is often deprived of an equal opportunity and life chance. This is reflected in both Millicent and Zandile's accounts of '*a woman should mostly do house chores, cook and clean'*, as well as, '*one day I'll become a wife.'*, and '*as a girl child I cannot be lazy, I have to do house chores, or I won't get married.'*. My own experiences similarly resonate with those of my co-researchers in that I also experienced how the women folk in my family, but in particular my grandmother with whom I grew up, had to navigate the patriarchal structural contours that define South Africa's gender norms in occupying space as a marginalised woman. I witnessed my grandmother giving so much of herself yet remaining invisible and perceived as inferior. This aligns with Lugones's (2008) assessment in general concerning how the influences of colonialism have dehumanised non-dominant women marked female. By this, colonised and enslaves female were not allowed any stakes in economic matters, since they were invalidated as minors by both coloniser and colonised men (ibid., Akala and Divala 2016, Mendoza 2016, Akala 2018, Vergès 2021, Mkhize 2022). Hence, the oppression of Black female bodies carries remnants associated with coloniality, whereby Black men have become entitled to violating that which the colonial hierarchical system have shown him to be of inferior in nature (Lugones 2007, Santos 2018).

Moreover, what can be noted is how the colonial imbrication of gender has remained intact, particularly in the Majority World (Skeggs 2019, Gill and Pires 2019), and how its societies have remained complement in further shaping and sustaining it (Quijano 2000, Lugones 2007, Gqola 2015). Drawing on Wood's (2019: 2) definition of patriarchy being 'a hierarchical system of social organization whereby men hold positions of power over women', including the notion that 'the male has superior control over women and all others under their care', the above accounts go on to demonstrate how South African families still adopt patriarchal practices that are firmly rooted in culture and heteronormative tradition whereby females are subjugated and regarded as inferior and their roles are to nurture and care for males. This is similar to (Akala and Divala's (2016), and later Akala's (2018) analysis of patriarchal

principles based on cultural norms, values and dispositions that African parents may hold, which can also be deeply intertwined with aspects of religiosity and coloniality.

Another interesting feature that stood out in my data was the issue of class dynamics and patriarchy in the home context. I found that my middle-class co-researchers were never subjected to the same patriarchal principles as those emanating from lower socio-economic backgrounds and their parents appeared to hold more egalitarian views on gender. This corroborates research by Helman and Ratele (2016) which found that South African families are situated on a spectrum based on beliefs and assumptions towards the notion of patriarchy and the issue of gender remains complexly constructed in the home environment. The researchers found that families from lower SES contexts had more clearly demarcated gendered roles, in terms of what men and women are supposed to do based on their normative gendered attributes. However, they found that middle-class families held more egalitarian notions of gender construction, but at the same time also perpetuated forms of patriarchy and gender inequality. In this study, I found that my co-researchers from middle-class families did not feel that their parents had strongly perpetuated gender inequality in the home context. Patricia and Sunny who both emanate from middle-class rural backgrounds alluded to the notion that traditionally gendered norms and expectations were not a primary feature in their upbringing. Instead, Patricia commented on how she could take on roles traditionally associated with men, and this way rigid normative gender roles were discouraged:

> *I think… yeah, it was good, it was a middle-class black family who lived wherever we lived. Coz we've lived in Swaziland, and I've lived in South Africa. And I didn't really grow up in a home where I was told that girls should do this so guys… my parents aren't very traditional in that sense. They're traditional in other senses. But, so like we could all help my dad fix his car or whatever. So, it wasn't really weird.*
>
> *(Patricia)*

Moreover, Sunny went on to suggest that her parents shielded her from all forms of oppression:

> *…we were shielded and these things, (race and gender inequality) only happened to me at university…*

> *(Sunny)*

Needless to say, patriarchy in the household can also manifest in various different ways, such as domestic abuse and gender-based violence, and women from lower SES backgrounds are more apparently subjected to forms of gender-based violence and domestic abuse according to a range of extant research (Maseno and Kilonzo 2011, Madiba and Ngwenya 2017, Mshweshwe 2020, Segalo 2022, see also Orton 2016).

6.3 Cultural Patriarchy and its Impact on Schooling

I found that, based on how rigidly patriarchal principles are imposed in the home context, the educational development and wellbeing of young Black women are often impacted, especially where deep levels of poverty exist, such as in South Africa's rural enclaves. Hence, in light of my findings, I further show how Black South African women from rural and township backgrounds experienced patriarchy in their homes whilst growing up, but more so, how patriarchal norms and structures more overtly and directly impacted co-researchers emanating from rural backgrounds. The narratives of Neo, Ayanda, Hope, Zandile and Buhle suggested how being accustomed to normative gender divisions of work in the home context had implications for their studies and schoolwork. Neo, who emanates from a township background, and Hope, who comes from a rural area on the outskirts of South Africa, suggested the extent to which normative gender roles applied in their respective households and how Black women are often subjected to subordination as a result. Neo commented about her life growing up as a Black girl and how gendered roles were clearly demarcated in her home, which privileged men over women:

> *…when we were growing up my little brother had zero chores. Like zero, nothing was expected. He'd literally come back, here at home. Does his homework and lives his life willy nilly. And on weekends he lives his life freely and we are stuck mopping the house and washing dishes and doing all of that you know. So, my other little sister and I addressed this like, no! We are expected to do our schoolwork and work (household chores), my brother*

does nothing, it's not fair you know. We know we are females, and this is what we think is right, where it's expected of us but it's not fair.

<div align="right">

(Neo)

</div>

Hope, growing up in a rural context, similarly explained how traditional gender roles were normalised in her rural home, but went on to point out how due to a lack of resources in her surrounding environment, her oppression was further intensified:

…at home I had chores for after school like tidying the house and cooking, fetching water because we did not have a tap at the time, my brother who is younger than me could not do much since he was very young at the time, it was the same when I was at my aunt's house who has a son three years older than me, house chores were for girls…

<div align="right">

(Hope)

</div>

Moreover, Neo also alluded to how a lack of resources had further impacted her role as a woman in her home, due to the responsibilities that were placed on her shoulders:

…it was a lot. Coz, you have to get home and clean up and wash your socks and shirts or dresses, whatever that you were wearing or needed to wear the following day coz we, I had one shirt, one pair of socks, one dress. So, if I needed to wear the dress that I'm wearing today tomorrow, I have to wash it now, today. So that I can wear it tomorrow. So, every day I have to wash it, hang it, clean. After cleaning…coz I was the oldest. Make sure that the others also do their chores then we do our schoolwork. While doing our schoolwork, cook. So, you do your schoolwork while you are also cooking. So, it took up a lot of time. And then after you are done you have to wash the dishes. After that you are tired, you have to go to bed. And sometimes you're not even done with your assignment, your schoolwork but that's how life was, you know!

<div align="right">

(Neo)

</div>

In addition, I had a conversation with Ayanda about her experiences of growing up as a Black woman from a rural context in South Africa. She went on to mention during our interview

something similar to what Neo and Hope had alluded to, in terms of how the endemic nature of poverty in her rural environment impacted her experiences of growing up as a woman, to the extent that it had implications for her grades in high school, limiting her funding opportunities for further studies:

Ayanda   *Okay. To be honest, I will just go through like my own journey, what has been happening in my life, so I won't have to generalize anyone. So, where I come from like home, there are specific duties for like as you are a girl you have to, do this and that. And as guys they also have their own roles. And that thing has like created a lot of like problems within the household because when you are not around, other things are not done, everything has to wait for you. It doesn't matter whether you're doing matric, you attending or what. So, if our parents were structured in a way of saying it's not only girls who will cook, maybe I could have done much better in Grade 12, because I was so close in getting like a few distinctions, I ended up getting 79, 75 and I'm like if I didn't have so much roles. I was gonna get like a full bursary because everything was gonna be like okay. My marks were just going to be fine. So, because of the duties that we are given at home you …*

Zaira   *Like what kind of duties? Tell me, just give me an example.*

Ayanda   *Okay. You have to come back from school, cook. You have siblings, you have to wash their socks and everything. So, basically I was like coming out from school around five…5 pm and then I have to walk for an hour back home. When I get there, my siblings are here but they didn't do anything. As for like what are we cooking tonight, I would be defrosting the chicken. What's happening? You have to see and then we end up finishing those roles around nine and then you still have the homework from class that you were attending and then tomorrow morning it's half past six, seven o'clock in class, like there's no time to rest.*

Besides having to juggle schooling and household chores at the same time, both Zandile and Buhle (the former from a township and the latter from a rural background) suggested that

they had to fit schoolwork and studying into their busy schedules of performing household chores or find time in the evenings or on weekends:

Zandile:　　　*I would have to make my own time for homework and schoolwork because house chores took priority, there were designated times for chores, like Saturday mornings were for what we call 'spring cleaning'.*

Buhle:　　　*I would study only during weekends or at school or at night.*

Based on the above analysis, I found that Black women from both townships, as well as rural contexts experienced traditional gender normative roles in the household and as a result were subjected to patriarchal practices. This reflects the literature by Zuze (2020) indicating that the more impoverished the home environment the girl child finds herself in, the more household responsibilities she is subjected to, compared to her more affluent counterparts. Her findings show that, from the period of 2007 until 2013 in the South African context, girls from lower SES (quintile 1) backgrounds were subjected to more household chores and responsibilities, compared to their middle class (quintile 5) peers, which meant they had less time at their disposal to engage with schoolwork.

My findings further suggest that socio-economic factors, such as, '…*fetching water because we did not have a tap…'*, in Hope's case, as well as, '…*every day I have to wash it, hang it, clean.'*, according to Neo, including, '… *I have to walk for an hour back home'*, for Ayanda, further intensified the gender oppression that Black rural women were already experiencing due to patriarchal and wider structural constraints at home. Thus, what Fraser (1998, 2007a, 2008), as well as Fraser and Bedford (2008) note here is that the distribution element is interconnected to the recognition dimension in informing the gender oppression experienced by women from lower socio-economic contexts. These two interrelated dimensions work together in denying them the right to participate as equals in society, especially in relation to men, including women positioned higher up on the social hierarchy. For example, impoverished women are burdened with household responsibilities, due to a system of cultural patriarchy, which occurs as a result of being misrecognised based on their gender, which devalues and disrespects them. However, they also have to contend with deep levels of poverty from being mal(distributed), especially in rural settings, impacting on how they

carry out their chores and duties and how this dynamic manifest into other areas of their lives, such as the impact it has on schooling and studies.

Moreover, to illustrate how rural and township women's experiences are situated in a colonial matrix (patriarchy and poverty) which are both 'interconnected heterogenous historico-structural nodes', as well as current forms of colonial articulations (Mignolo 2011a: 17, see also Waghid and Hibbert 2018a), I draw on the experiences of Ayanda and Hope, whereby underlying rural poverty, including cultural patriarchy affected both their life chances. In other words, if Ayanda was not burdened with household chores and caring responsibilities, as well as being confined to an impoverished rural South African context, she would have stood a better chance to do well in school and obtain the funding that would have the potential to improve her life chances, including the circumstances of those surrounding her. Similarly, Hope would also have more time to focus on her studies without being overburdened by house chores and caring responsibilities. Their respective situations describe to me how the colonial construct of gender was set up through processes of colonisation, with the intent of exploiting minority women's labour, which continues to deprive Black women economically, especially where class plays a role (Vergès 2021, Fraser 2022, see also Fraser 2013). In other words, there is a historical factor to consider in how patriarchy manifests itself in their respective situations. Also, given the fact that knowledge is situated, both are self-aware of the injustices metered out against them, due to both elements of poverty, as well as cultural patriarchy (Haraway 1988).

The above is further reflected in the perceptions and attitudes in both rural and township households where household duties took priority over school-related responsibilities, such as homework and assignments, in sentiments echoed such as, '…*house chores took priority…*', as well as, '*I would study only during weekends or at school or at night*' and '…*you do your schoolwork while you are also cooking*', in Zandile, Buhle's and Neo's accounts respectively. Hence, the notion that Black Women's oppression in the Global South context is often dynamic and complex, concerning economic (maldistribution) and cultural (misrecognition) in the exploitation of labour in the home, and including the patriarchal normalisation of men as breadwinners (Fraser 1997, 1998, 2008, Khan 2019, Czerniewicz et al. 2020). Furthermore, it resonates with what Idahosa and Mkhize (2021) learned in understanding Black women's experiences in STEM and how a combination of patriarchy and underlying poverty in

impoverished communities worked to exclude the participation of Black women aspiring to do STEM in South Africa. Similarly, the above resonates with my own personal encounters of cultural patriarchy whilst growing up. I have personally witnessed, whilst growing up, how the women folk in my family were overburdened with household responsibilities, day after day, to the point whereby sweat would drip down from their foreheads. I recalled once where one whispered under her breathe, *'this is kak'*, from exhaustion. 'Kak' is an expression in Afrikaans to signal your dissatisfaction with something or viewing something as totally unacceptable.

Also, my experiences of observing women I was once so close to, serving the needs of others, whilst neglecting their own, is further resonant in the accounts of Neo and Ayanda. Both expressed feeling tired and exhausted to the point where they lacked the energy and motivation to fulfil their school tasks (Lugones 2007). This is further what Fraser (2007a, 2008) sees as an aspect of mal(distribution) due to a lack of resources, which does not allow for rest and recreation, denying both the opportunity to make time for themselves, as well as take time for recreation. In this both were prevented from competing on par with their middle-class peers who may not be subjected to cultural patriarchal standards at home. If Ayanda and Neo had more leisure time, they would also feel more refreshed, relaxed, and motivated, which may positively contribute to their studies, and improve their marks and results. Hence, the experiences reported supports the analysis by Harrichurran, Vermaak, and Muller (2021) based on research concerning access to leisure time between men and women in the South African context. As Harrichurran, Vermaak, and Muller (2021) found, and in line with my own findings pertaining to the experiences of rural and township women, leisure time remains highly gendered in the home context, with men having more leisure time at their disposal relative to women due to the traditional gendered expectations of women as caregivers in the home. This further brings to mind the notion that the Black female is non-gendered, and devoid of humanness, hence the normalisation of being overworked with very little regard (Lugones 2008).

Adding to how colonisation had hierarchised Black and non-dominant women, it is also imperative to assess the economic dimension in such subjugations, particularly in the South African context. In my mind, as much as poverty and patriarchy shaped our lived realities, as Black women, the historical processes of colonialism, such as capitalism and its emphasis on wealth creation and intergenerational poverty, is what further exacerbated the

disempowerment, of all non-dominant bodies (Quijano 2000, Lugones 2008). The South African case remains unique, as the influence of Apartheid, which was informed by principles of colonisation deliberately neglected the underdevelopment of rural spaces (Timmis et al. 2022, Omodan 2022), as well as dislocating racialised people, including the dispossession of their land, involving forced removal to the outskirts of the country in sustaining the construct of segregation (Hlalele 2014, Masinire 2020) that would currently entrap and stifle rural women's potential (Fraser 2008, Fraser and Bedford 2008). For example, if rural and township women in South Africa were not affected by a historical system which set out to marginalise based on race, gender, as well as geo-spatial location, the situation would be very different for them, especially in the case of the former. In the case of Hope, she had to access water from a well to perform her chores, as there was no access to a tap where she lived, whereas Ayanda had to walk far distances to and from school, to be confronted with household chores and caring responsibilities, further shedding light on the *darker side of modernity* (Mignolo 2011a, Waghid and Hibbert 2018a) This further affirms the sentiments of scholars who have opined on the interrelationship of rurality and poverty in terms of ongoing coloniality in the South African context and how it remains distinct from other geographic spaces (Hlalele 2014, Masinire 2020, Timmis et al. 2022). What can also be noted in the accounts, especially in that of rural women, was their agency to do well in school and to go onto to be accepted at university, as a means to escape the ongoing cycle of poverty, as well as the harsh effects of cultural patriarchy. This can be seen to be more directly and overtly expressed in Ayanda's account, whereby her sights were set in obtaining good grades to go to university and make a life for herself away from her rural village. The situation she finds herself in is what decolonial scholars refer to as the modern-day colonial entrapment, which is based on the modernity/coloniality nexus which remains intact, working to exploit those deemed vulnerable in society to retain their position on the social hierarchy (Quijano 2000, 2007, Lugones 2008, Ndlovu-Gatsheni 2013, 2016).

Furthermore, my data reveals that not all Black women who are aspiring to do STEM are positioned in the same manner, since Patricia and Sunny were not subjected to more extreme forms of injustice at home, as well as poverty, thus making it easier for both to focus on their studies and do well at school, including having more time to prepare for university.

Also, township women had to contend with patriarchy, but not rural poverty, which also gave them a better chance at performing well in school and having the resources available in their surroundings that would assist them in preparation for university, which rural women did not have at their disposal (Zuze 2020). This demonstrates how an uneven terrain is created and often sustained (Fraser 1998, 2008 see also, 1997a), hence, the need to understand South African rurality's close intertwinement with coloniality (Quijano 2000, Masinire 2020). I am not contending though that Middle-Class and Township female co-researchers are not affected by coloniality, or in the case of the latter to some extent poverty, to the contrary, as non-dominant females we were all subjected to colonisation and do have a social justice claim. However, how coloniality currently affects all of us remains differential based on our unique positionings and circumstances.

6.3.1 Negotiating household duties

Co-researchers provided accounts of how due to a patriarchal culture in the home environment, women and girls are seen as being responsible for housekeeping and caring responsibilities and suggested that they had to negotiate such responsibilities with their mothers. Hope and Kgosigadi who both stem from rural backgrounds narrated instances whereby their mothers were readily available to assist them with household chores, as a means to free up available time for them to study:

> *I was now cooking every day and cleaning every day, those were the things I used to do as chores after school and my mother helped me when she was around.*

> *(Hope)*

Kgosigadi, suggested that family members exploited her, due to being a female and younger, which prevented her from studying:

> *They always made me do everything most of time if I didn't go to school or the library…But most of the time it was taking up my study time.*

> *(Kgosigadi)*

She further stated that when she was with her mother, her mother used to step in and assist her with household chores:

When I was with my mom, things were better.

(Kgosigadi)

Grace, who is also from a rural background, instead provided her mother with assistance in terms of housework when she had spare time. She mentioned:

I would help my mom since she had a lot of housework…

(Grace)

These narratives were resonant of other co-researchers and suggests that Black women in this study, particularly those from rural contexts were often burdened with household responsibilities, which impinged on their study time, as already pointed out. However, in such instances, these women were often found to negotiate household responsibilities with their mothers, who were seen to be very supportive of their daughter's educational development (Levison and Moe 1998). Hence, mothers were more readily available to step in for their daughters, to relieve them of the mundane burden that comes with housework and caring responsibilities, in order for them to dedicate more time to their studies. This negotiation between mothers and daughters in rural homes reaffirms Mshweshwe's (2020) observations, as I pointed out at the onset of this chapter, that patriarchal culture remains deeply intertwined in the general fabric of South African society, which is shaped by factors, such as socioeconomic status and class background. This also further confirms previous findings that rural women from impoverished contexts suffer the most from patriarchy and articulations of coloniality in the home environment (Lugones 2008), but also in terms of the pace at which such communities have evolved (Maseno and Kilonzo 2011, Helman and Ratele 2016, Skeggs 2019, Gill and Pires 2019). Moreover, mothers, albeit not highly educated, looked out for the interest of their daughters to give them a better future. This also points to how Black women in general are being mis(recognised) in the home (Fraser 1997b, 2000, 2008), particularly by men, as well as suffering from economic forms of maldistribution (Fraser 2008). These processes disregard the equal status of the feminine gender, impeding their equal participation in matters concerning the interest of women, compared to their masculine counterparts. Lastly, the same can be said here for the female parent, as they too are subjected to patriarchy in the home, hence mothers and daughters were found to support each other.

I have found that South African families in general continue to subscribe to Eurocentric constructs of gender binaries in the home context, which ensured a strict demarcation of gendered roles. However, the rigidity of such normative roles was dependent to some extent on social class, as well as factors relating to parental education level and income. In other words, middle-class families were found to be more egalitarian when it came to gendered roles in the home. Moreover, middle-class parents discouraged rigidly defined gendered roles in the home and women could take on roles traditionally associated with men. Middle-class, more highly educated parents also tended to be more protective in shielding their offspring from forms of inequality and oppression.

In contrast to this, township and rural women were more likely to be subjected to normative gender roles in the private sphere in contrast to their middle-class counterparts. During their childhoods and into adulthood, township women were commonly expected to take responsibility for cooking, cleaning and caring responsibilities after school, whilst simultaneously having to attend to schoolwork, which had implications for the amount of time and focus being afforded to studies.

I also found that the experience for the rural girl child growing up was more severe and amplified compared to both their township and middle-class counterparts, due to the underlying mechanisms involving poverty, pertaining to the overarching systems and structures that come with rurality and its colonial undertones that have been constructed to occlude, as well as exclude. In this, rural women were subjected to cultural patriarchy, but also had to endure more difficult material hardships such as walking long distances from school, fetching water from a well to cook, clean, and care for their siblings, which were informed by coloniality. This dynamic further dehumanised the rural girl child, as it made it more challenging to carry out their domestic, as well as caring duties, which had implications for the amount of time they were able to dedicate to their studies. Moreover, exhaustion from household responsibilities also put a strain on their ability to concentrate and focus on studying, which became reflected in their school grades, in turn presenting challenges to compete for competitive funding for HE studies. Being awarded funding would alleviate the financial strain that comes with preparing for university, and such funding is critical for rural girls wanting to pursue STEM and have enhanced life and career opportunities.

Apart from cultural patriarchy dictating gender normative roles in the home, another dimension to inequality is the uneven distribution of household resources, making it less conducive to facilitate school-related activities and further hindering educational outcomes. I found that families from both township and rural contexts were found to perpetuate gender inequality through prioritising household chores over women's educational development. Given this pervasive dynamic, the girl child was found to build a stronger bond with a female figure in the home, such as a mother or grandmother, in alleviating them at times from their responsibilities in order for them to dedicate time to their studies. In essence, the odds were found to be stacked against rural, as well as township women, but primarily the former, given that they had to contend with a hostile patriarchal system which overburdens them, is less supportive of their educational endeavours, as well as contend with the multiple deprivations of endemic poverty and the repercussions that all of this have for their educational attainment and life chances.

Furthermore, middle-class women were found to be more privileged whilst growing up and had more time to dedicate to their educational endeavours and preparation for university. They were also not burdened by the issue of poverty that plagued both rural, as well as township women. Both township and rural women, on the other hand, had limited study time and had to deal with extreme forms of poverty and cultural patriarchy, which had implications for their studies and funding opportunities available to them. Hence their experiences remain differential based on their social positionings prior to STEM HE.

6.4 Schooling Challenges and Complexities in Rural and Former Model C Schools

My co-researchers described their experiences of having to navigate the South African schooling terrain. I found that access to material resources, as well as human resources, including the wider systemic issues that affect impoverished schooling contexts to have hindered the potential of Black female scholars intending to pursue STEM at university. Moreover, my data reveals that as much as township and Model C school goers experienced disadvantage in relation to schooling dynamics, co-researchers who attended rural and farm schools in South Africa were more disadvantaged, and their oppression and inequality remained ongoing and systemic. This is consistent with the literature on schooling inequality

in South Africa and the differential opportunities learners are confronted with, as well as how a lack of access to resources and skilled teachers remains a challenge for the most deprived of contexts and learner populations (Maringe, Masinire, and Nkambule 2015).

6.4.1 Access to labs, chemicals and equipment

My co-researcher noted a lack of access to basic facilities during their schooling, such as laboratories, lab equipment and chemicals which are needed to provide young South African scholars with the basic foundations, as a starting point in grasping the scientific acumen required to become successful female scientists. My co-researchers agreed that this disadvantaged them and played out in varying degrees across all backgrounds prior to university. Precious, who comes from a middle-class background, but attended a rural school, commented on her access to resources, saying: *'We had a lab at school, but it was used as a storeroom…'*. This corroborates the literature by Maringe, Masinire, and Nkambule (2015) which found that schools in rural areas in South Africa refrained from teaching science practicals, as they lacked the expertise and teaching capacity to do so. Instead, as in my study, these researchers also found that rural schooling laboratories were often turned into storage facilities as a result. Moreover, apart from labs not being used for its intended purpose, Buhle said that there were no physical labs present on her school premises, and no scientific equipment, including chemicals: *'we didn't have access to any chemicals, or the lab or nothing.'* Both Precious and Buhle's experiences speaks to a (mal) distribution of resources, which would aid their scientific enquiry and allow them to gain the foundational skills and knowledge for university.

There are a range of studies that have similarly found a lack of crucial educational resources in South African rural schools, described as institutions facing multiple deprivation (Masinire, Felix, and Nkambule 2014, Maringe, Masinire, and Nkambule 2015, Maringe and Moletsane 2015). This phenomenon of systemic inequality often involving limited access to basic resources in rural teaching contexts are also well demonstrated in research by (du Plessis 2014), (Timmis and Muhuro 2019), (du Plessis and Mestry 2019), (Myende and Maifala 2020), and (Timmis et al. 2022) in line with my study. As Keddie (2019: 44) notes, 'schools continue to perpetuate class disadvantage through the inequitable distribution of education's material benefits and given that poverty and early school leaving continue to be the most accurate predictor of educational disadvantage and future economic and social marginalisation.'

Similarly, my co-researchers variously reported, South African rural students in particular, could spend their entire schooling journey without having access to science labs:

> Precious: *…the only time I got to see a lab or a laboratory, was when I got to varsity when I was doing my undergrad…*

> Buhle: *The first time I saw a lab was here at university…*

> Anne-Marie: *When I got to university, wow! These labs were so big…*

However, Ayanda and Hope who both attended rural schools, reported on having access to labs at school, but in Ayanda's case, her school would teach the subject of chemistry, but would totally omit the didactics of chemistry practicals in the lab:

> *I remember other schools had lab practicals on the chemistry side of physical sciences, but we never had it…..*

> *(Ayanda)*

She further noted that where lab work was conducted for other subjects, the challenges of overcrowding, as well as double-grade teaching ensured that teaching and learning did not go as planned:

> *There was a lab class but then we would run out of chemicals because we had like many students for grade 12. And also grade 10's had to mix.*

> *(Ayanda)*

Also, in exceptional circumstances, Hope mentioned that she did have access to a school lab, as well as chemicals and equipment, due to having been privileged to attend a technical school in her rural surroundings:

> *…in my school there was 1 lab, 1 chemistry lab. Coz, I attended a technical school back then, maybe the school was like one of the good schools in my area…*

> *(Hope)*

However, she went on to state:

They (the school) didn't have much of everything that we needed. So, if they have… obviously there is like 3 conical flasks, not every student can have.

(Hope)

As can be seen from the above analysis, the issue of a lack of access to crucial resources in facilitating the scientific development of rural students remained evident in the accounts of all co-researchers attending impoverished rural schools. I found where labs, chemicals and equipment were available in rural schools, the teaching of science practicals posed a challenge due to the limited availability of resources in such contexts (Fraser 2008). Moreover, my findings confirm what Nesthivhumbe and Mudua (2021) discovered in a rural school in South Africa where teachers regarded teaching science lab work as unbearable, due to a lack of resources. I also found that issues of overcrowding and multi-grade teaching also further compounded the teaching of science practicals in rural schooling contexts, since impoverished schools already faced a shortage of resources, such as science chemicals and instruments. This further corroborates research conducted by du Plessis and Mestry (2019) on teaching dilemmas in South African rural schools. The researchers found that overcrowding, as well as multi-grade teaching was a common feature in rural schools, which impacted the quality of content delivered in such contexts, given that teachers had to divide their attention between two grades. In addition, what can be noted from the experiences pertaining to a lack of resources, as well as overcrowding is a symptom of what Quijano (2000) deems the coloniality of power, which has been constructed in ways that provides the colonised with a sub-standard of education, as a means to entrench their liminality.

Scholars such as Jansen (2009) and Mbembe (2016) regard children who have such a lack of access to necessary educational resources, as recounted by Buhle, Precious, and Anne-Marie, as being alienated, given their dislocation to the periphery of society, involving ongoing deprivation, which can be viewed as a symptom of coloniality. Moreover, where labs were available in rural schools, they were often utilised for something other than teaching and learning.

When I enquired how teaching was carried out in the absence of a lab, as well as chemical and instruments, both Ayanda, as well as Buhle stated the following:

> *…at times it would be more like the teacher will tell you that when oxygen reacts with hydrogen its water. But for you to put those 2 together to see water, it never happened. But you have to know it, it exists.*
>
> *(Ayanda)*
>
> *We're taught through textbooks, you know, they tell you those centres react with those two from there and that so that, and so that is it.*
>
> *(Buhle)*

Ayanda though went on to share her sentiments on why she felt that teaching through experiential learning is an essential part of scientific enquiry and exploration:

> *Coz if you saw something happening it's more like it stays with you till the end of life, than when you are cramming something, it's different from learning and observing.*
>
> *(Ayanda)*

These sentiments expressed by Ayanda above is what Freire (2005) refer to as the Banking Model to teaching. In this, the teacher just banks whilst teaching, without allowing for a two-way interaction. In other words, critical learning will allow Ayanda not to just be an engaged learner, but it will pave the way for her to positively contribute to changing society, through what she has acquired. This will also open up new avenues for her to explore, which will contribute to her epistemological access, especially when preparing to access dominant spaces, such as HE, which are not aligned to her habitus (Bourdieu 1984, Adebisi 2016). Instead, Freire (2005) views what Ayanda is subjected to as a dehumanising process and denies her emancipation. It is also evident from this, that Ayanda is fully aware that the education she is receiving does not fully empower her (Haraway 1988, Escobar 2004, 2007, see also Clisby and Holdsworth 2014).

This is similar to what I observed in the school where I worked, whereby science practicals never took place, due to a lack of resources, and pressure were mounted on teachers to complete the syllabus on time. Hence, much of the focus was mainly on theory, whereas science practicals were regarded as extra, which further confirms the literature by Nesthivhumbe and Mudua (2021). In their study, the researchers found that in the absence of

the needed resources to conduct experiments, rural schools resorted to relying on textbooks in teaching science practicals. Thus, for rural learners in particular, the lack of resources (maldistribution), enables teachers, as well as schools, and other educational structures, to undermine the educational opportunities for pupils from multiple-deprived schools, which impedes their participation as equal bodies (misrecognition) (Fraser 1997b), and can be seen to be further entrenched in the colonial matrix in historically subjugating and denying equal access to empowerment through education (Mignolo 2007a, 2011a).

In contrast to this, Millicent, Esther and Patricia all attended former Model C schools, albeit all three emanating from township and rural contexts. They all had access to functioning laboratories in their schools. Although in some instances, a lack of access to the needed resources required to conduct experiments were a challenge for their scientific development. They stated the following when I probed about having labs at school:

> Millicent: *We had labs, computer labs.*

> Esther: *…we did have a science lab. We would go to the labs once or twice every week.*

In as much as science labs were available to learners at these schools, the labs were also functioning. Patricia had access to a science lab at her school, but felt that she could not get much use out of it, due to big class sizes and the availability of limited resources (equipment and chemicals) at the school's disposal:

> *As I said I went to like a very government school, but it was in town. And so our school wasn't very resourced. We kind of like… we didn't have a lot of resources.*
>
> *(Patricia)*

Millicent also went on to a Model C school suggested something similar:

> Millicent: *Yes, we had challenges with resources…*

Millicent and Patricia provided insight into how schools would carry out science practicals in the absence of sufficient resources:

…we were a lot. So, it was a bit challenging for us to practically do lab work. Let's say there's one equipment, we'd be a group of 5 using that specific equipment.

(Millicent)

So mostly we'd go to the labs if something is being demonstrated to us.

(Millicent)

We didn't like do experiments or… we just read about them and then you figure it out or have like a teacher do it alone.

(Patricia)

However, Esther felt that her school was well resourced in accommodating everyone in terms of science practicals, saying: '*There was equipment, chemicals, and tools to help us with our experiments and practicals*' but she felt disadvantaged because of the lack of computers and IT equipment to cater for everyone, which she felt could have benefited her:

I would hardly use one at school because there was one or two computers in the library and they really weren't enough to cover for hundreds of learners at the same time. Due to this, I didn't know much about Microsoft Office and other software (giggling).

What can be noted from the above analysis, in former Model C schools, physical labs were available and functional. However, a lack resources, such as lab instruments and chemicals remained a challenge. The literature is mostly silent on this, as it is mainly found that former Model C schools are well resourced (McKay 2015, Walker 2018a). Also, when juxtaposing this against those who attended rural schools, the difference in resources remained stark. In addition, the issue of overcrowding also further hindered participation on the number of resources available to more affluent South African schools, as noted by Millicent, '*…we were a lot.',* as well as, '*…they really weren't enough to cover for hundreds of learners…*', in terms of science resources and computers respectively (Fraser 1998, 2008, Keddie 2012). This is similar to a study conducted in Middle East, whereby teachers found it challenging to teach where equipment was needed, such as science chemicals and instruments, due to large class sizes and the lack of available resources (Ali-Rweide 2019). I did find though that although

resources were a challenge for former Model C schools, learners could still engage in practicals, but this required the sharing of resources, through textbooks or teacher demonstrations. Hence, learners from former middle-C schools, such as Millicent, Esther and Patricia's circumstances also speak to an issue of a (mal) distribution of resources (Fraser 2008), which impeded their participation in science and IT development, albeit emanating from more resourced schooling contexts.

I found that overall, despite some differences in extent of these experiences, schooling inequality remains a challenge for learners from rural, township, as well as former Model C schools, especially in terms of a distribution of resources. Based on the comparison, it can be noted that learners from rural schooling contexts were severely deprived, compared to their former Model C counterparts, given that they reported having never experienced a science laboratory for the entire duration of their schooling journeys and in certain instances, their laboratories were used for something other than teaching and learning. The lack of capacity in teaching science in rural schools also played a pivotal role, whether a scientific culture was fostered, including the resources needed to carry out scientific inquiries. Also, where labs were available, a lack of resources still posed a challenge to conduct experiments, given the overcrowding of classes, as well as double-grade teaching. This resulted in rural schools omitting science practicals and rather focusing on explaining the experiments to students. I further found that by schools omitting lab practicals and teachers solely relying on scientific demonstrations through textbooks, this resulted in superficial learning, whereby rural learners were often unable to relate to abstract explanations, compromising on the quality of education being rendered. This severe form of injustice further entrenches inequality and does not permit learners from rural schooling context and equal opportunity to master the foundational skills to become competent scientists. In other words, due to their severe (mal)distribution rural students are still expected to compete on an equal footing with students from more affluent contexts, yet they were not exposed to the basics of teaching, due to the systemic nature of their schooling.

In contrast, I found that former Model C learners always had access to science labs at school, though there were instances where a lack of resources, such as equipment and chemicals, posed a challenge for teaching and learning. Learners in former Model C schools were exposed to some lab work, but this often occurred through sharing of resources and in some

instances, due to a lack of resources, teachers improvised and demonstrated experiments, similar to the manner in which they were performed in rural schools. This was also primarily due to overcrowding and bigger class sizes, which further impacted on meaningful learning and teaching. However, it should be noted that as much as former Model C schools faced challenges with the distribution of resources, their schools were still relatively well-resourced and functional, compared to those in rural contexts. Double-grade teaching was not a feature in former Model C schools, so class sizes were smaller than in rural schools. I also suspect that the quality of their teaching (albeit using mainly textbooks) would also be superior, as they would have more skilled and better trained teachers, compared to impoverished schooling contexts. Thus, the experiences for rural vs former Model C schooling contexts remain very differential, primarily due to a lack of resources, including other compounding factors, such as class sizes and double-grade teaching.

6.4.2 Metrics, performances, and the dilemma of skilled teachers

Co-researchers provided accounts of their experiences during their matric year and how the schooling system was set up to disenfranchise them, particularly those from impoverished learning contexts. My findings reveal that during the final year of schooling, the focus was mainly on grades and results for both rural, as well as former Model C schools. Hence, the emphasis in both these schooling contexts was to ensure that there were always teachers available to teach the respective subjects. This is understandable, since the last year of schooling is deemed to be the most critical. However, Precious questioned this practice, as it only happened in grade 12 and not in the other grades at her rural school:

> *…in grade 12, they got that Maths teacher, you know, that was good in all grades to have. You all have like, good teachers, they make sure that there's no teacher that is not there. The teacher that is there is available and is doing the work. But I was wondering, why?*

> *(Precious)*

When I enquired on her thoughts about special attention given to grades and pass rates in matric, she responded with the following:

Because they want to, they want you guys to pass and you know, to all to keep the flag flying for the school, because that's where everything is recognised at in grade 12, 'that okay, this school is good! They passed well in grade 12. Look at their pass rate, it's 85. Or it's 90', you know, they don't go and check, how was it in grade10? How was it in in grade 10 in each class, you know, they just check the overall which is in grade 12, that oh, we had like 50 learners that wrote grade 12 and then for 49 got A's and then you know, so yeah!

(Precious)

Look how insightful Precious is of the reasoning behind her rural school's actions, as well as that of the Department of Basic Education (DBE) in South Africa to bolster grades and performances without taking issues of schooling inequity into account. She possesses insight and awareness into how an unequal education system had disadvantaged her, given that she was left without a science teacher for the duration of her grade 10 year, yet in grade 12, her school ensured that she has a teacher for every subject (Shikalepo 2020). In this, Precious lost one year of teaching during her high school years, which has implications for her when she goes to university, as she is expected to compete with students who received instruction throughout their schooling journey (Fraser 1997b, 2008). This resonates with my own personal experience, as a similar phenomenon occurred in the school where I worked, whereby due to a shortage of teachers, The School Management Team (SMT) will rather substitute lower grade teachers to ensure that teaching and learning takes place in grade 12. What is also noteworthy to mention here is that schools in South Africa are under pressure from the districts and the national Department of Higher education (DHE) to produce overall pass rates, which contributes to the District, Provincial, as well as National outputs. This yields certain benefits and privileges for schools and improving pass rates may be looked at as a good thing, though it becomes problematic and even unethical when it is carried out on an unequal playing field for some. This what (Mignolo 2011a) attests to concerning our unequal schooling experiences in relation to coloniality, in which pervasive hierarchies in the schooling terrain remain entrenched through systems that have neglected and deprived certain strata to flourish yet expecting them to compete on an equal footing. Moreover, the situation in

former Model C schools appeared more positive, since the emphasis was on grades and results, but there was no mention of not having teachers. Sunny and Esther mentioned:

I feel that schools mostly focus on grade 12's and do not pay as much attention to the other grades…

(Sunny)

We usually left the school premises later than other learners. It was definitely to ensure a 100% pass rate. Every year for four consecutive years since 8th grade, this was achieved. It was a great reflection on the school. Excellent Key Performance Indicators. Until the rate dropped to 98% during my matric year. That was definitely a shock to many. We often consoled ourselves by comparing our pass rate with other "appalling" results from other schools (giggling). Petty, I know. So, in short, yes. Much of the spotlight was placed on matric learners to perform well in order to represent the school well.

(Esther)

Moreover, what Precious refers to as going the entire year without a teacher in Grade 10, Anne-Marie recounted not having a science teacher for the most part of her grade 12 year, since her teacher resigned from his post. She suggested that her school was unable to replace him, but had made attempts, but was unable to find someone with the right expertise and skill. Anne-Marie mentioned:

…but they tried to replace him. But they were not, they couldn't get the best fit. I think, we had two or three teachers that came that year. Like, they just couldn't explain, they didn't know what they were doing.

(Anne-Marie)

She went on to mention:

So, I think most of the time people don't prefer teaching in such environment. So, they prefer the loctions (township slang for 'ghetto' in South Africa), or

like townships or suburbs or something like that. They don't really prefer teaching in villages.

(Anne-Marie)

The above further highlights the realities for both rural learners, as well as their more affluent counterparts in relation to teachers and the expectation on learners and schools to produce results. Furthermore, as much as all schools in South Africa would want to ensure that there is a warm bodied teacher for each grade 12 classroom, since it's in the interest of the school, Anne-Marie's rural school was unable to fill this post. This is also aligned to what Precious notes about not having a grade 10 science teacher for most of her grade 10 year. This corroborates the literature concerning the lack of teaching capacity in rural schools (Venkat and Spaull 2015, Shikalepo 2020, see also Maringe, Masinire, and Nkambule 2015), due to poor working conditions and salary incentives (Hlalele 2012, Shikalepo 2020). Also, what can be noted here is the systemic nature of rurality and poverty, which intermeshes and is influenced by ongoing coloniality in creating more sinister problems for rural learners (Masinire 2020). As I have already highlighted that schooling inequality creates an unequal playing field, but what is more important to note is how it further creates unequal life opportunities, especially when transitioning out of school. What I mean is that both Anne-Marie, as well as Precious would have gaps in their learning by the time they leave school, due to not having had a teacher for long periods of time, despite passing their final year of school. This meant that they were left to their own devices and rely on independent learning, rather than receiving support and guidance from a teacher. What is of concern in that both are equally expected to compete for a place at university and even for competitive funding.

Moreover, both were aspiring to become medical doctors, but were unable to reach the competitive threshold for getting accepted into medical school. Hence, what can be further noted is a complex interplay if both were not affected by the colonial matrix (Mignolo 2011a, see also Mignolo 2007b) associated with poverty and patriarchy (Masinire 2020), as well as the pervasive issues of rural schooling and skilled teachers to guide their learning, both would have been better equipped to compete on a level playing field (Fraser 1997b, 1998, 2008). This is why institutions need to take socio-cultural, economic and historical factors into account, instead of starting everyone of on the same footing, which affords more privileged groups advantages over less privileged ones, and in doing so exclude those who do not fit the

criteria of being a legitimate student groups (Fraser 2007a, Carter 2012). Also, here aspects of both distribution, as well as misrecognition intersects to inform both their experiences, since not having access to the right resources, such as teachers (mal)distribution, allow for the education system to despise and overlook their subordination (mis)recognition (Fraser 1997b).

Here, I found that learners from rural schools displayed a keen level of awareness to the fact that schools were solely focused on raising pass rates in grade 12 and going onto gain recognition and even some incentives from this but displayed very little regard for their learning in formative years. This resulted in schools giving special preference to grade 12, by ensuring that every subject has a teacher for it. Moreover, a similar phenomenon occurred in former Model C schools, where much emphasis was squarely placed on grades 12 in contributing to the school's output. However, in rural schools, learners were left without teachers for most of the school year in matric, and at times for an entire academic year in lower grades, due to schools being unable to attract skilled and competent teachers. This creates an uneven platform for competition, as rural learners are expected to compete with those from former Model C schools, as well as those from private institutions for a place at university, as well as competitive funding at times, which diminishes their hopes and aspirations in pursuing certain career fields. Hence, how we are positioned remain imperative, as well as the opportunities and privileges bestowed upon us, allow for us to look at issues of equity and social justice with a different lens. In this, rural learners are confronted with coloniality on a daily basis, given the unique circumstances of rurality in South Africa and the challenges it poses for schooling.

6.5 Conclusion

This chapter has provided insight into aspiring Black female STEM students experiences prior to accessing university. Black women's participation remains distinct from each other, in relation to household labour, kinship and schooling dynamics, and determined by their social and gendered positioning in society. Differences exist among these differently situated Black women co-researchers prior to pursuing STEM HE in relation to how problematics associated with cultural patriarchy at home, as well as schooling dilemmas inform their realities. Despite South African society still subscribing to patriarchal values, the experiences associated with a

middle-class background can be more empowering as it can provide a platform for Black women's greater emancipation at home. This is derived from the views held by parents towards principles on equity at home, well-resourced schools, including skilled teachers enabling better preparation, both socially and academically for university. These women have more time to focus on studies at home, including recreational activities, as a result of less restricted by patriarchal values. In contrast to this, township women's participation has been hindered in preparation for university, given that cultural patriarchy, as well as a lack of resources influenced the way in which they engage with school-related work at home. Nevertheless, in spite of these challenges, they still have access to relatively well-resourced and better functioning schools, being located near urban centres and metropolitan hubs.

Both groups of women have been affected by aspects of social justice issues, yet also remain privileged at the same time, as I have outlined. However, rural women's participation in this regard has been impeded, due to processes involving aspects of social justice, as well as coloniality. This suggests that cultural patriarchy at home, as well as aspects of deeper underlying poverty are often intermeshed, creating an uneven terrain in preparation for STEM HE, as household chores and caring responsibilities at home are prioritised over schoolwork, making it difficult to study and to qualify for bursaries and funding opportunities for further studies. A lack of resources questions the quality of the education received and whether it would be fair to participate as equals at university, especially in relation to metrics and not possessing the required resources that more elite schools are endowed with. Furthermore, what can be noted is that as much as all women experienced inequality and social justice prior to university, rural women were confronted with coloniality on a daily basis, which is dehumanising for them, and denies their full participation as equals. The next chapter deals with how Black women in STEM access and participate in STEM HE, through multi-dimensional exclusion, as well as infrastructural support from others like themselves.

Chapter Seven
The Precarious Task of Journeying into STEM: Multidimensional Exclusion and Support through Embodied Infrastructures

7.1 Introduction

As can be seen from Chapter 6, the life chances and opportunities available and presented to Black South African female aspiring scientists remain a continuation to the next phase of their educational endeavours and are determined by how they are positioned on the social hierarchy. This pertains to SES, family construction and attitudes in relation to matters of gender equity, as well as the social and cultural capital available to them. In this chapter, I present the data analysis and discuss the findings from my fieldwork focusing on how Black women access and participate within STEM HE. I argue that the transitioning process into HE remains complicated for all students, however, for those occupying the lower echelons of society, it can be especially difficult, as their experiences remain dehumanised, whereas the reverse is true for those high up the hierarchy. I first show how SES and geo-spatial factors shape how Black women from different class backgrounds access and participate in HE. I demonstrate how co-researchers who have been positioned differently engage with the application process in preparing for university and how they made sense of this in the presences, as well as in the absence of knowledge and guidance in applying to university. Second, I show how rural women feel alienated and excluded by the neo-liberal institution upon first arriving on campus and how they are unable to relate to pertinent facilities and resources put in place to aid their learning, including the dominant middle-class culture, due to a misalignment between their backgrounds and that of the modern neo-colonial university. Third, I show how Black women from different social positionings engage with the dominant lingua franca of the modern university and the implications this has on matters of their engagement and participation. Fourth, I provide detail on the supportive and empowering roles Black women played towards each other in participating in HE and further show the positive educational, as well as personal effects it has. Last, I summarise the findings and provide concluding thoughts on equal access into HE and the role played by the institutions

in enhancing such access and participation, especially in highly stratified contexts like South Africa.

7.2 The Application Process

7.2.1 Epistemological access into STEM higher education

My data shows that students from socio-economically disadvantaged, and resource-poor households struggle more when accessing HE due to a lack of epistemological access. This is particularly the case for those who are first generation students, as well as those from more marginal socio-economic contexts, such as rural and township backgrounds. The narratives of Anne-Marie, Ayanda, and Neo, who are first generation students and who emanate from rural and township contexts, will be explored in understanding their journeys into university and the challenges they experienced as a result of lacking the requisite knowledge, understanding and guidance in successfully applying to university and lodging funding applications to support their smooth journeys into STEM HE. I also weave in my own experiences of being a first-generation student in accessing HE for the first time. I further explore Patricia's narrative who emanates from a rural, but middle-class background and who is a second-generation student, since her mother is a schoolteacher.

Anne-Marie who grew up in a rural context expressed a lack of knowledge and understanding on her path, in terms of the university application process. She attempted to access HE initially based on her own assumptions, trying to navigate her own way through, but later realised that it remains incumbent to follow a formal process to be granted access. As a result of her lack of knowledge and support, she did not apply for NSFAS funding which she qualified for, and which would have aided her smooth transition into university. As a result, she had to drop out of her course half-way through the year, as the university was demanding payment and her grandparents advised her to return home since they were unable to meet the financial expectations. She took their advice and had this to say:

> *Firstly, when I was in grade 12, I thought you write the exam. Because they give us exam numbers. And then the universities will have your exam number and they will automatically think oh, this person applied to us so they will just take you. Forgetting that you have to choose the course. I thought they*

would call us and ask: 'hey, which course do you want? We saw your marks'. It's a procedure. There's application process and then there's what's that fee? Application fee. There's just a lot that I had to do. So, when I went to [university] I didn't know that I have to pay for registration, I have to pay for accommodation, I have to… there's tuition fee, I didn't know such.

(Anne-Marie)

She added:

…the problem was that I did not apply for funding. It was just, it was, it was a new thing for me. It was really, I didn't know much about universities, funding and stuff. I didn't know anything. I went to [university]. And then I had to come back because, because of funding…

(Anne-Marie)

Ayanda experienced a similar encounter. Also from a rural village, she identifies herself as emanating from a resource-poor background and further explained how she struggled with accessing HE, especially the know-how of applying for NSFAS funding which she was entitled to. As a result, she was accepted onto her university programme, but remained self-funded during her first year, due to lacking the knowledge in lodging a successful NSFAS application. She currently still has outstanding debt with the institution, which bears repercussions for participation now after her honours studies. She commented on the following:

So, in terms of applying for NSFAS, I know many girls like myself have done that. You think that since you have registered on the NSFAS profile, that means you have applied. Just to receive that message that "thank you for updating your NSFAS profile". You think ah I'm done, I've applied. And that's not the case. You still need to send your affidavits, documents, your certified ID. And I didn't do that […] And then [the University] admitted me the following year. I thought I had funding in my mind. And I'm like okay I'm going. I do have funding. The SRC are asking me "show us your ref number for NSFAS". This is me taking out an SMS that I've updated. They're like "that is not how you apply".

Neo, who transitioned into university from a township background and being the first to attend university also struggled with gaining access, since she had no support and guidance, apart from the advice from her middle-class peers at school. She was also entitled to NSFAS funding, due to her social positioning, but lacked the knowledge and understanding in terms of preparing a successful funding application on her own. She too remained excluded from successfully gaining epistemological access into HE, as she had to self-fund during her first year of undergraduate studies and thereafter could not reregister for her second year since she still had outstanding debt. She then decided to take a year off to work and save up money to settle this debt before she could resume her studies again and apply for NSFAS. She explained:

> *…it was quite difficult, and I did work independently since I was the first one in my family to study further, it was something new for all of us. So I, I had no-one, or I had little information […] So, then I had to take a GAP year that year to go work so that I can pay my fees…for the previous year. But then after that when I went back, I applied for NSFAS.*

(Neo)

Patricia who stems from a middle-class background and is a second- generation student, had a different experience of applying to university, as she possessed greater socio-cultural and epistemological capital, which she derived from her family context. Patricia commented on the following when I asked her about her challenges in applying to university:

> *…it really helped that my mom – She is now retired, but she was a teacher. So, she up until matric and Grade eleven, so like the last few years of high school... So, she was very acquainted with the fact that you need to follow a strict process and apply.*

(Patricia)

She further noted that both her parents were responsible for supporting and guiding her access into university and whereas her mother was familiar with the bureaucratic processes

pertaining to funding, her father was instrumental in seeing that she applied for private bursaries and that her application was in on time:

> *My dad took it to the post office to send it. And I actually was a bit hesitant, "Ooh, mining? Okay, I don't think I want to go that serious". But when he saw that form, he said, "No, you need to post that now". And it was like the day before it closed. So, he took it quickly and sent it through like, Fastmail.*

> *(Patricia)*

I found based on the above analysis that lacking the necessary knowledge and understanding of the processes involved in successfully applying to HE was an issue for Anne-Marie, Ayanda, as well as Neo. All three found themselves lacking in the knowledge in accessing government financial support through NSFAS funding for which they were entitled to, given the criteria that their household income was below the minimum for qualifying. This lack of knowledge was largely due to them being the first in their families to pursue a university education and also how they are positioned on the social hierarchy of society (Bourdieu 1984, Bourdieu and Wacqaunt 1992, Lareau 2015).

What these three experienced, Anne-Marie, Ayanda, Neo is what Mayet (2016: 2) refers to as the 'articulation gap', which prevented us from successfully fulfilling the criteria that goes with accessing HE. The articulation gap stems from lacking the correct forms of capital and habitus to source out requisite information, required to lodge successful applications which will enhance access into university (Bourdieu 1984, Bourdieu and Wacquant 1992, Liccardo and Bradbury 2017). Fraser's (1997b, 1998, 2007b, 2008) understanding of this dilemma suggests that by not being able to access education, which is a fundamental basic right, we were misrecognised in the process. This suggests that they were unable to participate as equals compared to those who had the resources, guidance, and support from their parents and families, at their disposal in accessing HE (Fraser 1998, 2008).

Moreover, it further speaks to the different zones of being in which dislocated students find themselves in, which influences their experiences when accessing the western higher educational space (Maldonado-Torres 2016, 2017, Grosfoguel 2019). Fanon (1986) conceptualised the zone of being and the zone of nonbeing as racial hierarchies that were created to sustain the White/Black, European/non-European binaries in relegating people to

experience reality based on racial background, I argue that for the South African context, class becomes a more distinguishable marker in subjecting people to either zone (Walker 2018a, 2018b, Spaull 2019, see also Pather and Chetty 2015). In this, the issue of the individual's humanity is interrogated and questioned. As Grosfoguel (2019: 266) suggests, 'the oppression of class, sexuality, and gender that exist in the zone of non-being is qualitatively different and more devastating from those oppressions that exist in the zone of being.'.

In other words, by Anne-Marie assuming that access into university is automatic, based on matric results and exam numbers and Ayanda suggesting that what she thought was an application for NSFAS funding, which in actual fact was the processing of her basic information, as well as Neo having to rely on friends to source out information about courses, imply that all three were situated in the zone of non-being in applying to university (Fanon 1986, Santos 2007a, Fraser 2022, see also Gordon 2005). By being situated in the zone of non-being, Anne-Marie, Ayanda and Neo's experiences are further dehumanised, since they lacked emancipation, accompanied by unregulated violence in accessing HE (Santos 2007a). For example, Anne-Marie, Ayanda, as well as Neo lacked emancipation, due to being confined to the zone of non-being, as sub-humans and being deprived the opportunity to choose courses and explore funding options, due to a myriad of factors, such as lacking support and guidance from parents (Makunga et al. 2018), as well as the required resources (van Zyl-Schalekamp and Mthombeni 2017, Walker 2018a, see also van Zyl 2016), but also as a result of a differentiated schooling system that remains ill-equipped to adequately prepare students for accessing HE (Morrow 2009, Liccardo, Botsis, and Dominguez-Whitehead 2015, Liccardo 2018b). Moreover, these findings are further confirmed by a large project carried out by Swartz et al. (2018) in understanding the experiences shaping Black students' access and participation into South African HE. The researchers learnt that participants from the 8 universities expressed that the complexities embedded within families were part of the obstacles and challenges that hindered successful access into HE.

Furthermore, Anne-Marie had to drop out of university and Ayanda had to go without funding, whilst Neo had to drop out of her undergraduate studies to take up employment, in order to save up more money, only to resume her studies, once she had accumulated enough savings. This further implies that their journeys into HE had been plagued by unregulated violence, discomfort, anxiety, as well as disappointment, depriving them of the opportunity

to receive an education, as a result of lacking the needed capital and habitus (Santos 2007a, see also Bourdieu 1984). This dilemma denied them the opportunity to be on par with those who are situated in the zone of being or who find accessing HE a humanising process (Fraser 1998, 2022).

Also, it brings into sharp contrast the situation that Patricia finds herself in. Patricia stems from a middle-class background and are privileged to have received the guidance from her mom, who is well acquainted with the university application process, as well as a father who have played a supportive role in ensuring that her bursary application reaches the funding organisation on time. By being supported through the university application process, by a mother who is a university graduate, Patricia has in place the underlying mechanisms which does not generate misrecognition for her but ensures that she is in a position to participate equally, as a bon-fide student (Fraser 1998, 2007a). She is in a position to lodge successful applications and even explore private funding opportunities, as well as successfully apply for it, paving a way for a more fruitful career path under the guidance and direction of her knowledgeable, caring and interested parents, which humanises her experiences and relegates her to the zone of being (Fanon 1986, Santos 2007a, 2020b, Fraser 2022). In other words, her situatedness in the zone of being, allows for her experiences to be regulated with non-violence, as well as emancipated, according to Santos (2007a). Her emancipation from belonging to the zone of being, suggests that she is at liberty to draw on the resources (both material and non-material), from her surroundings valuable capital endorsed by institutions, in mitigating against the violence associated with transitioning into its hegemonic enclaves (Bourdieu 1984, Bourdieu and Wacquant 1992, Liccardo 2018b).

The other issue for both Anne-Marie and Ayanda's access into HE concerns the issue of geospatial disadvantage, in which deeper poverty and a lack of development is more likely to be a characteristic of rural areas, further restraining access to university (Timmis and Muhuro 2019). For example, since rural villages are scattered far away from urban cities, both will have to travel many miles to provinces to submit portfolios, attend interviews or even lodge applications as part of the application process, and in a context where the rural transportation services are underdeveloped and even non-existent (Walker 2018a, Masinire 2020, Timmis et al. 2022), This implies that bodies which are already dislocated will be further relegated to the zone of non-being, and their experiences subjected to unregulated violence, as a result of

poverty and rurality, in further perpetuating inequality and misrecognition, as well as dehumanising their existence (Santos 2007a, see also Fraser 1997b, 2008). This also further confirms a study conducted by (Timmis et al. 2022) where the researchers found that rural South African students struggled more with accessing HE, due to the geo-spatial space and the challenges it presents, like having limited access to the necessary services and facilities that would facilitate their transitions into university, such as technology and adequate transportation. Research by Maringe, Masinire, and Nkambule (2015), as well as later work by Masinire (2020) have similarly argued that rural enclaves are trapped in a colonial past, which infiltrates the daily lives of its people, given the neglect that comes with being on the periphery.

Also, for Anne-Marie, her mother worked as a domestic worker in a different province, which compelled her to grow up with her grandparents who were not familiar with accessing university. This further confirms the literature that low socio-economic children often grow up with the granny or aunt, since parents are absent in supporting the educational endeavours of their offspring, due to work commitments (Nicolaides 2015, Swartz et al. 2017, Gradín 2019, Martinez-Vargas, Walker, and Mkwananzi 2019). Also, Ayanda's parents were poultry workers who never completed their schooling and were unable to support her university access. In addition, Hope, who is also a first-generation student from a rural village, sheds light on how coloniality is articulated in the experiences of rural students being confined to the zone of non-being in shaping the choices that are available to them in relation to education and accessing university:

> *…when you from a disadvantaged background most parents they don't know because either way they didn't go to school. So, they don't know the importance of education.*
>
> *(Hope)*

As can be noted from Hope's quote, rurality further positions Black rural women in the zone of non-being, given how the intergenerational legacy of colonialism are carried over through parental educational levels and the opportunities that were available to parents, further entrenching inequality (Quijano 2000, Segalo and Fine 2020, Masinire 2020, Timmis et al. 2022). This further speaks to a pertinent issue concerning that of Habitus (Bourdieu 1984)

raised by Hope, in which parents may not have high expectations from their children in going to university, which further entrenches intergenerational disadvantage. In other words, parents may expect children to follow in their footsteps of doing menial work. Hence, they can't understand the *importance of education* in Hope's words.

7.2.2 Gap years due to epistemological access

As I argue, due to a lack of epistemological knowledge in successfully accessing university, first generation students from rural and township backgrounds are more likely to experience disruptions to their studies as a consequence. In addition, the issue of taking a break in their studies or a 'gap year' is a theme that recurred throughout the data on Black women accessing STEM HE. For example, similar to the experiences of Anne-Marie, Neo and Hope, Lerato lacked epistemological access into university, as she was the first in her family to attend university. She met the eligibility criteria to qualify for NSFAS funding but lacked the awareness and knowledge pertaining to the mechanistic functions of NSFAS, as well as its existence, which prevented her from applying in the first instance. She only learnt about the scheme supporting financially needy students once at university through a family connection. She acknowledged:

> *I also didn't know about NSFAS until I got to, not varsity until I got dropped, and only because a close friend of my sister was in varsity.*

> *(Lerato)*

Moreover, she applied for a private bursary to fund her studies after school and was successful, however, the company went insolvent, as she was about to begin her studies. She noted:

> *I was ready and just didn't have a bursary and I had to take a year off. I was devastated. I was so devastated. So, I took a gap year.*

> *(Lerato)*

 She further acknowledged that due to her lack of understanding about how NSFAS functioned, she may not have considered it as an option, had she known about it, further stating, '*I didn't want to get into a situation where I had a loan that I had to pay back'.* Sunny, on the other hand, is also the first in her family to attend university, though she did not qualify

for NSFAS due to her family income threshold. Finances was never an issue for her in accessing HE as her father had the means of supporting her educational endeavours. However, she emanates from a semi-rural background and lacked the epistemological access too, as she found the university transition process very challenging on her own but was fortunate enough to be supported by a family friend. She does admit, though, that was it not for the assistance received, she was likely to resort to postponing her entry into HE. She asserted:

> *…I think I had a lot of help from people so, but had I not gotten any help from anyone I think at some point I would have taken a gap year.*

> *(Sunny)*

Both Lerato and Sunny's experiences further reflect those of Anne-Marie and Neo in terms of lacking the knowledge and insights into successfully accessing HE, which led to both postponing the commencement of their studies (Walker 2018a). This dynamic further shed light on how socio-cultural and economic factors, including home background and quality of formative schooling, can shape access into HE and further entrench inequality. Although Lerato had secured a place on a course at university, she was forced to postpone her studies due to a lack of finances. However, if she had the knowledge at her disposal about NSFAS and the fact that she had indeed met the criteria to qualify for assistance, she would have had more options at her disposal, which may have prevented her from taking a gap year (Liccardo 2018b). In other words, she would be in possession of knowledge that would emancipate her in mitigating against unregulated violence, in having to postpone her studies, due to insufficient resources (Santos 2007a).

Such was also the case of Ayanda, however, she decided to continue her studies despite not having finance in place, due to a lack of understanding in completing the online application. She was instead left with historic debt, which meant that she is not in possession of her degree certificate as a result. Not being in possession of a degree certificate brings shame to Ayanda, as it indicates to prospective employers, as well as further study providers, that she is untrustworthy, and further dehumanises her in the process (Santos 2007a). For Sunny, having access to the means but not the knowledge meant that she ran the risk of delaying her studies (Morrow 2009). This is what Fraser (Fraser 1997b, 1998, 2008) sees as the unequal participation of minority groups, which should be considered, given their maldistribution, but

more so that their intersecting identities (Black, rural, socio-economically marginalised and women) are misrecognised, generating a lack of respect in transitioning into middle-class and elite institutional spaces. It also further suggests that their fragment environments in terms of growing up and schooling experience experiences that they derived from this exposure delayed their integration into university (Pather and Chetty 2015).

7.2.3 Navigating access into higher education

Black women were found to resort to drawing on others, as well as the available resources at their disposal, as they navigated their way into STEM HE in the absence of epistemological access (Morrow 2009), as well as by being situated in the zone of non-being (Santos 2007a). Grace is from a rural background but is not a first-generation student. She found the process of accessing HE difficult since her brother was not at home, but in another province attending university. Hence, she had no one to assist her at home, but instead sought help from a fellow church member who had been to university. Buhle, on the other hand, is the first in her family to go to university and also emanates from a rural context. She qualified for NSFAS funding but was financially, as well epistemologically, supported in accessing university by an NGO, supporting needy students demonstrating academic potential. However, having graduated from a rural high school and having never had the experience of preparing for tertiary studies and neither did anyone she knew, she found the process daunting but sees herself as being privileged to have received support and guidance, due to the fact that she was a top learner at her school. She attested:

> *…initially, I had to do it myself, then those company came and helped us out with the applications. So, they just told us you choose the universities that, you that you want to go to, then they will apply for us…on my behalf. So, I never had to do like, any applications myself. They were done for me.*

> *(Buhle)*

Moreover, Anne-Marie and Neo relied on their middle-class and wealthier peers to support their intial access into HE. For Anne-Marie, in the absence of technological resources, as well as lacking parental support in aiding her access into university, she drew on the assistance of her middle-class boyfriend in matric, which she juxtaposed against that of her own family background. She explained:

> *…my boyfriend at that time, he came with his laptop at school. So, we were trying… he knew how to work things. Because he was coming from a kind of… his mom was a nurse, everyone was working at his family and then with my family everyone was a domestic worker, literally everyone, all of my aunts and my mom.*

> *(Anne-Marie)*

Neo, too, in the absence of family support drew on the support and guidance of her middle-class friends, whilst in her final year of high school. She knew she wanted to go to university but was uncertain of the processes and practices involved in successfully accessing HE. Hence, she decided to be led through the process of accessing HE by her more affluent counterparts. She recalled:

> *…so, ja, so I just relied a lot on just copying what my friends were doing. Oh, we're now applying, okay so now I also need to apply!. Oh! now we're doing this. They're doing that, so now I also need to do that. So it was just like a, a mimicking session for me when I hear that no, they're going to go and visit you know, the department of what-what, and what-what university, then I would like, 'oh! can I also tag along?' you know.*

> *(Neo)*

Also, she further noted aspect of class differentials involved in influencing the transitory experiences of her middle-class peers, including herself, stemming from issues pertaining to parental levels of education:

> *… for one of my friends, both her parents were teachers and then the other one her mother was nurse, and I think her father was an accountant, then the other friend will be her mother was a teacher as well so it's, so they were, you know, they were around people who had done it before and ja, well, myself, none of my parents were, had previous you know, formal learning…*

By having to draw on the support of others for Anne-Marie, Buhle, including Neo, suggests that their participation is enabled, since those who were socio-culturally positioned mitigated against their maldistribution, as well as misrecognition (Fraser 1997b, 2008). This confirms

my data, especially in relation to rural students, whereby Timmis et al. (2022) found that rural schools are one of the first places that its learners are exposed to the idea of universities, as well as getting support in transitioning from friends, as well as alumni who have gone on to university to study.

I too found myself sourcing out information from acquaintances, during my delay to university, since I didn't know anyone who had studied at tertiary level. Moreover, what can also be noted about Anne-Marie and Neo's access into university is that as much as they received support from others, such support remained limited in that both experienced disruptions along their studies, given that they had not followed the correct procedures in accessing funding, in ensuring their smooth transitions. This is due to how their intersecting identities (Fraser 1995, 1998, Xaba 2017, Khan 2017), are intertwined in a complex manner, informing their habitus (Bourdieu 1984, Bourdieu and Wacquant 1992, Liccardo 2018a, 2018b) in remaining alienated and preventing their equal participation.

I found that first generation rural, as well as township students, lacked the epistemological knowledge in accessing HE, due to lacking the support and guidance of a parent or guardian in facilitating their access into HE. This resulted in low SES Black women finding the application process complicated, since they often relied on their own assumptions, as well as on others for assistance, which further presented challenges. Lacking the knowledge of accessing HE funding, which they were entitled to, meant that they had to rely on their own understanding when completing application forms, which they either failed to complete, or even omitted altogether, resulting in their financial exclusion at university. This situated them in the zone of non-being and dehumanised their experiences, as they had to endure financial hardship at university, drop out of their courses to find work, as a means to fund their studies, or drop out of their courses altogether and start afresh at different institutions, incurring student debt. Hence, their experiences were embedded with unregulated violence. Also, in the absence of epistemological knowledge, some were also more inclined to take gap years, as I demonstrated in the previous section. These findings resonate with that of Pather and Chetty (2015), including recent work carried out by Timmis et al. (2022), in which they found that first generation students who are also from rural and impoverished South African backgrounds struggled academically integrate into the university environment, due to how their social positionings, family and schooling backgrounds intersects, by situating the at odds

with institution and its practices. In other words, they have not acquired and mastered the orderly practices, customs and processes that are integral to the institution (Bourdieu 1984, 1986).

Moreover, the above circumstances generated both maldistribution, as well as misrecognition aspects, impeding the equal participation of those entering academia and being situated on the fringes of society. Moreover, middle-class, and second-generation students were privileged not only to material resources, but also to knowledgeable parents which assisted them with their applications and dedicated time to explore various funding options with them. They were at liberty to choose funding in line with their interests, as well as career options. By being privileged to the above, their experiences were humanised, which situated them in the zone of being. As a result, their access to resources, as well as epistemological knowledge mitigated against unregulated violence, which allowed them to successfully access HE. Furthermore, their participation was also enabled, since they did not suffer from a maldistribution and misrecognition in accessing HE, given that their underlying habitus aligned with that of the institution.

7.3 Participation at University

7.3.1 Subaltern bodies occupying dominant institutional spaces

Upon arriving at university, my co-researchers all expressed the notion of feeling epistemically excluded. Ayanda stated that she was unable to relate to the institutional set up and the modern equipment, structures, and fixtures that come with the neo-liberal institution. Moreover, she found it challenging to engage with the technologies which were meant to aid and guide her learning in class, due to a lack of resources back at her rural school, making it difficult for her to gain the full benefit of participating as an equal at university:

> *It happens that you get into a space you not even used to projectors and everything. It's like your first time. And then you feel like this is… feels like New York but I've never been there, but this is different like something that I've never seen. And then the excitement and everything. And then you can't even point where is this person reading. Don't see. The projector is there but from where she's reading right now, maybe it's line two or three, we can't even point out. And there are people who are understanding…*

Hope also suggested a lack of prior knowledge as a result of attending under-resourced rural schools that led to difficulties in accessing important facilities that would enhance her learning at university. Due to her non-exposure to libraries whilst at school, she never sought advice to utilise her university library. This influenced her participation throughout her studies:

> *For example, I did not know how to… okay, one of the weirdest things is that for my undergraduate, one of the things that happens is that if you can't afford a book like buy your own textbook, you can always borrow from the library. Because I didn't know how to go to the library and borrow a book… I have never borrowed a book from a library. So, you see how that was? Because I was not familiar. I didn't know how to do it, I was…I didn't even have the confidence to ask how do I go and borrow a textbook from the library? So, I never borrowed any textbook from the library up until I finished my undergraduate. So, some things I didn't even learn up until now.*

> *(Hope)*

Anne-Marie experienced a similar phenomenon of not having had experiences with using a library and expressing sentiments of feeling lost, as a well as a lack of belonging, making it difficult for her to access essential resources to enhance her learning and development:

> *and the fact that this was my first-time experiencing the library, like this is how the library looks like. So, I would get there and not know where to go.*

> *(Anne-Marie)*

Ayanda, Hope and Anne-Marie found that they were unable to relate to the Western university environment that they found themselves participating in. They all emanate from rural enclaves and therefore, their identities and backgrounds remain incongruent with the institutional set up. This implies that they were unable to make sense of it and regarded themselves as outsiders, given the misalignment between their habitus and that of the institution (Bourdieu 1984). In this the neo-colonial university does not recognise the fact that non-dominant bodies stepping into its dominant space, lack the ability to relate to its

normative values, inadvertently setting out to exclude them. Thus, they remained dehumanised, as a result of being seen as outliers, to the alien practices and culture of the institution (Santos 2007a, Fataar 2018, 2019). As a result, they neither fully included nor totally excluded (Liccardo 2018a). Moreover, by feeling estranged, they already find themselves disadvantaged in participating on an equal footing to those with full membership and inclusion to the institution, generating misrecognition based on race, class, gender and geo-spatial location (Fraser 1997b). As Liccardo (2018b: 22) argues:

> The normalisation and ligitimisation of white middle class habitus, which serves the interest of the dominant group in the field of higher education, are represented as equal opportunity for all. However, agents do not compete on a level playing field as their socially made (valued) bodily dispositions are raced, gendered and classed.

This further speaks to a lack of understanding pertaining to the importance of effective teaching modalities, such as projectors, in enhancing learning, in Ayanda's case, as well as displaying a lack of awareness in terms of how libraries function, as well as the processes involved in borrowing books to complement their studies, in Hope and Anne-Marie's circumstances. Moreover, failing to follow where the lecturer is pointing on the projector, and noticing others having no difficulty in this, indicates how Ayanda feels excluded, since she lacks the academic habitus of those surrounding her in class (Bourdieu 1984, Fraser 1997b). This similar to what Timmis and Muhuro (2019) found in a South African study of students emanating out of rural schools. The researchers learned that rural students were often technologically excluded at university, due to not having had the exposure in being educated through technology, leaving them alienated at university.

A similar observation can be noted for both Hope and Anne-Marie. Hope went through her entire undergraduate programme not knowing how to borrow a book, which shows the institution's disregard for her. If both Hope and Anne-Marie were afforded the opportunity to be fully inducted, Hope could have benefited more from accessing the library services to aid her studies, and it would have saved Anne-Marie the confusion in the first place. Ayanda, too, would feel more engaged and not left out in class, including benefitting from the entire lesson. Also, even if induction had taken place, more support should have been in place for students emanating from rural contexts. This supports my findings and affirms a study conducted by Liccardo, Botsis, and Dominguez-Whitehead (2015) in which they learned that

students from impoverished schooling contexts could not apply themselves at university, in comparison to their elite schooling counterparts, due to dispositions associated with rote learning.

Furthermore, due to institutional misrecognition based on aspects of identity (Fraser 1997b, 2008), inequality is also further entrenched through an abyssal line in participating at the neo-colonial university (Santos 2007a, 2018, 2020a, 2020b). For example, my three co-researchers find themselves on the non-human side of the abyssal line, since they unable to relate to the colonial inscribed practices set out by the university, which specifically caters to the dispositions of those who are fully deemed to be human. Hence, the dehumanisation of all three, but in particular, in Hope's case, as she engaged her entire undergraduate degree without being in a position to access the library services, since the educational endeavours of the non-human side is not taken into account and remain othered. Hope is aware that she is misrecognised by the university, due to how she remains positioned (low SES and rural). As Santos (2020b: 119) states: 'Social exclusion here is abyssal, as it is ruled by norms that can only be imposed on sub-human beings.'.

Apart from the epistemic exclusion, financial exclusion also played out very strongly in the narratives of my co-researchers, especially those who emanate from rurality, and had experienced the neo-liberal university system for the first time. By being positioned very differently to her working class and affluent urban peers, Ayanda's financial exclusion left her traversing the margins throughout her undergraduate course. In her painting below, she depicted herself entering university with no hands, which suggests that she felt that she had nothing to offer and give back. Being without hands in society is also a symbolic of how rurality has shaped her being, and how this is influenced by the ongoing coloniality, which further disempowers her (Haraway 1988, Escobar 2004). This had both social and academic implications for her participation at university, as she was unable to compete with those deemed higher in status than her (Fraser 2008).

The step of participating at university without funding affected her entire first year experience, in which she never felt able to socialise with her better-resourced peers, as she felt inferior to them since she found it difficult to fit in without possessing material resources (Giroux 2017, 2018). She now feels that years later, financial, social, as well as epistemological

exclusion from the past, continues to affect her life chances, as she is not in possession of her

Ayanda, Creative

Workshop)

Anne-Marie similarly elaborated more on what Ayanda's painting suggested in one of our interviews, as well as in her painting:

> *I think first thing first it was where I stayed like. Coming from my background, getting here was like okay, I don't think I can do this, look at the people around here. You look at the students how they're wearing, the phones that they were using. I remember I literally had I think it was a 2-quire book and that was the only book I had. I got to class, and everyone took out their laptops and I was just like okay, what is happening? I don't have one. And then it was that and how they were dressed. It was just a lot of pressure….*

> *(Anne-Marie)*

(Anne-Marie)

Anne-Marie depicts herself in the above painting, as a rural South African girl with a dream and vision to pursue STEM at university. In particular, she wanted to pursue studies in the medical field. Though she was unable to study what she initially had her sights set on, she still gained access into a non-medical STEM programme. However, once at university, she realised the embedded inequality that is designed to exclude Black, rural women, such as herself, due to a lack of material resources affecting her goals. She further makes reference to Black tax, which shape the realities of students from impoverished backgrounds, further perpetuating poverty and inequality, though she herself has not been affected by it. Black tax in South Africa is a practice amongst Black families, whereby those who are in employment are obliged

158

to assist their younger siblings, as well as their parents and extended relatives who are not in employment (Fongwa 2019). In other words, students who are in possession of NSFAS funding are expected to use their allowances to assist the family back home. This has financial implications, as already financially struggling students may not be in a position to assist.

As can be noted, both Ayanda and Anne-Marie were socially excluded from university based on their class background and how that intersects with the geo-spatial space they emanate from. By being confronted on a daily basis with peers possessing resources which they found difficult to come by, warranted unnecessary pressure for both, which led to their self-isolation. The tension for both also involve a lack of diversity, whereby they were only exposed to socialising with other rural African students, which made their social integration more challenging (Pather and Chetty 2015, Walker 2018a). Hence, coming into the university and being presented with students from differential racial and class backgrounds, they automatically felt excluded. Fraser (1997b, 1998, 2008) suggests that the tension which both of them are experiencing in living up to a certain standard set out by the institutional hegemony (middle-class values) as the generation of a (mal) distribution of resources manifesting into (mis)recognition and resulting in a lack of self-esteem and self-worth for both. Moreover, Ayanda did not feel worthy of respect or esteem, as she felt that she had nothing to offer, as she lacked the material resources, which meant that saw herself possessing a deficit in relation to her affluent peers and therefore was prevented from participating on an equal footing at university.

Similarly, Anne-Marie noted, 'It was just a lot of pressure....', suggesting that she too found it difficult to be seen as an equal, as her peers were in possession of fancy clothes, expensive phones and computers and in comparison, she wore flipflops to class with an A4 size notebook and pen (Fataar 2018, 2019). By witnessing this, she felt inadequate and experienced a lack of belonging, and unable to fit in with the dominant status quo (Walker 2018a, 2018b). By this form of social exclusion, Ayanda and Anne-Marie became further disadvantaged in the process, since forging connections with their middle-class peers may open up more opportunities for them, such as the necessary academic and social support in order to thrive and succeed in their studies (Bourdieu and Passeron 1990, Fraser 1997a, 1997b, 2022), given that their school habitus, as well as required forms of capital situate them as outsiders (Liccardo 2018a, 2018b, see also Liccardo, Botsis, and Dominguez-Whitehead

2015). This further corroborates what Vincent and Hlatshwayo (2018) found in their study at a South African university concerning class dynamics and student integration into the institutional domain. They found that students emanating from impoverished backgrounds were often socially excluded and as a result were unable to forge relations that would assist their integration into university, compared to students who possessed the means and exposure through prior schooling.

7.3.2 Linguistic exclusion

The issue of how linguistic identity shaped participation at university played out very strongly during the data collection phase and was a theme that kept recurring throughout both the interviews and the creative workshops. Upon closer analysis, I found that social class, prior schooling and home background had an important role in perpetuating forms of exclusion that prevented Black women pursing STEM and from fully engaging and interacting at university. Lebohang provided her assessment of how English is exalted, idolised, and even associated with intelligence in institutional contexts, at the expense of non-English languages, including the stigmatisation attached to those who are deemed non-English speakers or who are less fluent in the language:

> *…I felt like people from, you know, high class or what is it, Model C Schools. And the whole, like, you know, there's this stigma we have when a person can speak English fluently. Because, I mean, English is not our first, it's not our home language, it's our first additional language. So, we felt as though a person who's well-spoken. And who knows English is like, they very smart.*
>
> *(Lebohang)*

She further goes on to state that due to not being privileged enough to attend a school that immersed her fully in the English language, she felt disadvantaged as a result, which presented challenges for her linguistic engagement at university:

> *…certain subjects were taught in my language, you know, maybe that's, that also kind of hindered us to, like not being able to speak fluently in English because we knew they taught us in our language, so that we understand.*
>
> *(Lebohang)*

Hope suggested something similar about being disadvantaged linguistically at university, due to prior schooling exposure, but also took the time to compare the way she expressed herself to the eloquent manner of her more affluent peers, which made her doubt herself:

> *There was a lot of other students who went to model C. Yes, and it threatened my confidence a lot because every time they would be confident. Even when we were doing group presentations.*

> *(Hope Interview 2)*

Kgoisigadi confirmed what Lebogang and Hope had already suggested, especially about the experiences of being educated through her vernacular to make sense of English concepts in her school, but went on to mention how she was disadvantaged at university, due to the inferior quality of schooling she received:

> *…I think I would have been in a better position if I was from a proper background. Because you know, like, in my high school, I would say I was a top student, but then when I got here, like, probably I was the average or below average, you see.*

> *(Kgosigadi)*

Based on the above analysis, I found that Black women participating in STEM education felt themselves to be in some ways academically, linguistically, and epistemologically inadequate and inferior, because of the disadvantages embedded in former schooling and home contexts, but also due to how they perceived the English language upon entering university, as well as comparing themselves to those who emanated from affluent schooling contexts. Fraser (1997b) sees university students, such as Lebohang, Hope, as well as Kgosigadi as being disrespected and despised, by the normative linguistic culture shaping education and academia, which impedes on their ability to participate as equals, due to their lower SES status. Her misrecognition elements are strongly connected to the distribution in the case of the aforementioned co-researchers, in which their status as low socio-economic, township and rural allow the institution and the linguistic cultural hegemony it had created, to undermine them as equals in further reinforcing their exclusion. Moreover, this conundrum corroborates earlier findings by (Swartz et al. 2017), which suggest that impoverished

schooling contexts in South Africa subscribe to practices where learners are educated through the medium of their vernacular to learn and comprehend English content. As a result, their non-English speaking accents stand out at university, reinforcing their inferiority status, by opting not to engage with others (Msila 2019). This is further amplified in the narratives of Lebohang, Buhle as well as Constance:

> *You think, okay, I can't… I can't speak like how he or she speaks. So, I'd rather keep quiet.*
>
> *(Lebohang)*

> *…you never want to seem like you don't know what you saying. So yes, I wasn't feeling confident at all. Yes, I never liked asking questions in class or raise my hand, when asked to ask questions. Yes, that's like, something I still struggle with.*
>
> *(Buhle)*

Constance:	*I was even afraid of engaging. I never engaged a lot. In varsity the first years no. People didn't know me.*
Zaira:	*And why?*
Constance:	*I just felt like I wasn't well spoken. And I felt like the moment I would speak, people would think this girl, what is she talking? She doesn't even know. I never spoke. People used to know me as this quiet girl. I just used to go to class and go back home, go to class and go back home and that was it. Coz I just felt like I was afraid of people making me feel small. Already I feel small. So, I was just afraid of people making me feel small.*

> *(Interview 2)*

Entering HE and being self-aware knowers of their linguistic deficits allowed for their self-exclusion, since the linguistic hegemony of the university (Phillipson 1997, Schutnab-Kangas 1988) have historically set out to exclude non-dominant bodies, such as Black women in STEM occupying its confines (Santos 2017, 2020a). This further confirms research conducted by

Shefer, Clowes, and Ngabaza (2020) at a South African university, where Black female students emanating from township schooling contexts displayed a high level of awareness of how the linguistic hegemony of the institution, resulted in their disempowering experiences in excluding them from interacting in class.

Moreover, Fricker (2013) sees the above co-researchers to be suffering from Testimonial Injustice, which is based on the idea that someone lacks credibility and, as a result, their word cannot be relied upon due to the different types of characteristics they possess, i.e., class, race, gender, geo-spatial, etc. This is more evident in Patricia's case, whereby race, instead of class played a role in her linguistic exclusion whilst at university. Patricia held a strong command of the English language at the time of going to university, as her home and schooling backgrounds endowed upon her the linguistic capital of the institution (Bourdieu 1984, Lareau 2015, Liccardo 2018b). She was taught through the medium of English at school, even though her school was dual medium (English and Afrikaans). However, she experienced the imposter syndrome when having to express herself in front of her white peers at university:

> *…it was like 80 percent there, white male, and that was just how we went. And so confidence… that's why I'm thinking this is a bit of a personal one, it's not necessarily like the school or the university is challenging you but like personal confidence to speak up in class, to ask questions without questioning yourself. It took me years…*

> *(Patricia)*

As the researcher, I too am still confronted with the imposter syndrome at times when having to expressi myself in front of those I deem to be white and English speaking, which coincides with Patricia's account, as well as that of my other co-researchers. Also, what can be seen to be more sinister and underlying in this is how the generation of misrecognition results in deeper psychological issues for all of us (Honneth 1995, Lister 2007, Hochfeld 2022). Moreover, this can be seen to be more overtly expressed by Constance, as well as Hope, but further evident in all other accounts. Hence, I am not in alignment with Fraser (1997b) in looking past how psychological trauma affect those who suffer from forms of misrecognition, as she remains more concerned with how social arrangements affect equal participation.

Furthermore, the above accounts also raise epistemic issues for non-dominant bodies in South African HE. What this means for my co-researchers is that due to their non-dominant embodiments, the language and knowledge that accompany them to university can be seen as invalid and less valuable (Santos 2018, Liccardo 2018a). In other words, the university being staunch in its linguistic practices undermine the value of alternative forms of knowledge and linguistic plurality, despite serving a diverse student populace (Makalela 2015, 2018, see also Fataar 2018). Hence, Lebohang and Buhle felt that they had to conceal the fact that they were educated within rural and township schools, which resulted in their imposter syndrome. However, if universities placed greater emphasis on a plurality of perspectives, Lebohang and Buhle would feel more confident and at ease to contribute, including all the other co-researchers, and not resort to being mere spectators, due to appreciating the fact that what they bring with them is also of value (Wa Thiongo 1986, Santos 2020a). This ensures that a level playing field is created whereby participations remain equal and everyone is afforded the same respect and dignity (Fraser 1997b, 2007a).

In more severe cases, and particularly for rural students from homogeneous backgrounds, it can further create tension upon arriving at university and being expected to participate equally (Fraser 1997b). Constance expressed in one of our conversations the following, *'...the first time I saw a white person was at university....'*. This is a good example of being denied cognitive justice (Visvanathan 2006, Santos 2017, 2018, Hall and Tandon 2017), given that Constance is denied what she held onto as valuable all her life, and is compelled to immerse herself in the Eurocentric knowledge canons, as well as solely relying on English as a medium of instruction at university (Mgqwashu et al. 2020, Timmis et al. 2022). It will be good though if Constance, as well as the other co-researchers can be exposed to both dominant, as well as alternative paradigms as frames of reference in the diverse institutions of higher learning. Another issue for my co-researchers is the issue of how life chances can be shaped, especially beyond university and into the world of work, since not being confident in the English language bears repercussions for career progression (Block 2019).

7.3.3 Interacting with White lecturers

There were also instances whereby Black female students in STEM avoided interacting and consulting with lecturers, due to the racialised treatment afforded to Black students

compared to their white counterparts, as well as being looked down on as not possessing the intellect and qualities that comes with being a scholar. Lerato explained:

> *And you felt the difference. I mean, like, you could see the difference in when you go to ask a question[….] and you can see the White kids in and out of those offices, you know, and they never fail, which is interesting. I don't think white people are that much smarter.*

> *(Lerato, Creative workshop 3)*

Buhle suggested something similar, but felt the need to refrain from engaging her lecturers, despite her challenges with Maths, due to the fear of being perceived as incompetent:

> *Maths was always a problem for me. I don't want to lie. Yes, it was always a problem. Also, because we had like White lecturers. So, the thought of having to go for face-to-face consultations didn't happen.*

> *(Buhle Interview 2)*

Furthermore, during our creative workshop, Sunny noted that she too avoided engaging with her White lecturers when having had difficulties with course content, for fears of feeling inadequate when having to face and interact with them:

> *Zaira:* *What do you think impacted you know your confidence then to approach the lecturer?*

> *Lerato:* *I think it's, it's …*

> *Sunny:* *I have never.*

> *Zaira:* *Have you ever asked a question?*

> *Sunny:* *No. Like to consult?*

> *Zaira:* *Yes.*

> *Sunny:* *No, no, it's fine. What I don't know, I don't know.*

> *Constance: That's deep.*

> *Zaira:* So, what do you think prevented you then?
>
> *Sunny:* I think you feel stupid to even have the question, in a sense, like, and I don't …
>
> *Zaira:* And even if it's in English?
>
> *Sunny:* Even if it's in English, I think you generally feel like they feel like you're not smart enough to be there. So, by the time I have a question that I want to go ask I'm not confident enough that what I want to ask is not obvious. Are you asking a valid question? Does it make sense for you to ask?

(Creative Workshop 3)

I further learned that these Black women co-researcher refrained from consulting with White lecturers, due to a fear of receiving differential treatment compared to their White peers. This finding is reinforced by Liccardo's (2018b) study with a group of Black female STEM scholars at a South African university, in which she found that White lecturers were less willing to support them when they went to consult, but were seen to be more supportive towards fellow White students. This may also suggest that White lecturers may even mistake outspokenness with intelligence, influencing their decision to embrace native English speakers more, which Lebohang suggested earlier on about the perception of being viewed as smart if you can express yourself well in English (Makalela 2018, Msila 2019). Being unable to engage with lecturers, due to stigmatisation based on race, class, gender, rurality leaves Lerato, Buhle as well as Sunny with the burden of going the extra mile in seeking support, which denies their full right in equally participating on par with their White English native counterparts (Fraser 1997b, 2007b, Alexander and Hermann 2015, Wilkins-Yel, Hyman, and Zounlome 2019).

In other instances, Lerato, Buhle and Sunny refrained from consulting with lecturers because they felt a lack of belonging, a form of alienation and social exclusion, and as such lacked confidence. This in turn had implications for Black women's academic progress. This is similar to what Liccardo (2018b) found in her study on the lack of belonging and exclusion which shaped a group of Black female STEM students' experiences at a South African university. The

researcher found that White lecturers held negative assumptions about their Black female students, as lacking the skills and knowledge to be competent future engineers. The researcher also found that White lecturers would often finish sentences for Black female students, as a means of indirectly hinting that they needed extra support in articulating themselves. Moreover, what can be further noted from my conversation with Sunny is that she remained adamant in not refraining from consulting with lecturers but would instead resort on seeking alternative means to obtain information that will assist her, even if it will inconvenience her or delay her progress. This is further evidence, as I have already alluded, that being misrecognised generates emotional and psychological harm, even though she does not realise it (Honneth 1995). Constance further picks up on how Sunny is affected and comments on its profoundness during our conversation.

I have found that Black women from rural enclaves often experienced a disconnect when participating in HE for the first time, due to a misalignment between their habitus (schooling and home) with that of the institution. This further resulted in their muti-dimension exclusion, which included epistemic, financial, as well as linguistic, especially for those from rural backgrounds, since they were not only unable to relate to the setup of the modern institution with its sophisticated technological teaching equipment, but also to the services offered, meant to complement learning, such as library facilities and resources. Moreover, lacking the material resources further positioned them as outsiders at university, since they had to contend with living up to the expectations set out by their affluent peers, which became burdensome and resulted in their self-isolation. Furthermore, they also found themselves linguistically excluded, which were not only the case for those from impoverished backgrounds, but even those from affluent middle-class backgrounds found it challenging to express themselves in front of their white English-speaking counterparts. In this, non-English speaking women's self-esteem and confidence were not only impacted, but their ability to engage in class and consult with lecturers remained further hindered. In addition, not possessing the underlying epistemic and linguistic knowledge espoused by the institution, as well as the material resources created a maldistribution in participating equally, but also generated aspects of misrecognition in which non-dominant bodies experienced stigmatisation, including a lack of respect, which further impinged on how they participated

in dominant spaces. Also, due to their exclusion, they were affected psychologically and emotionally, as well, in traversing the margins.

7.4 Participation and the Role of Embodied Infrastructures in STEM Higher Education

7.4.1 Upliftment through empowering each other in STEM higher education

In this section I explore the narratives of co-researchers who provided their accounts of how being supported through 'community management work' created by Black women to support and enhance the moral, emotional, as well academic wellbeing of women who traverse the margins in Engineering (Clisby and Holdsworth 2014: 11). According to Clisby and Holdsworth (2014), community management work involves employment without compensation that women take on with the aim of improving the lives of others, and which often goes unrecognised. This is an example of how Black female engineering students came up with the idea of establishing an organisation, called the Society for Women in Engineering (SWiET) in supporting the endeavours of all minority women pursuing engineering at university. It was solely created as a safe space for Black women and by Black women themselves in providing, as well as receiving academic, as well as psycho-social support.

Millicent found support by this organisation and was also at the time part of the executive committee, to aid the development of female engineers, particularly those who are underrepresented. She found that other minority women at her organisation played a pivotal role in supporting her academically, when she faced challenges and setbacks in her studies:

> *And you know sometimes you would have school stress and you just be frustrated with whatever that's going on with your schoolwork and whatever. But when you get to that space it's just you are engaging with people who are going through more or less the same things as you are…*
>
> *(Millicent)*

Constance, who also received support through female engineering students forming part of SWiET acknowledged incidents along her journey that threw her off completing her

engineering degree in the stipulated timeframe, due to the underlying structural processes shaping her entry into academia, but more so due to the masculine hegemony associated with engineering. She recalled how during times of struggles; she could count on other female engineering students for support:

> *She was always there to pick me up to say you can do this, it's doable.   It doesn't mean that just coz you don't understand this part it doesn't mean that you can't go on, it's doable.*

(Constance)

Given that HE in South Africa has set out to exclude non-dominant bodies, such as Black women, but also in particular, how masculinised study programmes remain racialised, classed and gendered, Black women in STEM are often confronted with traversing the margins, as reported by various scholars in the South African context, such as Liccardo (2018b) and later work by Mkhize (2022). Hence, Black female engineering students were found to use their agency in setting up an organisation (SWiET) to support and build other non-dominant women in becoming successful engineers. Such acts of enabling support for others, as well as receiving it, is what Clisby and Holdsworth (2014: 7) see as *'embodied infrastructures'*.

In this, both Millicent, as well as Constance received academic and emotional support, whereby Millicent could offload onto other women the *school stress* and difficulties she had to endure that comes with being a Black female in Engineering. She could freely access the services of SWiET after class or when afforded free time and were encouraged to talk about her obstacles and challenges. In this, Millicent finds herself being built through the infrastructural support she received from other Black women in forging ahead with her study endeavours. Yet, at the same time she also served as an executive of the same organisation, supporting women and building them through similar infrastructural care and support. Similarly, Constance, struggled to complete her engineering degree in the stipulated time frame, as she lacked the needed support being surrounded mostly by men on her course. This meant that she was unable to connect with others who were going through similar challenges in supporting her through her problems, until she came into contact with SWiET. By accessing such services, she found mentorship and words of encouragement from senior female

engineering students, which inspired her to persevere. These are examples of what Clisby and Holdsworth (2014: 7) regard as:

> …ways that women's bodies and material actions themselves become the vehicles, the catalysts, the embodied infrastructure, facilitating access to services and enabling change and support through women's networks. This infrastructure is created through a range of encounters, from those women who act as mentors to other women within their working lives, to the services and formal and informal networks women have established that serve to provide a framework, an infrastructure of support for women.

7.4.2 Alleviating Financial and Material Burdens Outside of SWiET

Outside of SWiET, co-researchers such as Constance, Ayanda and Anne-Marie, found financial and material support from other Black women. Constance spoke about how being delayed in finishing her course, a fellow female friend from university provided her with ongoing financial support, since she graduated ahead of her, and later went on to secure permanent employment:

> *…remember, I told you that I took some time to finish my qualification. So, things started getting tough. So, she got work. And she would actually give me monthly allowance.*

> *(Constance)*

Ayanda shared something similar about how lacking basic resources such as a personal computer, and access to the internet at her place of residence, prevented her from completing her assignments, whereby she was compelled to stay on campus the entire night in accessing the university services:

> *At other times when we had a lot of due dates, I will have to cross night because going back to [home] where I was staying there is no Wi-Fi, I don't have a laptop, there is nothing I can do. It was either that or I'm failing.*

> *(Ayanda)*

She further revealed how a friend provided her with food, clothes, and toiletries after spending the entire night on campus working on her projects:

…I had to bath at (the university) gymnasium, a friend of mine from Venda that I met at school was very supportive. She made me lunch in the morning and then I got back to class. At least I was able to change the top, not the trousers because we were not the same size. Just so my classmates wouldn't know that I slept at school.

(Ayanda)

The above narratives about women providing financial, as well as material support in aiding each other, stood out in my data and was a theme that kept recurring. By both Ayanda and Constance receiving both material and financial support are further examples of how Black women build each other through their time, commitment, sacrifice, but most importantly through their bodies (Clisby and Holdsworth 2014). Also, what can be noted from the above accounts are that women are self-aware and reflexive of their normative conditioning, given the struggles they have to endure in occupying liminal spaces, in which they intentionally set out to effect change through normative roles typically associated with feminine duties of care and nurture (Haraway 1988, Escobar 2004, Clisby and Holdsworth 2014, Clisby 2020).

Moreover, Clisby and Holdsworth (2014: 11) are of the view that such actions demonstrated by the overwhelming majority of women in society often go unnoticed, since it is 'expensive in terms of time and emotional labour as well as more directly financial costs'. Moreover, I would also argue that their actions are further underpinned by the notion of Ubuntu (Letseka 2012, Ramose 2020) in which emphasis is taken off the sovereign individual and placed on the communal. In other words, the sharing of both material (food, clothes, and money), as well as non-material resources, such as emotional and academic support suggest that they set out to rehumanise one another, as non-dominant bodies in STEM (Liccardo 2015, 2018a, Lane and Id-Deen 2023). Such acts are also what Yosso (2005) refers to familial capital, in which communities, families and even friends share in kinship and bond, by supporting each other in various ways in resisting the forces of oppression. This further supports the literature, as well as confirm my findings in research undertaken by Ong, Smith, and Ko (2018) in the American context, whereby they found that women in created counterpaces outside of the confines of the university to support each other academically, as well as non-academically, as a means to buffer against the underlying hegemonic culture associated with STEM.

I found that Black women used their agency and resources, both material, as well as non-material in creating a platform to support other Black females studying subjects that are dominated by men, as well as creating space for themselves to further receive assistance in return. Moreover, through the support of such a platform, such as SWiET, Black women supported each other through their bodies, in providing both emotional, academic and morale support to other Black female bodies. However, outside the confines of the organisation, they were found to support each other through financial and material support. In light of this, Black women have displayed a keen awareness of how their intersecting identities shape the experiences of those deemed 'othered' such as themselves in occupying hegemonic spaces that are meant to exclude them. Hence, by being situated knowers, they further act in the interest of others, as well as themselves in enacting change in widening participation for Black women in STEM, as well as rehumanising their experiences through alternative forms of capital.

7.5 Conclusion

In conclusion, this chapter has set out to demonstrate how Black women in STEM access into and participate through HE. In this, I have shown how different social class positionings in society affect Black women's access into HE. This relates to how different forms of capital, such as parents and resources facilitated Black women's journeys into university. In other words, Black women from lower socio-economic backgrounds and who were also the first to attend university, lacked knowledgeable parents and material resources at their disposal, which dehumanised their experiences in accessing HE, such as not following the correct processes and procedures, leading to their misrecognition and exclusion. Their journeys into higher education were also less straightforward and were plagued by interruption and breaks. Conversely, Black middle-class women had access to knowledgeable parents and access to material resources which humanised their experiences and presented very little challenges for them in accessing HE. Moreover, I have showed how a complex interplay of race, class, gender, as well as rurality presented the issue of multi-dimensional exclusion for Black women's participation in STEM HE. Rural impoverished women often experienced a disconnect with the Western higher educational set up, were unable to relate to its teaching resources and facilities, since it did not align to their habitus, as well as experiencing difficulties in relating to its middle-class capitalistic culture. This further problematised the

role of the university in aligning itself to cater to the needs of those participating at the lower echelons. Black middle-class, as well as impoverished women remained linguistically excluded at university, given that English was their second language, but in particular, the latter suffered severe misrecognition, given their inadequate schooling and home experiences. This further perpetuated their unequal participation, since they were less willing to engage with lecturers and native English-speaking peers, presenting implications for their studies, as well as mental anguish. However, I also further demonstrated that by being misrecognised as both insiders, as well as outsiders in HE, as well as being positioned as outliers In the STEM departments, Black women were also found to create platforms in supporting each other, through time, commitment, resources (both material and non-material), and care in enacting change as self-aware and reflexive knowers.

Chapter Eight

Untangling the complexities influencing Black aspiring female scientists' transitions into further study and the world of work

8.1 Introduction

The aim of this chapter is to present the descriptive data and analysis on the experiences of Black women transitioning out of undergraduate/honours STEM programmes. In particular, in this chapter, I document the journeys of Black women in STEM and analyse how they give meaning to experiences of transitioning out of STEM HE and into the world of work. First, I present the data and discuss the findings in light of the secondary literature and theoretical concepts in terms of how Black women negotiate their access into postgraduate studies and working spaces that are historically white and male dominated. Here, I demonstrate how Black women in STEM do not have straight pathways in transitioning out of STEM, rather these are both complex and nuanced and affected by both a lack of resources in pursuing further studies, including the prospects of employment afterwards. Second, I consider how transformative agendas, pertaining to the EEA, as well as BEE work against their interests, which leaves minority females open to exploitation. Moreover, I demonstrate and discuss how Black women are excluded on multiple fronts in places of work, their voices often unheard, and silenced. I further show how worksites can be problematic for Black women, through a lack of concern for their safety which contributes to their attrition in male dominated disciplines within STEM or thoughts of leaving the terrain altogether. Third, I show how some men were instrumental in supporting the development of women and became enablers and support structures in empowering Black women in STEM. Fourth, I show how Black women view themselves in relation to STEM and how they perceive themselves in contributing to their respective fields. Lastly, I embed thoughts throughout my discussion in terms of how transformation can be actualised to ensure equitable transitions of Black women out of STEM undergraduate studies, as well as how engineering workplace culture and conditions associated with hegemonic masculinity can be disrupted, which may provoke transformation, in order to accommodate minority groups.

8.2 Further Studies and Work

8.2.1 Complexities in transitioning into postgraduate studies and work

During my conversations with co-researchers, I got the sense that they, especially those from rural backgrounds, lacked a clear direction in what they wanted to do after their undergraduate studies. This was evident in instances whereby co-researchers who were not afforded funding opportunities to study undergraduate courses, due to not possessing the knowledge, as well as the social and cultural capital, were less likely to secure employment opportunities, as well as further studies. This points to how inequality is perpetuated through certain dispositions associated with Westernisation, including coloniality and modernity and the rules and structures underpinning it (Quijano 2007, Mignolo 2007a, Tlostanova and Mignolo 2012, Liccardo 2018a). Furthermore, co-researchers who studied a certain domain in STEM, such as engineering, were afforded funding, which had further implications for their preparation and transitions into university.

Philisiwe and Patricia, both from middle-class backgrounds, studied engineering at university and were afforded funding opportunities and both went on to work for engineering companies. Philisiwe noted, '*So, I got a bursary in grade 12.*', as well as Patricia, '*…my studies in mechanical engineering were paid for by a mining company…*', in their own words. Patricia was fortunate enough to secure employment through the same organisation that sponsored her university studies, '*…when I finished my degree I then worked at the mine as a graduate…*'. The same went for Lerato and Constance who secured employment through their funders upon graduation. However, in other instances, Philisiwe and Neo had not secured funding through their employers but were still able to access work opportunities in breaking through into the engineering STEM space.

Also, the transition out of undergraduate studies was not straightforward for c-researchers such as Sunny, Anna-Marie and Lebohang, whose specialisms at university were non-engineering qualifications. Graduates of other disciplines in STEM, such as Physiology (Sunny), Zoology (Lebohang) and Botany (Anne-Marie) were found to have not been successful in securing funding opportunities from external bursars, and were mostly reliant on NSFAS, as I showed in Chapter 7. They also were unsuccessful in securing funding opportunities after their undergraduate and honours degrees, as I will show. This is due to courses being classed

as professional vs non-professional qualifications and because there are more opportunities in engineering, in terms of external corporations providing funds and incentives to ensure the equal representation of Black women in such heteronormative masculine spaces (Liccardo and Bradbury 2017).

This above confirms the findings of Cameron and Drennan (2017), who explored the sustainability of prioritising engineering bursaries for Black women and examined the South African government's transformative strategy in this regard. The researchers found that by prioritising funding based on race, class and gender remained contentious and problematic, since Black female engineering graduates were less inclined to enter engineering spaces afterwards, due to the highly masculine nature of the work. Hence, they suggested that bursaries be put aside for Black men instead, as they were more likely to utilise such skills after their studies. This further confirms my data in which both Lerato, as well as Patricia suggested that their first choice of study was Accounting, but they instead opted for engineering, due to the financial priority given to engineering courses. Moreover, it also confirms my data in terms of the high attrition rate amongst Black female engineers, later on in the chapter, due to the highly toxic masculine culture in engineering workspaces:

> *…I actually enrolled for civil engineering. Because that's what was on offer at the time because I could get a bursary for civil engineering based on the company that I worked for. And that was my funding story. I wanted to do accounting, actually. But they wouldn't fund accounting.*
>
> *(Lerato)*
>
> *So, after like applying, the best bursary I could get or the one that actually paid my school fees would be engineering.*
>
> *(Patricia)*

This dynamic had consequences for those co-researchers not engaged in courses such as engineering, as well as implications for further job opportunities. I had a conversation with Sunny during our creative workshop in which she walked me through her path transitioning out of her undergraduate degree:

Sunny: ...*I started with, I was a research assistant. It was a three-month course, contract. And then after that, I also got something, but it was like a one month. Yes, so it just, they just had to understand that I'm doing what I can for me and my child. Because as.... said I needed to do a master's, my undergrad, even the honours, really it meant nothing. So, in 2020 and this was part of the pandaing (hustling). In 2017, I actually registered for a postgraduate certificate in education, because I didn't want to sit and do nothing and there was a bursary, so that would give me money a bit.*

Zaira: So, you wanted to go into teaching?

Sunny: Not necessarily. So, the teaching was everything that happened because I saw that, okay fine this man who calls himself my father he is not going to continue with us. So that was let me do my PhD, while I work at the high school or wherever.

Zaira: Your PGCE?

Sunny: Yes. So, after I got it, that was the plan, I'm going to look for a job and then after I get a job then I apply for the Ph.D., you know so that I have a bit of that money coming in.

In a virtual interview, Anna-Marie was optimistic and excited that she had secured funding for her Masters programme. But, a few months later when I conducted a follow-up face-to-face interview with her, she confirmed that the funding was indeed withdrawn and as a result she was unable to pursue her Masters course due to a lack of finances. She had at the same time of applying for her masters, applied for a teaching qualification, as a backup plan, which would provide her with the credentials of practicing as a fully qualified teacher, similar to the path Sunny had opted for. However, both Anna-Marie and Sunny never saw themselves as teachers, nor taking on the role in the first instance when they started their undergraduate studies, but noted that they were using the opportunity as leverage to gain resources which would enable them to study further:

…so I ended up doing this one, PGCE. So, with PGCE I know that it is guaranteed, I will get a job. I will be a life science teacher or a natural science teacher. And also, I also thought to myself its better than just being …at home it's like rural areas. So that means now I'd be sitting at home trying to send CV's out, trying to apply for jobs and just get more depressed because… yeah. So, I was just like keep yourself busy, you would gain something at the end of the year and there's a greater chance that you would get a job from this but to be honest, it's not something that I like. I don't see… see myself teaching…

(Anna-Marie)

The above analysis suggest that Black women were more likely to secure funding to study engineering at university due to positive and wilful initiatives to increase female minority representation in the field, but that this may not have been the direction my co-researchers aspired to take in the first place. Nevertheless, my data suggests that often the recipients of engineering scholarships went on to secure employment opportunities through their funders, suggesting that they had the extra cultural and social capital in place that they could draw from these. Hence, generous funding, as well as the prospects of employment opportunities after their engineering studies, are factors which further motivated Black women to pursue engineering instead. In other instances, recipients who received engineering bursaries, without the social capital in place from funders, managed to secure employment on their own. This goes against the literature of Liccardo (2018a) in which she found that Black females on a STEM scholarship programme in Engineering and Architecture at a South African historically advantaged university found difficulties in securing employment opportunities upon completion of their studies.

A reason for this could be that in the researcher's study, her participants were all working class Black women who were on scholarship programme, whereas my co-researchers were predominantly middle-class, with the exception of Lerato. This suggests that these two different sets of Black women embodied, as well as reflected different types of capital and habitus to draw on, which afforded them varying degrees of symbolic power in the field (Bourdieu and Wacquant 1992, Liccardo 2018b). Another could be that they were on a government scholarship, as a result did not have social networks in place to facilitate their

journeys into employment, as apposed to the majority of my participants who went on to secure employment through companies and organisations that funded their studies, with a mandate to work for those entities afterwards.

However, those studying 'non-professional' qualifications, such as Physics, Zoology and Botany, were either self-funded or received NSFAS support, and were found to struggle in gaining employment upon the completion of their undergraduate studies (Fraser 1997b, Fraser and Bedford 2008). The holder of a non-professional qualification is meant to pursue further studies, such as Masters or PhD qualifications, in order to gain professional registration or in pursuing an academic career. Given their struggle to secure funding for their desired programmes, co-researchers were found to resort to pursuing study courses with a financial incentive attached to it, as well as the assurance of employment opportunities afterwards. In this way, those who have opted for both professional, as well as non-professional qualifications have not been able to study courses of their choice, or further studies that would enable them to be competitive in searching for employment opportunities, due to a lack of resources and opportunities after their undergraduate studies (Habiyaremye, Habanabakize, and Nwosu 2022). This is similar to what Harry and Chinyamurindi (2020) found in their study exploring the experiences of students at a South African university who graduated, but who they found experienced stress and anxiety, since they were unable to secure employment due to a lack of job opportunities. This was further bolstered by sentiments of co-researchers who did not have the financial means to study further, but took advantage of opportunities, due to financial and job incentives, which did not appeal to them, nor serve their career objectives (Fraser 2008, 2022).

Rural students, such as Anne-Marie, as well as those who do not have the support and backing of their parents, as in Sunny's case, are more vulnerable not only to the challenges posed by their socio-economic context, but also to broader structural challenges, such as unemployment and a lack of funding opportunities for further studies (Mgqwashu et al. 2020, Harry and Chinyamurindi 2020, Timmis et al. 2022). This implies that if more employment related opportunities were available, apart from finances for further study, Anne-Marie and Sunny could have capitalised on those in enabling them to align their careers to their desired objectives and interests (Mncayi and Dunga 2016, Mncayi and Meyer 2022). Hence, due to a lack of funding resources for further studies, as well as the fact that they are not by the means

to fund themselves for Masters and PhD studies, both are prevented from equally participating in transitioning out of university (Fraser 2008, Fraser and Bedford 2008).

Another issue to consider is that, given a diversity of opportunities, both co-researchers would not need to make use of teaching bursaries, as a waste of time, skills and resources in training capacity, which may not be utilised effectively or perhaps even at all, since the primary aim for both is to accumulate finances to pursue their Masters and PhD studies. In other words, a more deserving candidate may lose out on a chance at pursuing their dreams of becoming a teacher and going on to make a much-needed contribution in an already challenging South African education system. This confirms previous research by Harry and Chinyamurindi (2020), whereby low socio-economic commerce graduates were found to pursue teaching qualifications, as it gave them a financial incentive, as well as guaranteed employment in mitigating against the underlying obstacles which their backgrounds pose for them. I now move onto how rural female STEM graduates are situated between their homes and the university.

8.2.2 In-between rural homes and the university

Co-researchers were reluctant to return home, especially those from impoverished rural contexts, once they have completed their undergraduate studies, and the thought of having to face deprivation and poverty further motivated them to pursue courses and employment trajectories not aligning to their primary interests and career objectives, as Sunny acknowledged, '…*I didn't want to sit and do nothing…*', as well as Anne-Marie, '…*I also thought to myself its better than just being … at home it's like rural areas.* This was further reflected in the accounts of Ayanda, as well as Sophia who were reluctant to return home to avoid the endemic poverty associated with rurality plaguing their respective living environments, including, in the event should further study or employment opportunities arise for them.

Moreover, I had a conversation with Ayanda during a face-to-face interview, where she described her fate in the event that she returned home to her rural village:

> *Ayanda: I know for a fact that I will miss out on many opportunities. Let's just say I get a call for an interview cause my phone would be off, there's no electricity, it's … I am sure you know this place. Have you like had taste of….? The one in like clear bottles and they are written in red…*

> *Zaira: Huh-um.*

> *Ayanda: That's where I come from. It's a farm called….. So, me going back there with everything since I've been like away for like four years, I'm back there. The network is not even working properly. So, I know for a fact that as of Tuesday, it's more like back to darkness, back to reality.*

> *Zaira: So, there's no infrastructure? There's no lights?*

> *Ayanda: There is nothing. We use candles. We use woods to make fire. It's that life. That's where I'm from.*

Sophia, further provided insight into the context she emanates from:

> *…I'm from a rainy village, it's not a township. It's the villages, those villages that didn't have electricity and water back then. Now things… things, things have changed. So now, at least we have water, but back then, there was nothing, you know, we would, we would study with candles and stuff like that.*

> *(Sophia)*

Ayanda and Sophia raise an additional important dimension to being excluded from pursuing further opportunities once they have transitioned out of undergraduate studies, pertaining to the extent of their deprivation back home and the uncertainty that comes with it in securing opportunities. The impact of rural poverty on student transitions and participation have been demonstrate in Chapters 6 and 7. Apart from being prevented from participating equally in terms of a lack of distribution (resources), as well as recognition (being undervalued and discriminated against), a third form of injustice that excludes them from the institutional frame involves rurality (Fraser 2008, Gredley 2020). Thus, a lack of funding would prevent Anne-Marie and Sunny from pursuing study courses in line with their career goals and in the event if Ayanda and Sophia return to their rural villages, then they will be cut off from potential study, as well as job opportunities, due to a maldistribution of resources (Fraser 1997b, 2008, Timmis et al. 2022).

Furthermore, occupying space at university after graduation may not be feasible with no funding for further studies, nor job prospects in sight. Moreover, how class intersects with

rurality shapes how co-researchers access opportunities and the choices they make as a result of transitioning into HE, which I discussed in Chapter 7. In other words, co-researchers who studied engineering with funding opportunities afforded to them never embodied rurality, as well as poverty. Hence, I argue that it becomes imperative that socio-economically marginalised, and especially rural, students are supported with knowledge concerning study options and funding opportunities in accessing HE, which will determine their transitions out of HE and beyond.

Anne-Marie, Sunny, Ayanda and Sophia, for example, have some form of rural connection and three of them are socio-economically disadvantaged, with the exception of Sunny who fits into the 'missing-middle'. Moreover, what can also be noted is that all of them have been misframed, due to their social positioning, since the underlying mechanism of oppression which would facilitate their transitions into HE, such as a solid schooling career, a family and community support structure during the preparation for university, all of which they lacked and which affected their equal participation in transitioning out of university in terms of the scope of options available to them, in creating a level playing field (Fraser 2007b, Bozalek and Boughey 2020).

The ways my co-researchers emanating from rural backgrounds continue to be dislodged speaks to their environment and living arrangements and whether these would be conducive in cushioning them, in the event that they need to return home in search for work or further study related opportunities, which speaks to their misframing. This can be noted in statements such as, '… *say I get a call for an interview cause my phone would be off, there's no electricity…*', as well as, '*There is nothing.*', and *'…we would study with candles…'*, implies the extent to which co-researchers have been misframed from the broader structures of HE and beyond, compounded by both distribution and misrecognition aspects to participation, especially for those from rural backgrounds (Fraser 2007b, Alcoff 2007, Fraser 2008, Gredley 2020).

The above further suggest that my co-researchers remain voiceless in matters pertaining to political participation in influencing processes, such as more employment and funding opportunities, in enabling their equal participation in transitioning out of HE (Harry and Chinyamurindi 2020, Fraser 2008). Hence, for those from more affluent urban settings, their experience may not involve the same setbacks and obstacles in searching out opportunities,

such as a lack of resources for further studies or electricity and computers at home to send out applications or search the internet for jobs. This is affirmed by Timmis and Muhuro (2019), as well as Timmis et al. (2022) in which they found that rural students from socio-economically deprived backgrounds are still technologically excluded when transitioning into HE, which further perpetuates inequality and makes it difficult for them to compete on an equal footing with urban middle-class peers.

The lack of participatory parity in transitioning out of undergraduate studies leaves Ayanda and Sophia in a constant flux, since they are unable to relate to the setup back home, involving extreme poverty (maldistribution) after being away for some time, such as '… *me going back there with everything since I've been like away for like four years…*' reflected in Ayanda's statement (Fraser 2008, 2022). This also implies that as a much as Ayanda could not relate to her rural background after being away for such a long time, she also saw transitioning into university and making the move to an urban city as an escape out of poverty, as well as the embedded coloniality of patriarchy, including opting to pursue studies without having successfully secured funding, as I demonstrated in chapters 6 and 7 respectively.

In other words, out of desperation to distance herself from her rural background, she rather resorted to creating university debt for herself, despite being in a position to afford it. This is similar to what Swartz et al. (2017) found when they assessed the experiences of South African university students from impoverished backgrounds. The researchers found that students emanating from impoverished contexts saw HE as an emancipation out of poverty. Hence, it becomes so difficult for students such as Ayanda to return home.

Another important point to be cognisant of is that they also experience a lack of belonging and exclusion from institutions, due to how they are positioned (race, class, geo-spatial location), which I have demonstrated in Chapter 7, highlighting how their identities put them at odds with the neo-liberal institution, which further impedes their participation. Liccardo (2018b, 2018a) similarly found that first-generation Black South African women in the STEM field were unable to relate to the Western cultural terrain of HE, due to a disjuncture in what they were able to relate to and what the university represented to them. This leads to a new lack of belonging for Ayanda, Sophia and Anne-Marie within their respective rural and impoverished backgrounds, due to being away from home for so long and becoming accustomed to the white and Black middle-class values being reproduced by the institution.

This dislocation from 'home' can further impede their participation when transitioning out of university, since they may then lack the support of their families and communities. Thus, Ortega (2020) views them as occupying in-between spaces, akin to how minority women are situated in dominant mainstream society. They are neither insiders (university) nor outsiders (communities), which is informed by Anzaldua (1987) concept of borderlands, of being unable to fit into either dominant or non-dominant societal contexts, due to occupying different worlds (Lugones 1987, Lugones and Price 2003, Liccardo 2015, Liccardo and Bradbury 2017, Liccardo 2018a, 2018b). In fact, Lugones (2003: 77-78) assessment of those that are in the position of Ayanda and Sophia goes as follows:

> The outsider has necessarily acquired flexibility in the shifting from the mainstream construction of life where she is constructed as an outsider to other constructions of life where she is more or less "at home" … One can travel between these "worlds" and one can inhabit more than one of these "worlds" at the same time.

I thus found that the transitions out of STEM undergraduate studies for Black South African women were often marred by uncertainty. This was especially the case for those who are socio-economically disadvantaged, and who do not possess a bursary to pursue further study opportunities, as well as prospects of employment offers, upon the completion of the undergraduate degrees. Hence, a lack of financial or job opportunities were found to be the major obstacles facing Black women transitioning out of HE, as well as shaping their career trajectories and life opportunities going forward.

I also found that the type of qualification in STEM that Black women pursued had an influence on employment opportunities once they completed their undergraduate studies. Women who pursued professional qualifications, such as engineering courses for example, were more likely to have secured bursaries through mining and engineering-related organisation, which provided the, with the needed social capital to venture into work. Also, in other instances, Black women pursuing engineering qualifications did not struggle in securing employment after their courses, even without the support of their funders. This suggests that a professional qualification, such as engineering, remained valuable, especially in terms of securing employment afterwards. Also, what further makes an engineering qualification so valuable, especially in the case of Black women, concerns the government's efforts to

transform the terrain. Hence, more employers may find it useful to employ Black women, since they may benefit through incentives in doing so, as I demonstrate in the next section.

Furthermore, I found that Black women, especially from urban settings or even rural middle-class backgrounds, pursued engineering courses during their undergraduate studies due to the lucrative financial incentives attached to it, as well as the likely guarantee of employment afterwards, despite it not being their first study choice or desired career path.

In contrast to this, I also learned that Black women who forged ahead in pursuing non-professional qualifications, such as Zoology and Botany, were struggling to gain employment or further study opportunities due to a lack of finances. This was particularly in the case where rurality and class intersected, but also where parents were not able or willing to support the outward transitions of their offspring (Harry and Chinyamurindi 2020, see also Fongwa 2019). Moreover, being positioned as rural and lacking material resources shaped how university opportunities were accessed, which in turn determined my co-researchers' outward trajectory into the world of work and further study. This motivated co-researchers in such situations to pursue study courses in which they had little or no interest, and which they did not see as long-term careers, but due to the financial incentives in further planning their desired careers.

My co-researchers were further driven to pursue study courses not aligned to their passion or career aspirations, to refrain from returning to their rural backgrounds and facing the ongoing poverty and stigma of being deemed failures. This further played out very strongly in how co-researchers made sense of occupying in-between spaces, given a disconnect to their rural backgrounds after a long period of studying in an urban setting with infrastructural support in place, whilst at the same time being deemed misfits in the neo-liberal institution. Hence, there remain nuances, as well as complexities in terms of how Black women transition out of HE and the opportunities available to them, based on where and how they are positioned on the social hierarchy in facilitating their transitions into, through and out of HE. I now turn to how legislative aspects of equity shape Black women's participation in STEM industry, as well as how the interaction between non-dominant men and their female counterpart plays out at work.

8.3 Workplaces as Contested Spaces in STEM

8.3.1 Black Economic Empowerment (BEE) and inequality in the workplace

Co-researchers provided accounts of how current workplace legislation on equity and redress had served to undermine them instead of enabling transformation for Black women in male-dominated spaces. Lerato who is a senior manager and the only Black women in her company with three other men (both White and Black) commented on how legislation intended to redress past injustices in the workplace were used by her company to hinder the participation of women of colour, and to exploit them in the process:

> *So, I'm recognised in my company as higher management, like senior management, right? I'm in a company of four people, I manage myself. So, who are you senior managing? We are in a very flat structure. There is no senior managing, I am just senior manager on paper for BEE. Right so for me, I should, it should make you feel like an asset, but it doesn't make you feel like an asset more than it makes you feel used. You understand what I mean?*

> *(Lerato)*

Moreover, she further provided her assessment of how her company exploits loopholes in the BEE policy to oppress her:

> *Lerato: Because I mean, like, before you even have every year there's an interview for it. And you know, every year HR sits with you and says, remember you are senior management when they ask you, don't forget that you are senior management. Right.*

> *Zaira: That's ridiculous.*

> *Lerato: So that's why it upsets me. Because the mere fact that you have to remind me means that you actually not treating me as one and not paying me as one which is equal to the treatment, right?*

Neo, who is also part of senior management at her place of employment suggested something similar about her company's preference of hiring men over women, but were forced to comply with BEE legislation in addressing equity in the workplace:

> *When I started here, I was the only female before they hired my other colleagues which are female. And my manager told me that they hired me because of… because they needed to comply. He told me, he was honest. He didn't hire me because I'm competent, so I could bring in something to the table that they couldn't get anywhere else. He told me that they hired me because I'm female and they needed to comply to some score, some BEE score or something like that. And that's why they hired me.*

> *(Neo)*

Furthermore, Sunny affirmed more of what both Lerato and Neo had just suggested, but also goes on to point out the financial incentive that organisations receive by employing a minority female, as well as propping up and fronting Black females in STEM:

> *I don't know how true this is. But that's grapevine talk, that they would only take black woman only for that funding opportunity thing. Because if you, if you have this amount of black woman in your, and then you apply for funding as a department, you're most likely to get it if there is that representation of black woman …*

> *(Sunny)*

Based on the above analysis, I found that Black women do not feel valued and part of the STEM industry, despite the overarching legislation pertaining to BEE, which would ensure that organisations reach a threshold of providing opportunities to previously disadvantaged groups pertaining to race, gender, disability, etc. Rather, co-researchers felt that organisations are only using them as tokens to fulfil a mandate in the interest of their organisations. In both Lerato and Neo's cases, the organisations benefitted more from having them than they would from employing a Black man or a white woman. This is similar to what Makgoba (2019) found in her analysis in terms of how the South African government has framed discourse around BEE, which allow mining elites to undermine its transformative

agenda in favour of profits. In doing so, she found that organisations have leverage at exploiting minorities who are supposed to be recipients of BEE. In a similar manner, engineering organisations exploit minorities, such as Lerato by fulfilling its mandate to include Black women in leadership positions but preventing them from benefiting from material resources (maldistribution), as well as failing to hold them in high esteem for their contributions (misrecognition) (Fraser 1997b, 2007a, 2008). The same goes for Neo who felt that she was only hired to tick boxes in compliance, which also resulted in BEE points and incentives for her company.

Moreover, this also implies that as much as companies must '…*comply to some score, some BEE score…'*, there are also '…*that funding opportunity thing.'*, that organisations and institutions stand to benefit from according to both Neo and Sunny, respectively. Hence, Black women such as Lerato feel disempowered and taken advantage of by a system that's meant to empower and reverse prior workplace injustices affecting minority groups. In this way, Black women bear the brunt over that of Black men or even White women (Naidoo and Kongolo 2004, Segalo and Fine 2020), as more gets taken from them with little in return, as Lerato suggests, '…*not treating me as one and not paying me as one…'*.

Klasen and Minasyan (2021) assessed the impact of BEE prior to its inception and after it was introduced to ascertain its impact and whether it's intended purpose which was to ensure equal representation of minorities, such as Black women in the upper echelons of the workforce. The researchers found that Black women's positions did increase to top management in organisations from before BEE to after, yet not significantly. They also became better qualified compared to Black men. However, what the researchers also found was that the salaries for Black female leaders remained below par, compared to those of their Black and White men, as well as their White female counterparts. Instead, they found that white men were more likely to be promoted to senior positions and their salaries had increased by 30 per cent. This was seen to be reflected in Philisiwe's account:

> *I just see it in the way that male colleagues would progress, and male colleagues of the fairer skin would progress versus myself as Black and female and speaking to other Black and female peers in the same industry.*

> *(Philisiwe)*

Being subjected to such discriminatory treatment was demoralising and demeaning for Black women, such as Lerato, Neo and Sunny, in knowing their value and what they bring to their respective organisations as minorities. Yet they feel that due to BEE conditions, organisations are compelled to prop them up in return for incentives (Naidoo and Kongolo 2004, Klasen and Minasyan 2021), which makes them doubt their status as professionals in STEM, as Lerato pointed out, '…*that's why it upsets me.*', and continuing on to explain how her organisation exploits her position as a minority female leader:

> *So, by virtue of it you are higher. And if he makes a mistake, I'm asked why. Right. And if he doesn't do something I am asked, did you tell him what to do? Which is very upsetting for me, because I know you earn more than me.*

In the above statement, Lerato shed light on how being placed in a management position came with extra responsibilities in accounting for the work of her White male colleague who was earning more than her. The lack of respect afforded to Black women such as Lerato, Sunny, including Philisiwe, allow all three women to doubt their self-worth and value, which creates an unequal playing field in the workplace in competing on par with both dominant men and women, as well as minority men (Fraser 1997a, 1997b, 1998, Fraser and Bedford 2008).

Lerato, Neo, Sunny and Philisiwe find themselves less equally represented as minorities at work, due to boundary setting principles to representation in which Black women remain disempowered by BEE legislation used against them (Fraser et al. 2004, Fraser 2007b, 2007a, Makgoba 2019). In this, Black women in STEM are unable to influence the dynamic between government and huge conglomerate entities in setting the agenda for their exploitation through legislative frameworks, even through the influence of their work unions (Fraser 2007b, 2007a, 2013). Hence, Lerato, Neo, Sunny, as well as Philisiwe lacks voice in matters which affect them, contributing to their frustration and resentment in sentiments such as, '*So that's why it upsets me.*'. Also, this is similar to what I point out in my conclusion of this thesis, Chapter 9, whereby 3 co-researchers decided to withdraw from the study, as they lacked voice in influencing decisions that will enhance their safety and wellbeing at work. Furthermore, what Lerato, Neo, Sunny and Philisiwe's experiences reflect is what Santos (2018: 109) deems to be a by-product of the ongoing coloniality, which has merely been

altered in its 'form', but not in its substance, and what Mkhize (2022) calls reformation under the guise of transformation in STEM workplaces.

Lerato, Neo and Patricia also suggested how they became easy targets at work, due to being positioned as minorities, as a result of toxic masculinity embedded in their places of work. Lerato mentioned how her work would be overly critiqued and scrutinised to the point whereby her Black male colleague would make demeaning comments and remarks in questioning her ability, but later developed a thick skin and could withstand their harsh critique:

> *…I've noticed that even in my handling critique, it's different. You know, I'm able, because he's very harsh, like, he'll just come and say, that's just nonsense, why did you do that? You know, and I'm able to say, no, I don't think it's nonsense, because it's what I thought, whereas previously I'd I would just walk away thinking, oh, my God, like it's garbage you know…*

> *(Lerato)*

Moreover, Patricia noted something similar for not being valued for her accomplishments, but often harshly critiqued by her Black male counterparts when something goes wrong:

> *even when they [male colleagues] make a mistake it's like oh, but it was just probably a mistake, oh they just missed this. Your mistakes are illuminated, and your success is like ahh! that was great, but moving on along…*

> *(Patricia)*

Neo who also manages a team of men under her mentioned something similar about her successes as a Black woman not being acknowledged and recognised in the workplace, but that the Black male achievement never goes unnoticed:

> *…I think when they see that I'm doing my work and I'm getting it done or whatever they don't see it as me being the one that's managing the work. They see it as no, the artisans that were working for her did very well. Whereas with my male counterpart is seen as wow, he really did a great job! he really manages that department very well. But for me it's no, the artisans are doing a very good job…*

Apart from the complexities with BEE that often get used as a loophole to exploit Black females in male-dominated workspaces, I further found that unequal pay, under recognition and over scrutiny were used to entrench inequality in Engineering organisations when it comes to the work produced by Black minority women. These factors are what questions their status as legitimate workers and employees and often works to ensure that they remain second-class citizens in comparison to their Black male counterparts at work (Bozalek and Boughey 2012).

Concerning the issue of (un)equal pay, despite Lerato working in an organisation with only three other men, she is expected to take responsibility for the work of a White junior male colleague who is paid more than her, Moreover, Philisiwe, who is also part of the senior management and is one of a few Black women in her organisation, also noted that she is not compensated equitably for the same amount of work as her colleagues who are White men. She stated the following:

> *…a real thing here in our country that's not been addressed is just the pay scale or the gap between male and female pay scale for the same jobs and the same amount of work or responsibilities. That's still a thing.*

This suggests that Black women are still underpaid and overworked, as in Lerato's case, given that she must take on extra responsibility for the work of her colleague. This is similar to what Fouad et al. (2017) found in terms of wage disparities between men and women in Engineering careers, leaving the latter dissatisfied to the point of wanting to change industries and resign altogether.

Such forms of discrimination create tension and resentment for both Lerato and Philisiwe, knowing very well that they are not financially rewarded equally in relation to their white and Black male colleagues. Moreover, both feel demotivated and undervalued, as they feel their contributions are less valued and their skills and expertise exploited, due to the entanglements of being racialised and gendered by their respective organisations (Fraser 1997b, Bohrer 2019, Collins and Bilge 2020, Fraser 2022). This lack of recognition for Black women, which have been created by organisation and reflected in Black men's attitudes towards their work is what Lerato refers to as '…*not treating me as one and not paying me as*

one…'. Hence, organisation need Black men to sustain the oppression of women to ensure their entrenchment and subjugation. This corroborates Mkhize's (2022) findings from a study that she conducted on the experiences of Black doctoral women pursuing STEM at a South Africa university. The researcher found that the working relationships were often toxic between Black men and their Black female counterparts in the STEM HE fraternity, whereby men were overly hostile in their critiquing of the work produced by their female peers. Mkhize (2022) argued that their behaviours were meant to undermine and humiliate rather than to develop and promote the expertise and skill of Black minority women. This led the researcher to conclude that Black men were not able to be hostile to White women, due to their own inferiority complex, however, due to their own sense of entitlement, Black women became their scapegoat (ibid.).

Black women in STEM-dominated terrains are often treated as minors and become easy targets in the engineering workplace and this is similar to how Lugones (2007) views heteronormativity as a construct of colonialism whereby a binary system of reasoning has been imprinted in the minds of the colonial subjects. Hence, my co-researchers felt that they and their contributions were being rendered invisible in hegemonic masculine spaces, since the space has been constructed with the underlying colonial agenda intact, in which Black women are marked genderless in the psyche of dominant, as well as non-dominant men, hence the justification for their poor treatment and unequal remuneration (Lugones 2010, Segalo and Fine 2020, Mkhize 2022). This is also what Fraser (Fraser 1998) sees as the unpaid labour that are very gender divided and female orientated in most societies around the globe, and where the expectation is that the female gender is not capable of carrying out complex duties that are highly masculine and therefore should be rewarded accordingly. Hence, the unequal pay and the excessive critique of her work.

We can noted is how Lerato doubts herself, due to the domination effect (Fricker 2008), including the hostility mounted against her work, but later developed confidence to defend her work, '…*I'm able to say, no, I don't think it's nonsense…', '…previously I'd I would just walk away thinking, oh, my God, like it's garbage…'.* Here, Lerato can be seen to resist a form of Eurocentric modernity and its epistemological configurations that situated Black women and 'other' minorities as intellectually inferior, thus subjugating their existence (Lugones 2008, Vergès 2021). The notion of being looked down upon, not being treated with respect, as well

as their contributions being disregarded (forms of misrecognition) further show how the racialisation of gender manifests in male dominated workspaces, whereby the odds are already stacked against them in the first instance (Akala and Divala 2016, Akala 2018, Fraser 1997b, 2007a). I now move on to show how a hostile heteronormative workplace terrain further sexualises Black women in undermining their abilities.

8.4 Hegemonic Masculinity in Workspaces

8.4.1 Conformity to fit into male-dominated spaces

This section demonstrates the challenges faced by Black women in STEM when dealing with masculinity in working contexts, in relation to how they interacted and responded to men. When I enquired about the challenges and obstacles that Black women face working in male-dominated spaces, co-researchers suggested that they were compelled to conform to male standards of being in the workplace and had to adapt to fit a certain mould to be acknowledged and validated as relevant, though not seen as entirely equal (Fraser 1997a, 1997b, Lugones 2008, McGee and Bentley 2017, Male et al. 2018, see also Anzaldua 1987). I had a conversation with Constance who is a trainee engineer about her challenges working in a masculinised space:

> Constance: …like I had to be more of a guy to fit in with the guys. I couldn't be more of a female to fit in with the guys.

> Zaira: Really? So, what do you mean exactly by that? Give me an example.

> Constance: The conversations. And I don't like having guy conversations or like you know… they want you to be a guy-guy. Like have conversations about girls. This girl this, this girl that. They want you to be… the conversations we were having in the department were just guyish conversations and the moment you come up with you and your conversations, you're too emotional, you're this and that…

Moreover, Prudence who worked as an engineer, but has since left her role to pursue a banking career made the following comments:

> …it didn't matter how good you are. Or it mattered, but not as much as the type of female you are. So, if you're going to be too much of a female, I don't

know, if that would make sense, then you're perceived as weak, right? So, a lot of whatever female characteristics that we have, you sort of have to put that aside...

(Prudence)

Patricia had this to say:

And then as a woman it requires something of you that I am not willing to give. I do not want to change too much. I don't know if it requires like, a specific type of like... I am not necessarily a hard person, but I am very like, no nonsense approach... So, it is not creative. No nonsense-approach, every day. And I just found that exhausting.

(Patricia)

Based on the above analysis, I found that Black women are forced to adapt to heteronormative masculine standards of being, in order to be acknowledged, validated and included into male dominated working enclaves. This confirms the literature by both Male et al. (2018) on a group of Australian engineering students conducting experiential learning in an engineering company, as well as that of Sendze's (2023) on African American female engineers, where they had to fit the mould of masculinity to fit into engineering working spaces. Narratives such as those echoed by Constance, Patrica, as well as prudence further suggest an underlying masculine hegemony remain pervasive in engineering workspaces, which remain incongruent with their identities of being Black and female. This corroborates Leo's (2020) assessment in unravelling the mystery surrounding the role of gender in light of the first contacts the colonisers had with the indigenous people of America. He is of the opinion that when the colonialists arrived in the Americas, the 'natives' displayed signs of gender diversity and fluidity to the extent that some appeared androgynous and even dressed as the opposite gender. The indigenous communities were highly respectful of such individuals as they deemed them to have significant spiritual prowess. However, the colonialists were not tolerant of such gender "deviations" and offered young native heterosexual men the opportunity to be inducted into the Eurocentric way of being (ibid.). It is during this time that the colonialist imposed toxic masculinity, heteropatriarchy and religious dogma on the

indigenous subjects, by instilling in them values that undermine and dehumanise women and all 'Other' genders.

Moreover, where Black women were not adapting to masculine ways of being and of occupying space in the workplace, men disregarded them in favour of their male colleagues (McGee and Bentley 2017, Male et al. 2018). Look how Hope narrates her experience of conducting experiential training with another male trainee and how as a result of the masculine affinity, he received more support from male mentors, compared to her:

> *…because he's familiar with everyone in the lab, all the guys. So, anything that he had like a question, or he struggled with something, they would help him.*

> *(Hope)*

Neo provided a similar incident whereby her male mentor did not support her development in becoming an engineer in the same way that he did for her male colleagues:

> *…But then also he never spoke to me. He never said you need to do this. He never had conversations with me to make me understand what I'm supposed to know, what's important etcetera, etcetera. So… and I'm sure with [male colleague] they would have conversations. Yeah, if you want to be an engineer you need to do this, come let me show you this, come let me show you that. But for me it wasn't like that.*

> *(Neo)*

Both Hope and Neo raise a very important issue pertaining to how the dominant masculine hegemony in STEM working contexts is reinforced and sustained. This takes place not only through an affinity of being marked male, but also about being hegemonically masculine. Male mentors were more readily available to support men, due to the underlying masculinity that they identify with as men, and this is similar to what Male et al. (2018) found in an Australian study in which male engineers preferred the company of other men, as well providing them with more work-related support than they did for female colleagues. This allowed men to develop professionally at a faster pace than their female counterparts would. This resonates with what Lugones (2003, 2007) refers to as the Black female gender being

negated and rendered invisible in dominant contexts, perceived as bodies out of place, and not fitting into the (masculine) status quo. This further confirms what Constance, Prudence and Patricia alluded to by having to take on masculine traits and behaviours, which are considered superior, to get by in the workplace. In this way, I found that Black women were often excluded from important engagements that could benefit their careers, but due to traversing the margins in dominant working contexts their participation remained impeded (Fraser 1997a, 1997b, 1998, 2008, Idahosa and Mkhize 2021, Mkhize 2022).

Furthermore, my findings resonate with those of Idahosa and Mkhize (2021) who studied the experiences of Black South African women pursuing STEM PhD degrees. The researchers found that Black women suffered exclusion in male dominated spaces, due the stereotypical notions that are associated with race, gender and ability, but also from the sexual connotations undermining their intelligence as 'legitimate knowers' (Idahosa and Mkhize 2021: 6). In other words, Black women participating in STEM faculties were perceived to be incompetent, due to the inferiority associated with being Black women's work (servant, maid, etc.), but also how the Black female body was historically viewed as hypersexual and devoid of intelligence (Vergès 2021, see also Collins and Bilge 2020, Small 2012).

This further confirms my data in terms of how issues of heteronormativity in STEM domains are perpetuated and Black women's abilities are often questioned both overtly and indirectly. During a face-to-face interview with Sibongile, she commented on how her male supervisor insinuated that her femininity gave her an upper hand in winning a poster competition, instead of her abilities and competence as a female scientist and intellectual:

> *He said, it must have been your pretty face that made you win that poster.*

> *(Sibongile)*

Moreover, in an indirect manner Constance and Karabo experienced gender stereotypical treatment from the men they worked with. Constance stated:

> *…guys have this thing of treating ladies as a fragile being that we can't…you won't be able to handle it. You can't give her so much, she's so fragile, we don't want to overwhelm her…*

> *(Constance)*

196

Karabo, who worked in industry as an Engineer but has since left her role for academia, recalled an incident whereby her male supervisor found out that he was going to supervise a new female recruit and was overheard saying:

> *…I remember one of my bosses as well, when I started at the fine Ash Dam project, when I came in, and he heard that I'm a female. And apparently, he went on site, told that other QA saying, Oh, I'm coming, and I'm going to help him sort out his filing, Right. So literally, when I heard that I'm like, from the first day until I leave this project, I will not do his filing. He literally come to the office and said, Oh! you need to help me with this file and help him with this file now and I would just agree, like, okay, and I would just not do it.*

> *(Karabo)*

The experiences of Sibongile, in terms of reference being made to her '…*pretty face…*' being responsible for her success in winning a poster competition are examples of men not believing in Black women's scientific abilities (Sanchez et al. 2019, Mkhize 2022). This is further affirmed by how Constance is perceived to be a '… *fragile being…*' in carrying out her duties – a role for which she has undergone training and obtained qualifications, hence her position in industry as an engineer in the making. Similarly, Karabo was being expected to carryout filing and secretarial duties for her new supervisor. Both of these examples illustrate how men have constructed stereotypical gender roles in the work environment and also how Black women in STEM are positioned as less than equal, due to their intersecting identities (Fraser 1997a, 1997b, Gouws 2017, 2022). In a British study of female engineers carried out by Fernando, Cohen, and Duberley (2019), the researchers found that the female body was visibly sexualised in that male engineers often perceived their feminine attributes to make them less competent in the engineering space. This further confirms the literature and affirms my study as per the work of McGee and Bentley (2017) in which they found concerning African American women occupying space in a male-dominated field in the US context. The researchers discovered that men held very gender stereotypical roles towards African American females involved in engineering, such as not seeing them as future engineers, but more of a secretary or admin worker, which went on to hinder their development and progress.

The above also bears credence to Lerato's work contribution not being appreciated and acknowledged in the construction drawing project that she produced, yet her male colleagues were never interrogated about their designs and drawings, which further suggest how engineering workspaces have been constructed and hegemonized with the masculine heteronormative agenda in mind, which speaks to the notion of men, particularly those of a certain class background and their entitlement (McGee and Bentley 2017, Fouad et al. 2017, Fernando, Cohen, and Duberley 2019). In this Black and White middle-class men have set the tone in the engineering space that would validate and privilege their ideas and contributions. Oyewumi (2002) sees this rigid construction of gender binaries, including the roles as played by men and women as Eurocentric, since African society were gender neutral prior to colonisation, whereby seniority remained essential in social interactions. Hence, what can be noted is that men have reinforced the colonial hierarchical binaries in engineering spaces, privileging identity politics concerning legitimacy over equality and transformation (Gill and Pires 2019, Ortega 2020, see also Tlostanova 2010). In this way, Black women occupying masculine working enclaves are merely tolerated, yet not fully accepted and validated (Male et al. 2018), given how the Black female have been caricatured and fetishised as objects non-worthy of dignity and respect (Fraser 1997a, 1997b, 2007b, 2008). Furthermore, apart from sexualising and undermining the abilities of Black women, older white men further discriminated against Black younger women, especially those in leadership positions, which I demonstrate in the next section.

8.4.2 Exclusion based on gender, age, race and language

A common theme which emerged from the data pertains to Black female exclusion based on race, gender, age, and language and how such identities intersected to inform the experiences of my co-researchers in their places of work. Prudence who formed part of the management team expressed an incident whereby both her race, age and gender resulted in her exclusion at work:

> …I'm remembering another situation where I had gone to do an inspection, it was myself, and this other colleague of mine, he was there for his own thing, but I was the lead person who had to sign off on a specific thing. And the person that I had worked with was a white male, much older than I, that I was going with. So, they were there to do their part of the inspection. As a

maintenance person, and me being the lead engineer on I would sign off on whether we accepted or not. So, when I went there, they assumed that my male counterpart was the person who was the lead and was signing off. And the treatment I got was very shocking, because they were all white.

(Prudence)

Constance experienced something similar, but mentioned how her gender as well as age put her at odds in sharing opinions with Black male artisans working on sites:

I used to do some work with this engineer, he was a guy. When he went to sites and he'd voice out that why can't we try this, this and that. It's easy for them to take advice. For you, you'd have to go via that guy to tell them this. Which was sometimes unfair. Coz why can't it come from me personally?

(Constance)

Patricia, who worked with older white men as part of a management team, experienced exclusion due to her race, as well as her linguistic background:

And then they supported me in the most harsh way. Like they would speak Afrikaans to explain something technical. And I would like [say], "oh, no I do not understand". And they were like, "I can't explain to you". And then there was this white girl that we were with. She was English. They couldn't explain to her in Afrikaans, and then they would explain to her in English.

(Patricia)

Sunny who works in academia, but is doing a PhD through a former Afrikaans university in South Africa, illustrated in the representation below how she feels trapped, as a result of the racial and linguistic segregation she had to endure, but sees the completion of her studies as liberating:

(Sunny)

Based on the above accounts, it can be noted that Black women in STEM workspaces are still excluded on multiple fronts, including intersections of gender, age and race. Mkhize's (2022) study on South African Black women in STEM HE also found that age, race and gender combined were intersecting variables that made female bodies seen as 'bodies out of place' to colleagues and mentors. Moreover, in Constance, Patricia and Sunny's experiences, it also pertained to the same exclusion that Prudence had experienced, but further took on a linguistic dimension. This suggests that had these three co-researchers not possessed the aforementioned identities, it is likely that they would have not been excluded and discriminated against in carrying out their duties. This is more evident in both Prudence and Patricia's encounters on the basis of racial exclusion, for example with Prudence noting that they assumed her white male colleague was the lead and not her, and Patricia mentioning that her male colleagues linguistically excluded her but would take the time to explain to her White English-speaking colleague. This is what hooks (2000) see as patriarchal manifestation shaping out interaction, in which White men dominate and White women sustain such domination, hence the experiences of White and Black women can never be the same as they do not live the same reality.

For Sunny too, having to contend with linguistic exclusion was very disempowering, making her feel trapped in chains by having to contend with the overt racial and cultural overtones

of occupying space in a former Afrikaans institution, which historically used, race, language and culture to subjugate and exclude minority groups (Jansen 2009, see also Giliomee 2019). Similarly with Constance, her gender identity made it difficult for men to take her recommendations onboard but would eagerly obey instruction from her male colleague. What all three co-researchers are enduring is what decolonial feminists believe to be oppression on multiple axes affecting Black women (Vergès 2021, Ortega 2020, 2006, see also Lugones 1987). In other words, due to how their intersectional identities work to oppress Black women, not only are they affected by the construction of hegemonic masculine spaces and how Black men excluded Black women in such enclaves, but more so how White men perpetuate injustices relating to misrecognition, based on race, age, gender, as well as language in the workplace (Fraser 1997a, 1997b, 2007a, 2010). This confirms the literature by Idahosa and Mkhize (2021), and by Mkhize (2022), in which they found that Black women in STEM were often oppressed on multiple fronts by Black and White men, due to being situated at the bottom of the hierarchy.

Some of my co-researchers experienced more sinister and nefarious motives concerning sabotage at work. Patricia and Prudence were responsible for leading older more experienced White men at work and as a result of their intersecting identities of being Black, female and young, they experienced brutal forms of sabotage, which made leading a team dominated by men unbearable. Patricia noted, '…t*hey would like hide information. And they would like try to sabotage…'*. Moreover, Prudence suggested, '…*they'll give you vague answers, no one is really trying to help you.'*

In these ways, we see that Black women were sabotaged in the process of being misrecognised, which made their working situation very difficult (Fraser 1997b, 2013). Older White men sabotaging Black women can be seen as a tactic to undermine their leadership competencies in a situation where men who once wielded power, given their years of experience in the industry, are now in a position where they need to be accountable to younger Black women. Giving up their power and adapting to the 'other' and their 'female' ideas may also be challenging for older White men still holding onto traditional notions of gender, race and age, hence the need to resort to sabotage and hostility rather than collegiality and teamwork (Male et al. 2018, Bilge 2014, Collins and Bilge 2020). This is similar to what Balalola, du Plessis, and Babalola (2023) found concerning the dynamic between Black

female leaders in STEM and the men who report to them in 14 African countries. The researchers found that Black women leaders were unable to implement their leadership duties, due to the tension and competition espoused by men for being led by Black women. I now move onto strategies that Black women use in the workplace to overcome prejudice and abuse, as well as how they experience issues of safety.

8.4.3 Strategies in mitigating male domination in the workplace

South African society is still steeply entrenched in cultural traditions associated with heteropatriarchal ideals pertaining to female subordination, as I have discussed in Chapter 6 (Mama 1995, Akala 2018), and, such influences were found in the STEM industry, in particular in its working confines. Black women found to work in such spaces, had to negotiate their interaction with men on a daily basis in order to be acknowledged in the sense of not only being seen, but also to be heard, especially where minority women also occupy leadership positions. McGee and Bentley's (2017: 280) study found in the American context that Black women in STEM experienced the treatment from men as akin to *'a work wife'*. Hence, Constance, Neo and Philisiwe, with the latter two being in management positions, provided similar accounts of the ways culture in the South African context intersected with race and gender in masculine workspaces.

> *One thing I've learnt is your approach. With these people you need to have a strategic approach to sharing concepts or ideas with them. Coz the moment you come with an attitude of I know so, it becomes an issue. You need to… some of these men they like these people… they like you to play that humble African woman, but they want you to do it in the workplace, but they don't understand that you can't be doing such things in the workplace.*
>
> *(Constance)*

> *They can show authority, you know. I always have to be… and I don't know what you call it in your… when you are in authority but also very submissive…*
>
> *(Neo)*

> *…having to have that balance between being observant of my own culture, being Zulu as well and still needing to be professional, observant from a place of respect, but still needing to be professional and drawing the lines and being able to be an Engineer who dishes out instructions…*

> *(Philisiwe)*

As can be seen from these narratives, much progress has been made in recruiting Black minority females into leadership positions in STEM working enclaves in wielding power and authority. However, Black women also had to employ novel ways of interacting with their male colleagues working under them**,** which suggest that they have to navigate extra hurdles in influencing men, which does not allow them to participate on par with junior men, as well as with their senior male counterparts (Fraser 1997b, 2010).

8.4.4 Female safety and wellbeing

The issue of safety for Black women undertaking working masculine working spaces was also a concern. Co-researchers provided accounts of working in male-dominated spaces as physically and emotionally hostile, whilst fearing for their safety and wellbeing at work. Patricia had this to say when describing her working environment, '*…it is very normal to find someone swearing at someone, beating or ridiculing them'.* Moreover, Neo, suggested these concerns by working in male-dominated confines, *'You do feel like am I going to be safe? Is nobody going to hurt me? Is nobody going to attack me?'* This is similar to what Male et al. (2018) found in an Australian study where female engineering interns felt uncomfortable in pursuing their training, due to the unsafe and hostile environment created by men. Moreover, Philisiwe suggested that working in dark confined spaces, such as underground mining contexts, posed risks of physical, as well as sexual harm, which prevented women from carrying out their duties effectively:

> *…sites is a challenge just on the security of females. So progressively there are now ladies who work on sites doing different things, so like from actual hand work on sites to artisanal work there, but it's still quite a small number.*

During the recruitment phase of this study three co-researchers had withdrawn, due to the unpleasant and unsafe working conditions pertaining to site work. They expressed that

nothing has been done to make sites more conducive for female engineers, hence they did not see the need to take part in the study, as they felt they were wasting their time. Moreover, the unsafe working arrangements and the lack of importance associated with it are examples of the misrecognition based on gender that women experience in participating equally to men when it comes to carrying out their duties on sites (Fraser 1997a, 1997b, 2013, Segalo and Fine 2020, Segalo 2022). The lack of regard for women in terms of workplace safety and well-being are instances of what Gqola (2015) refers to as the dehumanisation of the female Black body, given its susceptibility to being violated and raped. By relying on her understanding of colonial influences and slavery's role in the violation of Black female bodies in the South African context and as a result, how rape and gender-based violence have become normalised in society, it seems plausible that engineering and mining organisations will turn a blind eye to the safety concerns of its Black females working on non-gender friendly worksites.

I also found that a lack of safety in a '*hostile'* environment and *'feeling not valued…'* for the contribution made by Black women in STEM, in Prudence's own words , and having conflicting values to those espoused by the organisation, such as, *'…it was capital interest and, you know, white developers, and they were doing things that I felt were contradictory to my beliefs and how I envision a South African city.'* in Annicca's own words, which prompted women to leave the industry altogether (Fouad et al. 2017). The next sections will demonstrate how some men played supportive roles in Black women's STEM endeavours, as well as how women perceive themselves in masculine fields.

8.5 Men as Support Structures in STEM

Despite the continued prevalence of discriminatory and exclusionary attitudes displayed by many male peers, nevertheless all co-researchers had provided some account of a male figure being an enabler and support structure in STEM, whether such men were friends, relatives or whether they occupied a more significant mentorship role in school, university, or the workplace. Esther had support from her brother in terms of motivating her to pursue a PhD in engineering, saying, '*I think he is really looking forward to me becoming or having that Doctor title.'*. Precious, on the other hand found support in a male friend whilst occupying university residence: *'…after my schedule when I'm done studying or I'm tired. I'd go to his room and I'm here for my lunch or for my supper, and then he'd dish out for me.'*. Constance

suggested that her male manager had been diligently mentoring her work progress, by engaging her on various hands-on projects in supporting her presence on sites:

> *…he's trying to get me to work on sites a lot so that I can understand the basic principles of engineering in order for me to build my confidence in terms of the industry and to understand the jargon of engineering.*
>
> *(Constance)*

Apart from the embedded structures pertaining to masculinity and the underpinning workplace cultures that display a lack of regard for Black women in STEM, co-researchers still found anchors of support and encouragement in some men that have played a role in shaping their development as upcoming female scientists (Fraser 1997b). This suggests that not all men were found to be oppressive towards Black women, rather some regarded them as equals and this was evident amongst the younger generation of Black men, as opposed to the older men. In both an American and an Australian study, researchers similarly found that the phenomena of men supporting women in their work duties were not something new (McGee and Bentley 2017, Male et al. 2018).

In summary, I found that Black women were often confronted by a number of challenges, especially in the engineering working context. This pertained to the limitations of BEE legislation in protecting the interest of Black women, used by employers in setting the tone for profits, and gain, and in doing so enforcing the colonial agenda of subjugation of minority women in dominant spaces, ensuring an uneven playing field in which minority female engineers' practices are situated. For example, I found that Black women in masculine spaces were also often burdened with extra responsibilities and undercompensated for it. The issue of pay inequality can still be regarded as remnants of coloniality globally, but especially in developing contexts where the policies of deeper segregation based on race and gender (apartheid) shape society.

Moreover, where Black women produced work requiring their technical skill and expertise, Black men were overly hostile in their critique of women's work. Hence, my findings further suggest that due to the constructed masculine hegemony associated with STEM spaces, Black women were often excluded by Black men and their contributions negated and invalidated. However, men and their work were never subjected to the same scrutiny. In addition, Black

female bodies were also expected to take on masculine attributes, such as behaviour, conversations, etc., as holding onto their feminine ways of being, resulted in their exclusion (Male et al. 2018).

Also, as much as Black women were expected to uphold the masculine hegemony in STEM workspaces, they were merely just tolerated (seen but not heard), not accepted, as well as not included as equals, given that men still ascribed non-STEM gender stereotypical roles to their gender in certain instances at work. This further speaks to the favouring of men over women, with Black females bearing the brunt, as the Black man's development was at a faster pace compared to that of their female counterpart. Furthermore, their intersecting identities of being Black, female, young and non-native Afrikaans speakers perpetuated the injustices metered out against them by White men. The above dynamic which Black women found themselves having to contend with in masculine spaces suggest that they are still not competing on an equitable footing, compared to with their male counterparts, which further reinforces the notion that STEM is still an untransformed terrain, ensuring that it remains exclusive only to a select few of a certain race, gender, age and class background.

I also found that Black women in management positions found it difficult to exert their power and influence, as they received pushback from both junior, as well as more senior men from both racial backgrounds. In other instances, Black women's work were deliberately sabotaged, as a means to undermine their leadership abilities. This led Black women to devise strategies that will appease men in navigating the patriarchal working context, in an attempt to influence and persuade in carrying out their duties. Another hinderance I found to black women's work concerned the lack of safety in general, but also where work is supposed to be carried out on worksites, posing both physical as well as sexual risks, given their exposure to often dark secluded spaces, as well as the fact that men outnumber women on worksites. This further shows that mining and engineering companies which require sitework often overlook and disregard the issue of Black women's safety, as such spaces were not conducive for Black women's work especially given South Africa's track record of gender-based violence (GBV) lately.

8.6 Black female perceptions of themselves in STEM

Co-researchers also provided accounts of themselves as representations of Black women in STEM and how they would like to be viewed by the outside world. During a creative workshop, Lebohang and Sophia devised paintings of themselves as Black women in STEM. In this, Lebohang sees herself as a flower surrounded by the hopes, dreams she aspire to be as a female African scientist, as well as the challenges she endured and will continue to, given her Blackness and African roots:

This item has been removed due to third party copyright. The unabridged version of the thesis can be viewed at the Lanchester library, Coventry University

(Lebohang)

Sophia's painting expressed a similar depiction of herself, as an up-and-coming Black woman in STEM, but also points out the setbacks that come with being Black and socio-economically disadvantaged:

(Sophia)

As can be seen from both Lebohang and Sophia's visual and written representations of themselves, they have had the opportunity to pursue studies in STEM as university. Lebohang was at the latter stage of her Masters and Sophia still pursuing undergraduate studies at the time of data collection. Both are optimistic and positive about their outlook as minorities in STEM, however, both also feel that to get to where they are, they had to endure struggles

and challenges, such as funding obstacles for university, as well as endemic poverty and impoverished schooling conditions, where a distribution of resources prevented them at times and still do from participating equitable (Fraser 2008, Fraser and Bedford 2008, see also Escobar 1995). What can also be noted is that they are aware of the dominant masculine STEM terrain and the challenges which continue to stand in their way as minority women in STEM building a more equitable playing field (Haraway 1988, Fraser 1997a, 1997b, Alexander and Hermann 2015, Wilkins-Yel, Hyman, and Zounlome 2019).

8.7 Conclusion

In conclusion, this chapter has provided an account of how Black women in the South African context transition out of STEM HE and how they participate in further study and the world of work. Moreover, I have demonstrated the challenges and opportunities that Black females have to contend with being situated between dominant (workplaces and universities), as well as their home backgrounds. I have further shown how the transitions out of university for Black marginal bodies are often plagued by a lack of resources, class disadvantages, as well as geographic challenges, all of which problematizes their career trajectories. In this, dominant Black women (middle-class and urban) found opportunity in their available social, as well as cultural capital to secure workplace employment. However, for those who studied for non-engineering qualifications, such as rural and impoverished women, they were found to take up courses, not aligned to their career goals, as a means to earn an income to further their studies in STEM, which presented challenges in transitioning out of HE. Another challenge for this demographic group, was the issue of returning home after their undergraduate and honours studies, since poverty and deprivation would further hinder their career prospects, but also not being able to relate to their home environment after being away for so long. Hence, they remained in-between spaces, since they were considered outsiders to the neo-liberal institution, too, and as a result discovered a new lack of belonging. This suggest that mainly Black women from middle-class backgrounds, as well as those who secured bursaries went into employment. Moreover, Black women's participation in the world of work was not always supported as well as it might be by policies and legislation meant to protect the interest of minorities. Rather, organisations constructed a heteronormative and masculine terrain in using legislative loopholes to exploit Black women's work, by under compensating them, whilst at the same time overlooking their wellbeing and safety on worksites. This was

further sustained by younger Black men's hostility in undermining the work produced by their Black female counterparts, as well as the oppression metered out by older White men, due to the intersectional identities of age, race, gender, and language, especially where minority women occupied leadership positions. Furthermore, in certain instances Black women were also supported by Black men in their STEM endeavours, which at other times gave them the motivation to see themselves as worthy of making a contribution as a minority group.

Chapter Nine
Conclusion

9.1 Introduction

This thesis set out to explore the experiences of Black South African women's access into and participation through STEM HE and beyond, such as further study and/or the world of work. I reported on the research I conducted with 21 Black South African female co-researchers, who were at various stages of their STEM journeys (undergraduate, postgraduate, employment) over a 10-month period. In this, I documented the experiences of Black South African women who were differentially situated in preparing for STEM HE, examining how they made sense of accessing and participating at university, as well as how their post-university transitions were further shaped moving into further study, as well as the world of work. Moreover, I have relied on a bifocal lens to understand Black women's STEM experiences wholistically, namely by merging Fraser's distribution (2008) dimension, with decolonial concepts, such as Mignolo's (2011a) colonial matrix, Quijano' (2000) coloniality of power, as well Lugones's (2007, 2008, 2010) coloniality of gender to make sense of the complex nuances involved in preparing for STEM HE. I also employed Fraser's (1997b) recognition dimension with Santos's (2007a, 2018) cognitive justice concepts, and Fanon's (1986) zones of being and non-being insights, as well as Clisby and Holdsworth's (2014) embodied infrastructures to understand how Black women experience accessing into and participating through STEM HE. Furthermore, I weave together Fraser's (2007b) political dimension with decolonial feminist concepts, such as in-between spaces (Ortega 2020), world travelling (Lugones 2003, Lugones and Price 2003), including borderlands (Anzaldua 1987, Clisby 2020) to give meaning to how Black women remain excluded from further study opportunities, as well as occupying space in masculine workspaces. Lastly, this research took on a storytelling approach, relying on both dominant and non-dominant forms, and included words and phrases in the African Nguni languages and translated to English to give relevance and meaning to Black women's situatedness, as well as uncentering the dominant narrative.

9.2 Concluding reflections on the Research Questions

As I have alluded to in my introductory chapter, as well as having demonstrated throughout this thesis, unequal participation is still a reality for most in the Majority World, especially in

contexts, such as the South African one, which is currently the most unequal in the world (Amnesty International 2020). Various scholars have alluded to the urgency of devising strategies to tackle issues of access and participation in education, as a response to the violent protests in 2015/16, calling for a more inclusive and transformative terrain to serve the needs of those who are completely out of the HE frame (Fraser 2007a, Bozalek and Boughey 2012, 2017, Hölscher and Bozalek 2020, see also Fataar 2019), such as female students emanating from impoverished rural backgrounds. The plight for Southern Black women occupying space in STEM HE becomes more challenging, as they not only have to contend with the Eurocentric set up of the university, but also its underlying heteronormative and masculine culture associated with the scientific field. This brings to the fore my findings in relation to my research questions, documenting the wholistic experiences of Black South African women in terms of how they prepare, access, and participate, as well as transition out of STEM HE into further studies and the world of work, which I address in the next sections.

9.2.1 What are the differential experiences of Black South African women growing up prior to transitioning into STEM higher education?

Young Black rural and impoverished women growing up are still confronted with patriarchal standards on a daily basis, as the normal cultural practices of family, including society dictate that women first and foremost need to care for her offspring and husbands before her educational development. This is also shaped by the dogmatic religious values, which South Africa subscribes to, as suggested by various scholarly findings (Wood 2019, Maponya 2022), but also due to foreign colonial values inscribed in the psyche of Black men which defines binaries (Oyewumi 2002, Chávez 2019), as well as the hierarchisation thereof (Quijano 2007, Lugones 2008, Leo 2020). This further shape the reality of Black women living under patriarchal standards, such as rural and township females, especially in relation to schooling and how being subjugated has implications for their grades, and bears further consequences for scholarships in perpetuating and entrenching inequality and oppression (Fraser 1997a, 1997b, 2007a, 2008, Zuze 2020). Hence, Black South African women prepare for STEM HE from diverse backgrounds, and vantage points, shaped by whether their experiences are situated in a colonial matrix (Mignolo 2011a), involving the entanglement of ongoing poverty, cultural patriarchy and schooling inequality, which presents implications for their university STEM preparation. Scholars such as Akala and Divala (2016), as well as Walker (2019) remind

us that schooling, especially that involving taking on masculine White roles were not intended for the Black female, especially at the lower echelons of society. This fragmentation was not evident in the experiences of middle-class Black women, resulting in an unequal playing field being created and entrenched in preparation for STEM HE (Walker 2018a, Liccardo 2018a, see also Fraser 1998).

In other words, my findings suggest that not all Black female bodies are situated equally in preparation for events that will emancipate them, as well as others around them. Thus, it becomes imperative in remaining cognisant of how race, class, gender, as well as geo-spatiality (coloniality) intersects in articulating the experiences of those on the periphery in enhancing parity and creating a level playing field (Fraser 1997a, 1997b, 2008, Lugones 2008, 2010). In other words, to refrain from being tokenistic, we should ensure that we do not perpetuate the very thing that we are trying to dismantle by privileging the already elite members of non-dominant groups as a means to represent the interest of whole. Middle-class Black men and women are not representative of those at the lower echelons of society, given that their experiences are not entrenched in a colonial matrix on a daily basis (Mignolo 2011a, 2011b, Santos 2020b). I am not saying that all non-dominant bodies were not affected by historical colonialism, indeed we were, but what I am suggesting is how ongoing coloniality remains embedded within such experiences are pivotal in creating a level playing field in an ongoing globalised world (Quijano 2000, Fraser 1997a, 1997b, 2007b, 2008, 2010). This would further ensure that our 'transformative' attempts are not geared to privileging dominant identities within groups, whilst overlooking more hidden ones that stand to be severely oppressed, i.e., such as rural, trans, queer, disabled, etc. In this, I hold the same view of certain scholars that awarding privileges to minorities should not be seen as doing anyone favours (Bozalek and Boughey 2020, Hölscher and Bozalek 2020), as it remains a moral (Honneth 1995), as well as an ethical obligation (Fraser 1997b) to rectify past injustices which continue to linger. I now move onto my next research question, which interrogates the role of HE in Black women's access and participation in STEM.

9.2.2 How do Black South African women in STEM navigate the higher education terrain through access and participation?

Access into HE is primarily through prior schooling influences, as well as parental guidance and support. In this rural and township women from impoverished contexts, who are the first to attend university are left without the necessary social, as well as cultural capital, including habitus (Bourdieu 1984, 1986, Bourdieu and Wacquant 1992, Bourdieu and Passeron 1990) that will position them as legitimate students and enable meaningful access into dominant institutional spaces (Liccardo and Bradbury 2017, Pather and Chetty 2015). This exaltation in serving the middle-class and their needs are what misrecognises (Fraser 1997a, 1998, 2008) and further dehumanises (Fanon 1986, Santos 2007a) Black women from township and rural backgrounds in being situated as outsiders when having to access and participate in HE. Hence, the hegemony of elite values, its underpinning neo-liberal agenda, with its idolising stance on favouring a certain linguistic status quo set low socio-economic women apart and prevents them from making a meaningful contribution at university. As a result, they are deprived of forging valuable networks and acquiring the necessary habits, traditions and practices that will enhance their learning and integration (Bourdieu 1984, Bourdieu and Passeron 1990), and as result humanise their experiences (Fanon 1986, Santos 2007a, see also Fataar 2019) in positioning them to participate fully as equals at university (Fraser 1997a, Khan 2020).

Moreover, their affluent peers, such as middle-class Black women accessed HE with a superior set of cultural and social values that they inherited from their robust schooling backgrounds, as well as from their knowledgeable and informed parents, which positioned them as legitimate students to the university (Liccardo, Botsis, and Dominguez-Whitehead 2015, Walker 2018a, Swartz et al. 2018, Roberts 2021). This provided them with the upper hand to participate as equals (Fraser 1997a, 1997b, 2008), as it bestowed upon them the respect and self-worth in humanising their experiences in accessing and participating at university. However, although middle-class Black women felt linguistically excluded, their experiences were not dehumanising, given that ongoing coloniality were not inscribed in their realities (Quijano 2000, 2007, Fanon 1986, Santos 2007a), as well as presenting them with more opportunities to benefit from the teaching practices and academic facilities of the institution.

However, being juxtaposed against the neo-colonial university, as well its dominant masculine STEM terrain, Black women were found to support and uplift each other, given their outlier status (Liccardo 2015, Liccardo and Bradbury 2017, Liccardo 2018b). Influences of more senior and middle-class Black women were profound on the academic and social integration of their less affluent peers, including acts of kindness, generosity and support, whilst receiving the same in return where necessary, in enabling a more diverse Black female scientific community at university in promoting inclusion and legitimacy (Yosso 2005, Clisby and Holdsworth 2014, Ong, Smith, and Ko 2018). I now move along to my last research question.

9.2.3 What are the obstacles and opportunities in transitioning out of STEM higher education and how do Black women perceive themselves?

Being misframed (Fraser 2007b) in transitioning out of HE spaces, left rural female students with a lack of belonging (Anzaldua 1987, Clisby 2020), as they often experienced conflict in traversing in-between (Ortega 2020) the institution which represented opportunities, aspirations for growth and emancipation in be(coming) future female scientists, however, at the same time feeling excluded by the neoliberal climate the institution had created in positioning them as outsiders (Liccardo 2018a, 2018b). In addition, they experienced a disconnect from their rural villages, after having been away for so long, which left them disempowered in further entrenching their outsider status, due to not fitting in with the norms and expectations that surrounds daily life and poverty (Anzaldua 1987, Timmis et al. 2022). Hence, upon completion of their junior qualification's Black women from impoverished rural confines were often confronted with making difficult decisions to return where they come from or to continue occupying the hostile terrain the institution had created, as a means to come by further study and work opportunities. This gives them a new sense of belonging in being confined to such liminality (Lugones 2003, Ortega 2006, 2020).

Moreover, middle-class Black women and those from township backgrounds who have secured work opportunities were often confronted with similar tension in working enclaves (Fraser 1997a, 2022). This was as a result of the complexities associated with hegemony of masculinity and the notion of being a scientist remaining incongruent with their many intersecting identities, intensifying their oppression and positioning them to map the contours of an often non-inclusive and accommodating hostile workplace terrain (Mkhize 2022, see

also Lugones 2007, 2010). Moreover, after having trained for many years and expecting to be emancipated, as a select few who could penetrate male dominated confines, they instead experienced dehumanising incidents which questioned their legitimacy as Black female scientists and visibilised their gender in enabling non-gender friendly and stereotypically masculinised spaces in further promoting their lack of belonging (McGee and Bentley 2017, Male et al. 2018, Miles, Brockman, and Naphan-Kingery 2020). However, dominant men, including their non-dominant counterparts in providing opportunities for growth and development, were found to be empowering. This is what Chávez (2019) reminds us of the responsibility of men, especially those who are racially dislocated in society, to stand with women and other minorities in resisting oppression responsible for dehumanisation. Furthermore, decolonial feminist advocates for something similar from White women in building a coalitional praxis with non-dominant women, as a means to meaningfully understand their situatedness, in building more inclusive societies (Lugones 2003, Ortega 2006, Velez 2019, see also Banerjee and Ghosh 2018). I can only imagine if Black women from impoverished backgrounds were to experience workplace exclusion, given how coloniality has already been embedded in their realities, since the time they started preparing for the STEM journeys, which is more of a reason that we need both dominant men and women in fighting for more inclusiveness in dismantling the underlying heteropatriarchal culture associated with being a scientist. Lastly, Black women from all backgrounds held themselves in high regard in possessing the capabilities, resources and agency, including the resilience to positively contribute to the scientific terrain in their respective fields, despite being self-reflexive and self-aware knowers of the constraints in working in highly masculine spaces, as outsiders.

9.3 Recommendations for Policy and Practice

The findings of this study are important for government initiatives in widening STEM participation for underrepresented groups, such as Black women. These findings relate to the equitable participation of Black women in preparing for STEM HE, how Black women without the social and cultural capital in place access and navigate the university space, as well as how they occupy liminal spaces in transitioning out of tertiary institutions and into the world of work, in providing useful insights in rethinking policy that is aimed at increasing Black women's participation in STEM.

First, as much as 'Black women' are regarded as a homogenous entity in being underrepresented in the STEM field, which is traditionally masculine, the insights from this research will allow for intervention to be put in place to support Black women at the lower echelons of society in preparing for and accessing STEM disciplines. This is important, as it will ensure that there is an even representation of all Black women in male dominated disciplines, as well as ensuring that more support is afforded to those from rural and township background, given how their identities intersect in society, in terms of race, class, gender, including coloniality, as I had previously outlined. Also, to ensure that true transformation is taking place, policy interventions should not be geared to replace dominant White men and women with dominant Black women in an attempt to redress and transform the STEM terrain.

Second, South African universities and colleges can also learn from these finding in adapting existing policies in admitting Black women onto STEM programmes, as a means to transform the STEM terrain, and in so doing produce more Black female scientists, engineers, mathematicians, who are able to pursue STEM subjects from undergraduate studies, through to further studies and the world of work. Black women from marginalised backgrounds should be equipped and supported to transition out to STEM HE, with a clear path in mind, to make a meaningful contribution, as well improving on widening participation.

Third, the South African schooling curriculum should be geared to allow Black female learners, especially those from rural and township backgrounds, to participate equitably in preparation for STEM HE. Emphasis should be placed on ploughing scientific resources, as well as human resources, such as skilled teachers in rural and township contexts to ensure equitable Black female participation. Having the right material and non-material resources from an early age will assist Black women from rural and township backgrounds to equitably access and participate in STEM HE.

Fourth, tertiary institutions, such as universities and workplaces could gain insights from this study to implement practical interventions to enhance gender, race, as well as linguistic parity to ensure that all sectors of its student population, as well as workforce are equally represented and afforded respect and dignity.

9.4 Limitations and Challenges of the Study

This study does present its own limitations in terms of my own positionality as researcher and as a Black South African woman living in the UK. As much as I have ensured that power dynamics in the researcher-participant relationship remains flattened, I remain cognisant of the fact that arriving from abroad to conduct research, as well as my current position as a Ph. D student and fellow of a prestigious UK funding body may have had an impact on the data collected. If I had not had the privilege to live in a developed country, as well as having received funding to travel to conduct fieldwork, the outcome of my results may have been different. For example, if I had been from a rural background and just pursuing a PhD at a South African university, participants may have afforded me with a different set of data in storying their experiences with me. They saw this research as very liberating in giving voice to their stories, as well as the fact that I as the researcher, also took time in storying my own experiences in the process.

 Another limitation is that my study comprises a relatively small cohort, which does not represent the entire Black female STEM population in South Africa and therefore cannot be generalised. However, it does provide useful insights into understanding Black women's wholistic STEM experiences in South Africa, including the factors that influence access and participation into, through and out of dominant hegemonic spaces, such as universities and STEM workplaces and organisations. Also, my data is further shaped by the fact that I have relied on a storied approach to data collection, which provides rich and thick data, but had I opted for a different approach, I may have collected a different set of data, as well as results in understanding the Black female experience across the STEM journey.

During my fieldwork with co-researchers, I came across three situations where during face-to-face interviews, co-researchers became distressed as they recalled difficult issues that affected them and their relationships from their past. One co-researcher cried when she talked about how her biological mother remained absent from her life, and as a result, she was raised by her grandmother. Two other co-researchers spoke about how poverty had implications for the stress they experienced whilst at university, to the point where the one revealed that her boyfriend caught her trying to commit suicide. She was at the time receiving support from her boyfriend and a female lecturer. After the interviews, I offered these women

information about wellbeing support services provided by the university. I met up for the creative workshop with these three co-researchers a few weeks later and they all seemed to have coped well.

However, after recruitment and after the first interview, three co-researchers contacted me and requested to withdraw from the research, as they were experiencing ongoing struggles and anxiety with sitework as Black female engineers. They expressed sentiments of feeling disempowered by how their places of employment have turned a blind eye to issues of its female workers' safety and well-being, which directly affects them. It is due to this frustration, including the fact of not having a voice for quite some time, which influenced their decision to withdraw from the study. In addition, another asked for her data to be withdrawn after the second round of interviews, as what she had divulged during our conversations had severely implicated the unethical behaviour of her manager, whom she feared may not renew her contract, if ever it was detected that she leaked information about his unscrupulous ways, by contributing to this research. I did offer her assurance that her confidentiality and anonymity will be ensured, and that her data will be indeed protected if she continued, but she still did not wish to risk it.

Hence, as is common when talking in depth about one's life, sensitive issues did arise during my fieldwork and I was conscious of the importance of supporting these women in both a professional, as well as in an ethical manner. I made numerous attempts at convincing them to continue with the research, as a means to give their stories, but I had to also respect their wishes in the end. This is the reason why Smith (2012: 205) cautions researchers working with oppressed communities and vulnerable bodies to be acutely aware of their role pertaining to 'ethics and community sensibilities'. Moreover, another one co-researcher withdrew from the study, not as a result of stress or problems, but due to the fact that she had relocated for temporary work to a neighbouring African country. Furthermore, my co-researchers who decided to continue documenting their stories with me, also saw me as a friend and someone they could admire for being a Black South African woman who has managed to read for a PhD in the UK. They found this inspiring and motivating and asked me for advice about pursuing further studies abroad.

9.5 Areas for Future Research

As I have mentioned in the introductory chapter of this thesis, as well as indicted elsewhere, that this type of research is still underexplored in the South African context. As a matter of fact, there's a dearth of research in the South African context, as well as internationally in relation to Black women occupying space in the STEM field. Hence, more research is needed especially with Black women in STEM from diverse backgrounds in South Africa, given the country's heterogenous make up, as a means to diversify the terrain, as well as ensure widening access and participation. For example, a useful way to understand how access and participation in STEM shape experiences across the Black female population strata in South Africa would be to draw on a pool of participants from elite, as well as non-elite institutions, including private universities in South Africa. This will shed light on how more elite Black females navigate their journeys into, through and out of STEM HE, as well as provide deeper insight into how this compares against that of their middle-class, township and rural counterparts. Another interesting dimension to consider would be include men in STEM of all races and backgrounds (Black and White) in a study on Black South African women in STEM, as a means to documenting the male experience and their involvement in enabling or hindering the participation of Black women along the STEM journey, from a male perspective.

Moreover, I plan on conducting a more longitudinal study by doing follow-up interviews with my co-researchers in five years' time, to see where they are on their respective journeys and whether anything has changed for them or not. This will be interesting, as those who were doing their undergraduate degrees will be either working on pursuing further studies, as well as following up on those who went into teaching in this study, to gain finances as a means to do Masters and PhD studies in STEM, and whether they have indeed followed this route or stayed in teaching. It will also be interesting to see whether the co-researchers who were in employment, endured on in their jobs or whether they left the STEM field, as well as whether those co-researchers who were without funding and employment opportunities after their undergraduate studies, stayed in STEM or moved on to a different field altogether.

9.6 Conclusion

In conclusion, this chapter has set out to synthesise my findings on Black women's STEM journeys from the inception of their childhood in preparation for HE, through to accessing

and participating at university, as well as navigating their way into further studies and the world of work. Hence it looked at the wholistic experiences of Black women South African women who were differently positioned along their STEM trajectories and how their outlier status as a minority presented challenges and complexities in meaningfully forging ahead in their endeavours. In this, I have also weaved through my own reflections based on my observations in having carried out this research, including having interacted over a period of 10 months with these women in listening and giving meaning and voice to their stories. Moreover, I also provided recommendations for policy and practice, as well as addressing the limitations of the study, and challenges I experienced carrying out research of this nature. In addition, I also outline areas for future research that other researchers in the field may find useful, as well as providing insight on further building onto this work in a few years' time. Furthermore, my contribution to knowledge in weaving together two distinct theoretical frameworks, namely critical theory and decolonial/decolonial feminist thinking in providing a nuanced understanding of Black South African women's access and participation along the entire STEM journey.

Reference List

Abdoll, C. and Barberton, C. (2014) *Mud to Bricks : A Review of School Infrastructure Spending and Delivery*. Pretoria

Adam, T. (2020) 'Between Social Justice and Decolonisation: Exploring South African MOOC Designers' Conceptualisations and Approaches to Addressing Injustices'. *Journal of Interactive Media in Education* 2020 (1), 1–11

Adebisi, F.I. (2016) 'Decolonising Education in Africa: Implementing the Right to Education by Re-Appropriating Culture and Indigeneity'. *Northern Ireland Legal Quarterly* 67 (4), 433–451

Aexander, N. (2011) *Afrikaans: Success or Failure*. ed. by Joshua Fishman and Ofelia Garcia. New York: Oxford University Press

Akala, B. and Divala, J. (2016) 'Gender Equity Tensions in South Africas Post-Apartheid Higher Education: In Defence of Differentiation'. *South African Journal of Higher Education* 30 (1), 1–16

Akala, B.M. (2019) 'Affirmative Action for Gender Justice in South African and Kenyan Education Systems'. *Africa Education Review* 6627, 1–15

Akala, B.M. (2018) 'Challenging Gender Equality in South African Transformation Policies - a Case of the White Paper: A Programme for the Transformation of Higher Education'. *South African Journal of Higher Education* 32 (3), 226–248

Alcoff, M.L. (2007) 'Fraser on Redistribution, Recognition, and Identity'. *European Journal of Political Theory* 6 (3), 255–265

Alexander, Q.R. and Hermann, M.A. (2015) 'African-American Women's Experiences in Graduate Science, Technology, Engineering, and Mathematics Education at a Predominantly White University: A Qualitative Investigation'. *Journal of Diversity in Higher Education* 1–16

Ali-Rweide, T. (2019) 'The Use of Experiments Among Palestinian Science Teachers in Jurusalem Area'. *Journal of International Scientific Publications* 17, 139–145

Aman, R. (2016) 'Delinking from Western Epistemology: En Route from University to Pluriversity via Interculturality'. in *Decolonizing the Westernized University: Interventions in Philosophy of Education from Within and Without*. Maryland: Lexington Books, 95–114

Amin, S. (2009) *Eurocentricism: Modernity, Religion and Democracy - A Critique of Eurocentricism and Culturalism*. New York: Monthly Review Press

Amnesty International (2020) 'South Africa: Broken and Unequal: The State of Education in South Africa'. *Broken and Unequal: The State of Education in South Africa* [online] 120. available from <https://amnesty.org.za/research/broken-and-unequal-the-state-of-education-in-south-africa/>

Anzaldua, G. (1987) *Borderlands La Frontera: The New Mestiza*. Fourth. San Francisco: Aunt Lute Books

Badat, S. and Sayed, Y. (2014) 'Post-1994 South African Education: The Challenge of Social Justice'. *Annals of the American Academy of Political and Social Science* 652 (1), 127–148

Baker, M. (2012) 'Modernity/Coloniality and Eurocentric Education: Towards a Post-Occidental Self-Understanding of the Present'. *Policy Futures in Education* 10 (1), 4–22

Balalola, O.O., du Plessis, Y., and Babalola, S.S. (2023) 'Power of Shared Success : How Can Sharing Success and Roles of Others Motivate African Women in STEM ?' *International Journal for Educational and Vocational Guidance* [online] (0123456789). available from <https://doi.org/10.1007/s10775-023-09583-1>

Baldry, K. (2016) 'Graduate Unemployment in South Africa: Social Inequality Reproduced'. *Journal of Education and Work* [online] 29 (7), 788–812. available from <http://dx.doi.org/10.1080/13639080.2015.1066928>

Banerjee, S. and Ghosh, N. (2018) 'Introduction. Debating Intersectionalities: Challenges for a Methodological Framework'. *South Asia Multidisciplinary Academic Journal* (19), 0–17

Bassey, M. (1999) *Case Study Research in Educational Settings*. Buckingham: Open University Press

Bell, D. (2018) 'A Pedagogical Response to Decoloniality: Decolonial Atmospheres and Rising Subjectivity'. *American Journal of Community Psychology* [online] 62, 250–260. available from <10.1002/ajcp.12292>

Bergold, J. and Thomas, S. (2012) 'Participatory Research Methods: A Methodological Approach in Motion'. *Historical Social Research* 37 (4), 191–222

Bhambra, G. (2020) 'Global Social Thought via the Haitian Revolution'. in *Knowledges Born in the Struggle: Constructing the Epistemologies of the Global South*. 1st edn. ed. by B. Santos & M.P. Menses. New York: Routledge, 3–20

Bilge, S. (2014) 'Whitening Intersectionality: Evanescence of Race in Intersectionality Scholarship'. *Racism and Sociology* 175–205

Block, D. (2019) 'The Political Economy of Language Education Research (or the Lack Thereof): Nancy Fraser and the Case of Translanguaging'. in *Nancy Fraser, Social Justice and Education*. 1st edn. ed. by Vincent, C. Oxon: Routledge, 119–139

Bohrer, A.J. (2019) *Marxism and Intersectioality: Race, Gender, Class and Secuality Under Contemporary Capitalism*. Bielefeld: transcript Verlag

Boni, A. and Velasco, D. (2020) 'Epistemic Capabilities and Epistemic Injustice: What Is the Role of Higher Education in Fostering Epistemic Contributions of Marginalized Knowledge Producers?' *Global Justice : Theory Practice Rhetoric* 12 (01), 1–26

Botsis, H., Dominguez-Whitehead, Y., and Liccardo, S. (2013) 'Conceptualising Transformation and Interrogating Elitism: The Bale Scholarship Programme'. *Perspectives in Education* 31 (4), 129–140

Bourdieu, Pierre, Wacqaunt Loic, J, D. (1992) *An Invitation to Reflexive Sociology*. Oxford: Blackwell Publishers

Bourdieu, P. (1991) *Language and Symbolic Power*. Oxford: Blackwell Publishers

Bourdieu, P. (1987) 'Bordieu: What Makes a Social Class?: On the Theoretical and Practical Existence of Groups'. *Berkeley Journal of Sociology: A Critical Review* (32), 1–17

Bourdieu, P. (1986) 'Pierre Bourdieu 1986 - The Forms of Capital'. in *Handbook of Theory and Research for the Sociology of Education*. Greenwood, 241–258

Bourdieu, P. (1984) *Disctinction: A Social Critique of the Judgement of Taste*. Massachuttes: Harvard University Press

Bourdieu, P. and Passeron, J.-C. (1990) *Reproduction in Education, Society and Culture*. London: Sage Publication

Bourdieu, P. and Wacquant, L.J.D. (1992) *An Invitation to a Reflexive Sociology*. Chicago: Polity Press

Boylorn, R.M. (2008) 'As Seen on TV: An Autoethnographic Reflection on Race and Reality Television'. *Critical Studies in Media Communication* 25 (4), 413–433

Bozalek, V. and Boughey, C. (2020) '(Mis)Framing Higher Education in South Africa'. in *Nancy Fraser's Work and Its Relevance to Higher Education*. 1st edn. ed. by Vivienne, B. and Dorothee, H. Oxon: Routledge

Bozalek, V. and Boughey, C. (2017) *(Mis) Framing Higher Education in SouthAfrica*. 4

Bozalek, V. and Boughey, C. (2012) '(Mis)Framing Higher Education in South Africa'. *Social Policy and Administration* 46 (6), 688–703

Bozalek, V. and Carolissen, R. (2012) 'The Potential of Critical Feminist Citizenship Frameworks for Citizenship and Social Justice in Higher Education'. *Perspectives in Education* 30 (4), 9–18

Bozalek, V. and Hochfeld, T. (2016) 'The South African Child Support Grant and Dimensions of Social Justice'. in *Social Development and Social Work Perspectives on Social Protection*. 1st edn. ed. by Drolet, J. Oxon: Routledge

Bozalek, V. and Leibowitz, B. (2012) 'An Evaluative Framework for a Socially Just Institution'. in *Higher Education for the Public Good, Views from the South*. ed. by Leibowitz, B. Stellenbosch: SUN Press, 59–72

Braun, V. and Clarke, V. (2022) *Thematic Analysis: A Practical Guide*. London: SAGE Publications Ltd

Broekhuizen, H. van and Spaull, N. (2017) *The ' Martha Effect ' : The Compounding Female Advantage in South African Higher Education*.

Bryman, A. (2012) *Social Research Methods*. Fourth. New York: Oxford University Press

Calame, C. (2012) 'Referential Verisimilitude, Narrative Necessity and the Poetics of Vision: Classical Greek Historiography between the Factual and the Fictional'. *Annales HSS* [online] 67 (1), 81–102. available from <https://www.cairn-int.info/article-E_ANNA_671_0081--referential-verisimilitude-narrative-nec.htm#>

Calitz, T. (2018) 'Recognition as Reparation: A Participatory Approach to (Mis)Recognition and Decolonisation in South African Higher Education'. *Educational Research for Social Change* 7 (SpecialEdition), 46–59

Cameron, A. and Drennan, G. (2017) 'The Geoscience Education Pipeline in South Africa: Issues of Skills Development, Equity and Gender'. *Journal of the Southern African Institute of Mining and Metallurgy* 117 (6), 567–576

Carastathis, A. (2019) 'Beyond the "Logic of Purity": "Post-Post-Intersectional Glimpses in Decolonial Feminism'. in *Speaking Face to Face: The Visionary Philosophy of Maria Lugones*. ed. by P.J. DiPietro, J. McWeeny, S.R. Albany: State University of New York Press, 85–102

Cardador, M.T. and Hill, P.L. (2018) 'Career Paths in Engineering Firms: Gendered Patterns and Implications'. *Journal of Career Assessment* 26 (1), 95–110

Carspecken, P.F. (2019) 'The Missing Infinite: A History and Critique of Mainstream and Counter-Mainstream Methodologies'. in *Critical Theory and Qualitative Data Analysis in Education*. ed. by Winkle-wagner, R., Lee-johnson, J., and Gaskew, A.N. New York: Taylor & Francis, 14–45

Carter, L. (2011) 'The Challenge of Science Education and Indigenous Knowledge'. in *Indigenous Philosophies and Critical Education*. ed. by Dei, G.J.. New York: Peter Lang Publishing Inc, 312–329

Carter, P.L. (2012) *Stubborn Roots: Race, Culture and Inequality in the U.S. and South African Schools*. New York: Ovford University Press Inc

Carter, P.L. (2003) '"'Black'" Cultural Capital, Status Positioning, and Schooling Conflicts for Low-Income African American Youth'. *Social Problems* 50 (1), 136–155

Cazden, C. (2012) 'A Framework for Social Justice in Education.' *International Journal of Educational Psychology* 1 (3), 178–198

Chapman, T.K. and Bhopal, K.K. (2013) 'Countering Common-Sense Understandings of "good Parenting:" Women of Color Advocating for Their Children'. *Race Ethnicity and Education* 16 (4), 562–586

Chase, S.E. (2018) 'Narrative Inquiry: Toward Theoretical and Methodological Maturity'. in *The Sage Handbook of Qualitative Research*. 5th edn. ed. by Denzin, N. and Lincoln, Y. Los Angeles: Sage, 546–560

Chávez, M. (2019) 'Toward a Decolonial Ethics'. in *Speaking Face to Face: The Visionary Philosophy of Maria Lugones*. ed. by DiPietro, P., McWeeny, J., and Roshanrava, S. Albany: State University of New York Press, 175–194

Chilisa, B. (2020) *Indigenous Research Methodologies*. 2nd edn. Los Angeles: Sage Publications, Inc

Chinyamurindi, W.T. (2016) 'Using Narrative Analysis to Understand Factors Influencing Career Choice in a Sample of Distance Learning Students in South Africa'. *South African Journal of Psychology* 1–11

Chisale, S.S. (2018) 'Ubuntu as Care: Deconstructing the Gendered Ubuntu'. *Verbum et Ecclesia* 39 (1), 1–8

Cigdem, E. (2017) 'Telling Stories in Pictures: Constituting Processual and Relational Narratives in Research with Young British Muslims Women in East London'. *Qualitative Social Research* 18 (1), 1–16

Claussen, S. and Osborne, J. (2013) 'Bourdieu's Notion of Cultural Capital and Its Implications for the Science Curriculum'. *Science Education* 97 (1), 58–79

Clisby, S. (2020) 'Gender, Sexuality and Identities of the Borderlands'. in *Gender, Sexuality and Identities of the Borderlands*. ed. by Clisby, S. Oxon: Routledge, 1–11

Clisby, S. and Holdsworth, J. (2014) *Gendering Women: Identity and Mental Wellbeing Through the Lifecourse*. Bristol: Policy Press

Clowes, L., Shefer, T., and Ngabaza, S. (2017) 'Participating Unequally: Student Experiences

at UWC'. *Education as Change* 21 (2), 86–108

Collins, P.H. and Bilge, S. (2020) *Intersectionality*. 2nd edn. Cambridge: Polity Press

Connell, R.. (1993) *Schools and Social Justice*. Philadelphia: Temple University Press

Connell, R. (2017) 'Southern Theory and World Universities'. *Higher Education Research and Development* 36 (1), 4–15

Connell, R. (2014) 'Using Southern Theory: Decolonizing Social Thought in Theory, Research and Application'. *Planning Theory* 13 (2), 210–223

Connelly, F. M. and Clandinin, D.J. (2006) 'Narrative Inquiry'. in *Handbook of Complementary Methods in Education Research*. 3rd edn. ed. by Green, J. L, Camilli, G., Elmore, P. New Jersey: Lawrence Erlbaum, 477–487

Connelly, F.M. and Clandinin, D.J. (1990) 'Stories of Experience and Narrative Inquiry'. *Educational Researcher* 19 (5), 2–14

Cornell, D. and van Marle, K. (2015) 'Ubuntu Feminism: Tentative Reflections'. *Verbum et Ecclesia* 36 (2), 1–8

Cross, M. (2009) 'New Students' in South African Higher Education: Institutional Culture, Student Performance and the Challenge of Democratisation'. *Perspectives in Education* 27 (1), 6–18

Cross, M. and Atinde, V. (2015) 'The Pedagogy of the Marginalized: Understanding How Historically Disadvantaged Students Negotiate Their Epistemic Access in a Diverse University Environment'. *Review of Education, Pedagogy, and Cultural Studies* [online] 37 (4), 308–325. available from <http://dx.doi.org/10.1080/10714413.2015.1065617>

Czerniewicz, L., Agherdien, N., Badenhorst, J., Belluigi, D., Chambers, T., Chili, M., de Villiers, M., Felix, A., Gachago, D., Gokhale, C., Ivala, E., Kramm, N., Madiba, M., Mistri, G., Mgqwashu, E., Pallitt, N., Prinsloo, P., Solomon, K., Strydom, S., Swanepoel, M., Waghid, F., and Wissing, G. (2020) 'A Wake-Up Call: Equity, Inequality and Covid-19 Emergency Remote Teaching and Learning'. *Postdigital Science and Education* 2, 946–967

Daniels, V.Z., Davids, E.L., and Roman, N.V. (2018) 'The Role of Family Structure and

Parenting in First Year University Adjustment'. *South African Journal of Psychology*

Davids, N. (2016) 'On Extending the Truncated Parameters of Transformation in Higher Education in South Africa into a Language of Democratic Engagement and Justice'. *Transformation in Higher Education* 1 (1), 1–7

Davies, C.J. (2016) *Whose Knowledge Counts? Exploring Cognitive Justice in Community-University Collaborations* [online] University of Brighton. available from <http://eprints.brighton.ac.uk/15891/1/WHOSE KNOWLEDGE COUNTS_CJDavies PhD FINAL JUNE16.pdf>

Davis, A.Y. (2019) *Women, Race and Class*. Pondicherry: Penguin Classics

Department of Arts and Culture (2003) *National Language Policy* [online] available from <https://www.tandfonline.com/doi/full/10.1080/03147538208712231>

Department of Basic Education (2021) *National School Nutrition Programme* [online] available from <https://www.education.gov.za/Programmes/NationalSchoolNutritionProgramme.aspx > [2 July 2023]

Desai, Z. (2016) 'Learning through the Medium of English in Multilingual South Africa: Enabling or Disabling Learners from Low Income Contexts?' *Comparative Education* 52 (3), 343–358

van Deventer, I., van der Westhuizen, P.C., and Potgieter, F.J. (2015) 'Social Justice Praxis in Education: Towards Sustainable Management Strategies'. *South African Journal of Education* 35 (2), 1–11

DiPietro, P.J. (2019) 'Beyond Benevolent Violence: Trans* of Color, Ornamental Multiculturalism, and the Decolonization of Affect'. in *Speaking Face to Face: The Visionary Philosophy of Maria Lugones*. ed. by P.J. DiPietro, J. McWeeny, S.R. Albany: State University of New York Press, 197–216

Drummond, A. (2016) 'An Analysis of Language Policy versus Practice in Two South African Universities'. *Southern African Linguistics and Applied Language Studies* 34 (1), 71–79

Dukhan, S., Cameron, A., and Brenner, E.A. (2012) 'The Influence of Differences in Social and

Cultural Capital on Students' Expectations of Achievement, on Their Performance, and on Their Learning Practices in the First Year at University'. *International Journal of Learning* 18 (7), 337–352

Dutta, U. (2016) 'Prioritizing the Local in an Era of Globalization: A Proposal for Decentering Community Psychology'. *American Journal of Community Psychology* 58 (3–4), 329–338

Dykes, G.Z. (2018) 'Exploring Participatory Parity in Higher Education: Experiences of Social Work Students'. *Social Work (South Africa)* 54 (2), 163–178

Echazarra, A. and Radinger, T. (2019) *Learning in Rural Schools: Insights from PISA , TALIS and the Literature*. 4 196. Paris

Einestein, Z. (1999) 'Critical Sociology 25,2/3'. *Crisis* 25 (2–3), 196–217

Eliastam, J.L.B. (2015) 'Exploring Ubuntu Discourse in South Africa: Loss, Liminality and Hope'. *Verbum et Ecclesia* 36 (2), 1–8

England, K. (1994) *Getting Personal: Reflexivity, Positionality, and Feminist Research* [online] available from <https://atrium.lib.uoguelph.ca/xmlui/bitstream/handle/10214/1811/18-England.pdf?sequence=1&isAllowed=y>

Escobar, A. (2020) 'Thinking-Feeling with the Earth: Territorial Struggles and the Ontological Dimension of the Epistemologies of the South'. in *Knowledges Born in the Struggle: Constructing the Epistemologies of the Global South*. ed. by Menses, B.S.& M.P. New York: Routledge, 41–57

Escobar, A. (2007) 'Worlds and Knowledges Otherwise: The Latin American Modernity/ Coloniality Research Program'. *Cultural Studies* 21 (2–3), 179–210

Escobar, A. (2004) 'Beyond the Third World: Imperial Globality, Global Coloniality and Anti-Globalisation Social Movements'. *Third World Quarterly* 25 (1), 207–230

Escobar, A. (1995) *The Making and Unmaking of the Third World; Ecountering Development*. Oxfordshire: Princeton University Press

Fanon, F. (1986) *Black Skin, White Masks*. London: Pluto Press

Fataar, A. (2019) 'Academic Conversation: From the Shadows to the University's Epistemic Centre-Engaging the (Mis)Recognition Struggles of Students at the Post-Apartheid University'. *Southern African Review of Education* 25 (2), 22–33

Fataar, A. (2018) 'Placing Students at the Centre of the Decolonizing Education Imperative: Engaging the (Mis)Recognition Struggles of Students at the Postapartheid University'. *Educational Studies* 54 (6), 595–608

Fernando, D., Cohen, L., and Duberley, J. (2019) 'Navigating Sexualised Visibility: A Study of British Women Engineers'. *Journal of Vocational Behavior* [online] 113, 6–19. available from <https://doi.org/10.1016/j.jvb.2018.06.001>

Fine, M. (2018) *Just Research in Contentious Times: Widening the Methodological Imagination*. New York: Teachers College Press

Fine, M. (2012) 'Troubling Calls for Evidence: A Critical Race, Class and Gender Analysis of Whose Evidence Counts'. *Feminism and Psychology* 22 (1), 3–19

Flanagan, J. (2021) *75% of Youth in South Africa Are Unemployed.* [online] available from <https://www.thetimes.co.uk/article/75-of-youth-in-south-africa-are-unemployed-2krzpzvmx> [4 September 2023]

Fongwa, S.N. (2019) 'Interrogating the Public Good versus Private Good Dichotomy: "Black Tax" as a Higher Education Public Good'. *Compare: A Journal of Comparative and International Education* [online] 1–16. available from <https://doi.org/10.1080/03057925.2019.1651194>

Fouad, N.A., Chang, W.H., Wan, M., and Singh, R. (2017) 'Women's Reasons for Leaving the Engineering Field'. *Frontiers in Psychology* 8 (JUN), 1–11

Fraser, N. (2022) *Cannibal Capitalism*. New York: Verso

Fraser, N. (2016) 'Contradictions of Capital and Care'. *New Left Review* 100, 99–117

Fraser, N. (2013) *Fortunes of Feminism: From State-Managed Capitalism to Neoliberal Crisis*. New York: Verso

Fraser, N. (2010) 'Injustice at Intersecting Scales: On "social Exclusion" and the "Global Poor"'. *European Journal of Social Theory* 13 (3), 363–371

Fraser, N. (2008) 'Abnormal Justice'. *Critical Inquiry* 34 (3), 393–422

Fraser, N. (2007a) 'Feminist Politics in the Age of Recognition: A Two-Dimensional Approach to Gender Justice'. *Studies in Social Justice* 1 (1), 23–35

Fraser, N. (2007b) 'Re-Framing Justice in a Gobalising World'. in *(Mis)Recognition , Social Inequality and Social Justice: Nancy Fraser and Pierre Bourdieu*. ed. by Lovell, T. New York: Routledge, 17–35

Fraser, N. (2001) 'Recognition without Ethics?' *Theory, Culture & Society* 18 (2–3), 21–42

Fraser, N. (2000) 'Rethinking Recognition'. *New Left Review* 3, 107–120

Fraser, N. (1998) 'Social Justice in the Age of Identity Politics: Redistribution, Recognition, Participation'. in *(Discussion Papers / Wissenschaftszentrum Berlin Für Sozialforschung* [online] Berlin: Leibniz-Institut, 1–14. available from <https://ideas.repec.org/p/zbw/wzboem/fsi98108.html>

Fraser, N. (1997a) 'Heterosexism , Misrecognition , and Capitalism : A Response to Judith Butler'. *Social Text* (52/53), 279–289

Fraser, N. (1997b) 'From Redistribution to Recognition? Dilemmas of Justice in a "Postsocialist" Age'. in *Justice Interruptus: Critical Reflections on the 'Postsocialist' Conditions*. New York: Routledge

Fraser, N. (1995) *From Redistribution to Recognition? Dilemmas of Justice in a "Postsocialist" Age* [online] available from <https://newleftreview.org/issues/i212/articles/nancy-fraser-from-redistribution-to-recognition-dilemmas-of-justice-in-a-post-socialist-age> [23 February 2021]

Fraser, N. and Bedford, W.K. (2008) 'Social Rights and Gender Justice in the Neoliberal Moment: A Conversation about Welfare and Transnational Politics'. *Feminist Theory* 9 (2), 225–245

Fraser, N., Dahl, H.M., Stoltz, P., and Willig, R. (2004) 'Recognition, Redistribution and Representation in Capitalist Global Society : An Interview with Nancy Fraser'. *Acta Sociologica* 47 (4), 374–382

Freire, P. (2005) *Pedagogy of the Oppressed*. 30th Anniv. New York: The Continuum

International Publishing Group

Fricker, M. (2013) 'Epistemic Justice as a Condition of Political Freedom?' *Synthese* 190 (7), 1317–1332

Fricker, M. (2008) 'Forum on Miranda Fricker's Epistemic Injustice: Power and the Ethics of Knowing'. *Theoria* 23 (61), 69–71

Fricker, M. (2003) 'Epistemic Injustice and a Role for Virtue in the Politics of Knowing'. *Metaphilosophy* 34 (1–2), 154–173

Garraway, J.G. (2017) 'Participatory Parity and Epistemological Access in the Extended Curriculum Programmes'. *Education as Change* 21 (2), 109–125

Giliomee, H. (2019) *The Rise and Demise of the Afrikaners*. Tafelberg: NB Publishers

Gill, A. and Pires, T. (2019) 'From Binary to Intersectional to Imbricated Approaches: Gender in a Decolonial and Diasporic Perspective'. *Contexto Internacional* 41 (2), 275–302

Giroux, H.A. (2018) 'What Is the Role of Higher Education in Authoritarian Times?' *Scottish Educational Review* 50 (1), 3–17

Giroux, H.A. (2017) 'Neoliberalism's War against Higher Education and the Role of Public Intellectuals'. *The Future of University Education* 185–206

Gordon, L.R. (2005) 'Through the Zone of Nonbeing: A Reading of Black Skin, White Masks in Celebration of Fanon's Eightieth Birthday'. *The CLR James Journal* [online] 11 (1), 1–30. available from <https://globalstudies.trinity.duke.edu/sites/globalstudies.trinity.duke.edu/files/file-attachments/v1d3_LGordon.pdf>

Gouws, A. (2022) 'Theorizing Feminism from the South: Knowledge Production through South Africa's Feminist Journal AGENDA'. *Journal of International Women's Studies* 23 (2), 57–71

Gouws, A. (2018) '#EndRapeCulture Campaign in South Africa: Resisting Sexual Violence Through Protest and the Politics of Experience'. *Politikon* 45 (1), 3–15

Gouws, A. (2017) 'Feminist Intersectionality and the Matrix of Domination in South Africa'.

Agenda 31 (1), 19–27

Gouws, A. and van Zyl, M. van (2015) 'Towards a Feminist Ethics of Ubuntu: Bridging Rights and Ubuntu'. *Care Ethics and Political Theory* 164–186

Gqola, P.D. (2015) *Rape: A South African Nightmare*. Johannesburg: Jacana Media (PTY) LTD

Gradín, C. (2019) 'Occupational Segregation by Race in South Africa after Apartheid'. *Review of Development Economics* 23 (2), 553–576

Le Grange, L. (2020) 'Covid-19 Pandemic and the Prospects of Education in South Africa'. *Prospects* [online] (0123456789). available from <https://doi.org/10.1007/s11125-020-09514-w>

Le Grange, L. (2007) 'Integrating Western and Indigenous Knowledge Systems: The Basis for Effective Science Education in South Africa?' *International Review of Education* 53 (5–6), 577–591

Gredley, S. (2020) '"When It Rains [Our House] Rains Too":Exploring South African Students' Narratives of Maldistribution'. in *Nancy Fraser and Participatory Parity: Reframing Social Justice in South African Higher Education*. 1st edn. ed. by Bozalek, V., Hölscher, D., and Zembylas, M. Oxon: Routedge, 94–110

Grosfoguel, R. (2020) 'Epistemic Extractivism: A Dialogue with Alberto Acosta, Leanne Betasamosake Simpson, and Silvia Rivera Cusicanqui'. in *Knowledges Born in the Struggle: Constructing the Epistemologies of the Global South*. ed. by Santos, B. de S. and Meneses, M.P. New York: Routledge, 203–218

Grosfoguel, R. (2011) 'Decolonizing Post-Colonial Studies and Paradigms of Political-Economy: Transmodernity, Decolonial Thinking, and Global Coloniality'. *TRANSMODERNITY: Journal of Peripheral Cultural Production of the Luso-Hispanic WorldJournal of Peripheral Cultural Production of the Luso-Hispanic World* 1 (1)

Grosfoguel, Ramón (2019) 'What Is Racism? Zone of Being and Zone of Non-Being in the Work of Frantz Fanon and Boaventura de Sousa Santos'. in *Unsettling Eurocentricism in the Westernised University*. ed. by Cupples, J. and Grosfoguel, R. New York: Routledge, 264–274

Habiyaremye, A., Habanabakize, T., and Nwosu, C. (2022) 'Bridging the Labour Market Skills Gap to Tackle Youth Unemployment in South Africa'. *Economic and Labour Relations Review* 33 (4), 786–805

Haker, H. (2019) 'Towards a Decolonial Narrative Ethics'. *Humanities* [online] 8 (20), 1–31. available from <doi:10.3390/h8030120>

Hall, B.L. and Tandon, R. (2017) 'Decolonization of Knowledge, Epistemicide, Participatory Research and Higher Education'. *Research for All* 1 (1), 6–19

Haraway, D.J. (1988) 'Situated Knowledges: The Science Question in Feminism of Partial and the Privilege Perspective'. *Feminist Studies* 14 (3), 575–599

Harrichurran, P., Vermaak, C., and Muller, C. (2021) *The Influence of Household Composition on Leisure Time in South Africa: A Gender Comparison* [online] vol. 29. available from <https://www.wider.unu.edu/node/238329>

Harry, T. and Chinyamurindi, W.T. (2020) 'Illustrating School-to-Work Transition through Drawings: An Exploratory Study with a Sample of South African Students'. *SA Journal of Human Resource Management* 18, 1–10

Helman, R. and Ratele, K. (2016) 'Everyday (in)Equality at Home: Complex Constructions of Gender in South African Families'. *Global Health Action* 9 (1), 1–13

Higgs, P. (2016) 'The African Renaissance and the Transformation of the Higher Education Curriculum in South Africa'. *Africa Education Review* 13 (1), 87–101

Higgs, P. (2010) 'Towards an Indigenous African Epistemology of Community in Education Research'. *Procedia - Social and Behavioral Sciences* 2, 2414–2421

Hlabangane, N. (2018) 'Can a Methodology Subvert the Logics of Its Principal? Decolonial Meditations'. *Perspectives on Science* 26 (6), 658–693

Hlalele, D. (2014) 'Rural Education in South Africa: Concepts and Practices'. *Mediterranean Journal of Social Sciences* 5 (4), 462–469

Hlalele, D. (2012) 'Social Justice and Rural Education in South Africa'. *Perspectives in Education* 30 (1), 111–118

Hlengwa, A., McKennna, S., and Njovane, T. (2018) 'The Lenses We Use to Research Student Experiences'. in *Higher Education Pathways: South African Undergraduate Education and the Public Good*. ed. by P. Ashwin and J.M. Case. Cape Town: African Minds, 149–162

Hochfeld, T. (2022) *Granting Justice: Cash, Care, and the Child Supporting Grant*. 1st editio. Cape Town: HSRC Press

Hölscher, D. and Bozalek, V. (2020) 'Nancy Fraser and Participatory Parity: Reframing Social Justice in South African Higher Education'. in *Nancy Fraser's Work and Its Relevance to Higher Education*. 1st edn. ed. by Vivienne Bozalek, Dorothee Hölscher, M.Z. Oxon: Routledge, 3–19

Honneth, A. (1995) *The Struggle for Recognition: The Moral Grammar of Social Conflicts*. Massachusetts: The MIT Press

hooks, b. (2000) *Where We Stand: Class Matters*. New York: Routedge

Hopwood, N. (2019) 'Transforming Trajectories for Disadvantaged Young Children Lessons from Tasmania's Child and Family Centres'. in *Harnessing the Transformative Power of Education*. ed. by Becky Shelley, Kitty te Riel, Natalie Brown, T.C. Leiden: Koninklijke Brill NV, 265–281

Hurst, E. and Mona, M. (2017) '" Translanguaging " As a Socially Just Pedagogy Introduction : The South African Context And'. *Education as Change* 21 (2), 126–149

Icaza, R. (2017) 'Decolonial Feminism and Global Politics: Border Thinking and Vulnerability as a Knowing Otherwise'. in *Critical Epistemologies of Global Politics*. ed. by M. Woons & S. Weier. Bristol: E-International Relations Publishing, 26–45

Idahosa, G.E. and Mkhize, Z. (2021) 'Intersectional Experiences of Black South African Female Doctoral Students in STEM: Participation, Success and Retention'. *Agenda* 1–13

Jansen, J. (2019) 'On the Politics of Decolonisation: Knowledge Authority and the Settled Curriculum'. in *Decolonisation in Universities: The Politics of Knowledge*. ed. by Jansen, J. Johannesburg: Wits University Press, 278

Jansen, J. (2009) *Knowledge in the Blood: Confronting Race and the Apartheid Past*.

California: Stanford University Press

Jansen, J. and Walters, C. (2018) 'The Recent Crisis in South African Universities'. *International Higher Education* 2018 (96), 23–24

Jayakumar, U.M., Vue, R., and Allen, W.R. (2013) 'Scholars : A Community Cultural Wealth Perspective'. *Harvard Educational Review* 83 (4), 551–580

Johnson, A.G. (2014) *The Gender Knot: Unraveling Our Patriarchal Legacy* [online] 3rd edn. Philadelphia: Temple University Press. available from <https://medium.com/@arifwicaksanaa/pengertian-use-case-a7e576e1b6bf>

Johnstonbaugh, M. (2018) 'Conquering with Capital: Social, Cultural, and Economic Capital's Role in Combating Socioeconomic Disadvantage and Contributing to Educational Attainment'. *Journal of Youth Studies* 21 (5), 590–606

Kalenga, R.C. and Samukelisiwe, M. (2015) 'Exploring Psycho-Social Challenges of Underperforming Students in the Faculty of Education at the University of Kwa Zulu Natal in South Africa'. *Anthropologist* 19 (3), 749–761

Keddie, A. (2019) 'Schooling and Social Justice through the Lenses of Nancy Fraser'. in *Nancy Fraser, Social Justice and Education*. 1st Editio. ed. by Vincent, C. Oxon: Routledge, 40–56

Keddie, A. (2012) 'Schooling and Social Justice through the Lenses of Nancy Fraser'. *Critical Studies in Education* 53 (3), 263–279

Keet, A. (2018) *The Plastic University Knowledge, Disciplines and Decolonial 'Circulations' (Inaugural Lecture: Professor André Keet)*. Port Elizabeth, 1–33

Keet, A. (2014) 'Plasticity, Critical Hope and the Regeneration of Human Rights Education'. in *Discerning Critical Hope in Educational Practices*. 1st edn. ed. by Vivianne Bozalek, Brenda Leibowitz, Ronelle Carolissen, M.B. Oxon: Routledge, 69–81

Kemmis, S. and McTaggart, R. (2003) 'Partcicipatoy Action Research'. in *Strategies of Qualitative Inquiry*. Second. ed. by Denzin, N.K. and Lincoln, S.Y. California: Sage Publications, Inc, 336–397

Kent, J. (2000) 'Group Inquiry: A Democratic Dialogue?' in *Research and Inequality*. First. ed.

by Truman, C., Mertens, D.M., Humphries, B. London: UCL Press, 80–94

Khan, F. (2020) 'Addressing Economic Constraints Impeding the Achievement of Fraser's Notion of Participatory Parity in Student Learning: A Study at a Historically Disadvantaged Institution'. in *Nancy Fraser's Work and Its Relevance to Higher Education*. 1st edn. ed. by Holscher, V.B. and D. Oxon, 111–127

Khan, F. (2019) *Social Justice and Participatory Parity: Students' Expereinces of University Residence Life at a Historically Disadvantaged Institution in South Africa*. University of the Western Cape

Khan, K. (2017) 'Intersectionality in Student Movements: Black Queer Womxn and Nonbinary Activists in South Africa's 2015–2016 Protests'. *Agenda* 31 (3–4), 110–121

Kiguwa, P. and Segalo, P. (2019) 'From Where We Stand: Reflecting on Engagements with Decolonial Feminist Community Psychology'. in *Decolonial Feminist Community Psychology*. ed. by Boonzaier, F. and Niekerk, T. Zug: Springer Nature, 129–141

Kincheloe Joe L. McLaren Peter (2011) *Key Works in Critical Pedagogy*. ed. by : Hayes K., Steinberg S.R., T.K. Sense Publishers

Klasen, S. and Minasyan, A. (2021) 'Affirmative Action and Intersectionality at the Top : Evidence from South Africa'. *Industrial Relations* 60 (1), 3–35

van Klaveren, M; Tijdens, K; Hughie-Williams, M; Martin, N. (2009) *An Overview of Women 's Work and Employment in South Africa*.

Kubow, P.K. and Min, M. (2016) 'The Cultural Contours of Democracy: Indigenous Epistemologies Informing South African Citizenship.' *Democracy & Education* 24 (2), 1–12

Lafon, M. (2009) *The Impact of Language on Educational Access in South Africa* [online] Johannesburg. available from <https://halshs.archives-ouvertes.fr/halshs-00451832>

Lane, T.B. and Id-Deen, L. (2023) 'Nurturing the Capital Within: A Qualitative Investigation of Black Women and Girls in STEM Summer Programs'. *Urban Education* 58 (6), 1298–1326

de Lange, N., Mitchell, C., and Bhana, D. (2012) 'Voices of Women Teachers about Gender

Inequalities and Gender-Based Violence in Rural South Africa'. *Gender and Education* 24 (5), 499–514

Language in Education policy (1997) *Language in Education Policy*. Pretoria

Language Policy for Higher Education (2002) *Language Policy for Higher Education*. Pretoria

Lareau, A. (2015) 'Cultural Knowledge and Social Inequality'. *American Sociological Review* 80 (1), 1–27

Lareau, A. (2011) *Unequal Childhoods: Class, Race, and Family Life*. 2nd edn. California: University of Californnia Press

Leibowitz, B. (2017a) 'Power, Knowledge and Learning: Dehegemonising Colonial Knowledge'. *Alternation* 24 (2), 99–119

Leibowitz, B. (2017b) 'Cognitive Justice and the Higher Education Curriculum'. *Journal of Education (University of KwaZulu-Natal)* (68), 93–112

Leibowitz, B. and Bozalek, V. (2016) 'The Scholarship of Teaching and Learning from a Social Justice Perspective'. *Teaching in Higher Education* [online] 21 (2), 109–122. available from <https://doi.org/10.1080/13562517.2015.1115971>

Leibowitz, B. and Bozalek, V. (2014) 'Access to Higher Education in South Africa'. *Widening Participation and Lifelong Learning* 16 (1), 91–109

Leo, B. (2020) 'The Colonial/Modern [Cis]Gender System and Trans World Traveling'. *Hypatia* 35, 454–474

Letseka, M. (2016) 'A Call for More Literature and Deeper Data'. *Democracy & Education* 25 (1), 1–6

Letseka, M. (2012) 'In Defence of Ubuntu'. *Studies in Philosophy and Education* 31 (1), 47–60

Levison, D. and Moe, K.S. (1998) 'Household Work as a Deterrent to Schooling: An Analysis of Adolescent Girls in Peru'. *Journal of Developing Areas* 32 (3), 339–356

Lewin, T. and Mawoyo, M. (2014) *Student Access and Success : Student Access and Success :*

Li, Z. and Qiu, Z. (2018) 'How Does Family Background Affect Children's Educational

Achievement? Evidence from Contemporary China'. *Journal of Chinese Sociology* 5 (13), 1–21

Liccardo, S. (2018a) '"We Have No Faces": The Intersectional Positionality of Black South African Women in STEM Fields'. in *Transforming Transformation in Research and Teaching at South African Universities*. ed. by Pattman, R. and Corlissen, R. SUN PRESS, 231–246

Liccardo, S. (2018b) 'A Symbol of Infinite (Be)Longing: Psychosocial Rhythms of Inclusion and Exclusion at South African Universities'. *South African Journal of Higher Education* 32 (3), 12–29

Liccardo, S. (2015) *Re-Imagining Scientific Communities in Post-Apartheid South Africa: A Dialectical Narrative of Black Women's Relational Selves and Intersectional Bodies*. University of the Witwatersrand

Liccardo, S., Botsis, H., and Dominguez-Whitehead, Y. (2015) 'Background Knowledge and Epistemological Access: Challenges Facing Black Women in a Set Scholarship Programme'. *South African Journal of Higher Education* [online] 29 (1), 373–389. available from <http://wiredspace.wits.ac.za/bitstream/handle/10539/20543/Liccardo (2015) Background.pdf?sequence=1>

Liccardo, S. and Bradbury, J. (2017) 'Black Women Scientists: Outliers in South African Universities'. *African Journal of Research in Mathematics, Science and Technology Education* 21 (3), 282–292

Lister, R. (2007) '(Mis) Recognition , Social Inequality and Social Justice: A Critical Social Policy Perspective'. in *(Mis)Recognition, Social Inequality and Social Justice: Nancy Fraser and Pierre Bourdieu*. 1st edn. ed. by Lovell, T. Oxon: Routledge, 157–176

Loh, J. (2013) 'Inquiry into Issues of Trustworthiness and Quality in Narrative Studies: A Perspective'. *The Qualitative Report* 18 (65), 1–15

Lombard, E. (2017) 'Students' Attitudes and Preferences toward Language of Learning and Teaching at the University of South Africa'. *Language Matters* 48 (3), 25–48

Lorde, A. (2017) *The Master's Tools Will Never Dismantle the Master's House*. Milton

Keynes: Silver Press

Lowndes, V. (2016) 'Storytelling and Narrative in Policymaking'. in *Evidence Based Policymaking in the Social Sciences: Methods That Matter*. ed. by Evans, G.S.& M. Bristol: Policy Press, 103–122

Luckett, K. and Naicker, V. (2016) 'Responding to Misrecognition from a (Post)/Colonial University'. *Critical Studies in Education* 1–18

Lugones, M. (2010) 'Toward a Decolonial Feminism'. *Hypatia* 25 (4), 742–759

Lugones, M. (2008) 'The Colonity of Gender'. *Worlds & Knowledges Otherwise* 1–17

Lugones, M. (2007) 'Heterosexualism and the Colonial / Modern Gender System'. *Hypatia* 22 (1), 186–209

Lugones, M. (2003) *Pilgrimages: Theorising Coalition Against Multiple Oppressions*. Maryland: Rowman and Littlefield Publishers

Lugones, M. (1987) '"World"-Travelling, and Loving Perception'. *Hypatia* [online] 2 (2), 3–19. available from <https://www.jstor.org/stable/3810013>

Lugones, M. and Price, J. (2003) 'The Inseparability of Race, Class, and Gender in Latino Studies'. *Latino Studies* 1 (2), 329–332

Madden, R. (2010) *Being Ethnographic: A Guide to the Theory and Practice of Ethnography)*. London: Sage

Madiba, M. (2012) 'Language and Academic Achievement: Perspectives on the Potential Role of Indigenous African Languages as a Lingua Academica'. *Per Linguam* 28 (2), 15–27

Madiba, S. and Ngwenya, N. (2017) 'Cultural Practices, Gender Inequality and Inconsistent Condom Use Increase Vulnerability to HIV Infection: Narratives from Married and Cohabiting Women in Rural Communities in Mpumalanga Province, South Africa'. *Global Health Action* [online] 10 (0), 1341597. available from <https://doi.org/10.1080/16549716.2017.1341597>

Maisela, T. and Ross, E. (2018) 'The Experiences of Motherhood among Black

Undergraduate Students at a South African University: Reconciling Competing Roles'. *South African Review of Sociology* 49 (2), 41–60

Makalela, L. (2018) '"Our Academics Are Intellectually Colonised": Multi-Languaging and Fees Must Fall'. *Southern African Linguistics and Applied Language Studies* 36 (1), 1–11

Makalela, L. (2016) 'Ubuntu Translanguaging: An Alternative Framework for Complex Multilingual Encounters'. *Southern African Linguistics and Applied Language Studies* 34 (3), 187–196

Makalela, L. (2015) 'Translanguaging as a Vehicle for Epistemic Access: Cases for Reading Comprehension and Multilingual Interactions'. *Per Linguam* 31 (1), 15

Makgoba, M. (2019) 'Constructing Black Economic Empowerment in South African Mining: Government v Corporate Discourse'. *African Studies* 78 (4), 568–589

Makunga, B., Schenck, C.J., Roman, N. V, and Spolander, G. (2018) 'Illiteracy among Caregivers: Implications for Children's Educational and Social Development'. *Southern African Journal of Social Work and Social Development* 29 (3)

Maldonado-Torres, N. (2017) 'Frantz Fanon and the Decolonial Turn in Psychology: From Modern/Colonial Methods to the Decolonial Attitude'. *South African Journal of Psychology* 47 (4), 432–441

Maldonado-Torres, N. (2016) 'Outline of Ten Theses on Coloniality and Decoloniality'. *Berkeley Planning Journal* [online] 26 (1), 1–37. available from <http://frantzfanonfoundation-fondationfrantzfanon.com/article2360.html>

Maldonado-Torres, N. (2007) 'On the Coloniality of Being: Contributions to the Development of a Concept'. *Cultural Studies* [online] 21 (2–3), 240–270. available from <10.1080/09502380601162548>

Male, S.A., Gardner, A., Figueroa, E., and Bennett, D. (2018) 'Investigation of Students' Experiences of Gendered Cultures in Engineering Workplaces'. *European Journal of Engineering Education* [online] 43 (3), 360–377. available from <https://doi.org/10.1080/03043797.2017.1397604>

Mama, A. (1995) *Beyond the Masks: Race, Gender and Subjectivity*. London: Routledge

Maponya, D.T. (2022) 'Religion , Patriarchy and the Prospect for Gender Equality in South Africa'. *International Journal of Philosophy and Theology* [online] 82 (4–5), 337–349. available from <https://doi.org/10.1080/21692327.2021.2003231>

Marais, P. (2016) '"We Can't Believe What We See": Overcrowded Classrooms through the Eyes of Student Teachers'. *South African Journal of Education* 36 (2), 1–10

Maringe, F., Masinire, A., and Nkambule, T. (2015) 'Distinctive Features of Schools in Multiple Deprived Communities in South Africa: Implications for Policy and Leadership'. *Educational Management Administration and Leadership* 43 (3), 363–385

Maringe, F. and Moletsane, R. (2015) 'Leading Schools in Circumstances of Multiple Deprivation in South Africa: Mapping Some Conceptual, Contextual and Research Dimensions'. *Educational Management Administration and Leadership* 43 (3), 347–362

Martinez-Vargas, C., Walker, M., and Mkwananzi, F. (2019) 'Access to Higher Education in South Africa: Expanding Capabilities in and through an Undergraduate Photovoice Project'. *Educational Action Research* [online] 00 (00), 1–16. available from <https://doi.org/10.1080/09650792.2019.1612767>

Maseno, L. and Kilonzo, S.M. (2011) 'Engendering Development : Demystifying Patriarchy and Its Effects on Women in Rural Kenya'. *International Journal of Sociology and Anthropology* 3 (February), 45–55

Masinire, A. (2020) 'The Historical Burden of Rural Education: Reflections of Colonial Legacy on Current Rural Education in South Africa'. in *Rurality, Social Justice and Education in Sub-Saharan Africa Volume I: Theory and Practice in Schools*. ed. by Masinire, A. and Ndofirepi, A.P. vol. I. Cham: Springer Nature, 27–38

Masinire, A., Felix, M., and Nkambule, T. (2014) 'Education for Rural Development: Enbedding Rural Dimesnions in Intital Teacher Preparation'. *Educational Management Administration and Leadership* 32 (3), 146–158

Mathebula, T. (2018) 'Human Rights and Neo-Liberal Education in Post-Apartheid South Africa'. *Journal of Education* (71), 91–106

Matsehela, L. (2018) 'The Rising Challenge of University Access for Students from Low-

Income Families'. in *Higher Education Pathways: South African Undergraduate Education and the Public Good*. CapteTown: African Minds, 165–176

Matsepe, D., Maluleke, M., and Cross, M. (2019) 'Re-Imagining Teacher's Experience with Overcrowded Classrooms in the Public Secondary Schools in South Africa'. *Journal Of Gender, Information and Development in Africa* (Special Issue), 91–103

Mayaba, N.N., Ralarala, M.K., and Angu, P. (2018) 'Student Voice: Perspectives on Language and Critical Pedagogy in South African Higher Education'. *Educational Research for Social Change* 7 (1), 1–12

Mayet, R. (2016) 'Supporting At-Risk Learners at a Comprehensive University in South Africa'. *Journal of Student Affairs in Africa |* [online] 4 (2), 1–12. available from <www.jsaa.ac.za>

Mbembe, A.J. (2016) 'Decolonizing the University: New Directions'. *Arts and Humanities in Higher Education* 15 (1), 29–45

Mbembe, A.J. (2015) 'Decolonizing Knowledge and the Question of the Archive'. *Wits Institute for Social and Economic Research (WISER), University of the Witwatersrand* [online] 29. available from <http://wiser.wits.ac.za/system/files/Achille Mbembe - Decolonizing Knowledge and the Question of the Archive.pdf>

Mcgee, E.O. and Bentley, L. (2017) 'The Troubled Success of Black Women in STEM The Troubled Success of Black Women in STEM'. *Cognition and Instruction* [online] 35 (4), 265–289. available from <https://doi.org/10.1080/07370008.2017.1355211>

McGee, E.O. and Bentley, L. (2017) 'The Troubled Success of Black Women in STEM'. *Cognition and Instruction* [online] 35 (4), 265–289. available from <https://doi.org/10.1080/07370008.2017.1355211>

McKay, T.M. (2015) 'Schooling, the Underclass and Intergenerational Mobility: A Dual Education System Dilemma'. *The Journal for Transdisciplinary Research in Southern Africa* 11 (1), 98–112

McKeever, M. (2017) 'Educational Inequality in Apartheid South Africa'. *American Behavioral Scientist* 61 (1), 114–131

Mendoza, B. (2016) 'Coloniality of Gender and Power: From Postcoloniality to Decoloniality'. in *The Oxford Handbook of Feminist Theory*. ed. by L. Disch & M. Hawkesworth. London: Oxford University Press, 1–25

Merriam, S.B., Tisdell, E.J. (2016) *Qualitative Research: A Guide to Design and Implementation*. Fourth. San Francisco: Jossey-Bass

Merriam, S.B., Johnson-Bailey, J., Lee, M.-Y., Kee, Y., Ntseane, G., and Muhamad, M. (2001) 'Power and Positionality: Negotiating Insider/Outsider Status within and across Cultures'. *International Journal of Lifelong Education* 20 (5), 405–416

Mertens, D. (1999) 'Inclusive Evaluation: Implications of Transformative Theory for Evaluation'. *The American Journal of Evaluation* 20 (1), 1–14

Mertens, D.M. (2012) 'Transformative Mixed Methods: Addressing Inequities'. *American Behavioral Scientist* 56 (6), 802–813

Mgqwashu, E.M., Timmis, S., De Wet, T., and Madondo, E.N. (2020) 'Transitions from Rural Contexts to and through Higher Education in South Africa : Negotiating Misrecognition'. *Compare: A Journal of Comparative and International Education* [online] 50 (7), 943–960. available from <https://doi.org/10.1080/03057925.2020.1763165>

Michie, M. (2013) 'Methodological Pluralism and Narrative Inquiry'. in *Cultural Studies of Science Education* [online] ed. by Tobin, K., Milne, C. and Siry, C. vol. 8. Dordrecht: Springer, 517–520. available from <DOI 10.1007/s11422-013-9524-5>

Mignolo, W. (2013) 'Geopolitics of Sensing and Knowing: On (de)Coloniality, Border Thinking, and Epistemic Disobedience'. *Confero* [online] 1 (1), 129–150. available from <doi: 10.3384/confero.2001- 4562.13v1i1129>

Mignolo, W. (2011a) *The Darker Side of Western Modernity: Global Futures, Decolonial Options*. Durham & London: Duke University Press

Mignolo, W. (2011b) 'Epistemic Disobedience and the Decolonial Option: A Manifesto'. *Transmodernity* 44–66

Mignolo, W.D. (2007a) 'Delinking: The Rhetoric of Modernity, the Logic of Coloniality and the Grammar of de-Coloniality'. *Cultural Studies* 21 (2), 449–514

Mignolo, W.D. (2007b) 'Introduction: Coloniality of Power and de-Colonial Thinking'. *Cultural Studies* 21 (2–3), 155–167

Miles, M.L., Brockman, A.J., and Naphan-Kingery, D.E. (2020) 'Invalidated Identities: The Disconfirming Effects of Racial Microaggressions on Black Doctoral Students in STEM'. *Journal of Research in Science Teaching* 57, 1608–1631

Mishler, E.G. (1995) 'Models of Narrative Analysis: A Typology'. *Journal of Narrative and Life History* 5 (2), 87–123

Mkhize, Z. (2022) 'Is It Transformation or Reform ? The Lived Experiences of African Women Doctoral Students in STEM Disciplines in South African Universities'. *Higher Education* [online] (0123456789). available from <https://doi.org/10.1007/s10734-022-00918-5>

Mlambo, Y.A. (2022) 'Black African Women in Engineering Higher Education in South Africa'. in *Gender Equity in STEM Higher Education: International Perspectives on Policy, Institutional Culture and Individual Choice*. 1st edn. ed. by Ro, H.., Fernandez, F., and Ramon, E.. New York: Routledge, 158–173

Mncayi, P. and Dunga, S.H. (2016) 'Career Choice and Unemployment Length: A Study of Graduates from a South African University'. *Industry and Higher Education* 30 (6), 413–423

Mncayi, P. and Meyer, D.F. (2022) 'Evaluating the Determinants of the Perceptions of Underemployment among Young University Graduates: A South African University Case'. *Cogent Social Sciences* [online] 8 (1), 1–27. available from <https://doi.org/10.1080/23311886.2022.2054126>

Mohanty, C.. (1984) 'Feminist Postcolonial Theory a Reader'. *Under Western Eyes: Feminist Scholarship and Colonial Discourse* 12 (3), 333–385

Monica Mawoyo and Ursula Hoadley (2009) *Social and Academic Integration of Young Women at the University of Cape Town*. Pretoria: Cargenie - South Africa

Morrell, R., Jewkes, R., and Lindegger, G. (2012) 'Hegemonic Masculinity/Masculinities in South Africa: Culture, Power, and Gender Politics'. *Men and Masculinities* 15 (1), 11–30

Morrow, S.L. (2005) 'Quality and Trustworthiness in Qualitative Research in Counseling

Psychology'. *Journal of Counseling Psychology* 52 (2), 250–260

Morrow, W. (2009) *Bounds of Democracy: Epistemological Access in Higher Education*. Pretoria: HSRC Press

Morrow, W. (2007) 'What Is Teachers ' Work?' *Journal of Education* 41, 3–20

Motala, E., Vally, S., and Maharajh, R. (2016) 'Education, the State, and Class Inequality: The Case for Free Higher Education in South Africa'. *Working Paper* (October), 1–18

Motala, S. and Carel, D. (2019) 'Educational Funding and Equity in South African Schools'. in *South African Schooling: The Enigma of Inequality*. ed. by Jansen, J. and Spaull, N. Cham: Springer, 67–86

Mpungose, C.B. (2020) 'Emergent Transition from Face-to-Face to Online Learning in a South African University in the Context of the Coronavirus Pandemic'. *Humanities and Social Sciences Communications* [online] 7 (113), 1–9. available from <http://dx.doi.org/10.1057/s41599-020-00603-x>

Mshweshwe, L. (2020) 'Understanding Domestic Violence: Masculinity, Culture, Traditions'. *Heliyon* [online] 6 (10), 1–5. available from <https://doi.org/10.1016/j.heliyon.2020.e05334>

Msibi, T. (2011) 'The Lies We Have Been Told'. *Africa Today* 58 (1), 55–77

Msila, V. (2019) 'Rethinking Babylon:The Language Dilemma and the Search for Social Justice in Africa'. *English Academy Review* 36 (1), 100–112

MSU (n.d.) *South Africa: Ovrecoming Apartheid and Building Democracy* [online] available from <https://overcomingapartheid.msu.edu/unit.php?kid=163-571-2&page=1> [1 September 2023]

Mtshiselwa, N. (2015) 'Reconstructing a Deuteronomistic Athaliah in the (South) African Context: A Critique of the Patriarchal Perception of Women'. *Verbum et Ecclesia* 36 (1), 1–8

Mucina, D.D. (2011) 'Story as Research Methodology'. *AlterNative: An International Journal of Indigenous Peoples* 7 (1), 1–14

Mutasa, D.. (2015) *Language Policy Implementation in South African Universities Vis-a-Vis the Speakers of Indigenous African Languages' Perception*. [online] 31 (1), 46–59. available from <http://weekly.cnbnews.com/news/article.html?no=124000>

Mutekwe, E. (2015) 'Towards an Africa Philosophy of Education for Indigenous Knowledge Systems in Africa'. *Creative Education* 06 (12), 1294–1305

Mutekwe, E. (2014) 'Manifestations of Differential Cultural Capital in a University Classroom: Views from Classroom Observations and Focus Group Discussions in a South African University'. *Journal of Education and Learning (EduLearn)* 8 (4), 349–362

Mutekwe, E., Modiba, M., and Maphosa, C. (2011) 'Factors Affecting Female Students' Career Choices and Aspirations: A Zimbabwean Example'. *Journal of Social Sciences* 29 (2), 133–141

Myende, P.E. and Maifala, S. (2020) 'Complexities of Leading Rural Schools in South Africa: Learning from Principals' Voices'. *International Journal of Rural Management* 16 (2), 225–253

Naidoo, R. (2004) 'Fields and Institutional Strategy: Bourdieu on the Relationship between Higher Education, Inequality and Society'. *British Journal of Sociology of Education* 25 (4), 457–471

Naidoo, V. and Kongolo, M. (2004) 'Has Affirmative Action Reached South African Women ?' *International Journal of Women's Studies* 6 (1)

Ndlovu-Gatsheni, S.J. (2021) 'Revisiting Marxism and Decolonisation through the Legacy of Samir Amin'. *Review of African Political Economy* 48 (167), 50–65

Ndlovu-Gatsheni, S.J. (2016) 'Decolonizing the University and the Problematic Grammars of Change in South Africa'. in *5th Postgraduate Student Conference on Decolonizing the Humanities and Social Sciences.* held 2016 at Durban. 1–27

Ndlovu-Gatsheni, S.J. (2015) 'Decoloniality as the Future of Africa'. *History Compass* 13 (10), 485–496

Ndlovu-Gatsheni, S.J. (2013) 'The Entrapment of Africa within the Global Colonial Matrices of Power: Eurocentrism, Coloniality, and Deimperialization in the Twenty-First Century'.

Journal of Developing Societies [online] 29 (4), 331–353. available from <doi: 10.1177/0169796X13503195>

Ndlovu, H. (2017) 'Womxn's Bodies Reclaiming the Picket Line: The "Nude" Protest during #FeesMustFall'. *Agenda* 31 (3–4), 68–77

Ndlovu, M. (2017) 'Fees Must Fall: A Nuanced Observation of the University of Cape Town, 2015–2016'. *Agenda* 31 (3–4), 127–137

Nel, N. and Müller, H. (2018) 'The Impact of Teachers' Limited English Proficiency on English Second Language Learners in South African Schools'. *South African Journal of Education* 30 (4), 635–650

Nesthivhumbe, N. and Mudua, A. V (2021) 'Teaching Challenges in the Senior Phase Natural Sciences Classroom in South African Schools: A Case Study Og Vhembe District in the Limpopo Province'. *Journal for the Education of Gifted Young Scientists* 9 (4), 299–315

Ngabaza, S., Shefer, T., and Clowes, L. (2018) 'Students' Narratives on Gender and Sexuality in the Project of Social Justice and Belonging in Higher Education'. *South African Journal of Higher Education* 32 (3), 139–153

Ngoasheng, A. and Gachago, D. (2017) 'Dreaming up a New Grid: Two Lecturers' Reflections on Challenging Traditional Notions of Identity and Privilege in a South African Classroom'. *Education as Change* 21 (2), 187–207

Nicolaides, A. (2015) 'Gender Equity, Ethics and Feminism: Assumptions of an African Ubuntu Oriented Society'. *Journal of Social Sciences* 42 (3), 191–210

Nkosi, Z.P. (2014) 'Postgraduate Students' Experiences and Attitudes towards IsiZulu as a Medium of Instruction at the University of KwaZulu-Natal'. *Current Issues in Language Planning* [online] 15 (3), 245–264. available from <http://dx.doi.org/10.1080/14664208.2014.915456>

Okeke, I.N., Babalola, C.P., Byarugaba, D.K., Djimde, A., and Osoniyi, O.R. (2017) 'Broadening Participation in the Sciences within and from Africa: Purpose, Challenges, and Prospects'. *CBE Life Sciences Education* 16 (2), 1–9

Omodan, B.I. (2022) 'Challenges of Pre-Service Teachers in Rural Places of Teaching

Practice : A Decolonial Perspectives'. *International Journal of Learning, Teaching and Educational Research* 21 (3), 127–142

Ong, M., Smith, J.M., and Ko, L.T. (2018) 'Counterspaces for Women of Color in STEM Higher Education: Marginal and Central Spaces for Persistence and Success'. *Journal of Research in Science Teaching* 55 (2), 206–245

Ortega, M. (2020) *In-Between: Latina Feminist Phenomenology, Multiplicity, and the Self*. Albany: State University of New York Press

Ortega, M. (2006) 'Being Lovingly, Knowingly Ignorant: White Feminism and Women of Color'. *Hypatia: A Journal of Feminist Philosophy* 21 (3), 56–74

Orton, B. (2016) 'Gender Security/Sexuality in South Africa: "I Am HIV-Positive. How Could You Do This to Me?"' in *Gender and Race Matter: Global Perspectives on Being a Woman: Advances in Gender Research* [online] vol. 21. Emarald Group Publishing Limited, 127–147. available from <https://doi.org/10.1108/S1529-212620160000021008>

Oyedemi, T. (2020) '(De)Coloniality and South African Academe'. *Critical Studies in Education* [online] 61 (4), 399–415. available from <https://doi.org/10.1080/17508487.2018.1481123>

Oyewumi, O. (2002) 'Conceptualizing Gender: The Eurocentric Foundations of Feminist Concepts and the Challege of African Epistemologies'. *Jenda: A Journal of Culture and African Women Studies* 2 (3), 1–9

Pather, S. and Chetty, R. (2015) 'The Habitus and Social Capital of First-Year Students: A Case Study'. *Alternation Special Edition* 17, 54–76

Phillipson, R. (1997) 'Realities and Myths of Linguistic Imperialism'. *Journal of Multilingual and Multicultural Development* 18 (3), 238–248

Pienaar, R. and McKay, T.M. (2014) 'Mapping Socio-Economic Status, Geographical Location and Matriculation Pass Rates in Gauteng, South Africa'. *Perspectives in Education* 32 (1), 105–123

Piketty, T. (2014) *Capitalism in the 21st Century*. Massachusetts: Harvard Universuty Press

du Plessis, P. (2014) 'Problems and Complexities in Rural Schools : Challenges of Education and Social Development'. *Mediterranean Journal of Social Sciences* 5 (20), 1109–1117

du Plessis, P. and Mestry, R. (2019) 'Teachers for Rural Schools – A Challenge for South Africa'. *South African Journal of Education* 39 (September), 1–9

Polkinghorne, D.E. (1995) 'Narrative Configuration in Qualitative Analysis'. *International Journal of Qualitative Studies in Education* 8 (1), 5–23

Potgieter, A.P. (2016) 'Lexical and Grammatical Development in Trilingual Speakers of IsiXhosa, English and Afrikaans'. *Journal of Communication* 63 (2), 1–11

Du Preez, P., Simmonds, S., and Chetty, D. (2017) *Critical Transformation in Higher Education: Ethical Reflections on #Mustfall Movements and Concomitant Gender-Based Violence*. 31 (6), 96–112

Pretorius, E.J. and Spaull, N. (2016) 'Exploring Relationships between Oral Reading Fluency and Reading Comprehension amongst English Second Language Readers in South Africa'. *Reading and Writing* 29 (7)

Price, J.M. (2019) 'Travel to Death-Worlds'. in *Speaking Face to Face: The Visionary Philosophy of Maria Lugones*. ed. by P.J. DiPietro, J. McWeeny, S.R. Albany: State University of New York Press, 217–236

Prinsloo, C.H., Rogers, S.C., and Harvey, J.C. (2018) 'The Impact of Language Factors on Learner Achievement in Science'. *South African Journal of Education* 38 (1), 1–14

Prinsloo, P. (2012) 'Being an African: Some Queer Remarks from the Margins'. in *From Conflict to Recognition: Moving Multiculturalism Forward*. ed. by Kearney, M. London: BRILL, 139–158

Quijano, A. (2007) 'Coloniality and Modernity/Rationality'. *Cultural Studies* [online] 21, 168–178. available from <10.1080/09502380601164353>

Quijano, A. (2000) 'Coloniality of Power, Eurocentrism, and Latin America (English Translation)'. *Nepantla: Views from South* 1 (3), 533–580

Ramose, M. (2020) 'On Finding the Cinerarium for Uncremated Ubuntu: On the Street Wisdom of Philosophy'. in *Knowledges Born in the Struggle: Constructing the*

Epistemologies of the Global South. ed. by B. Santos & M.P. Menses. New York: Routledge, 58–77

Riessman, C.K. (2005) 'Narrative, Memory & Everyday Life'. in *Narrative, Memory & Everyday Life* [online] Huddersfield: University of Huddersfield, 1–7. available from <http://eprints.hud.ac.uk/id/eprint/4920/2/Chapter_1_-_Catherine_Kohler_Riessman.pdf&embedded=true>

Riessman, C.K. (2001) 'ANALYSIS OF PERSONAL NARRATIVES'. in *Handbook of Interviewing*. ed. by Gubrium, J. F., Holstein, J.A. Sage Publication

Roberts, J.S. (2021) 'Power in Pedagogy: Legacies of Apartheid in a South African School'. *Whiteness and Education* [online] 6 (2), 130–146. available from <https://doi.org/10.1080/23793406.2021.1917305>

Romm, N.R.A. (2015) 'Reviewing the Transformative Paradigm: A Critical Systemic and Relational (Indigenous) Lens'. *Systemic Practice and Action Research* [online] 28 (5), 411–427. available from <http://dx.doi.org/10.1007/s11213-015-9344-5>

Rose, G. (1997) 'Situating Knowledges: Positionality, Reflexivities and Other Tactics'. *Progress in Human Geography* 21 (3), 305–320

Runyan, A.S. (2018) 'Decolonizing Knowledges in Feminist World Politics'. *International Feminist Journal of Politics* 20 (1), 3–8

Sanchez, M.E., Hypolite, L.I., Newman, C.B., and Cole, D.G. (2019) 'Black Women in STEM: The Need for Intersectional Supports in Professional Conference Spaces'. *Journal of Negro Education* 88 (3), 297–310

Santos, B. (2020a) 'Decolonizing the University'. in *Knowledges Born in the Struggle: Constructing the Epistemologies of the Global South*. ed. by B. Santos & M P. Menses. New York: Routledge, 219–240

Santos, B. (2020b) 'Towards an Aesthetics of the Epistemologies of the South: Manifesto in Twenty-Two Theses'. in *Knowledges Born in the Struggle: Constructing the Epistemologies of the Global South*. 1st edn. ed. by B. Santos & M.P. Menses. New York: Routledge, 117–125

Santos, B. (2018) *The End of the Cognitive Empire: The Coming of Age of Epistemologies of the South*. Croydon: Duke University Press

Santos, B. (2017) *Decolonising The University: The Challenge of Deep Cognitive Justice*. Cambridge: Cambridge Scholars

Santos, B. (2012) 'Public Sphere and Epistemologies of the South'. *Africa Development* 37 (1), 43–67

Santos, B. (2009) 'A Non-Occidentalist West?: Learned Ignorance and Ecology of Knowledge'. *Theory, Culture & Society* 26 (8), 103–125

Santos, B. (2008) *Another Knowledge Is Possible: Beyond Northern Epistemologies*. ed. by Santos, B. de S. New York: Verso

Santos, B. (2007a) 'Beyond Abyssal Thinking: From Global Lines to Ecologies of Knowledges'. *Review* XXX (1), 45–89

Santos, B. (2007b) 'A Discourse on the Sciences'. in *Cognitive Justice in a Global World : Prudent Knowledges for a Decent Life*. ed. by Santos, B. de S. Lanham: Lexington Books, 462

Schutnab-Kangas, T. and R.P. (1988) 'Language in Human Rights'. *Gazette Vol* 60 (1), 27–67

Seabi, J., Seedat, J., Khoza-Shangase, K., and Sullivan, L. (2014) 'Experiences of University Students Regarding Transformation in South Africa'. *International Journal of Educational Management* 28 (1), 66–81

Segalo, P. (2022) 'Stitching Narratives of Gender-Based Violence: Meaning-Making through Embroidery'. *Journal of International Women's Studies* 24 (4), 1–14

Segalo, P. (2018) 'Women Speaking through Embroidery: Using Visual Methods and Poetry to Narrate Lived Experiences'. *Qualitative Research in Psychology* [online] 15 (2–3), 298–304. available from <https://doi.org/10.1080/14780887.2018.1430013>

Segalo, P. (2015) 'Gender, Social Cohesion and Everyday Struggles in South Africa'. *Psychology in Society* (49), 70–82

Segalo, P. and Fine, M. (2020) 'Underlying Conditions of Gender-Based Violence—Decolonial

Feminism Meets Epistemic Ignorance: Critical Transnational Conversations'. *Social and Personality Psychology Compass* 14, 1–10

Seidman, I. (2006) *Interviewing as Qualitative Research* [online] 3rd edn. vol. 58. New York: Teachers College Press. available from <https://linkinghub.elsevier.com/retrieve/pii/0022285261903472%0Ahttp://arxiv.org/abs/1011.1669%0Ahttp://dx.doi.org/10.1088/1751-8113/44/8/085201%0Ahttp://www.ncbi.nlm.nih.gov/pubmed/25246403%0Ahttp://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=PMC4>

Sendze, M.S. (2023) 'I Can't Quit: Experiences of Black Women in STEM Professions'. *Journal of Career Assessment* 31 (2), 377–396

Shefer, T. (2016) 'Resisting the Binarism of Victim and Agent: Critical Reflections on 20 Years of Scholarship on Young Women and Heterosexual Practices in South African Contexts'. *Global Public Health* 11 (1–2), 211–223

Shefer, T., Clowes, L., and Ngabaza, S. (2020) 'Student Expereince: A Participatory Parity Lens on Social (in)Justice in Higher Education'. in *Nancy Fraser and Participatory Parity: Reframing Social Justice in South African Higher Education*. 1st edn. ed. by Bozalek, V., Hölscher, D., and Zembylas, M. Oxon: Routledge, 61–76

Shefer, T., Clowes, L., and Vergnani, T. (2012) 'Narratives of Transactional Sex on a University Campus'. *Culture, Health and Sexuality: An International Journal for Research* 14 (4), 435–447

Shepherd, N. (2018) 'Decolonial Thinking & Practice'. *ECHOES: European Colonial Heritage Modalities in Entangled Cities* [online] 1–13. available from <https://keywordsechoes.com/decolonial-thinking-and-practice>

Shikalepo, E.E. (2020) 'Challenges Facing Learning at Rural Schools : A Review of Related Literature'. *International Journal of Research and Innovation in Social Science* IV (III), 128–132

Sim, J. and Waterfield, J. (2019) 'Focus Group Methodology: Some Ethical Challenges'. *Quality and Quantity* [online] 53 (6), 3003–3022. available from <https://doi.org/10.1007/s11135-019-00914-5>

Singh, R., Zhang, Y., Wan, M. (Maggie), and Fouad, N.A. (2018) 'Why Do Women Engineers Leave the Engineering Profession? The Roles of Work–Family Conflict, Occupational Commitment, and Perceived Organizational Support'. *Human Resource Management* 57, 901–914

Skeggs, B. (2019) 'The Forces That Shape Us: The Entangled Vine of Gender, Race and Class'. *The Sociological Review* 67 (1), 28–35

Small, S. (2012) 'Slavery, Colonialism and Their Legacy in the Eurocentric University. The Case of Britain and the Netherlands'. *Human Architecture: Journal of the Sociology of Self-Knowledge* 10 (1), 69–80

Smith, B. (2017) 'Narrative Inquiry and Autoethnography'. in *Routledge Handbook of Physical Cultural Studies*. ed. by Silk, M, Andrews, D, Thorpe, H. London: Routledge, 505–514

Smith, L. (2012) *Decolonizing Methodologies: Research and Indigenous People*. London: Zed Books

Smythe, W.E. and Murray, M.J. (2000) 'Owning the Story : Ethical Considerations in Narrative Research'. *Ethics & Behavior* [online] 10 (4), 311–336. available from <doi: 10.1207/ S15327019EB1004_1%0ATo>

Sobuwa, S. and McKenna, S. (2019) 'The Obstinate Notion That Higher Education Is a Meritocracy'. *Critical Studies in Teaching and Learning* 7 (2), 1–15

Spaull, N. (2016) 'Disentangling the Language Effect in South African Schools: Measuring the Impact of "Language of Assessment" in Grade 3 Literacy and Numeracy'. *South African Journal of Childhood Education* 6 (1), 1–20

Spaull, N. (2013a) 'Poverty & Privilege: Primary School Inequality in South Africa'. *International Journal of Educational Development* 33 (5), 436–447

Spaull, N. (2013b) *South Africa's Education Crises: The Quality of Education in South Africa 1994-2011*.

Spaull, Nicholas (2019) 'Equity: A Price Too High to Pay'. in *South African Schooling: The Enigma of Inequality*. ed. by Jansen, J. and Spaull, N. Cham: Springer, 1–24

Spivak, G.C. (2010) 'Can the Subaltern Speak? Revised Edition, from the "History" Chapter of Critique of Postcolonial Reason'. in *Reflections on the History of an Idea*. ed. by Morris, R.. New York: Columbia University Press, 21–78

Squire, C., Andrews, M., and Tamboukou, M. (2014) *What Is Narrative Research?* [online] available from <https://repository.uel.ac.uk/download/d2ff448fd8d1d9b9322e5328470a7d8c31ead9cd3455215479761658b52c475f/249740/2013_Doing_narrative_research-intro.pdf> [10 August 2020]

Statistics South Africa (2022) *Mbalo Brief: The Missing Piece of the Puzzle* [online] Pretoria. available from <https://www.statssa.gov.za/wp-content/uploads/2022/08/MbalobriefAug2022.pdf>

Swartz, S., Mahali, A., Arogundade, E., Khalema, E., Rule, C., Cooper, A., Stanley, M., and Naidoo, P. (2017) *Ready or Not! Race, Education and Emancipation: A Five-Year Longitudinal, Qualitative Study of Agency and Impasses to Success amongst Higher Education Students in a Sample of South African Universities.* Pretoria

Swartz, S., Mahali, A., Moletsane, R., Arogundade, E., Khalema, E.N., Cooper, A., and Groenewald, C. (2018) *Studying While Black: Race, Education and Emanicipation in South Afrcan Universities*. Cape Town: HSRX Press

Teeger, C. (2015) 'Ruptures in the Rainbow Nation: How Desegregated South African Schools Deal with Interpersonal and Structural Racism'. *Sociology of Education* 88 (3), 226–243

The Strugle for Recognition: The Moral Grammer of Social Conflicts (n.d.)

Timmis, S., Mgqwashu, E.M., Naidoo, K., Muhuro, P., Trahar, S., Lucas, L., Wisker, G., and de Wet, T. (2019) 'Encounters with Coloniality Students' Experiences of Transitions from Rural Contexts into Higher Education in South Africa'. *Critical Studies in Teaching and Learning* 7 (Special Issue), 76–101

Timmis, S. and Muhuro, P. (2019) 'De-Coding or de-Colonising the Technocratic University ? Rural Students ' Digital Transitions to South African Higher Education'. *Learning, Media and Technology* [online] 44 (3), 252–266. available from

<https://doi.org/10.1080/17439884.2019.1623250>

Timmis, S., De Wet, T., Naidoo, K., Trahar, S., Lucas, L., Mqgwashu, E., Muhuro, P., and Wisker, G. (2022) *Rural Transition to Higher Education in South Africa: Decolonial Perspectives*. Oxon: Routledge

Tlostanova, M. (2010) 'Between Third World/Women of Color Feminism and Decolonial Feminism'. in *Gender Epistemologies and Eurasian Borderlands* [online] New York: Palgrave Macmillan, 3–18. available from <https://doi.org/10.1057/9780230113923>

Tlostanova, M. V. and Mignolo, W.D. (2012) 'Learning to Unlearn: Decolonial Reflections from Eurasia and the Americas'. *Learning to Unlearn Decolonial Reflections from Eurasia and the Americas* [online] (April), 281. available from <https://kb.osu.edu/handle/1811/51920>

Tove Skutnabb-Kangas (2000) *Linguistic Genocide in Education - or Worlwide Diversity and Human Rights?* New York: Routedge

Tuwe, K. (2016) 'The African Oral Tradition Paradigm of Storytelling as a Methodological Framework: Employment Experiences for African Communities in New Zealand'. in *21st Century Tensions and Transformation in Africa,* [online] held 2016 at Auckland. African Studies Association of Austalasia and Pacific. available from <https://www.ecald.com/assets/Resources/Tuwe-African-Storytelling-Research-Method.pdf>

Velez, E.D. (2019) 'Decolonial Feminism at the Intersection: A Critical Reflection on the Relationship between Decolonial Feminism and Intersectionality'. *Journal of Speculative Philosophy* 33 (3), 390–406

Venkat, H. and Spaull, N. (2015) 'What Do We Know about Primary Teachers' Mathematical Content Knowledge in South Africa? An Analysis of SACMEQ 2007'. *International Journal of Educational Development* [online] 41, 121–130. available from <http://dx.doi.org/10.1016/j.ijedudev.2015.02.002>

Venter, E. (2004) 'The Notion of Ubuntu and Communalism in African Educational Discourse'. *Studies in Philosophy and Education* 23, 149–160

Vergès, F. (2021) *A Decolonial Feminism*. Northampton: Pluto Press

Vincent, J., Rowe, H., and Johnson, J. (2021) 'Parity of Participation for Autistic Students: Mapping Provision across UK Higher Education Institutions'. *Research in Education* 0 (0), 1–19

Vincent, L. and Hlatshwayo, M. (2018) 'Ties That Bind: The Ambiguous Role Played by Social Capital in Black Working Class First-Generation South African Students' Negotiation of University Life'. *South African Journal of Higher Education* 32 (3), 118–138

Visvanathan, S. (2006) 'Alternative Science'. *Theory, Culture & Society* 23 (3), 164–169

Visvanthan, S. (2021) *Dialogues of Difference: The Search for Cognitive Justice* [online] available from <https://www.acu.ac.uk/the-acu-review/the-search-for-cognitive-justice/> [23 July 2021]

Visvanthan, S. (2005) 'Knowledge, Justice and Democracy'. in *Science and Citizens: Globalization and the Challenge of Engagment*. ed. by Leach, M., Scoones, I., and Wynne, B. London: Zed Books

Wa Thiongo, N. (1986) *Decolonising the Mind: The Politics of Language in African Literature*. Nairobi: East African Educational Publishers

Waghid, Z. and Hibbert, L. (2018a) 'Advancing Border Thinking through Defamiliarisation in Uncovering the Darker Side of Coloniality and Modernity in South African Higher Education'. *South African Journal of Higher Education* 32 (4), 263–283

Waghid, Z. and Hibbert, L. (2018b) 'Advancing Border Thinking through Defamiliarisation in Uncovering the Darker Side of Coloniality and Modernity in South African Higher Education'. *South African Journal of Higher Education* 32 (4)

Walby, S. (1989) 'Theorising'. *Sociology* 23 (2), 213–234

Walker, M. (2019) 'The Achievement of University Access: Conversion Factors, Capabilities and Choices'. *Social Inclusion* 7 (1), 52–60

Walker, M. (2018a) *A Multi-Dimesional Approach to Fair Access*. ed. by Paul Ashwin and Jennifer Case. Cape Town: African Minds

Walker, M. (2018b) 'Aspirations and Equality in Higher Education: Gender in a South African University'. *Cambridge Journal of Education* [online] 48 (1), 123–139. available from <http://dx.doi.org/10.1080/0305764X.2016.1254159>

West, J. and Meier, C. (2020) 'Overcrowded Classrooms – The Achilles Heel of South African Education?' *South African Journal of Childhood Education* 10 (1), 1–10

Wilkins-Yel, K.G., Hyman, J., and Zounlome, N.O.O. (2019) 'Linking Intersectional Invisibility and Hypervisibility to Experiences of Microaggressions among Graduate Women of Color in STEM'. *Journal of Vocational Behavior* [online] 113, 51–61. available from <https://doi.org/10.1016/j.jvb.2018.10.018>

Wood, H.J. (2019) 'Gender Inequality: The Problem of Harmful, Patriarchal, Traditional and Cultural Gender Practices in the Church'. *Theological Studies* 75 (1), 1–8

Wynter, S. and McKittrick, K. (2015) 'Unparalleled Catasrophe for Our Species? Or, to Give Humanness a Different Future: A Conversation'. in *Sylvia Wynter: On Being Human as Praxis*. ed. by K. McKittrick. New York: Duke University Press, 9–89

Xaba, W. (2017) 'Challenging Fanon: A Black Radical Feminist Perspective on Violence and the Fees Must Fall Movement'. *Agenda* 31 (3–4), 96–104

Yosso, Burciaga, R. (2016) *Reclaiming Our Histories, Recovering Community Cultural Wealth The Question Posed in Tara*. Los Angeles

Yosso, T.J. (2005) 'Whose Culture Has Capital? A Critical Race Theory Discussion of Community Cultural Wealth'. *Race Ethnicity and Education* 8 (1), 69–91

Young, C. and Campbell, M. (2014) 'Student Wellbeing at a University in Post-Apartheid South Africa: A Comparison with a British University Sample Using the GP-CORE Measure'. *British Journal of Guidance and Counselling* 42 (4), 359–371

Yuval-Davis, N. (2015) 'Situated Intersectionality and Social Inequality'. *Raisons Politiques* 58 (2), 91–100

Yuval-Davis, N. (2006) 'Intersectionality and Feminist Politics'. *European Journal of Women's Studies* 13 (3), 193–209

Zurn, C.F. (2003) 'Arguing over Participatory Parity on Nancy Fraser's Conception of Social

Justice'. in *SPEP Scholars Session*. (5/29/13). 1–31

Zuze, T.L. (2020) *RESEP Policy Brief*. Cape Town

van Zyl-Schalekamp, C. and Mthombeni, P. (2017) 'Social-Background Factors Affecting the Academic Success of First Year Sociology Students at The University of Johannesburg, South Africa'. *Journal of Sociology and Social Anthropology* 6 (1), 1–14

van Zyl, A. (2016) 'The Contours of Inequality: The Links between Socio-Economic Status of Students and Other Variables at the University of Johannesburg'. *Journal of Student Affairs in Africa* 4 (1), 1–14

Appendices
Appendix A

INFORMED CONSENT FORM

Study title: 'The wholistic experiences of knowing as Black South African women at university: The untold stories from the margins in STEM'.

You are invited to take part in this research study for the purpose of collecting data on 'A case study of agency, resources and knowing as African women at a South African university: The untold stories from the margins in STEM'.

Before you decide to take part, please **read the accompanying Participant Information Sheet.**

Please do not hesitate to ask questions if anything is unclear or if you would like more information about any aspect of this research. It is important that you feel able to take the necessary time to decide whether or not you wish to take part.

If you are happy to participate, please confirm your consent by circling YES against each of the below statements and then signing and dating the form as participant.

1	I confirm that I have read and understood both the Participation Information Sheet, as well as the Focus Group and Visual Narrative Workshop Information Sheet. In addition, the researcher has also explained important information, as I had the opportunity to ask clarity seeking questions. I also do understand that I am taking part in a longitudinal study and I am fully aware of the time commitments, as a result.	YES	NO
2	I may withdraw at any stage of the study and request that all my data be disposed of, besides for the focus groups and the Visual Narrative Workshop.	YES	NO
3	I understand that given the collective nature of focus groups and visual narrative workshops, the risks associated with it, and that I may be unable to withdraw my data, during or after the focus group. I am happy with this and am pleased to have my data used in collaboration with that of my fellow participants.	YES	NO

4	I understand that all the information I provide will be held securely and treated confidentially and that people, places and events affiliated to myself will be pseudonymised as an additional measure to ensure my anonymity.	YES	NO
5	I understand that I am not to discuss anything pertaining to this research with a third party or to expose any of the participants during or after the focus group.	YES	NO
6	I am happy for the information I provide to be used (anonymously), including picture of the visual representations in the PhD thesis, academic papers and other formal research outputs.	YES	NO
7	I agree to take part in the above study.	YES	NO

Participant's Statement:

I _____ agree that the research project named above has been explained to me to my satisfaction and I agree to take part in the study. I have read both the notes written above and the Information Sheets about the project and understand what the research study involves.
Signed Date

Investigator's Statement:

I _____ Confirm that I have carefully explained the nature, demands and any foreseeable risks (where applicable) of the proposed research to the participant.
Signed Date

Appendix B

**Research Centre
Global Learning:
Education and Attainment** | **Coventry University**

Participant Information Sheet

YOU WILL BE GIVEN A COPY OF THIS INFORMATION SHEET

Study title: 'The wholistic experiences of knowing as Black South African women at university: The untold stories from the margins in STEM'

You are being invited to take part in the above study, which is part of my PhD. Before you decide whether or not to take part, please read the following information.

This study is funded by the Leverhulme Trust and supported by the Centre for Global Learning: Coventry University.

What is the purpose of the study?

I am interested in gaining an in-depth understanding of the wholistic experiences of Black women who are studying Science, Technology, Engineering and Maths (STEM) subjects at University in South Africa.

Why have I been invited to participate?

You have been invited to take part in this study because you identify as aBlack female scholar. You are either an undergraduate or postgraduate STEM scholar and are currently studying at a South African university, or you have graduated and are now in employment. You have expressed a willingness to participate in this research project at any stage of your STEM journey. This will involve participating in three main research sessions, each of which should last between 60-90 minutes.

What will happen if I choose to participate?

You will be asked to take part in a number of research sessions, namely interviews, focus groups (Mbizi), as well as a visual research workshop. The research sessions and activities will take place in three periods of time over the course of one academic year. To be involved in the research, I would ask that you commit to taking part in each aspect of the research over the course of the year. The research sessions (interviews, workshops and focus groups) are expected to last between 60-90 minutes. Questions will focus on your views and experiences relating to your identity and your African knowledge. In particular, we will talk about how you view yourself as a Black women in STEM, how

you use your agency and resources to succeed in STEM and what bearing, if any, does this have on your awareness as an African woman in an underrepresented field (study and work).

Is participation compulsory?

Participation is voluntary, you do not have to take part. If you choose to take part you will be asked to give written consent by signing a simple information and consent sheet as part of the study. You are also able to withdraw from the study at any stage and request that your information be destroyed. However, due to the collective nature of focus group discussions, including the visual workshop, you are unable to have your data withdrawn during or after these sessions, since your data will be integrated with that of other participants in the final write up, but your identity will remain confidential and any information used in the thesis will be anonymised.

What Covid-19 mitigation strategies have been put in place to ensure my safety?

All Covid-19 guidance measures pertaining to the South African Department of Health and the University of Johannesburg will be strictly adhered to. For all face-to-face interaction, the official health and safety guidelines current at the time of the research session, such as the wearing of face covering, the requirement for safe social distancing and hand sanitisation will be adhered to throughout. The researcher will provide masks and hand sanitisation at the start of each session, and ensure that all participants are in compliance with the guidelines such as the two-metre social distancing rule throughout our interaction. Furthermore, all face-to-face encounters will take place outdoors.

Are there any potential benefits to taking part?

You will be able to share your expertise and knowledge in the interest of improving the experiences of all women in underrepresented fields, such as STEM. This suggests that your stories may act as a vehicle to bring awareness and shape public perception and opinion in the interest of Black women in STEM, both locally and internationally. In addition, you will be assisting in giving voice to Black women in STEM, to shed light on pertinent issues in the interest of social justice and change. This research may also support other transformative benefits on a personal level, in the sense that it may be useful for you to think about and talk through your own challenges and opportunities currently experienced as a minority female in STEM. In a small way towards acknowledging your time and expertise, I will provide you with a £25 (R500) book voucher (funded through the Leverhulme Trust) at the end of the study as a gesture of good will for taking part. All refreshments and travelling costs will also be provided.

What will happen during the Mbizi (focus group)?

Each focus group will consist of approximately 2-6 participants and it will take roughly between 60 and 90 minutes. Together we will discuss various issues such as the unique experiences of Black women in STEM and whether they use their agency and resources to draw on African experiences, philosophies and viewpoints in STEM. The researcher, Zaira Solomons, will lead the discussion and will guide you through the various issues that will be explored together. There are no right or wrong answers in a discussion of this kind – I am simply interested in your views and opinions. You can expect the group will consist of approximately 2-6 participants The focus groups will be arranged at a convenient time for all concerned. I am happy to run them during the day or early evening, depending on people's preferences.

What will happen during the Visual Narrative Workshop?

Similar to the focus group, the Visual Narrative workshop requires all members, including the researcher, to come together and produce something creatively visual, for example a drawing, painting, or artefact. The reason for producing a creative piece of work is to allow you the opportunity to express your views, experiences and perceptions creatively. The workshop will take between 60-90 minutes and all supplies and equipment will be provided by the researcher. You are also free to bring your own equipment (paints, pencils, sheets etc.) if you wish but this is not necessary. Once everyone has had a chance to craft out their own visual narrative or story, the researcher will invite each participant to discuss their respective visuals, including the choice for each and its underlying meaning.

What will happen to the results?

The focus groups will be recorded and analysed accordingly, which will further help inform subsequent one-on-one interviews. In addition, the recordings will also help the researcher to see common threads in what participants are saying as individuals as well as a collective. I will take a photograph of each drawing or artefact, which may be included in my thesis or any publications that might arise from this project. The analysis will be written up as part of my PhD thesis and may even be used for peer review publications and conference proceedings. All recordings will be securely stored on an encrypted hard drive. Photographs taken during the course of the study will be securely retained on encrypted hard drive devices (Coventry University approved) and stored in a safe place at the Centre for Global Learning Education and Attainment, Coventry University.

What about data protection, confidentiality and the risks associated with focus groups?

Any data you provide will be treated in accordance with the General Data Protection Regulation 2016 (GDPR). The research sessions will be recorded and transcribed. However, you will not be identified in the recordings or any visual material. You can choose a pseudonym for yourself at the start of each session and you will be referred to accordingly during the session, if you wish. The researcher or members of her supervisory team will not tell anyone that you have taken part in the focus group, although there is of course a possibility that another participant in the group might recognise you. To mitigate against compromising your anonymity and confidentiality, all participants will be requested at the beginning of each session to refrain from discussing details of the study with any third party. Moreover, participants are also expected to sign a declaration as part of the consent form to not expose anyone who takes part in the study.

You will not be named in my thesis or any subsequent publications. All participants will be asked at the beginning to respect the confidentiality of their fellow participants. Your data will be securely archived on an encrypted device after my project has come to an end and it will be held confidentially, with access restricted to myself and my doctoral supervisors. Your electronic data will be stored on a password-protected computer file in the Centre for Global Learning: Coventry University. All paper records will be stored in a locked filing cabinet in GLEA. Your consented information will be kept separately from your responses in order to minimise risk in the event of a data breach. All collected data will be destroyed on or before 31/12/2026.

Lawful basis for processing your personal data

Under GDPR we must have a lawful basis to process your personal data and in this regard we rely on that of public task, i.e. the processing is necessary for the performance of a task carried out in the public interest, in this case scientific research.

What will happen if I wish to withdraw?

If you decide to change your mind and withdraw from the study after you have given your consent to participate then you simply need to inform the researcher (Zaira Solomons, Email solomo19@uni.coventry.ac.uk or Cell: +44 (0) 7375086885) and your name will be removed from the list. However, once both focus group discussions and the visual workshop have commenced, it will be impossible for you to withdraw your data because your data will become embedded in the entire group discussion. However, your information will always remain anonymous. You will be notified beforehand of the collective nature of focus groups and why it would impossible to withdraw any data once focus groups and the visual workshop have commenced.

What is expected from me, should I wish to take part?

Should you wish to take part, I would like you to read this General Information Sheet provided here and to ask questions that you are uncertain about. I will answer all your questions to make sure that you understand the nature of this research and its intended purpose. I will go through the form once again with all participants prior to the focus group and I will also make it a point to explain the appropriate codes of conduct pertaining to focus groups. This code of conduct means that we ask that participants show respect towards the opinions of other members and agree that whatever will be discussed remains in the focus group. This is to ensure that everyone knows the expectations and that no member should feel that their rights have been infringed upon. Once you have a clear understanding of what to expect, it is only then that you will be requested to sign an informed consent form.

International Data Transfers

Your data will be stored and processed in the Centre for Global Learning, Coventry University, United Kingdom.

Data Protection Rights

Coventry University is a Data Controller for the information you provide. You have the right to access information held about you. Your right of access can be exercised in accordance with the General Data Protection Regulation thereafter. You also have other rights including rights of correction, erasure, objection, and data portability. For more details, including the right to lodge a complaint with the Information Commissioner's Office, please visit www.ico.org.uk. Questions, comments and requests about your personal data can also be sent to the University Data Protection Officer - enquiry.igu@coventry.ac.uk

Who has reviewed the study?

This study has been reviewed by my Director of Studies, Professor Suzanne Clisby, through the formal university ethical approval process. Please send any queries or concerns to Professor Clisby at - Suzanne.Clisby@coventry.ac.uk

If you require any further information about the study, please get in touch via the e-mail address below.

Thank you for taking the time to read this information sheet.

Name: Zaira Solomons

Email: solomo19@uni.coventry.ac.uk

Appendix C

Iteration 1 – Open Ended Interview Schedule

60-90 minutes

<u>Orientation and Introduction</u>

<u>Establishing Rapport and Introducing myself and my research</u>

I will start by introducing myself to my co-researchers. I take advantage of this opportunity to get to know my co-researchers and for them to ask me any questions in relation to myself and my Ph.D. study. I brief my co-researchers and inform them of their rights. I obtain consent and provide them with Participants Information Sheets (PIS). Moreover, I highlight that data collection will extend over 10 months, underpinned by various iterations and strategies in an attempt to gather an in-depth understanding of the Black female students' lived experiences in STEM.

1. Tell me more about yourself. (Probe, tell me more about that, etc.)

2. What was your upbringings like? (Probe, tell me more about that, how did that make you feel? etc.)

3. Where did you grow up and what school did you attend? (Probe, what was that like, do you remember any significant events, teachers, etc.)

4. What was your experiences of growing up as Black woman wanting to pursue STEM? (Probe, do you think it was good or bad? How did it make you feel? etc.)

5. Who and what motivated you to pursue STEM? (Probe, who did you look upto, where did you find your inspiration from? etc.)

6. What was your schooling experiences like? (Probe, tell me more about that? Did you conduct experiments, did you have labs? etc.)

7. Is there anything else you would like to tell me?

Appendix D

Orientation and Introduction

Setting the scene: Interviews will be conducted on an individual one to one basis in a place of the co-researcher's choosing (ideally in person but online if necessary or preferred), but it should be somewhere quiet and a 'safe space' for them where they can talk without other people being able to overhear what they say as the interviews must remain confidential. I will start by introducing myself and my study once again to my participants. I take advantage of this opportunity to inform my co-researchers more about what a one-one-one interview entails, that I hope to gain a deeper and richer understanding of Black women in STEM and what such experiences may mean to them, including the fact that their stories are important, particularly as a means to provoke change where change is deemed necessary. I also remind my co-researchers that there is no correct or incorrect answer, and that all their opinions are important for this type of research, including the fact that I may have to follow-up with them to clarify issues should the need arise. Moreover, I highlight that data collection will extend over an entire academic year, underpinned by various iterations and strategies in an attempt to gather an in-depth understanding of the Black female students' lived experiences in STEM. In addition, I allow for clarity seeking questions and address such in return.

Interview Schedule

Interview Questions	Relevant Literature
Part 1) Black Female Experiences in STEM	
1.1 What does it mean to be a Black woman in STEM? (Probe: why, how, elaborate, explain more, how does your racialised, classed and gendered identities position you in the STEM terrain, how do you relate to white and female or Black middle-class peers? How did you apply to university? Etc).	Liccardo 2018, McPherson 2012, Anzaludua 1999, Yuval – Davis 2006, 2011, Crenshaw, 1989, 1991, Mills 2007, Tuana 2004, Lugones 2004, Mama 1995, Skeggs, Wilson 2016, Sanchez et al. 2019, etc.
1.2 Please share your thoughts on your institution in relation to you as a Black woman in STEM. (Probe: good or bad, enabler or hindrance or both, do you feel supported or valued? Why? what do you think should improve? Language and Exclusion? Please walk me through your schooling up until now etc.)	Liccardo and Bradbury 2017, Segalo 2016, Chisholm 2011, Fine 2018, Jansen 2019, Leibowitz 2017, Bhambra 2018 2018, McGee and Bentley 2017, Okeke et al. 2017, Mlambo 2017, Mamdani 2019, Hoadley and Galant 2019, Sanchez et al. 2019, Mbembe 2019, Black, Spreen and Vally 2020, etc.
Part 2) Agency and resources	
2.1 What would you say has been an obstacle to your successes as an African woman in STEM? (Probe: inferiority complex, imposter syndrome, lack of epistemic access, lack of preparedness, male-dominated confines, bullying, harassment, anything else, etc.)	Carlone 2007, McPherson 2012, Bryant 2019, Howard 2016, Clisby and Holdsworth 2016, Collins, Joseph and Ford 2019, Bloodhart et al. 2020, Miller 2017, Mlambo 2017, McGee and Bentley 2017, Foaud et al. 2017 etc.

2.2 What do you think has helped you to succeed in your studies and place of work?	Cross and Atinde 2015, Dumais 2002, Yosso 2005, Liccardo 2015, Walker 2018
2.3 What did you do to compensate for any barriers to your success or how did you overcome these, if at all? (Probe: what did you do specifically? What led you to this decision? What did you need and use to execute this strategy/s? etc).	McGee and Bentley 2017, Male et al. 2017, Museus et al. 2011, Bryant 2019, Bloodhart et al. 2020, Miller 2017, Mlambo 2017, Carlone 2007, etc.
Part 3) Community Cultural Wealth in STEM 3.1 What/who made you decide to choose STEM as a field of study? And Why? (Probe: how, when, why what, give an example, etc). (community, friends, family, teachers)	Bourdieu 1984, Yosso 2005, Coleman 1998, Putnam 2000, Crozier and Reay 2011, Farinde and Lewis 2012, Dumais 2002, Crozier et al. 2008, Bathmaker, Ingram and Waller 2013, O'Shea 2016, Clisby and Holdsworth 2016, etc.
3.2 How has this assisted you in furthering your endeavours in STEM (Probe: tell me more, how? Where? When? Provide an example of how it has impacted you, etc).	Bryant 2019, Sendze 2020, Howard 2016, Collins, Joseph and Ford 2019, Mlambo 2017, etc.
Part 4) Africanisation and STEM 4.1 From a traditional African perspective, what would you say are your community's views, perception and regards for you as a Black woman pursuing STEM? (Probe: how are you perceived? Do you get acknowledgement, or do you feel rejected? How do the male folks treat you and how do other women relate to you? What's the general attitude? Etc.)	Liccardo and Bradbury 2017, Liccardo 2018, Cameron 2017, Black Spreen and Vally 2020, Yosso, Msila 2016, Dumais 2002, Howard 2016, etc.
4.2 What do you believe has aided your learning thus far in terms your community's African traditional influence? (Probe: How do you feel about your own cultural knowledge system and what, if any, does this have on your studies in STEM? What traditional knowledge have you gained from your community elders can you say had been the most profound in terms of your successes in STEM? Please explain, are there any African teaching and knowledge that you apply to STEM? What do you understand by African indigenous knowledge? Etc)	Kamwendo 2016, Higgs, 2016, Msila 2016, Santos 2017, 2018, Quijano 2000, Maldonado-Torres 2016, Mamdani 2016, 2018, Mignolo 2011, Le Grange 2017, Gumbo 2016, Shava 2016, Hlatshwayo and Fomunyam 2019, Hlatshwayo and Shawa 2020, Chilisa 2020 etc.

Part 5) Thoughts and recommendations	Liccardo 2018, Liccardo and Bradbury 2016, Le Grange 2018, Hlatshwayo and Fomunyam 2019, etc.
5.1 What are your thoughts on the reformation of STEM for Black African women? (Probe: recommendations for practice, policy, etc).	
5.2 Is there anything else you would like to share with me, in relation to what was just discussed?	
Thank you for your time and for taking part in this study!!!	

Appendix E

Iteration 3 – Mbizi (African Focus Group Discussion) & Creative Workshop

90-120 min

Registration, Introduction and setting the scene: Introducing myself and my study to my participants as a South African woman of colour from a less privileged background and the fact that I am pursuing a PhD in the UK. At this stage, I inform my co-researchers more about what an Mbizi (African focus group), as well as a creative workshop entail, including that fact that my aim is to gain a better understanding of their stories as Black women in STEM, as well as informing them about my story, particularly in relation to the neo-liberal terrain and how situated ways of knowing feature into the lives of Black women. I also remind my participants that all stories are valid (both verbal and creative expressions) and that they should make use of this opportunity to tell their stories from their own perspectives and in their own voices. Participants will be encouraged to use their native African expressions to express themselves, as they would be talking to their friends/peers in an informal setting. As researcher, I will be doing follow-ups to clarify the meaning of such expressions and inquire further should I need further clarity.

My co-researchers will be storying their experiences as Black women in STEM informed by an Ubuntu Storytelling approach. A circle will be formed, and each co-researcher will have a turn to tell her story uninterrupted. Once everyone has had the chance to create their visuals, they will be requested to tell their stories uninterrupted and explain their visuals. After this, each member will get the chance to question each other based on the stories told and the visuals. I also take this time to probe for detail.

Furthermore, I outline the rules that should be adhered to for the Mbizi, how members are expected to conduct themselves. After introductions have taken place and rapport has been established, Participant Information Sheets (PIS) will be provided, ethics will be explained to all participants, including the fact that they unable to withdraw their data at this stage. Consent will be obtained and thereafter the Mbizi, as well as the creative workshops will proceed. The research questions will focus on the following two axes:

1. Co-researchers are asked to tell their story from an African female perspective engaged in STEM at university.

2. This should be constructed in relation to transitioning into a neo-liberal western education framework, and how they see themselves as women of colour in STEM, including their experiences (if any) of transitioning out of STEM and into further studies and the world of work. In addition, how they are situated between their respective communities and the university.

3. Co-researchers are asked to design a painting, drawing artefact, with the above in mind, in which they represent themselves as Black women in STEM, as well as discuss these in words and in writing.

4. Probing questions: tell me more about that, explain that more, that's interesting, but what happened next, why do you think that's the case?

Appendix F
Activities

5 Doctoral Courses – Stellenbosch University (South Africa)

- Scientific Communication: Article Writing and Giving Oral Presentations

- Writing and Publishing an Article During the Doctorate

- Research Publication and Presentation: Principles and Practical Steps

- Introduction to Atlas TI V9.1.5

- Conducting a Literature Review: A Mixed-Method Approach